Rhode Island Energy™

Rhode Island
Technical Reference Manual

For Estimating Savings from Energy Efficiency Measures

2024 Program Year

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APPENDICES

Introduction

This *Rhode Island Technical Reference Manual* ("TRM") documents for regulatory agencies, customers, and other stakeholders the methodologies and assumptions used by Rhode Island Energy to estimate the savings, including reductions in energy and demand consumption and other resource and non-energy impacts, attributable to its electric and gas energy efficiency programs. This reference manual provides methods, formulas, and default assumptions for estimating energy, peak demand and other resource and non-energy impacts from efficiency measures.

Within this TRM, efficiency measures are organized by the sector for which the measure is eligible and by the primary energy source associated with the measure. The three sectors are Residential, Income Eligible and Commercial & Industrial ("C&I"). The primary energy sources addressed in this TRM are electricity and natural gas.

Each measure is presented as a "measure characterization." The measure characterizations provide mathematical equations for determining savings (algorithms), as well as default assumptions and sources, where applicable. In addition, any descriptions of calculation methods or baselines are provided as appropriate. The parameters for calculating savings are listed in the same order for each measure.

Algorithms are provided for estimating annual energy and peak demand impacts for primary and secondary energy sources if appropriate. In addition, algorithms or calculated results may be provided for other non-energy impacts (such as water savings or operation and maintenance cost savings). Assumptions are based on Rhode Island data where available. Where Rhode Island-specific data is not available, assumptions may be based on: 1) manufacturer and industry data, 2) a combination of the best available data from jurisdictions in the same region, or 3) engineering judgment to develop credible and realistic factors.

The TRM is reviewed and updated annually to reflect changes in technology, baselines, and evaluation results.

The TRM in the Context of Energy Efficiency Programs

Overview

The purpose of this section is to show how the TRM fits into the process of administering energy efficiency programs in Rhode Island. This section explains how the TRM is connected to the following efforts:

- Planning,
- Annual reporting,
- Updates to Rhode Island Energy tracking systems,
- Evolution of program and measure cost effectiveness analysis tools,
- Evaluation, Measurement and Verification ("EM&V"),
- Quality control.

Planning and Reporting

Rhode Island Energy is submitting this version of the RI TRM (the 2024 TRM) to the stakeholders along with its Energy Efficiency Program Plan ("EE Program Plan") for 2024.

The RI TRM provides regulators and stakeholders with documentation of the assumptions and algorithms that Rhode Island Energy will use in planning and reporting its energy savings for 2024. It can also be used to support qualification in ISO-New England Forward Capacity Market Auctions. However, due to the nature of planning, not all planning assumptions – such as those for Commercial and Industrial programs – are documented in this TRM. For these areas, the algorithms used to calculate planned savings are presented.

Updates to Program Administrator Tracking Systems

Rhode Island Energy maintains a tracking system that contains the energy efficiency data that it uses to meet its annual reporting to the RI PUC. The current design of the tracking system influences the types of assumptions and algorithms that appear in this TRM. The current algorithms leverage inputs that Rhode Island Energy collects.

Evolution of Program and Measure Cost Effectiveness Analysis Tools

The program and measure cost effectiveness analysis tools are Microsoft® Excel® workbooks used by Rhode Island Energy to ensure that the measures and programs that they implement meet the cost effectiveness requirements defined by the filed three year plans, standards, and annual plans. Rhode Island Energy also uses the output from the cost effectiveness analysis tools to develop the input (data, tables, and graphs) for its EE Program Plans and Year-End Reports.

Evaluation, Measurement and Verification

Evaluation, Measurement and Verification ("EM&V") ensures that the programs are evaluated, measured, and verified in a way that provides confidence to the public at large that the savings are real and in a way that enables Rhode Island Energy to report those savings to the EERMC and RI PUC with full confidence.

A secondary goal of creating a TRM is to identify areas where savings calculations can be improved. The TRM will inform future EM&V planning as a means to make these improvements.

For its Rhode Island programs, Rhode Island Energy may use evaluation results from other jurisdictions. For some of these, Rhode Island contributed sites and/or budgets. For others, the application of results from other jurisdictions is considered based on how similar the programs, delivery, and markets are to those in Rhode Island.

Quality Control

Regulators and stakeholders can use the TRM to confirm that savings inputs and calculations are reasonable and reliable. However, the TRM cannot be used by regulators and stakeholders to replicate the Company's reported savings. The TRM does not provide regulators and stakeholders with data inputs at a level that is detailed enough to enable replication of the savings reported by Rhode Island Energy. These calculations occur within tracking systems, within separate Excel workbooks, and within cost effectiveness analysis tools. However, in the event that regulators and stakeholders request that Rhode Island Energy provide tracking system details, the reproduction of reported data will be possible using the TRM.

TRM Update Process

Overview

This section describes the process for updating the TRM. The update process is synchronized with the filing of EE Program Plans.

Updates to the TRM can include:

- additions of new measures,
- updates to existing TRM measures due to:
  - o changes in baseline equipment or practices, affecting measure savings
  - o changes in efficient equipment or practices, affecting measure savings
  - o changes to deemed savings due the revised assumptions for algorithm parameter values (e.g., due to new market research or evaluation studies)
  - o other similar types of changes,
- updates to impact factors (e.g., due to new impact evaluation studies),
- discontinuance of existing TRM measures, and
- updates to the glossary and other background material included in the TRM.

Each TRM is associated with a specific program year, which corresponds to the calendar year. The TRM for each program year is updated over time as needed to both plan for future program savings and to report actual savings.

Key Stakeholders and Responsibilities

Key stakeholders and their responsibilities for the TRM updates are detailed in the following table.

Stakeholder	Responsibilities
Rhode Island Energy	• Identify and perform needed updates to the TRM • Provide TRM to interested stakeholders
Rhode Island EERMC and Division of Public Utilities and Carriers	• Review; suggest modifications; and accept TRM • Assure coordination with Rhode Island Energy submissions of program plans and reported savings

Jointly	• Administrative coordination of TRM activities, including:
	  • Assure collaboration and consensus regarding TRM updates
	  • Assure updates are compiled and incorporated into the TRM
	  • Coordinate with related program activities (e.g., evaluation and program reporting processes)

TRM Update Cycle

The description below indicates the main milestones of the TRM update cycle over a period of two years. The identifier "program year" or "PY" is used to show that this cycle will be repeated every year. For example, for the 2024 Program Year, compilation of updates continues up through September 2024, for submission in the TRM in October 2024

September PY-2 to September PY-1: The PY TRM will be updated as needed based on evaluation studies and any other updates.

After the PY-1 TRM has been filed, there may be updates to the TRM. The most common updates to the TRM will result from new evaluation studies. Results of evaluation studies will be integrated into the next version of the TRM as the studies are completed. Other updates may include the results of group discussions to adopt latest research or the addition or removal of energy efficiency measures

October/November (PY-1) prior to program year: The PY TRM is filed with Rhode Island Energy's PY EE program plan

The PY TRM is submitted to the PUC jointly with Rhode Island Energy's EE program plan. With regard to the program plans, the TRM is considered a "planning document" in that it provides the documentation for how the Company *plan* to count savings for that program year. The TRM is not intended to fully document how the Company develop their plan estimates for savings.

January PY: Rhode Island Energy begins to track savings based on the PY TRM

Beginning in January PY, Rhode Island Energy will track savings for the PY based on the PY TRM.

Measure Characterization Structure

This section describes the common entries or inputs that make up each measure characterization. A formatted template follows the descriptions of each section of the measure characterization.

Source citations: The source of each assumption or default parameter value should be properly referenced in a footnote.

Applicability: All Measures shown within the 2024 TRM are active for the 2024 Program Year: from 1/1/2024 to 12/31/2024

Measure Description Overview

This section will include a plain text description of the efficient and baseline technology and the benefit(s) of its installation, as well as subfields of supporting information including:

Fuel: The fuel against which savings are being claimed, and the program from which EE incentives are being drawn

Sector: Indicates whether measure is Residential, Income Eligible or Commercial and Industrial

Project Type: Indicates if measure is Retrofit or New Construction / Time of Replacement

Category: Indicates the measure category, for example: Lighting, HVAC, Hot Water, Products, Food Service, Compressed Air, Motors/Drives, Refrigeration, Behavior, Custom, etc.

Type and Sub-type: Further measure classification for purposes of sorting measures

Program Name: The current program name under which the measure is being delivered.

Measure Name: A single device or behavior may be analyzed as a range of measures depending on a variety of factors which largely translate to where it is and who is using it. Such factors include hours of use, location, and baseline (equipment replaced or behavior modified). For example, the same screw-in LED lamp will produce different savings if installed in an emergency room waiting area than if installed in a bedside lamp.

Measure Description: Description of the energy efficiency measure, its benefits, and applications.

Baseline Description: Description of the assumed equipment/operation efficiency in the absence of program intervention. Multiple baselines will be provided as needed, e.g., for different markets. Baselines may refer to reference tables or may be presented as a table for more complex measures)

Savings Principle: The means by which the measure saves energy relative to the baseline. Description of the assumed or calculated equipment/operation efficiency from which the energy

and demand savings are determined. The high efficiency case may be based on specific details of the measure installation, minimum requirements for inclusion in the program, or an energy efficiency case based on historical participation. It may refer to tables within the measure characterization or in the appendices or efficiency standards set by organizations such as ENERGY STAR or the Consortium for Energy Efficiency

Savings Calculation method: How the savings values are determined; in most cases, values are either deemed or calculated

Savings unit: required minimum unit / characteristic for claiming listed savings values

Savings

This section includes various information on the measure savings and how they are determined.

- **Summary Average Gross Savings per Unit by Program:** This table summarizes the resource savings (kWh, kW, MMBtu) of all efficiency offerings within a measure category via a weighted average of their savings. This is only for illustrating savings and does not correspond to how savings are tracked
    - **Program:** This describes the programs in which the measures are offered. Some measures are offered in multiple programs **Sector and Program name mapping will be as follows**:

Sector	Fuel	Full Program Name
Residential	Electric	Residential New Construction
		Residential HVAC
		EnergyWise Single Family
		EnergyWise Multifamily
		Home Energy Reports
		Residential Consumer Products
	Gas	Residential New Construction
		Residential HVAC
		EnergyWise Single Family
		EnergyWise Multifamily
		Home Energy Reports
Income Eligible	Electric	Income Eligible Single Family
		Income Eligible Multifamily
	Gas	Income Eligible Single Family
		Income Eligible Multifamily
Commercial & Industrial	Electric	Large Commercial New Construction
		Large C&I Retrofit
		Small Business Direct Install
	Gas	Large Commercial New Construction
		Large C&I Retrofit
		Small Business Direct Install
		C&I Multifamily

- **Algorithm Type:** This section describes which of four methods of savings calculation applies to a measure
    - Deemed: The same savings are allocated to every unit of a measure
    - Engineering Algorithm with Deemed Inputs: Measure savings are calculated with an engineering formula, the inputs of which are constant for all units of a measure.
    - Engineering Algorithm with Site Specific Inputs: Measure savings are calculated with an engineering formula, the inputs of which depend on data from the installation site.
    - Custom: Each unit of a measure receives a unique savings calculation that depends on site specific data.
- **Units:** This section describes what is installed or affected by an efficiency measure (e.g. a boiler or a participant). It defines the quantity counted for savings.
- **Algorithm:** This section will describe the method for calculating the primary energy savings in appropriate units, i.e., kWh for electric energy savings or MMBtu for natural gas energy savings. The savings algorithm will be provided in a form similar to the following

  $\Delta kWh = \Delta kW \times Hours$

  Similarly, the method for calculating electric demand savings will be provided in a form similar to the following:

  $\Delta kW = (Watts_{BASE} - Watts_{EE})/1000$

  Below the savings algorithms, a table contains the definitions (and, in some cases, default values) of each input in the equation(s). The inputs for a particular measure may vary and will be reflected as such in this table (see example below).

- **Hours**: The operating hours for equipment that is either on or off, or equivalent full load hours for technologies that operate at partial loads, or reduced hours for controls. Reference tables will be used as needed to avoid repetitive entries.

ΔkWh	=	gross annual kWh savings from the measure
ΔkW	=	gross connected kW savings from the measure
Hours	=	average hours of use per year
WattsBASE	=	baseline connected kW
WattsEE	=	energy efficient connected kW

- **Measure Gross Savings per Unit:** This table summarizes the unit resource impacts of each efficiency offering within a measure category (e.g., the savings for boilers of different efficiencies and ratings in the Boiler measure category). The source for each value is referenced.
- **Non-Energy Impacts:** The non-energy impacts are shown for each efficiency measure under Annual and One-Time headings, depending on their recommended application

approach. The NEIs are shown with more detail in Appendix B.

- **Measure Life:** Measure Life includes equipment life and the effects of measure persistence. Equipment life is the number of years that a measure is installed and will operate until failure. Measure persistence takes into account business turnover, early retirement of installed equipment, and other reasons measures might be removed or discontinued**.**

Other impact factors are defined in the next section.

Impact Factors for Calculating Adjusted Gross and Net Savings

Rhode Island Energy uses the algorithms in the Measure Characterization sections to calculate the gross savings for energy efficiency measures. Impact factors are then applied to make various adjustments to the gross savings estimate to account for the performance of individual measures or energy efficiency programs as a whole in achieving energy reductions as assessed through evaluation studies. Impacts factors address both the technical performance of energy efficiency measures and programs, accounting for the measured energy and demand reductions realized compared to the gross estimated reductions, as well as the programs' effect on the market for energy efficient products and services.

This section describes the types of impact factors used to make such adjustments, and how those impacts are applied to gross savings estimates. Definitions of the impact factors and other terms are also provided in the Glossary (Appendix E).

Types of Impact Factors

The impact factors used to adjust savings fall into one of two categories:

Impact factors used to adjust gross savings:

- In-Service Rate ("ISR")
- Savings Persistence Factor ("SPF")
- Realization Rate ("RR")
- Summer and Winter Peak Demand Coincidence Factors ("CF").

Impact factors used to calculate net savings:

- Free-Ridership ("FR") and Spillover ("SO") Rates
- Net-to-Gross Ratios ("NTG").

The **in-service rate** is the actual portion of efficient units that are installed. For example, efficient lamps may have an in-service rate less than 1.00 since some lamps are purchased as replacement units and are not immediately installed. The ISR is 1.00 for most measures.

The **savings persistence factor** is the portion of first-year energy or demand savings expected to persist over the life of the energy efficiency measure. The SPF is developed by conducting surveys of installed equipment several years after installation to determine the actual operational capability of the equipment. The SPF is 1.00 for most measures.

In contrast to savings persistence, *measure persistence* takes into account business turnover, early retirement of installed equipment, and other reasons the installed equipment might be removed or discontinued. Measure persistence is generally incorporated as part of the measure life, and therefore is not included as a separate impact factor.

The **realization rate** is used to adjust the gross savings (as calculated by the savings algorithms) based on impact evaluation studies. The realization rate is equal to the ratio of measure savings developed from an impact evaluation to the estimated measure savings derived from the savings algorithms. The realization rate does not include the effects of any other impact factors. Depending on the impact evaluation study, there may be separate realization rates for energy (kWh), peak demand (kW), or fossil fuel energy (MMBtu).

A **coincidence factor** adjusts the connected load kW savings derived from the savings algorithm. A coincidence factor represents the fraction of the connected load reduction expected to occur at the same time as a particular system peak period. The coincidence factor includes both coincidence and diversity factors combined into one number, thus there is no need for a separate diversity factor in this TRM.

Coincidence factors are provided for the on-peak period as defined by the ISO New England for the Forward Capacity Market ("FCM") and are calculated consistently with the FCM methodology. Electric demand reduction during the ISO New England peak periods is defined as follows:

- Summer On-Peak: average demand reduction from 1:00-5:00 PM on non-holiday weekdays in June July, and August
- Winter On-Peak: average demand reduction from 5:00-7:00 PM on non-holiday weekdays in December and January

The values described as Coincidence Factors in the TRM are not always consistent with the strict definition of a Coincidence Factor (CF). It would be more accurate to define the Coincidence Factor as "the value that is multiplied by the Gross kW value to calculate the average kW reduction coincident with the on-peak periods." A coincidence factor of 1.00 may be used because the coincidence is already included in the estimate of Gross kW; this is often the case when the "Max kW Reduction" is not calculated and instead the "Gross kW" is estimated using the annual kWh reduction estimate and a load shape model.

A **free-rider** is a customer who participates in an energy efficiency program (and gets an incentive) but who would have installed some or all of the same measure(s) on their own, with no change in timing of the installation, if the program had not been available. The **free-ridership rate** is the percentage of savings attributable to participants who would have installed the measures in the absence of program intervention.

The **spillover rate** is the percentage of savings attributable to a measure or program, but additional to the gross (tracked) savings of a program. Spillover includes the effects of 1) participants in the program who install additional energy efficient measures outside of the program as a result of participating in the program, and 2) non-participants who install or influence the installation of energy efficient measures as a result of being aware of the program. These two components are the **participant spillover** (SOP) and **non-participant spillover** (SONP).

The **net savings** value is the final value of savings that is attributable to a measure or program. Net savings differs from gross savings because it includes the effects of the free-ridership and/or spillover rates.

The **net-to-gross** ratio is the ratio of net savings to the gross savings adjusted by any impact factors (i.e., the "adjusted" gross savings). Depending on the evaluation study, the NTG ratio may be determined from the free-ridership and spillover rates, if available, or it may be a distinct value with no separate specification of FR and SO values.

Standard Net–to–Gross Formulas

The TRM measure entries provide algorithms or methodologies for calculating the gross energy and demand savings for each category of efficiency measures. The following standard formulas show how the impact factors are applied to calculate the net savings. These are the calculations used by Rhode Island Energy to track and report gross and net savings for its energy efficiency programs in Rhode Island.

- **Calculation of Net Annual Electric Energy Savings**

  $net\_kWh = gross\_kWh \times SPF \times ISR \times RRE \times NTG$

- **Calculation of Net Summer Electric Peak Demand Coincident kW Savings**

  $net\_kW_{SP} = gross\_kW \times SPF \times ISR \times RR_{SP} \times CF_{SP} \times NTG$

- **Calculation of Net Winter Electric Peak Demand Coincident kW Savings**

  $net\_kW_{WP} = gross\_kW \times SPF \times ISR \times RR_{WP} \times CF_{WP} \times NTG$

- **Calculation of Net Annual Natural Gas Energy Savings**

  $net\_MMBtu = gross\_MMBtu \times SPF \times ISR \times RR_{G} \times NTG$

Where:
Gross_kWh = Gross Annual kWh Savings
net_kWh = Net Annual kWh Savings
$Gross\_kW_{SP}$ = Gross Connected kW Savings (summer peak)
$Gross\_kW_{WP}$ = Gross Connected kW Savings (winter peak)
net_kW_{SP} = Adjusted Gross Connected kW Savings (winter peak)
net_kW_{WP} = Net Coincident kW Savings (winter peak)
Gross_MMBtu = Gross Annual MMBtu Savings
net_MMBtu = Net Annual MMBtu Savings
SPF = Savings Persistence Factor
ISR = In-Service Rate
CF_{SP} = Peak Coincidence Factor (summer peak)
CF_{WP} = Peak Coincidence Factor (winter peak)
RR_{E} = Realization Rate for electric energy (kWh)
RR_{G} = Realization Rate for gas (MMBtu)

RR_{SP} = Realization Rate for summer peak kW
RR_{WP} = Realization Rate for winter peak kW
NTG = Net-to-Gross Ratio
FR = Free-Ridership Factor
SOP = Participant Spillover Factor
SONP = Non-Participant Spillover Factor

Depending on the evaluation study methodology:

- NTG is equal to (1 – FR + SO_P + SO_{NP}), or
- NTG is a single value with no distinction of FR, SO_P, SO_{NP}, and/or other factors that cannot be reliably isolated.

Measure Characterizations

Table of Contents for Measure Characterizations

Residential

Residential New Construction, Electric

Residential HVAC, Electric

Energy Wise Single Family, Electric

Energy Wise Multifamily, Electric

Residential HVAC, Gas

Energy Wise Single Family, Gas

Energy Wise Multifamily, Gas

Home Energy Reports, Gas

Income Eligible

Income Eligible Single Family, Electric

Income Eligible Multifamily, Electric

Income Eligible Single Family, Gas

Income Eligible Multifamily, Gas

Commercial and Industrial

Large Commercial New Construction, Electric

Large C&I Retrofit, Electric

Small Business Direct Install, Electric

Large Commercial New Construction, Gas

Large C&I Retrofit, Gas

C&I Multifamily, Gas

Clothes Washer

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Whole Home **Measure Type:** Clothes Washer **Measure Sub Type:** Clothes Washer

Program: Residential New Construction

Measure Description

The installation of an Energy Star clotheswasher in a Residential New Construction home.

Baseline Description

A standard non-Energy Star clotheswasher.

BCR Measures

BCR Measure Name	Unique Identifier
Clothes Washer	2024 Electric Residential New Construction Clothes Washer

Savings Principle

An Energy Star clotheswasher uses less electricity and water to clean clothes.

Savings Method

Deemed

Unit

Installed clothes washer.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Clothes Washer	46.3	0.0200	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Clothes Washer	11	1.00	1.00		1.00	1.00	1.00	0.89	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Clothes Washer	26.00%	40.00%	14.00%	20.00%

Measure Life Source: California Public Utilities Commission (2014). Energy Division, DEER EUL Table Update.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Clothes Washer	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Clothes Washer	0.30	0.00	0.00	0.70

TRC: $0 / Assumed to equal incentive amount. per housing Unit

Incentive: $0 / Assumed to equal incentive amount. per housing Unit

Codes and Standards

Sector: Residential

Fuel: Electric

Program Type: Custom

Measure Category: Whole Home

Measure Type: Codes and Standards

Measure Sub Type: Codes and Standards

Program: Residential New Construction

Measure Description

Energy efficiency code trainings and advocacy work to improve energy efficiency of buildings and equipment within Rhode Island.

Baseline Description

Un-influenced adoption curve of federal minimum codes and standards.

BCR Measures

BCR Measure Name	Unique Identifier
Codes and Standards	2024 Electric Residential New Construction Codes and Standards

Savings Principle

Accelerated adoption of advancing energy codes and equipment standards.

Savings Method

Calculated based on attribution study

Unit

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Codes and Standards	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Codes and Standards	20	1.00	1.00		1.00	1.00	1.00	0.24	0.89

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Codes and Standards	34.00%	51.00%	8.00%	7.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Codes and Standards	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Codes and Standards	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $0 / measure

Incentive: $0 / measure

Cooling

Sector: Residential | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Whole Home | **Measure Type:** Custom | **Measure Sub Type:** Cooling

Program: Residential New Construction

Measure Description

To capture lost opportunities, encourage the construction of energy-efficient homes, and drive the market to one in which new homes are moving towards net-zero energy.

Baseline Description

The User Defined Reference Home was revised in 2023 as a result of a baseline study.

BCR Measures

BCR Measure Name	Unique Identifier
Cooling - Tier 1	2024 Electric Residential New Construction Cooling - Tier 1
Cooling - Tier 2	2024 Electric Residential New Construction Cooling - Tier 2
Cooling - Tier 3	2024 Electric Residential New Construction Cooling - Tier 3

Savings Principle

The high efficiency case is represented by the specific energy characteristics of each “as-built” home completed through the program.

Savings Method

Calculated using site-specific inputs

Unit

Completed ESH heating, cooling, or DHW project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Cooling - Tier 1 Cooling - Tier 2 Cooling - Tier 3	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Electric kWh Note: Supplied by vendor

Electric kW Note: Supplied by vendor

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Cooling	25	1.00	1.00		1.00	1.00	1.00	0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Cooling	6.59%	3.85%	47.32%	42.24%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Cooling	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Cooling	0.25	0.00	0.00	0.75

NTG Source: NMR Group, Inc (2021). Low Rise Residential New Construction NTG Study (MA20X05-B-RNCNTG). https://ma-eeac.org/wp-content/uploads/MA20X05-B-RNCNTG_Low-rise-RNC-NTG_FinalDraft-07272021.pdf

NTG Note: Net-to-gross negotiated with C-Team based on MA results

TRC: $0 / home

Incentive: $0 / home

CP

Sector: Residential **Fuel:** Electric **Program Type:** Custom

Measure Category: Whole Home **Measure Type:** Custom **Measure Sub Type:** CP

Program: Residential New Construction

Measure Description

To capture lost opportunities, encourage the construction of energy-efficient homes, and drive the market to one in which new homes are moving towards net-zero energy.

Baseline Description

The User Defined Reference Home was revised in 2023 as a result of a baseline study.

BCR Measures

BCR Measure Name	Unique Identifier
CP - Cooling	2024 Electric Residential New Construction CP - Cooling
CP - DHW	2024 Electric Residential New Construction CP - DHW
CP - Heating	2024 Electric Residential New Construction CP - Heating

Savings Principle

The high efficiency case is represented by the specific energy characteristics of each "as-built" home completed through the program.

Savings Method

Calculated using site-specific inputs

Unit

Completed ESH heating, cooling, or DHW project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CP - Cooling							
CP - DHW	Calc	Calc	0.00	0.00	0.00	Calc	Calc
CP - Heating							

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
CP	Multi	1.00	1.00		1.00	1.00	1.00	0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
CP - Cooling	6.600%	3.800%	47.30%	42.20%
CP - DHW	26.00%	40.00%	14.00%	20.00%
CP - Heating	43.10%	56.90%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
CP	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
CP	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $0 / home

Incentive: $0 / home

DHW

Sector: Residential **Fuel:** Electric **Program Type:** Custom

Measure Category: Whole Home **Measure Type:** Custom **Measure Sub Type:** DHW

Program: Residential New Construction

Measure Description

To capture lost opportunities, encourage the construction of energy-efficient homes, and drive the market to one in which new homes are moving towards net-zero energy.

Baseline Description

The User Defined Reference Home was revised in 2023 as a result of a baseline study.

BCR Measures

BCR Measure Name	Unique Identifier
DHW - Tier 1	2024 Electric Residential New Construction DHW - Tier 1
DHW - Tier 2	2024 Electric Residential New Construction DHW - Tier 2
DHW - Tier 3	2024 Electric Residential New Construction DHW - Tier 3

Savings Principle

The high efficiency case is represented by the specific energy characteristics of each "as-built" home completed through the program.

Savings Method

Calculated using site-specific inputs

Unit

Completed ESH heating, cooling, or DHW project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
DHW - Tier 1							
DHW - Tier 2	Calc	Calc	0.00	0.00	0.00	Calc	Calc
DHW - Tier 3							

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Electric kWh Note: Supplied by vendor

Electric kW Note: Supplied by vendor

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
DHW	15	1.00	1.00		1.00	1.00	1.00	1.00	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
DHW	35.84%	30.76%	17.26%	16.14%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
DHW	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
DHW	0.25	0.00	0.00	0.75

NTG Source: NMR Group, Inc (2021). Low Rise Residential New Construction NTG Study (MA20X05-B-RNCNTG). https://ma-eeac.org/wp-content/uploads/MA20X05-B-RNCNTG_Low-rise-RNC-NTG_FinalDraft-07272021.pdf

NTG Note: Net-to-gross negotiated with C-Team based on MA results

TRC: $0 / home

Incentive: $0 / home

Dishwasher

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Whole Home **Measure Type:** Dishwasher **Measure Sub Type:** Dishwasher

Program: Residential New Construction

Measure Description

The installation of an Energy Star Dishwasher in a Residential New Construction home.

Baseline Description

A standard non-Energy Star Dishwasher.

BCR Measures

BCR Measure Name	Unique Identifier
Dishwasher	2024 Electric Residential New Construction Dishwasher

Savings Principle

An Energy Star dishwasher uses less electricity and water to clean dishes.

Savings Method

Deemed

Unit

Installed dish washer.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Dishwasher	39.0	0.0048	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Dishwasher	11	1.00	1.00		1.00	1.00	1.00	0.89	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Dishwasher	26.00%	40.00%	14.00%	20.00%

Measure Life Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Dishwasher	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Dishwasher	0.91	0.00	0.00	0.09

TRC: $0 / Assumed to equal incentive amount. per housing Unit

Incentive: $0 / Assumed to equal incentive amount. per housing Unit

Heating

Sector: Residential | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Whole Home | **Measure Type:** Custom | **Measure Sub Type:** Heating

Program: Residential New Construction

Measure Description

To capture lost opportunities, encourage the construction of energy-efficient homes, and drive the market to one in which new homes are moving towards net-zero energy.

Baseline Description

The User Defined Reference Home was revised in 2023 as a result of a baseline study.

BCR Measures

BCR Measure Name	Unique Identifier
Heating - Tier 1	2024 Electric Residential New Construction Heating - Tier 1
Heating - Tier 2	2024 Electric Residential New Construction Heating - Tier 2
Heating - Tier 3	2024 Electric Residential New Construction Heating - Tier 3

Savings Principle

The high efficiency case is represented by the specific energy characteristics of each “as-built” home completed through the program.

Savings Method

Calculated using site-specific inputs

Unit

Completed ESH heating, cooling, or DHW project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heating - Tier 1 Heating - Tier 2 Heating - Tier 3	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Electric kWh Note: Supplied by vendor

Electric kW Note: Supplied by vendor

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heating	25	1.00	1.00		1.00	1.00	1.00		0.43

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heating	43.13%	56.87%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heating	0	0	0.00	0.00	0.00	148.16	0.00	0.00

Annual $ Source: NMR Group, Inc (2021). RNC NEI Quick Hit Assessment (MA20X14-B-RINCNEI). https://ma-eeac.org/wp-content/uploads/MA20X14_RNC-NEI_Final-Report_-2021.10.06.pdf

One-time $ Source: NMR Group, Inc (2021). RNC NEI Quick Hit Assessment (MA20X14-B-RINCNEI). https://ma-eeac.org/wp-content/uploads/MA20X14_RNC-NEI_Final-Report_-2021.10.06.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heating	0.25	0.00	0.00	0.75

NTG Source: NMR Group, Inc (2021). Low Rise Residential New Construction NTG Study (MA20X05-B-RNCNTG). https://ma-eeac.org/wp-content/uploads/MA20X05-B-RNCNTG_Low-rise-RNC-NTG_FinalDraft-07272021.pdf

NTG Note: Net-to-gross negotiated with C-Team based on MA results

TRC: Tier 1 - $1590/home, Tier 2 - $5346/home, Tier 3 - $8457/home

Incentive: Tier 1 - $974/home, Tier 2 - $1678/home, Tier 3 - $4090/home

HERS

Sector: Residential **Fuel:** Electric **Program Type:** Custom

Measure Category: HVAC **Measure Type:** Home Energy Reports **Measure Sub Type:** Behavior

Program: Residential New Construction

Measure Description

The cooling, DHW, and heating savings resulting from the Home Energy Reports program.

Baseline Description

The baseline case is the performance of the house before participation in the program.

BCR Measures

BCR Measure Name	Unique Identifier
HERS - Cooling	2024 Electric Residential New Construction HERS - Cooling
HERS - DHW	2024 Electric Residential New Construction HERS - DHW
HERS - Heating	2024 Electric Residential New Construction HERS - Heating

Savings Principle

The efficient case is the post-retrofit performance of a house participating the program

Savings Method

Calculated using site specific inputs

Unit

Completed HERS heating, cooling, or DHW project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
HERS - Cooling HERS - DHW HERS - Heating	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
HERS	25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
HERS	26.00%	40.00%	14.00%	20.00%

Measure Life Note: Common measure life for insulation measures.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

CFwp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
HERS	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
HERS	0.25	0.00	0.00	0.75

TRC: $0 / home

Incentive: $0 / home

MFHR, Elec

Sector: Residential | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Whole Home | **Measure Type:** Custom | **Measure Sub Type:** Adaptive Reuse

Program: Residential New Construction

Measure Description

To capture lost opportunities, encourage the construction of energy-efficient homes, and drive the market to one in which new homes are moving towards net-zero energy.

Baseline Description

The User Defined Reference Home was revised in 2023 as a result of a baseline study.

BCR Measures

BCR Measure Name	Unique Identifier
MFHR - Cooling	2024 Electric Residential New Construction MFHR - Cooling
MFHR - DHW	2024 Electric Residential New Construction MFHR - DHW
MFHR - Heating	2024 Electric Residential New Construction MFHR - Heating
MFHR - Lighting	2024 Electric Residential New Construction MFHR - Lighting

Savings Principle

The high efficiency case is represented by the specific energy characteristics of each “as-built” home completed through the program.

Savings Method

Calculated using site-specific inputs

Unit

Completed ESH heating, cooling, DHW, or lighting project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
MFHR - Cooling MFHR - DHW MFHR - Heating MFHR - Lighting	Calc	Calc	Calc	Calc	Calc	Calc	Calc

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
MFHR - Cooling	Multi	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
MFHR - DHW								0.58	1.00
MFHR - Heating								0.01	1.00
MFHR - Lighting								0.17	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
MFHR - Cooling	0.90%	4.30%	52.70%	42.10%
MFHR - DHW	36.06%	35.11%	15.43%	13.40%
MFHR - Heating	40.80%	55.10%	1.40%	2.70%
MFHR - Lighting	36.30%	35.60%	12.90%	15.20%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
MFHR, Elec	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
MFHR, Elec	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $1256 / home

Incentive: $770 / home

Refrigerators

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Appliances **Measure Type:** Refrigerators **Measure Sub Type:** Refrigerator

Program: Residential New Construction

Measure Description

This measure covers the replacement of an existing inefficient refrigerator with a new efficient refrigerator.

Baseline Description

Existing refrigerator continues to operate.

BCR Measures

BCR Measure Name	Unique Identifier
Refrigerators	2024 Electric Residential New Construction Refrigerators

Savings Principle

The high efficiency case is an Energy Star® refrigerator or a model that is ENERGY STAR® rated and included in the Most Efficient® or Top Ten USA® ranking.

Savings Method

Calculated using deemed inputs

Unit

Installed refrigerator

Savings Equation

Gross kWh = Qty × (kWh_base - kWh_ee)

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

kWh_base = Deemed average demand per baseline unit.

kWh_ee = Deemed average demand per high-efficiency unit.

DeltakW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Refrigerators	101.4	0.0130	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Refrigerators	12	1.00	1.00		1.00	1.00	1.00	0.89	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Refrigerators	26.00%	40.00%	14.00%	20.00%

Measure Life Source: Environmental Protection Agency (2018). Savings Calculator for Energy Star Qualified Appliances.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Refrigerators	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Refrigerators	0.54	0.00	0.00	0.46

NTG Note: Per C-team savings from evalutaion are net. Gross Savings and NTGR provided by C-team

TRC: $0 / ESH Bundled costs

Incentive: $0 / ESH Bundled costs

Renovation Rehab Cooling, Elec

Sector: Residential **Fuel:** Electric **Program Type:** Custom

Measure Category: Whole Home **Measure Type:** Custom **Measure Sub Type:** Cooling

Program: Residential New Construction

Measure Description

The cooling savings resulting from Renovation Rehab projects that include the installation of roof, wall, and basement insulation.

Baseline Description

The baseline case is the current version of the RI energy code and/or UDRH performance.

BCR Measures

BCR Measure Name	Unique Identifier
Renovation Rehab - Cooling Tier 1, Elec	2024 Electric Residential New Construction Renovation Rehab - Cooling Tier 1, Elec
Renovation Rehab - Cooling Tier 2, Elec	2024 Electric Residential New Construction Renovation Rehab - Cooling Tier 2, Elec
Renovation Rehab - Cooling Tier 3, Elec	2024 Electric Residential New Construction Renovation Rehab - Cooling Tier 3, Elec

Savings Principle

The efficient case is the post-retrofit performance of a house participating the program

Savings Method

Calculated using site-specific inputs

Unit

Complete Renovation Rehab project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Renovation Rehab - Cooling Tier 1, Elec	Calc	Calc	0.00	0.00	0.00	Calc	Calc
Renovation Rehab - Cooling Tier 2, Elec							
Renovation Rehab - Cooling Tier 3, Elec							

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Electric kWh Note: Supplied by vendor

Electric kW Note: Supplied by vendor

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Renovation Rehab Cooling, Elec	25	1.00	1.00		1.00	1.00	1.00	0.24	0.89

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Renovation Rehab Cooling, Elec	0.90%	4.12%	53.81%	41.17%

Measure Life Note: Common measure life for insulation measures.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

CFwp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Renovation Rehab Cooling, Elec	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Renovation Rehab Cooling, Elec	0.22	0.02	0.12	0.92

NTG Source: NMR Group, Inc (2021). Residential Self-report Net-to-Gross Methodology Update and Sensitivity Analysis (MA21X22-B-RSRNTGUP). https://ma-eeac.org/wp-content/uploads/MA21X22-B-RSRNTGUP_Res-SR-NTG-Method-Update_Final-Report_2022.05.24.pdf

NTG Note: Net-to-gross negotiated with C-Team based on MA results

TRC: $0 / home

Incentive: $0 / home

Renovation Rehab CP, Elec

Sector: Residential **Fuel:** Electric **Program Type:** Custom

Measure Category: Whole Home **Measure Type:** Custom **Measure Sub Type:** CP

Program: Residential New Construction

Measure Description

The heating, cooling, and DHW savings resulting from Renovation Rehab CP projects. The heating savings resulting from Renovation Rehab projects that include the installation of roof, wall, and basement insulation. The DHW savings resulting from RenovationRehab projects that include more efficient water heating systems. The cooling savings resulting from Renovation Rehab projects that include the installation of roof, wall, and basement insulation.

Baseline Description

The baseline case is the current version of the RI energy code and/or UDRH performance.

BCR Measures

BCR Measure Name	Unique Identifier
Renovation Rehab CP - Cooling, Elec	2024 Electric Residential New Construction Renovation Rehab CP - Cooling, Elec
Renovation Rehab CP - DHW, Elec	2024 Electric Residential New Construction Renovation Rehab CP - DHW, Elec
Renovation Rehab CP - Heating, Elec	2024 Electric Residential New Construction Renovation Rehab CP - Heating, Elec

Savings Principle

The efficient case is the post-retrofit performance of a house participating the program

Savings Method

Calculated using site-specific inputs

Unit

Complete CP Renovation Rehab project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Renovation Rehab CP - Cooling, Elec	Calc	Calc	Calc	0.00	0.00	Calc	Calc
Renovation Rehab CP - DHW, Elec							
Renovation Rehab CP - Heating, Elec							

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Renovation Rehab CP, Elec	Multi	1.00	1.00	1.00	1.00	1.00	1.00	0.24	0.89

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Renovation Rehab CP, Elec	36.00%	31.00%	17.00%	16.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Renovation Rehab CP, Elec	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Renovation Rehab CP, Elec	0.22	0.02	0.12	0.92

NTG Source: NMR Group, Inc (2021). Residential Self-report Net-to-Gross Methodology Update and Sensitivity Analysis (MA21X22-B-RSRNTGUP). https://ma-eeac.org/wp-content/uploads/MA21X22-B-RSRNTGUP_Res-SR-NTG-Method-Update_Final-Report_2022.05.24.pdf

NTG Note: Net-to-gross negotiated with C-Team based on MA results

TRC: $0 / home

Incentive: $0 / home

Renovation Rehab Domestic Hot Water, Elec

Sector: Residential **Fuel:** Electric **Program Type:** Custom

Measure Category: Whole Home **Measure Type:** Custom **Measure Sub Type:** DHW

Program: Residential New Construction

Measure Description

The DHW savings resulting from Renovation Rehab projects that include more efficient water heating systems.

Baseline Description

The baseline case is the current version of the RI energy code and/or UDRH performance.

BCR Measures

BCR Measure Name	Unique Identifier
Renovation Rehab - DHW Tier 1, Elec	2024 Electric Residential New Construction Renovation Rehab - DHW Tier 1, Elec
Renovation Rehab - DHW Tier 2, Elec	2024 Electric Residential New Construction Renovation Rehab - DHW Tier 2, Elec
Renovation Rehab - DHW Tier 3, Elec	2024 Electric Residential New Construction Renovation Rehab - DHW Tier 3, Elec

Savings Principle

The efficient case is the post-retrofit performance of a house participating the program

Savings Method

Calculated using site-specific inputs

Unit

Complete Renovation Rehab project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Renovation Rehab - DHW Tier 1, Elec	Calc	Calc	0.00	0.00	0.00	Calc	Calc
Renovation Rehab - DHW Tier 2, Elec							
Renovation Rehab - DHW Tier 3, Elec							

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Electric kWh Note: Supplied by vendor

Electric kW Note: Supplied by vendor

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Renovation Rehab Domestic Hot Water, Elec	15	1.00	1.00		1.00	1.00	1.00	0.24	0.89

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Renovation Rehab Domestic Hot Water, Elec	0.90%	4.12%	53.81%	41.17%

Measure Life Note: Common measure life for insulation measures.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

CFwp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Renovation Rehab Domestic Hot Water, Elec	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Renovation Rehab Domestic Hot Water, Elec	0.22	0.02	0.12	0.92

NTG Source: NMR Group, Inc (2021). Residential Self-report Net-to-Gross Methodology Update and Sensitivity Analysis (MA21X22-B-RSRNTGUP). https://ma-eeac.org/wp-content/uploads/MA21X22-B-RSRNTGUP_Res-SR-NTG-Method-Update_Final-Report_2022.05.24.pdf

NTG Note: Net-to-gross negotiated with C-Team based on MA results

TRC: $0 / home

Incentive: $0 / home

Renovation Rehab Heating, Elec

Sector: Residential **Fuel:** Electric **Program Type:** Custom

Measure Category: Whole Home **Measure Type:** Custom **Measure Sub Type:** Heating

Program: Residential New Construction

Measure Description

The heating savings resulting from Renovation Rehab projects that include the installation of roof, wall, and basement insulation

Baseline Description

The baseline case is the current version of the RI energy code and/or UDRH performance.

BCR Measures

BCR Measure Name	Unique Identifier
Renovation Rehab - Heating Tier 1, Elec	2024 Electric Residential New Construction Renovation Rehab - Heating Tier 1, Elec
Renovation Rehab - Heating Tier 2, Elec	2024 Electric Residential New Construction Renovation Rehab - Heating Tier 2, Elec
Renovation Rehab - Heating Tier 3, Elec	2024 Electric Residential New Construction Renovation Rehab - Heating Tier 3, Elec

Savings Principle

The efficient case is the post-retrofit performance of a house participating the program

Savings Method

Calculated using site-specific inputs

Unit

Complete Renovation Rehab project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Renovation Rehab - Heating Tier 1, Elec	Calc	Calc	0.00	0.00	0.00	Calc	Calc
Renovation Rehab - Heating Tier 2, Elec							
Renovation Rehab - Heating Tier 3, Elec							

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Electric kWh Note: Supplied by vendor

Electric kW Note: Supplied by vendor

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Renovation Rehab Heating, Elec	25	1.00	1.00		1.00	1.00	1.00	0.24	0.89

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Renovation Rehab Heating, Elec	0.90%	4.12%	53.81%	41.17%

Measure Life Note: Common measure life for insulation measures.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

CFwp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Renovation Rehab Heating, Elec	0	0	0.00	0.00	0.00	148.16	0.00	0.00

One-time $ Source: NMR Group, Inc (2021). RNC NEI Quick Hit Assessment (MA20X14-B-RINCNEI). https://ma-eeac.org/wp-content/uploads/MA20X14_RNC-NEI_Final-Report_-2021.10.06.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Renovation Rehab Heating, Elec	0.22	0.02	0.12	0.92

NTG Source: NMR Group, Inc (2021). Residential Self-report Net-to-Gross Methodology Update and Sensitivity Analysis (MA21X22-B-RSRNTGUP). https://ma-eeac.org/wp-content/uploads/MA21X22-B-RSRNTGUP_Res-SR-NTG-Method-Update_Final-Report_2022.05.24.pdf

NTG Note: Net-to-gross negotiated with C-Team based on MA results

TRC: Tier 1 - $2061/home, Tier 2 - $3044/home, Tier 3 - $15518/home

Incentive: Tier 1 - $990/home, Tier 2 - $1672/home, Tier 3 - $2907/home

Room AC

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Cooling | **Measure Sub Type:** Room AC

Program: Residential New Construction

Measure Description

The installation of ENERGY STAR® qualified room air conditioners. ENERGY STAR® qualified air conditioners are typically 10% more efficient than models meeting federal standards.

Baseline Description

The baseline efficiency case is a window AC unit that meets the minimum federal efficiency standard for efficiency which currently is EER 9.8.

BCR Measures

BCR Measure Name	Unique Identifier
Room AC	2024 Electric Residential New Construction Room AC

Savings Principle

The high efficiency level is a room AC unit meeting or exceeding the federal efficiency standard by 10% or more. Average size is 10,000 Btu and average EERs is 10.8.

Savings Method

Deemed

Unit

Installed high-efficiency room air-conditioner.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Room AC	47.7	0.0600	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Room AC	12	1.00	1.00		1.00	1.00	1.00	0.30	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Room AC	0.00%	0.00%	70.00%	30.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Note: National Grid assumption based on regional PA working groups.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Room AC	0	0	6.14	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Room AC	0.44	0.00	0.00	0.56

NTG Source: NMR Group, Inc. (2021). Residential Products Net-to-Gross Study. https://ma-eeac.org/wp-content/uploads/MA20X04-E-PRODNTG_Res-Products-NTG-Report_FINAL_2021.06.08.pdf

TRC: $0 / measure

Incentive: $0 / measure

Showerheads

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Showerhead

Program: Residential New Construction

Measure Description

Installation of a low flow showerhead with a flow rate of 1.5 GPM or less.

Baseline Description

The baseline efficiency case is a showerhead with a flow of 2.5 gpm. For home audit applications, the baseline is the existing showerhead.

BCR Measures

BCR Measure Name	Unique Identifier
Showerheads	2024 Electric Residential New Construction Showerheads

Savings Principle

The high efficiency is a low-flow showerhead with a flow of 1.5 gpm or less.

Savings Method

Deemed

Unit

Installed low-flow showerhead

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Showerheads	240.6	0.0590	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Electric kW Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Showerheads	15	1.00	1.00		1.00	1.00	1.00	0.58	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Showerheads	39.89%	32.98%	14.54%	12.58%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rates are 100% since savings estimates are based on evaluation results.

CFsp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

CFwp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Showerheads	3696	0	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Showerheads	0.00	0.00	0.00	1.00

TRC: $0 / measure

Incentive: $0 / measure

Window

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Building Shell **Measure Type:** Windows **Measure Sub Type:**

Program: Residential HVAC

Measure Description

Early replacement of a single pane window either with or without a storm with a triple pane window.

Baseline Description

The baseline efficiency case is a single pane window with or without a storm.

BCR Measures

BCR Measure Name	Unique Identifier
Window -Electric Resistance	2024 Electric Residential HVAC Window -Electric Resistance
Window -Heat Pump	2024 Electric Residential HVAC Window -Heat Pump
Window -Oil	2024 Electric Residential HVAC Window -Oil
Window -Propane	2024 Electric Residential HVAC Window -Propane

Savings Principle

The high efficiency case is an Energy Star qualified triple pane window.

Savings Method

Deemed

Unit

Replacement of window with single pane either with or without a storm with a triple pane window.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Window -Electric Resistance	131.0	0.1300	0.00	0.00	0.00	0.00	0.00
Window -Heat Pump	69.0	0.0500				0.00	0.00
Window -Oil	7.0	0.0100				0.60	0.00
Window -Propane	7.0	0.0100				0.00	0.60

Electric kWh Note: Massachusetts Common Assumption

Electric kW Note: Massachusetts Common Assumption

Gas Heat MMBtu Note: Massachusetts Common Assumption

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Window -Electric Resistance	17	1.00	1.00		1.00	1.00	1.00	0.33	0.43
Window -Heat Pump								0.37	0.22
Window -Oil								0.37	0.00
Window -Propane								0.37	0.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Window -Electric Resistance	45.00%	44.00%	6.00%	5.00%
Window -Heat Pump	25.25%	29.29%	24.24%	21.21%
Window -Oil	3.96%	3.96%	49.50%	42.57%
Window -Propane	3.96%	3.96%	49.50%	42.57%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRsp Note: Massachusetts Common Assumption

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Window	0	0	6.81	0.00	0.00	0.00	0.00	0.00

Annual $ Note: MA values

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Window	0.04	0.00	0.00	0.96

NTG Note: Massachusetts Common Assumption

TRC: $251 / measure

Incentive: $75 / measure

ACDOWNSIZE

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Cooling **Measure Sub Type:** Central AC

Program: Residential HVAC

Measure Description

Reduction in system size consistent with manual J calculations.

Baseline Description

The baseline efficiency case is a system that is not sized in accordance with a manual J calculation.

BCR Measures

BCR Measure Name	Unique Identifier
ACDOWNSIZE	2024 Electric Residential HVAC ACDOWNSIZE

Savings Principle

The high efficiency case is a system that is sized in accordance with a manual J calculation.

Savings Method

Deemed

Unit

Completed job (assume downsize 1/2 ton).

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
ACDOWNSIZE	203.0	0.2950	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Electric kW Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Electric kW Note: Updated based on historic measure mix

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
ACDOWNSIZE	18	1.00	1.00		1.00	1.00	1.00	0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
ACDOWNSIZE	6.59%	3.85%	47.32%	42.24%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
ACDOWNSIZE	0	0	0.65	0.00	0.00	0.00	0.00	0.00

Annual $ Note: MA values

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
ACDOWNSIZE	0.15	0.00	0.00	0.85

NTG Note: Massachusetts Common Assumption

TRC: $250 / measure

Incentive: $0 / measure

CENTRAL AC

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Cooling **Measure Sub Type:** Central AC

Program: Residential HVAC

Measure Description

The purchase and installation of high efficiency central air-conditioning (CAC) unit rather than a standard CAC system, and/or to replace an existing inefficient CAC system.

Baseline Description

The baseline efficiency case is a blend of code-compliant central air-conditioning system with SEER = 14 and EER = 11. For early replacement installations, the baseline is an HVAC unit with rated SEER = 14 and an actual SEER efficiency of 12.0.

BCR Measures

BCR Measure Name	Unique Identifier
CENTRAL AC	2024 Electric Residential HVAC CENTRAL AC

Savings Principle

The high efficiency case is a SEER 16.8, EER 13 central AC unit.

Savings Method

Calculated using deemed inputs

Unit

Installed high-efficiency central AC system for cooling.

Savings Equation

Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) × Hours_C

Gross kW = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee)

Where:

Tons = Deemed average equipment capacity: 2.7 tons for 16 SEER unit / 3.1 tons for 18 SEER unit

12 kBtu/hr per ton = Conversion factor

SEER_base = Seasonal Energy Efficiency Ratio of baseline equipment.

SEER_ee = Seasonal Energy Efficiency Ratio of new equipment.

Hours_C = Deemed average equivalent full load cooling hours

Hours: 419

Hours Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Hours Note: The equivalent full load cooling hours are 360 hours/year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CENTRAL AC	223.2	0.3500	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Guidehouse (2021). Comprehensive TRM Review/RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Electric kWh Note: Baseline update can be found in first source and calculations for savings can be found in second source.

Electric kW Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Electric kW Note: Updated based on historic measure mix

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
CENTRAL AC	15	1.00	1.00		1.00	1.00	1.00	0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
CENTRAL AC	6.61%	3.80%	47.35%	42.24%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Massachusetts Common Assumption

RRsp Note: Massachusetts Common Assumption

RRwp Note: Massachusetts Common Assumption

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
CENTRAL AC	0	0	6.14	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
CENTRAL AC	0.34	0.22	0.00	0.87

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $1329 / measure

Incentive: $0 / measure

Central Ducted Heat Pump - Full Displacement

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Heat Pumps | **Measure Sub Type:** Heat Pump Electrification

Program: Residential HVAC

Measure Description

The installation of a high efficiency rated heat pump (15 SEER 9 HSPF) with the full displacement of an oil or propane furnace.

Baseline Description

The baseline efficiency case is an existing inefficient oil or propane furnace.

BCR Measures

BCR Measure Name	Unique Identifier
CDHP - Fully Displ Furnace, Oil	2024 Electric Residential HVAC CDHP - Fully Displ Furnace, Oil
CDHP - Fully Displ Furnace, Propane	2024 Electric Residential HVAC CDHP - Fully Displ Furnace, Propane

Savings Principle

The high efficiency case is a high-efficiency central heat pump.

Savings Method

Deemed

Unit

Per Project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CDHP - Fully Displ Furnace, Oil	-7473.0	-2.8200	0.00	0.00	0.00	86.70	0.00
CDHP - Fully Displ Furnace, Propane						0.00	86.70

Electric kWh Source: RES21_Task4_Final_Spreadsheet_Model_REVISED_2018-09-24_v3_RI Efficiency Levels

Electric kW Source: RES21_Task4_Final_Spreadsheet_Model_REVISED_2018-09-24_v3_RI Efficiency Levels

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Central Ducted Heat Pump - Full Displacement	16	1.00	1.00		1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Central Ducted Heat Pump - Full Displacement	35.10%	45.80%	10.10%	9.00%

Measure Life Source: Guidehouse (2021). Energy Optimization Fuel Displacement Impact and Process Study (MA20R24-B-EOEVAL). https://ma-eeac.org/wp-content/uploads/MA20R24-B-EOEval_Fuel-Displacement-Report_2021-10-13_Final.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Central Ducted Heat Pump - Full Displacement	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Central Ducted Heat Pump - Full Displacement	0.10	0.00	0.00	0.90

NTG Note: Massachusetts Common Assumption

TRC: $0 / measure

Incentive: $0 / measure

Central Ducted Heat Pump - Partial Displacement

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Heat Pumps | **Measure Sub Type:** Heat Pump Electrification

Program: Residential HVAC

Measure Description

The installation of a high efficiency rated heat pump (15 SEER 9 HSPF) with partial displacement of an oil or propane furnace and without integrated controls.

Baseline Description

The baseline efficiency case is an existing inefficient oil or propane furnace.

BCR Measures

BCR Measure Name	Unique Identifier
CDHP - PART No Control DispFurnace, Oil	2024 Electric Residential HVAC CDHP - PART No Control DispFurnace, Oil
CDHP - PART No Control DispFurnace, Propane	2024 Electric Residential HVAC CDHP - PART No Control DispFurnace, Propane

Savings Principle

The high efficiency case is a high-efficiency central Heat pump.

Savings Method

Deemed

Unit

Per Project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CDHP - PART No Control DispFurnace, Oil	-3682.8	-1.5700	0.00	0.00	0.00	68.84	0.00
CDHP - PART No Control DispFurnace, Propane	-5388.3	-1.5700				0.00	51.80

Electric kWh Source: RES21_Task4_Final_Spreadsheet_Model_REVISED_2018-09-24_v3_RI Efficiency Levels

Electric kW Source: RES21_Task4_Final_Spreadsheet_Model_REVISED_2018-09-24_v3_RI Efficiency Levels

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Central Ducted Heat Pump - Partial Displacement	17	1.00	1.00		1.00	1.00	1.00	-0.24	0.21

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Central Ducted Heat Pump - Partial Displacement	35.10%	45.80%	10.10%	9.00%

Measure Life Source: Guidehouse (2021). Energy Optimization Fuel Displacement Impact and Process Study (MA20R24-B-EOEVAL). https://ma-eeac.org/wp-content/uploads/MA20R24-B-EOEval_Fuel-Displacement-Report_2021-10-13_Final.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Central Ducted Heat Pump - Partial Displacement	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Central Ducted Heat Pump - Partial Displacement	0.10	0.00	0.00	0.90

NTG Note: Massachusetts Common Assumption

TRC: $0 / measure

Incentive: $0 / measure

Central Ducted Heat Pump - Partial Displacement w/ Integrated Controls

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Heat Pumps | **Measure Sub Type:** Heat Pump Electrification

Program: Residential HVAC

Measure Description

The installation of a high efficiency rated heat pump (15 SEER 9 HSPF) with partial displacement of an oil or propane furnace and with integrated controls.

Baseline Description

The baseline efficiency case is an existing inefficient oil or propane furnace.

BCR Measures

BCR Measure Name	Unique Identifier
CDHP - PART DISPFURNACE, OIL	2024 Electric Residential HVAC CDHP - PART DISPFURNACE, OIL
CDHP - PART DISPFURNACE, Propane	2024 Electric Residential HVAC CDHP - PART DISPFURNACE, Propane

Savings Principle

The high efficiency case is a high-efficiency central Heat pump.

Savings Method

Deemed

Unit

Per Project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CDHP - PART DISPFURNACE, OIL	-4092.0	-1.7400	0.00	0.00	0.00	57.56	0.00
CDHP - PART DISPFURNACE, Propane	-5987.0	-1.7400				0.00	76.49

Electric kWh Source: RES21_Task4_Final_Spreadsheet_Model_REVISED_2018-09-24_v3_RI Efficiency Levels

Electric kW Source: RES21_Task4_Final_Spreadsheet_Model_REVISED_2018-09-24_v3_RI Efficiency Levels

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Central Ducted Heat Pump - Partial Displacement w/ Integrated Controls	17	1.00	1.00		1.00	1.00	1.00	-0.24	0.21

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Central Ducted Heat Pump - Partial Displacement w/ Integrated Controls	35.10%	45.80%	10.10%	9.00%

Measure Life Source: Guidehouse (2021). Energy Optimization Fuel Displacement Impact and Process Study (MA20R24-B-EOEVAL). https://ma-eeac.org/wp-content/uploads/MA20R24-B-EOEval_Fuel-Displacement-Report_2021-10-13_Final.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Central Ducted Heat Pump - Partial Displacement w/ Integrated Controls	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Central Ducted Heat Pump - Partial Displacement w/ Integrated Controls	0.10	0.00	0.00	0.90

NTG Note: Massachusetts Common Assumption

TRC: $0 / measure

Incentive: $0 / measure

Central Heat Pump

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: HVAC

Measure Type: Heat Pumps

Measure Sub Type: Heat Pump Electrification

Program: Residential HVAC

Measure Description

The installation of a high efficiency rated heat pump (15 SEER 9 HSPF)

Baseline Description

The baseline efficiency case is a non- energy efficient® rated central heat pump with SEER 14, HSPF 8.2 for replace on failure. For early retirement, over the remaining life of the existing heat pump unit, the baseline assumes SEER 10 and HPSF 7.

BCR Measures

BCR Measure Name	Unique Identifier
Central Heat Pump	2024 Electric Residential HVAC Central Heat Pump

Savings Principle

For replace on failure, the high efficiency case is a SEER 17.6, 9.8 HPSF central heat pump. For early retirement, the high efficiency case is a code compliant SEER 14, HPSF 8.2 heat pump unit.

Savings Method

Calculated using deemed inputs

Unit

Installed high-efficiency mini-split heat pump system for heating and cooling.

Savings Equation

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Central Heat Pump	1533.2	0.5800	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Electric kWh Note: Updated based on historic measure mix

Electric kW Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Central Heat Pump	20	1.00	1.00		1.00	1.00	1.00	0.35	0.53

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Central Heat Pump	35.10%	45.80%	10.10%	9.00%

Measure Life Source: Michaels Energy (2022). X2001A: Connecticut Measure Life/EUL Update Study-Residential Measures. https://energizect.com/sites/default/files/2022-07/CT%20X2001A%20EUL%20Res%20Measure%20Report%20FINAL060522.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Central Heat Pump	0	0	5.22	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Central Heat Pump	0.34	0.22	0.00	0.87

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $758 / measure

Incentive: $350 / measure

CoolSmart AC QIV ES

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: HVAC

Measure Type: HVAC O&M

Measure Sub Type: Central AC Quality Install

Program: Residential HVAC

Measure Description

The verification of proper charge and airflow during installation of new Central AC system.

Baseline Description

The baseline efficiency case is a cooling system not installed according to manufacturer specifications.

BCR Measures

BCR Measure Name	Unique Identifier
CoolSmart AC QIV ES	2024 Electric Residential HVAC CoolSmart AC QIV ES

Savings Principle

The high efficiency case is the same cooling system installed according to manufacturer specifications.

Savings Method

Calculated using deemed inputs

Unit

Completed QIV on new AC system

Savings Equation

Gross kWh = Tons × (kBtu/hr per ton) × 1/SEER × Hours_C × %SAVE

Gross kW = Tons × (kBtu/hr per ton) × 1/EER × %SAVE

Where:

Tons = Deemed average equipment capacity: 2.7 tons

12 kBtu/hr per ton = Conversion factor

SEER = Seasonal Energy Efficiency Ratio of existing equipment

Hours_C = Deemed average equivalent full load cooling hours

5%SAVE = Average percent demand reduction; National Grid assumption based on regional PA working groups.

EER = Peak efficiency of existing equipment

Hours: 419

Hours Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Hours Note: The equivalent full load cooling hours are 360 hours/year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CoolSmart AC QIV ES	40.3	0.0640	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Electric kWh Note: Updated based on historic measure mix

Electric kW Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
CoolSmart AC QIV ES	18	1.00	1.00		1.00	1.00	1.00	0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
CoolSmart AC QIV ES	6.59%	3.85%	47.32%	42.24%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
CoolSmart AC QIV ES	0	0	1.55	0.00	0.00	0.00	0.00	0.00

Annual $ Note: MA values

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
CoolSmart AC QIV ES	0.25	0.16	0.00	0.91

NTG Source: The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.

TRC: $135 / measure

Incentive: $175 / measure

CoolSmart HP Digital Check

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** HVAC O&M | **Measure Sub Type:** Heat Pump Tune Up

Program: Residential HVAC

Measure Description

Tune-up of an existing heat pump system.

Baseline Description

The baseline efficiency case is a standard residential heat pump system that does not operating according to manufacturer specifications.

BCR Measures

BCR Measure Name	Unique Identifier
CoolSmart HP Digital Check	2024 Electric Residential HVAC CoolSmart HP Digital Check

Savings Principle

The high efficiency case is the same baseline system but which operates according to manufacturer specifications.

Savings Method

Calculated using deemed inputs

Unit

Completed tune-up of existing heat pump system

Savings Equation

Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER × Hours_C + 1/HSPF × Hours_H) × %SAVE

Gross kW = Tons × (kBtu/hr per ton) × max[(1/EER),(1/HSPF)] × %SAVE

Where:

Tons = Deemed average equipment capacity: 2.6 tons

12 kBtu/hr per ton = Conversion factor

SEER= Seasonal Energy Efficiency Ratio of existing equipment

HSPF = Heating efficiency of existing equipment

Hours_C = Deemed average equivalent full load cooling hours

Hours_H = Deemed average equivalent full load heating hours

5%SAVE = Average percent demand reduction; National Grid assumption based on regional PA working groups.

EER = Peak efficiency of existing equipment

Hours: N/A

Hours Source: ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.

Hours Note: Equivalent full load hours are 1200 hours/year for heating and 360 hours/year for cooling

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CoolSmart HP Digital Check	341.9	0.1240	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Electric kWh Note: Updated based on historic measure mix

Electric kW Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Electric kW Note: Updated based on historic measure mix

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
CoolSmart HP Digital Check	5	1.00	1.00		1.00	1.00	1.00	0.26	0.62

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
CoolSmart HP Digital Check	35.10%	45.80%	10.10%	9.00%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFsp Note: Massachusetts Common Assumption

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Note: Massachusetts Common Assumption

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
CoolSmart HP Digital Check	0	0	1.55	0.00	0.00	0.00	0.00	0.00

Annual $ Note: MA values

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
CoolSmart HP Digital Check	0.15	0.00	0.00	0.85

NTG Note: Massachusetts Common Assumption

TRC: $193 / measure

Incentive: $175 / measure

CoolSmart HP QIV ES

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: HVAC

Measure Type: HVAC O&M

Measure Sub Type: Heat Pump Quality Install

Program: Residential HVAC

Measure Description

The verification of proper charge and airflow during installation of new Heat Pump systems.

Baseline Description

The baseline efficiency case is a heating and cooling system not installed according to manufacturer specifications.

BCR Measures

BCR Measure Name	Unique Identifier
CoolSmart HP QIV ES	2024 Electric Residential HVAC CoolSmart HP QIV ES

Savings Principle

The high efficiency case is the same heating and cooling system not installed according to manufacturer specifications.

Savings Method

Calculated using deemed inputs

Unit

Completed QIV on new heat pump system

Savings Equation

Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER × Hours_C + 1/HSPF × Hours_H) × %SAVE

Gross kW = Tons × (kBtu/hr per ton) × max[(1/EER),(1/HSPF)] × %SAVE

Where:

Tons = Deemed average equipment capacity: 2.6 tons

12 kBtu/hr per ton = Conversion factor

SEER= Seasonal Energy Efficiency Ratio of existing equipment

HSPF = Heating efficiency of existing equipment

Hours_C = Deemed average equivalent full load cooling hours

Hours_H = Deemed average equivalent full load heating hours

5%SAVE = Average percent demand reduction; National Grid assumption based on regional PA working groups.

EER = Peak efficiency of existing equipment

Hours: N/A

Hours Note: Equivalent full load hours are 1200 hours/year for heating and 360 hours/year for cooling

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CoolSmart HP QIV ES	265.6	0.0970	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Electric kWh Note: Updated based on historic measure mix

Electric kW Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Electric kW Note: Updated based on historic measure mix

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
CoolSmart HP QIV ES	18	1.00	1.00		1.00	1.00	1.00	0.25	0.62

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
CoolSmart HP QIV ES	35.10%	45.80%	10.10%	9.00%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
CoolSmart HP QIV ES	0	0	1.55	0.00	0.00	0.00	0.00	0.00

Annual $ Note: MA values

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
CoolSmart HP QIV ES	0.25	0.16	0.00	0.91

NTG Source: The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.

TRC: $220 / measure

Incentive: $0 / measure

Duct Sealing - 100 CFM reduction in leaks 15% of flow to 5%

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Ducting **Measure Sub Type:** Duct Insulation

Program: Residential HVAC

Measure Description

A 66% reduction in duct leakage from 15% to 5% of supplied CFM.

Baseline Description

The baseline efficiency case is assumes a 15% leakage.

BCR Measures

BCR Measure Name	Unique Identifier
Duct Sealing - 100 CFM reduction in leaks 15% of flow to 5%	2024 Electric Residential HVAC Duct Sealing - 100 CFM reduction in leaks 15% of flow to 5%

Savings Principle

The high efficiency case is a system with duct leakage reduced by 66% to 5% leakage.

Savings Method

Deemed

Unit

Complete duct sealing job for existing HVAC system

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Duct Sealing - 100 CFM reduction in leaks 15% of flow to 5%	442.0	0.3100	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Navigant (2018). Home Energy Services Impact Evaluation (Res 34). https://ma-eeac.org/wp-content/uploads/RES34_HES-Impact-Evaluation-Report-with-ES_FINAL_29AUG2018.pdf

Electric kW Source: Navigant (2018). Home Energy Services Impact Evaluation (Res 34). https://ma-eeac.org/wp-content/uploads/RES34_HES-Impact-Evaluation-Report-with-ES_FINAL_29AUG2018.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Duct Sealing - 100 CFM reduction in leaks 15% of flow to 5%	20	1.00	1.00		1.00	1.00	1.00	0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Duct Sealing - 100 CFM reduction in leaks 15% of flow to 5%	6.59%	3.85%	47.32%	42.24%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Duct Sealing - 100 CFM reduction in leaks 15% of flow to 5%	0	0	0.23	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Duct Sealing - 100 CFM reduction in leaks 15% of flow to 5%	0.25	0.12	0.00	0.87

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

NTG Note: Massachusetts Common Assumption

TRC: $0 / linear foot

Incentive: $0 / linear foot

Ductless MSHP - Full Displacement

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Heat Pumps | **Measure Sub Type:** Ductless

Program: Residential HVAC

Measure Description

The installation of a high efficiency rated mini-split heat pump (15 SEER 10 HSPF) with the full displacement of an oil or propane furnace.

Baseline Description

The baseline efficiency case is an existing inefficient oil or propane furnace.

BCR Measures

BCR Measure Name	Unique Identifier
DMSHP - FULL DISPBOILER, OIL	2024 Electric Residential HVAC DMSHP - FULL DISPBOILER, OIL
DMSHP - FULL DISPBOILER, PROP	2024 Electric Residential HVAC DMSHP - FULL DISPBOILER, PROP

Savings Principle

The high efficiency case is a high-efficiency mini-split Heat pump.

Savings Method

Deemed

Unit

Per Project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
DMSHP - FULL DISPBOILER, OIL	-8765.0	-2.1300	0.00	0.00	0.00	102.27	0.00
DMSHP - FULL DISPBOILER, PROP	-8798.0	-2.1300				0.00	102.27

Electric kWh Source: RES21_Task4_Final_Spreadsheet_Model_REVISED_2018-09-24_v3_RI Efficiency Levels

Electric kW Source: RES21_Task4_Final_Spreadsheet_Model_REVISED_2018-09-24_v3_RI Efficiency Levels

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Ductless MSHP - Full Displacement	17	1.00	1.00		1.00	1.00	1.00	-0.31	0.21

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Ductless MSHP - Full Displacement	36.40%	48.20%	8.00%	7.40%

Measure Life Source: Guidehouse (2021). Energy Optimization Fuel Displacement Impact and Process Study (MA20R24-B-EOEVAL). https://ma-eeac.org/wp-content/uploads/MA20R24-B-EOEval_Fuel-Displacement-Report_2021-10-13_Final.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Ductless MSHP - Full Displacement	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Ductless MSHP - Full Displacement	0.10	0.00	0.00	0.90

NTG Note: Massachusetts Common Assumption

TRC: $0 / measure

Incentive: $0 / measure

Ductless MSHP - Integrated Controls Retrofit

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Heat Pumps | **Measure Sub Type:** Ductless

Program: Residential HVAC

Measure Description

The installation of an integrated controls on an existing Ductless MSHP.

Baseline Description

The baseline is a manual switch from the heat pump to the secondary heat source (oil/propane).

BCR Measures

BCR Measure Name	Unique Identifier
DMSHP - CONTROLS RETROFIT, OIL	2024 Electric Residential HVAC DMSHP - CONTROLS RETROFIT, OIL
DMSHP - CONTROLS RETROFIT, PROP	2024 Electric Residential HVAC DMSHP - CONTROLS RETROFIT, PROP

Savings Principle

The high efficiency case uses integrated controls to switch from heat pump to secondary heat source.

Savings Method

Deemed

Unit

Per Project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
DMSHP - CONTROLS RETROFIT, OIL	-4399.0	-2.0400	0.00	0.00	0.00	49.70	0.00
DMSHP - CONTROLS RETROFIT, PROP	-7564.0	-2.3700				0.00	84.70

Electric kWh Source: Guidehouse (2021). Energy Optimization Fuel Displacement Impact and Process Study (MA20R24-B-EOEVAL). https://ma-eeac.org/wp-content/uploads/MA20R24-B-EOEval_Fuel-Displacement-Report_2021-10-13_Final.pdf

Electric kW Source: Guidehouse (2021). Energy Optimization Fuel Displacement Impact and Process Study (MA20R24-B-EOEVAL). https://ma-eeac.org/wp-content/uploads/MA20R24-B-EOEval_Fuel-Displacement-Report_2021-10-13_Final.pdf

Oil MMBtu Source: Guidehouse (2021). Energy Optimization Fuel Displacement Impact and Process Study (MA20R24-B-EOEVAL). https://ma-eeac.org/wp-content/uploads/MA20R24-B-EOEval_Fuel-Displacement-Report_2021-10-13_Final.pdf

Propane MMBtu Source: Guidehouse (2021). Energy Optimization Fuel Displacement Impact and Process Study (MA20R24-B-EOEVAL). https://ma-eeac.org/wp-content/uploads/MA20R24-B-EOEval_Fuel-Displacement-Report_2021-10-13_Final.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Ductless MSHP - Integrated Controls Retrofit	10	1.00	1.00		1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Ductless MSHP - Integrated Controls Retrofit	0.00%	0.00%	0.00%	0.00%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Note: Consistent with MA TRM

CFwp Note: Consistent with MA TRM

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Ductless MSHP - Integrated Controls Retrofit	0	0	4.27	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Ductless MSHP - Integrated Controls Retrofit	0.10	0.00	0.00	0.90

NTG Note: Massachusetts Common Assumption

TRC: $0 / measure

Incentive: $0 / measure

Ductless MSHP - Partial Displacement

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Heat Pumps | **Measure Sub Type:** Ductless

Program: Residential HVAC

Measure Description

The installation of a high efficiency rated mini-split heat pump (15 SEER 10 HSPF) with the partial displacement of an oil or propane furnace and without integrated controls.

Baseline Description

The baseline efficiency case is an existing inefficient oil or propane furnace.

BCR Measures

BCR Measure Name	Unique Identifier
DMSHP - woIC PART DispBoiler, Oil	2024 Electric Residential HVAC DMSHP - woIC PART DispBoiler, Oil
DMSHP - woIC PART DispBoiler, Prop	2024 Electric Residential HVAC DMSHP - woIC PART DispBoiler, Prop

Savings Principle

The high efficiency case is a high-efficiency mini-split Heat pump.

Savings Method

Deemed

Unit

Per Project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
DMSHP - woIC PART DispBoiler, Oil	-4509.0	-1.1800	0.00	0.00	0.00	60.05	0.00
DMSHP - woIC PART DispBoiler, Prop	-6421.5	-1.1900				0.00	81.21

Electric kWh Source: RES21_Task4_Final_Spreadsheet_Model_REVISED_2018-09-24_v3_RI Efficiency Levels

Electric kW Source: RES21_Task4_Final_Spreadsheet_Model_REVISED_2018-09-24_v3_RI Efficiency Levels

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Ductless MSHP - Partial Displacement	18	1.00	1.00		1.00	1.00	1.00	-0.35	0.21

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Ductless MSHP - Partial Displacement	36.40%	48.20%	8.00%	7.40%

Measure Life Source: Guidehouse (2021). Energy Optimization Fuel Displacement Impact and Process Study (MA20R24-B-EOEVAL). https://ma-eeac.org/wp-content/uploads/MA20R24-B-EOEval_Fuel-Displacement-Report_2021-10-13_Final.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Ductless MSHP - Partial Displacement	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Ductless MSHP - Partial Displacement	0.10	0.00	0.00	0.90

NTG Note: Massachusetts Common Assumption

TRC: $0 / measure

Incentive: $0 / measure

Ductless MSHP - Partial Displacement w/ Integrated Controls

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Heat Pumps | **Measure Sub Type:** Ductless

Program: Residential HVAC

Measure Description

The installation of a high efficiency rated mini-split heat pump (15 SEER 10 HSPF) with the partial displacement of an oil or propane furnace and with integrated controls.

Baseline Description

The baseline efficiency case is an existing inefficient oil or propane furnace.

BCR Measures

BCR Measure Name	Unique Identifier
DMSHP - WIC PART DISPBOILER, OIL	2024 Electric Residential HVAC DMSHP - WIC PART DISPBOILER, OIL
DMSHP - WIC PART DISPBOILER, PROP	2024 Electric Residential HVAC DMSHP - WIC PART DISPBOILER, PROP

Savings Principle

The high efficiency case is a high-efficiency mini-split Heat pump.

Savings Method

Deemed

Unit

Per Project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
DMSHP - WIC PART DISPBOILER, OIL	-5010.0	-1.3200	0.00	0.00	0.00	66.72	0.00
DMSHP - WIC PART DISPBOILER, PROP	-7135.0	-1.3200				0.00	90.23

Electric kWh Source: RES21_Task4_Final_Spreadsheet_Model_REVISED_2018-09-24_v3_RI Efficiency Levels

Electric kW Source: RES21_Task4_Final_Spreadsheet_Model_REVISED_2018-09-24_v3_RI Efficiency Levels

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Ductless MSHP - Partial Displacement w/ Integrated Controls	18	1.00	1.00		1.00	1.00	1.00	-0.35	0.21

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Ductless MSHP - Partial Displacement w/ Integrated Controls	36.40%	48.20%	8.00%	7.40%

Measure Life Source: Guidehouse (2021). Energy Optimization Fuel Displacement Impact and Process Study (MA20R24-B-EOEVAL). https://ma-eeac.org/wp-content/uploads/MA20R24-B-EOEval_Fuel-Displacement-Report_2021-10-13_Final.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Ductless MSHP - Partial Displacement w/ Integrated Controls	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Ductless MSHP - Partial Displacement w/ Integrated Controls	0.10	0.00	0.00	0.90

NTG Note: Massachusetts Common Assumption

TRC: $0 / measure

Incentive: $0 / measure

ECM Pumps

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Motors | **Measure Sub Type:** ECM Motor

Program: Residential HVAC

Measure Description

Heating hot water circulation retrofit projects replacing the existing hot water circulation systems with ECM pumps and zone valves.

Baseline Description

The baseline case is standard efficiency steady-state motor without variable speed capabilities.

BCR Measures

BCR Measure Name	Unique Identifier
ECM Pumps	2024 Electric Residential HVAC ECM Pumps

Savings Principle

The efficient case is the installation of a pump with an electronically commutated motor (ECM) with variable speed capabilities on a boiler.

Savings Method

Deemed

Unit

Installed ECM circulator pump retrofit project.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
ECM Pumps	75.2	0.0410	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Residential Baseline Study - ECM Pumps (Report has not been finalized)

Electric kW Source: RI_PAs_2021-2023 PLAN Electric H&C Savings Workbook 08-11-2020

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
ECM Pumps	20	1.00	1.00		1.00	1.00	1.00		0.53

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
ECM Pumps	45.01%	54.99%	0.00%	0.00%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFwp Source: RI_PAs_2020PLAN Electric H&C Savings Workbook 08-20-2019

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
ECM Pumps	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
ECM Pumps	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $132 / measure

Incentive: $100 / measure

Elec Res to HP ducted or mix ducted

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: HVAC

Measure Type: Heating

Measure Sub Type: Heat Pump Electrification

Program: Residential HVAC

Measure Description

The purchase and installation of high efficiency heat pump (ducted or mix ducted) to replace an electric resistance heating system.

Baseline Description

The baseline efficiency case for heating is a residential electric resistance heating system.

The baseline efficiency case for cooling is a residential window AC unit with EER 9.8.

BCR Measures

BCR Measure Name	Unique Identifier
Elec Res to HP ducted or mix ducted	2024 Electric Residential HVAC Elec Res to HP ducted or mix ducted

Savings Principle

The high efficiency case is an ENERGY STAR® qualified air-source heat pump.

Savings Method

Deemed

Unit

Installed high-efficiency heat pump system (ducted or mix ducted) for heating and cooling.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Elec Res to HP ducted or mix ducted	6549.0	2.8300	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Electric kW Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Elec Res to HP ducted or mix ducted	18	1.00	1.00		1.00	1.00	1.00	0.02	0.62

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Elec Res to HP ducted or mix ducted	42.90%	57.10%	0.00%	0.00%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Elec Res to HP ducted or mix ducted	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Elec Res to HP ducted or mix ducted	0.31	0.22	0.00	0.91

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $0 / measure

Incentive: $0 / measure

Electric Resistance to MSHP

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: HVAC

Measure Type: Heating

Measure Sub Type: Heat Pump Electrification

Program: Residential HVAC

Measure Description

The purchase and installation of high efficiency mini-split heat pump system to replace an electric resistance heating system.

Baseline Description

The baseline efficiency case for heating is a residential electric resistance heating system.

The baseline efficiency case for cooling is a residential window AC unit with EER 9.8.

BCR Measures

BCR Measure Name	Unique Identifier
Electric Resistance to MSHP	2024 Electric Residential HVAC Electric Resistance to MSHP

Savings Principle

The high efficiency case is an ENERGY STAR® qualified air-source heat pump.

Savings Method

Deemed

Unit

Installed high-efficiency mini-split heat pump system for heating and cooling.

Savings Equation

Heating Gross kWh = Qty*deltakWh_heating

Cooling Gross kWh = Qty*deltakWh_cooling

Cooling Gross kW = Qty*deltakW

Where:

Qty = Total number of units.

deltakWh_heating = Average annual heating kWh reduction per unit.

deltakWh_cooling = Average annual cooling kWh reduction per unit.

deltakW = Average annual kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Electric Resistance to MSHP	6549.0	2.8300	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Electric kWh Note: Updated based on historic measure mix

Electric kW Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Electric Resistance to MSHP	17	1.00	1.00		1.00	1.00	1.00		0.62

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Electric Resistance to MSHP	42.92%	57.08%	0.00%	0.00%

Measure Life Source: Michaels Energy (2022). X2001A: Connecticut Measure Life/EUL Update Study-Residential Measures. https://energizect.com/sites/default/files/2022-07/CT%20X2001A%20EUL%20Res%20Measure%20Report%20FINAL060522.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Electric Resistance to MSHP	0	0	4.27	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Electric Resistance to MSHP	0.31	0.22	0.00	0.90

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $6736 / measure

Incentive: $4000 / measure

HPWH, Electric

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Water Heater

Measure Sub Type: Heat Pump Water Heater

Program: Residential HVAC

Measure Description

Installation of a heat pump water heater (HPWH) instead of an electric resistance water heater.

Baseline Description

The baseline efficiency case is a new, standard efficiency electric resistance hot water heater.

BCR Measures

BCR Measure Name	Unique Identifier
HPWH, Electric - <55 gallon	2024 Electric Residential HVAC HPWH, Electric - <55 gallon
HPWH, Electric - >55 gallon, UEF 2.70	2024 Electric Residential HVAC HPWH, Electric - >55 gallon, UEF 2.70

Savings Principle

The high efficiency case is a high efficiency heat pump water heater.

Savings Method

Deemed

Unit

Installed heat pump water heater.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
HPWH, Electric - <55 gallon	1712.0	0.3400	0.00	-0.10	0.00	-0.50	-0.07
HPWH, Electric - >55 gallon, UEF 2.70	360.0	0.0400		0.00		0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
HPWH, Electric	13	1.00	1.00		1.00	1.00	1.00	0.41	0.75

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
HPWH, Electric	39.13%	32.97%	14.89%	13.01%

Measure Life Source: NREL (2016). Field Performance of Heat Pump Water Heaters in the Northeast. https://www.nrel.gov/docs/fy16osti/64904.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
HPWH, Electric	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
HPWH, Electric	0.19	0.12	0.00	0.93

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: <55 gallon - $1104/measure; >55 gallon - $669/measure

Incentive: <55 gallon - $600/measure; >55 gallon - $150/measure

Mini Split Heat Pump QIV

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: HVAC

Measure Type: HVAC O&M

Measure Sub Type: Central AC Quality Install

Program: Residential HVAC

Measure Description

The verification of proper charge and airflow during installation of new Central AC system.

Baseline Description

The baseline efficiency case is a cooling system and heating system not installed according to manufacturer specifications.

BCR Measures

BCR Measure Name	Unique Identifier
Mini Split Heat Pump QIV	2024 Electric Residential HVAC Mini Split Heat Pump QIV

Savings Principle

The high efficiency case is the same cooling and heating system installed according to manufacturer specifications.

Savings Method

Calculated using deemed inputs

Unit

Completed QIV on new AC system

Savings Equation

Gross kWh = Tons × (kBtu/hr per ton) × 1/SEER × Hours_C × %SAVE

Gross kW = Tons × (kBtu/hr per ton) × 1/EER × %SAVE

Where:

Tons = Deemed average equipment capacity: 2.7 tons

12 kBtu/hr per ton = Conversion factor

SEER = Seasonal Energy Efficiency Ratio of existing equipment

Hours_C = Deemed average equivalent full load cooling hours

5%SAVE = Average percent demand reduction; National Grid assumption based on regional PA working groups.

EER = Peak efficiency of existing equipment

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Mini Split Heat Pump QIV	82.3	0.0290	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Electric kWh Note: Updated based on historic measure mix

Electric kW Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Electric kW Note: Updated based on historic measure mix

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Mini Split Heat Pump QIV	17	1.00	1.00		1.00	1.00	1.00	0.23	0.62

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Mini Split Heat Pump QIV	36.40%	48.20%	8.00%	7.40%

Measure Life Source: Michaels Energy (2022). X2001A: Connecticut Measure Life/EUL Update Study-Residential Measures. https://energizect.com/sites/default/files/2022-07/CT%20X2001A%20EUL%20Res%20Measure%20Report%20FINAL060522.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Mini Split Heat Pump QIV	0	0	1.55	0.00	0.00	0.00	0.00	0.00

Annual $ Note: MA values

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Mini Split Heat Pump QIV	0.00	0.00	0.00	1.00

TRC: $143 / measure

Incentive: $100 / measure

MiniSplit HP

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Heat Pumps **Measure Sub Type:** Ductless

Program: Residential HVAC

Measure Description

The installation of a more efficient rated Ductless MiniSplit system (15 SEER, 10 HSPF)

Baseline Description

The baseline efficiency case is a non- energy efficient® rated ductless mini split heat pump with SEER 15, HSPF 8.2.

BCR Measures

BCR Measure Name	Unique Identifier
MiniSplit HP	2024 Electric Residential HVAC MiniSplit HP

Savings Principle

The high efficiency case is a SEER 19.7, HPSF 11.2 ductless mini split heat pump.

Savings Method

Calculated using deemed inputs

Unit

Savings Equation

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
MiniSplit HP	584.2	0.1700	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Electric kWh Note: Updated based on historic measure mix

Electric kW Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
MiniSplit HP	17	1.00	1.00		1.00	1.00	1.00	0.27	0.62

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
MiniSplit HP	36.40%	48.20%	8.00%	7.40%

Measure Life Source: Michaels Energy (2022). X2001A: Connecticut Measure Life/EUL Update Study-Residential Measures. https://energizect.com/sites/default/files/2022-07/CT%20X2001A%20EUL%20Res%20Measure%20Report%20FINAL060522.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
MiniSplit HP	0	0	4.27	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
MiniSplit HP	0.34	0.22	0.00	0.87

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $707 / measure

Incentive: $350 / measure

Seasonal Savings Cooling

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** **Measure Sub Type:**

Program: Residential HVAC

Measure Description

The seasonal savings associated with cooling improvements in a home.

Baseline Description

The baseline is the existing cooling system.

BCR Measures

BCR Measure Name	Unique Identifier
Seasonal Savings Cooling	2024 Electric Residential HVAC Seasonal Savings Cooling

Savings Principle

The high efficiency case is the installation of high efficiency cooling measures.

Savings Method

Deemed

Unit

Installed high efficiency cooling measures.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Seasonal Savings Cooling	25.0	0.3500	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Seasonal Savings Cooling	18	1.00	1.00		1.00	1.00	1.00	1.00	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Seasonal Savings Cooling	0.90%	4.10%	53.80%	41.20%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Seasonal Savings Cooling	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Seasonal Savings Cooling	0.00	0.00	0.00	1.00

TRC: $0 / measure

Incentive: $0 / measure

Warm Air Furnace w/ ECM

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Motors | **Measure Sub Type:** ECM Motor

Program: Residential HVAC

Measure Description

Installation of high efficiency motors on residential furnace fans, including electronically commutated motors (ECMs) or steady state brushless furnace fan motors.

Baseline Description

The baseline efficiency case is the installation of a furnace with a standard efficiency steady state motor.

BCR Measures

BCR Measure Name	Unique Identifier
Warm Air Furnace w/ ECM	2024 Electric Residential HVAC Warm Air Furnace w/ ECM

Savings Principle

The high efficiency case is the installation an electronically commutated motor or brushless fan motor on a residential furnace.

Savings Method

Deemed

Unit

Installed high-efficiency furnace fan motor.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Warm Air Furnace w/ ECM	168.0	0.1200	168.00	0.00	0.00	0.00	0.00

Electric kWh Source: Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.

Electric kW Source: Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Warm Air Furnace w/ ECM	18	1.00	1.00	1.00	1.00	1.00	1.00		0.45

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Warm Air Furnace w/ ECM	44.58%	55.42%	0.00%	0.00%

Measure Life Source: Sachs, Harvey (2003). Energy Savings from Efficient Furnace Air Handlers in Massachusetts.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.

CFwp Source: Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Warm Air Furnace w/ ECM	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Warm Air Furnace w/ ECM	0.00	0.00	0.00	1.00

NTG Source: TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015

TRC: $0 / unit

Incentive: $0 / unit

WiFi programmable thermostat with cooling (gas)

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Thermostat

Program: Residential HVAC

Measure Description

Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.

Baseline Description

The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
WiFi programmable thermostat with cooling (gas)	2024 Electric Residential HVAC WiFi programmable thermostat with cooling (gas)

Savings Principle

The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.

Savings Method

Deemed

Unit

Installed programmable thermostat.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
WiFi programmable thermostat with cooling (gas)	64.4	0.0300	64.40	0.00	0.00	0.00	0.00

Electric kWh Source: Navigant (2018). Wi-Fi Thermostat Impact Evaluation-Secondary Research Study. https://ma-eeac.org/wp-content/uploads/Wi-Fi-Thermostat-Impact-Evaluation-Secondary-Literature-Study_FINAL.pdf

Electric kW Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Gas Heat MMBtu Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
WiFi programmable thermostat with cooling (gas)	11	1.00	1.00	1.00	1.00	1.00	1.00	0.35	0.35

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
WiFi programmable thermostat with cooling (gas)	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Southern California Edison (2017). Residential Smart Thermostat Workpaper (Work Paper SCE17HC054, Revision #0). https://www.peakload.org/assets/SCE17HC054.0_Residential_Sma.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
WiFi programmable thermostat with cooling (gas)	0	0	3.68	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
WiFi programmable thermostat with cooling (gas)	0.13	0.12	0.00	0.99

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $268 / measure

Incentive: $75 / measure

WiFi programmable thermostat with cooling (oil)

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Thermostat

Program: Residential HVAC

Measure Description

Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.

Baseline Description

The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
WiFi programmable thermostat with cooling (oil)	2024 Electric Residential HVAC WiFi programmable thermostat with cooling (oil)

Savings Principle

The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.

Savings Method

Deemed

Unit

Installed programmable thermostat.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
WiFi programmable thermostat with cooling (oil)	64.4	0.0500	0.00	0.00	0.00	2.79	0.00

Electric kWh Source: Navigant (2018). Wi-Fi Thermostat Impact Evaluation-Secondary Research Study. https://ma-eeac.org/wp-content/uploads/Wi-Fi-Thermostat-Impact-Evaluation-Secondary-Literature-Study_FINAL.pdf

Electric kW Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Oil MMBtu Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
WiFi programmable thermostat with cooling (oil)	11	1.00	1.00		1.00	1.00	1.00	0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
WiFi programmable thermostat with cooling (oil)	6.61%	3.80%	47.35%	42.24%

Measure Life Source: Southern California Edison (2017). Residential Smart Thermostat Workpaper (Work Paper SCE17HC054, Revision #0). https://www.peakload.org/assets/SCE17HC054.0_Residential_Sma.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
WiFi programmable thermostat with cooling (oil)	0	0	3.68	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
WiFi programmable thermostat with cooling (oil)	0.13	0.12	0.00	0.99

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $268 / measure

Incentive: $75 / measure

AC Timer

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** AC Timer

Program: EnergyWise Single Family

Measure Description

Installation of an air conditioner timer.

Baseline Description

The baseline case is that no ac timer exists.

BCR Measures

BCR Measure Name	Unique Identifier
AC Timer	2024 Electric EnergyWise Single Family AC Timer

Savings Principle

To reduce usage of ac.

Savings Method

Deemed

Unit

Installed AC Timer.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
AC Timer			0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
AC Timer	1	1.00	1.00		1.00	1.00	1.00	0.33	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
AC Timer	2.88%	2.15%	47.53%	47.43%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

CFwp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
AC Timer	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
AC Timer	0.00	0.00	0.04	1.04

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $0 / EW Bundled costs (see Participant listing)

Incentive: $0 / EW Bundled costs (see Participant listing)

Aerator

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Water Heating | **Measure Type:** Flow Control | **Measure Sub Type:** Faucet Aerator

Program: EnergyWise Single Family

Measure Description

Installation of a faucet aerator with a flow rate of 1.5 GPM or less on an existing faucet with high flow in a residential setting with service water heated by electricity.

Baseline Description

The baseline efficiency case is the existing faucet aerator with 2.2 GPM or greater flow rate.

BCR Measures

BCR Measure Name	Unique Identifier
Aerator, Electric	2024 Electric EnergyWise Single Family Aerator, Electric
Aerator, Oil	2024 Electric EnergyWise Single Family Aerator, Oil
Aerator, Others	2024 Electric EnergyWise Single Family Aerator, Others

Savings Principle

The high efficiency case is a faucet with 1.5 GPM or less installed.

Savings Method

Deemed

Unit

Installed faucet aerator.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Aerator, Electric	28.0	0.0100				0.00	0.00
Aerator, Oil	0.0	0.0	0.00	0.00	0.00	0.15	0.00
Aerator, Others	0.0	0.0				0.00	0.14

Electric kWh Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Electric kW Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Oil MMBtu Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Propane MMBtu Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Aerator, Electric								0.31	0.81
Aerator, Oil	7	0.86	1.00		1.00	1.00	1.00	0.00	0.00
Aerator, Others								0.35	0.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Aerator, Electric	41.52%	31.39%	15.22%	11.88%
Aerator, Oil	0.00%	0.00%	0.00%	0.00%
Aerator, Others	34.11%	19.64%	24.44%	21.81%

Measure Life Note: Massachusetts Common Assumption

ISR Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

ISR Note: For mailed-in faucet aerators, ISR is assumed at 59% based on MA VHEA Study (MA20R26-B-VHEA)

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Aerator	269	0	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Aerator	0.27	0.01	0.04	0.78

NTG Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

TRC: $7 / unit

Incentive: $7 / unit

Aerator, mailed

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Water Heating | **Measure Type:** Flow Control | **Measure Sub Type:** Faucet Aerator

Program: EnergyWise Single Family

Measure Description

Installation of a mailed faucet aerator with a flow rate of 1.5 GPM or less on an existing faucet with high flow in a residential setting with service water heated by electricity.

Baseline Description

The baseline efficiency case is 2.2 GPM or greater faucet.

BCR Measures

BCR Measure Name	Unique Identifier
Aerator, mailed - Electric	2024 Electric EnergyWise Single Family Aerator, mailed - Electric
Aerator, mailed - Oil	2024 Electric EnergyWise Single Family Aerator, mailed - Oil
Aerator, mailed - Others	2024 Electric EnergyWise Single Family Aerator, mailed - Others

Savings Principle

The high efficiency case is a faucet with 1.5 GPM or less aerator installed.

Savings Method

Deemed

Unit

Installed mailed aerator

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Aerator, mailed - Electric	28.0	0.0100				0.00	0.00
Aerator, mailed - Oil	0.0	0.0	0.00	0.00	0.00	0.15	0.00
Aerator, mailed - Others	0.0	0.0				0.00	0.14

Electric kW Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Oil MMBtu Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Propane MMBtu Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Aerator, mailed - Electric								0.35	0.00
Aerator, mailed - Oil	7	0.59	1.00		1.00	1.00	1.00	0.31	0.81
Aerator, mailed - Others								0.00	0.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Aerator, mailed - Electric	34.11%	19.64%	24.44%	21.81%
Aerator, mailed - Oil	41.52%	31.39%	15.22%	11.88%
Aerator, mailed - Others	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Source: RI_2022 Annual Plan_Gas_HVAC_WH_Calculations_2021-06-10

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Aerator, mailed	269	0	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Aerator, mailed	0.27	0.01	0.04	0.78

NTG Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

TRC: $0 / unit

Incentive: $0 / unit

Air Sealing Kit

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: Building Shell

Measure Type: Air Sealing

Measure Sub Type: Air Sealing/Infiltration

Program: EnergyWise Single Family

Measure Description

The installation of recessed lighting cans that provide air sealing benefits.

Baseline Description

The baseline is leaky recessed lighting cans.

BCR Measures

BCR Measure Name	Unique Identifier
Air Sealing Kit, Elec	2024 Electric EnergyWise Single Family Air Sealing Kit, Elec
Air Sealing Kit, Oil	2024 Electric EnergyWise Single Family Air Sealing Kit, Oil
Air Sealing Kit, Others	2024 Electric EnergyWise Single Family Air Sealing Kit, Others

Savings Principle

The high efficiency case is the existing building after the air sealing measure is implemented.

Savings Method

Deemed

Unit

Installed kit

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Air Sealing Kit, Elec	94.0	0.0710				0.00	0.00
Air Sealing Kit, Oil	0.0	0.0	0.00	0.00	0.00	0.38	0.00
Air Sealing Kit, Others	0.0	0.0				0.00	0.37

Electric kWh Source: Cadeo/Illume (2020). 2017-2019 Impact Evaluation of the Home Energy Reports Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ngrid-ri-behavior-evaluation-28aug2020.pdf

Electric kW Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Oil MMBtu Note: Calculated: (cfm50 pre in - cfm50 new in)/(18.5* height factor in) * 0.018 * 24 * 60* heating degree day in / seasonal efficiency in * correction factor in

Propane MMBtu Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Air Sealing Kit	12	1.00	1.00		1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Air Sealing Kit	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Rise Engineering (2015). Memo on Pilot Findings for LED inserts for Recessed Light Cans.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Air Sealing Kit	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Air Sealing Kit	0.00	0.00	0.04	1.04

NTG Source: The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation.

Electric Resistance to MSHP

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: HVAC

Measure Type: Heating

Measure Sub Type: Heat Pump Electrification

Program: EnergyWise Single Family

Measure Description

The purchase and installation of high efficiency mini-split heat pump system to replace an electric resistance heating system.

Baseline Description

The baseline efficiency case for heating is a residential electric resistance heating system.

The baseline efficiency case for cooling is a residential window AC unit with EER 9.8.

BCR Measures

BCR Measure Name	Unique Identifier
Electric Resistance to MSHP	2024 Electric EnergyWise Single Family Electric Resistance to MSHP

Savings Principle

The high efficiency case is an ENERGY STAR® qualified air-source heat pump.

Savings Method

Deemed

Unit

Installed high-efficiency mini-split heat pump system for heating and cooling.

Savings Equation

Heating Gross kWh = Qty*deltakWh_heating

Cooling Gross kWh = Qty*deltakWh_cooling

Cooling Gross kW = Qty*deltakW

Where:

Qty = Total number of units.

deltakWh_heating = Average annual heating kWh reduction per unit.

deltakWh_cooling = Average annual cooling kWh reduction per unit.

deltakW = Average annual kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Electric Resistance to MSHP	6549.0	2.8300	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Electric kWh Note: Updated based on historic measure mix

Electric kW Source: RI_2022 Annual PLan Electric H&C Savings Workbook_06-14-2021

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Electric Resistance to MSHP	17	1.00	1.00		1.00	1.00	1.00		0.62

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Electric Resistance to MSHP	42.92%	57.08%	0.00%	0.00%

Measure Life Source: Michaels Energy (2022). X2001A: Connecticut Measure Life/EUL Update Study-Residential Measures. https://energizect.com/sites/default/files/2022-07/CT%20X2001A%20EUL%20Res%20Measure%20Report%20FINAL060522.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Electric Resistance to MSHP	0	0	5.22	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Electric Resistance to MSHP	0.31	0.22	0.04	0.95

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $7000 / measure

Incentive: $4200 / measure

Participant

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Participant **Measure Type:** Participant **Measure Sub Type:** Participant

Program: EnergyWise Single Family

Measure Description

This row identifies a participant for tracking and cost purposes.

Baseline Description

BCR Measures

BCR Measure Name	Unique Identifier
Participant	2024 Electric EnergyWise Single Family Participant

Savings Principle

Savings Method

Unit

Savings Equation

N/A

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Participant			0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Participant	5	1.00	1.00		1.00	0.86	0.86		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Participant	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Participant	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Participant	0.00	0.00	0.00	1.00

TRC: $375 / participant

Incentive: $375 / participant

Pipe Insulation

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Water Heating **Measure Type:** Insulation **Measure Sub Type:** Pipe Insulation

Program: EnergyWise Single Family

Measure Description

Insulation upgrades to existing water heating system pipes

Baseline Description

The baseline case is uninsulated heated water pipes.

BCR Measures

BCR Measure Name	Unique Identifier
Pipe Insulation, Electric	2024 Electric EnergyWise Single Family Pipe Insulation, Electric
Pipe Insulation, Oil	2024 Electric EnergyWise Single Family Pipe Insulation, Oil
Pipe Insulation, Others	2024 Electric EnergyWise Single Family Pipe Insulation, Others

Savings Principle

The high efficiency case includes pipe wrap

Savings Method

Deemed

Unit

Insulated equipment

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Pipe Insulation, Electric	46.0	0.0100				0.00	0.00
Pipe Insulation, Oil	0.0	0.0	0.00	0.00	0.00	0.30	0.00
Pipe Insulation, Others	0.0	0.0				0.00	0.30

Electric kWh Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Oil MMBtu Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Propane MMBtu Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Pipe Insulation	15	0.98	1.00		1.00	1.00	1.00	0.31	0.81

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Pipe Insulation	41.52%	31.39%	15.22%	11.88%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Pipe Insulation	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Pipe Insulation	0.27	0.01	0.04	0.78

NTG Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

TRC: $7 / unit

Incentive: $7 / unit

Pre-weatherization

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: Whole Home

Measure Type: Weatherization

Measure Sub Type: Pre-Weatherization

Program: EnergyWise Single Family

Measure Description

Rebate for customers to improve home to make it ready for Wx install; non-energy related measures such as asbestos removal or remove knob and tube wiring

Baseline Description

N/A

BCR Measures

BCR Measure Name	Unique Identifier
Pre-weatherization	2024 Electric EnergyWise Single Family Pre-weatherization

Savings Principle

Savings Method

N/A

Unit

Rebated Pre-Wx

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Pre-weatherization			0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Pre-weatherization	1	1.00	1.00		1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Pre-weatherization	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Pre-weatherization	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Pre-weatherization	0.14	0.01	0.04	0.91

NTG Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

TRC: $250 / job

Incentive: $250 / job

Programmable Thermostat

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Thermostat

Program: EnergyWise Single Family

Measure Description

Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.

Baseline Description

The baseline efficiency case is an HVAC system without a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Programmable Thermostat - Elec	2024 Electric EnergyWise Single Family Programmable Thermostat - Elec
Programmable Thermostat, Oil	2024 Electric EnergyWise Single Family Programmable Thermostat, Oil
Programmable Thermostat, Others	2024 Electric EnergyWise Single Family Programmable Thermostat, Others

Savings Principle

The high efficiency case is an HVAC system with a programmable thermostat installed.

Savings Method

Deemed

Unit

Installed programmable thermostat.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Programmable Thermostat - Elec	222.6	0.1700	0.00	0.00	0.00	0.00	0.00
Programmable Thermostat, Oil	27.0	0.0400				2.07	0.00
Programmable Thermostat, Others	27.0	0.0400				0.00	2.07

Electric kWh Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Oil MMBtu Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Propane MMBtu Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Programmable Thermostat - Elec	19	0.88	1.00		1.00	1.00	1.00	0.34	0.21
Programmable Thermostat, Oil								0.35	0.00
Programmable Thermostat, Others								0.35	0.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Programmable Thermostat - Elec	26.13%	30.53%	22.51%	20.83%
Programmable Thermostat, Oil	6.59%	3.85%	47.32%	42.24%
Programmable Thermostat, Others	6.59%	3.85%	47.32%	42.24%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

ISR Note: For mailed-in thermostats, ISR is assumed at 59% based on MA VHEA Study (MA20R26-B-VHEA)

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Programmable Thermostat	0	0	3.68	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Programmable Thermostat	0.47	0.01	0.04	0.58

NTG Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

TRC: $100 / unit

Incentive: $100 / unit

Programmable Thermostat, mailed

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Thermostat

Program: EnergyWise Single Family

Measure Description

Installation of a mailed programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.

Baseline Description

The baseline efficiency case is an HVAC system without a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Programmable Thermostat, mailed - Elec	2024 Electric EnergyWise Single Family Programmable Thermostat, mailed - Elec
Programmable Thermostat, mailed - Oil	2024 Electric EnergyWise Single Family Programmable Thermostat, mailed - Oil
Programmable Thermostat, mailed - Others	2024 Electric EnergyWise Single Family Programmable Thermostat, mailed - Others

Savings Principle

The high efficiency case is an HVAC system with a mailed programmable thermostat installed.

Savings Method

Deemed

Unit

Installed mailed programmable thermostat

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Programmable Thermostat, mailed - Elec	222.6	0.1700				0.00	0.00
Programmable Thermostat, mailed - Oil	27.0	0.0400	0.00	0.00	0.00	2.07	0.00
Programmable Thermostat, mailed - Others	27.0	0.0400				0.00	2.07

Electric kWh Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Oil MMBtu Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Propane MMBtu Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Programmable Thermostat, mailed	19	0.59	1.00		1.00	1.00	1.00	0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Programmable Thermostat, mailed	4.92%	28.34%	35.27%	31.47%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: RI_2022 Annual Plan_Gas_HVAC_WH_Calculations_2021-06-10

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Programmable Thermostat, mailed	0	0	3.68	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Programmable Thermostat, mailed	0.47	0.01	0.04	0.58

NTG Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

TRC: $0 / unit

Incentive: $0 / unit

Refrig rebate

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Appliances | **Measure Type:** Refrigerators | **Measure Sub Type:** Refrigerator

Program: EnergyWise Single Family

Measure Description

This measure covers the replacement of an existing inefficient refrigerator with a new efficient refrigerator.

Baseline Description

For Top Ten® and Most Efficient® refrigerators, the baseline is a 50% mix of available Energy Star® and Federal standard compliant refrigerators. For Energy Star® refrigerators, the baseline is a refrigerator that meets Federal standards.

BCR Measures

BCR Measure Name	Unique Identifier
Refrig rebate	2024 Electric EnergyWise Single Family Refrig rebate

Savings Principle

The high efficiency case is an Energy Star® refrigerator or a model that is ENERGY STAR® rated and included in the Most Efficient® or Top Ten USA® ranking.

Savings Method

Deemed

Unit

Installed high-efficiency refrigerator.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Refrig rebate	914.0	0.1600	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Refrig rebate	15	1.00	1.00		1.00	1.00	1.00	0.79	0.65

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Refrig rebate	29.00%	31.95%	18.18%	20.87%

Measure Life Source: DOE (2021). Technical Support Document: Refrigerators, Refrigerator-freezers, and Freezers. EERE-2017-BT-STD-0014-0030. https://www.regulations.gov/document/EERE-2017-BT-STD-0003-0020

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Refrig rebate	0	0	0.00	0.00	0.00	1.46	0.00	0.00

One-time $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Refrig rebate	0.00	0.00	0.00	1.00

NTG Source: The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation.

TRC: $0 / unit

Incentive: $0 / unit

Refrigerator Brush

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: Refrigeration

Measure Type: Refrigeration O&M

Measure Sub Type: Refrigerator Brush

Program: EnergyWise Single Family

Measure Description

The cleaning of refrigerator coils.

Baseline Description

A refrigerator with uncleaned coils.

BCR Measures

BCR Measure Name	Unique Identifier
Refrigerator Brush	2024 Electric EnergyWise Single Family Refrigerator Brush

Savings Principle

A refrigerator with coils cleaned by an auditor.

Savings Method

Deemed

Unit

Per brushed refrigerator coil

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Refrigerator Brush	10.9	0.0020	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: DNV GL (2016). RI Impact Evaluation of 2014 EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160816_py2014_ri_energywise_report.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Refrigerator Brush	5	1.00	1.00		1.00	1.00	1.00	0.79	0.65

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Refrigerator Brush	29.00%	31.95%	18.18%	20.87%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Refrigerator Brush	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Refrigerator Brush	0.00	0.00	0.04	1.04

NTG Source: The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation.

TRC: $5 / unit

Incentive: $5 / unit

Showerhead

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Showerhead

Program: EnergyWise Single Family

Measure Description

A showerhead with a control that limits flow once water is heated.

Baseline Description

The baseline case is a showerhead with a flow of 2.5 gallons per minute, or for the case of the adapter, a low flow showerhead with flow of 1.5 gpm or less.

BCR Measures

BCR Measure Name	Unique Identifier
Showerhead - Elec	2024 Electric EnergyWise Single Family Showerhead - Elec
Showerhead - Oil	2024 Electric EnergyWise Single Family Showerhead - Oil
Showerhead - Other	2024 Electric EnergyWise Single Family Showerhead - Other

Savings Principle

The high efficiency is a low-flow showerhead with a flow of 1.5 gpm or less.

Savings Method

Deemed

Unit

Installed showerhead

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Showerhead - Elec	213.0	0.0500				0.00	0.00
Showerhead - Oil	0.0	0.0	0.00	0.00	0.00	1.20	0.00
Showerhead - Other	0.0	0.0				0.00	1.10

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Showerhead	15	0.85	1.00		1.00	1.00	1.00	0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Showerhead	34.11%	19.64%	24.44%	21.81%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

ISR Note: For mailed-in showerheads, ISR is assumed at 53% based on MA VHEA Study (MA20R26-B-VHEA)

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Showerhead	1565	0	0.00	0.00	0.00	0.03	0.00	0.00

Water/Sewer Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

One-time $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Showerhead	0.27	0.01	0.04	0.78

NTG Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

TRC: $30 / unit

Incentive: $30 / unit

Showerhead, mailed

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Showerhead

Program: EnergyWise Single Family

Measure Description

A mailed showerhead with a control that limits flow once water is heated.

Baseline Description

The baseline case is a showerhead with a flow of 2.5 gallons per minute, or for the case of the adapter, a low flow showerhead with flow of 1.5 gpm or less.

BCR Measures

BCR Measure Name	Unique Identifier
Showerhead, mailed - Electric	2024 Electric EnergyWise Single Family Showerhead, mailed - Electric
Showerhead, mailed - Oil	2024 Electric EnergyWise Single Family Showerhead, mailed - Oil
Showerhead, mailed - Others	2024 Electric EnergyWise Single Family Showerhead, mailed - Others

Savings Principle

The high efficiency is a mailed low-flow showerhead with a flow of 1.5 gpm or less.

Savings Method

Deemed

Unit

Installed mailed showerhead

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Showerhead, mailed - Electric	213.0	0.0500				0.00	0.00
Showerhead, mailed - Oil	0.0	0.0	0.00	0.00	0.00	1.20	0.00
Showerhead, mailed - Others	0.0	0.0				0.00	1.10

Electric kWh Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Showerhead, mailed	15	0.53	1.00		1.00	1.00	1.00	0.31	0.81

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Showerhead, mailed	41.52%	31.39%	15.22%	11.88%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: RI_2022 Annual Plan_Gas_HVAC_WH_Calculations_2021-06-10

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Showerhead, mailed	1565	0	0.00	0.00	0.00	0.03	0.00	0.00

Water/Sewer Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

One-time $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Showerhead, mailed	0.27	0.01	0.04	0.78

NTG Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

TRC: $0 / unit

Incentive: $0 / unit

Smart Strip

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Plug Load | **Measure Type:** Smart Strips | **Measure Sub Type:** Smart Strip

Program: EnergyWise Single Family

Measure Description

The basic measures switches off plug load using current sensors and switching devices which turn off plug load when electrical current drops below threshold low levels. The advanced measure shuts devices off after it no longer senses activity from their infrared controls.

Baseline Description

The baseline efficiency case is the absence power strip and leaving peripheral devices plugged in or using a power surge protector and leaving peripheral devices on.

BCR Measures

BCR Measure Name	Unique Identifier
Smart Strip	2024 Electric EnergyWise Single Family Smart Strip

Savings Principle

The high efficiency case is the use of a smart strip or advanced smart strip.

Savings Method

Deemed

Unit

Rebated smart strip.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Smart Strip	105.0	0.0200	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Smart Strip	5	0.84	1.00		0.92	0.92	0.92	0.58	0.86

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Smart Strip	32.24%	34.78%	15.36%	17.62%

Measure Life Note: Massachusetts Common Assumption

ISR Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

RRsp Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

RRwp Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Smart Strip	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Smart Strip	0.31	0.01	0.04	0.74

NTG Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

TRC: $22 / unit

Incentive: $22 / unit

VENTILATION - OTHER

Sector: Residential **Fuel:** Electric **Program Type:** Custom

Measure Category: Whole Home **Measure Type:** Ventilation **Measure Sub Type:** Other

Program: EnergyWise Single Family

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
VENTILATION - OTHER	2024 Electric EnergyWise Single Family VENTILATION - OTHER

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
VENTILATION - OTHER	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
VENTILATION - OTHER	1	1.00	1.00		1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
VENTILATION - OTHER	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

CFwp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
VENTILATION - OTHER	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
VENTILATION - OTHER	0.00	0.00	0.00	1.00

NTG Source: The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation.

TRC: $0 / EW Bundled costs (see Participant listing)

Incentive: $0 / EW Bundled costs (see Participant listing)

Weatherization

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Building Shell **Measure Type:** Insulation **Measure Sub Type:** Shell

Program: EnergyWise Single Family

Measure Description

Installation of weatherization measures such as air sealing and insulation upgrades in existing facilities.

Baseline Description

The baseline efficiency case is any existing home shell measures.

BCR Measures

BCR Measure Name	Unique Identifier
Weatherization, Electric Weatherization, Oil Weatherization, Others	2024 Electric EnergyWise Single Family Weatherization, Electric 2024 Electric EnergyWise Single Family Weatherization, Oil 2024 Electric EnergyWise Single Family Weatherization, Others

Savings Principle

Savings Method

The high efficiency case includes increased weatherization insulation levels.

Unit

Deemed

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: Completed insulation project.

Hours Source: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Weatherization, Electric	765.0	0.6400				0.00	0.00
Weatherization, Oil	64.0	0.0800	0.00	0.00	0.00	12.40	0.00
Weatherization, Others	64.0	0.0800				0.00	12.40

Electric kWh Source: Cadeo (2023). EnergyWise Single Family Weatherization Impact Evaluation.

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Oil MMBtu Source: Cadeo (2023). EnergyWise Single Family Weatherization Impact Evaluation.

Propane MMBtu Source: Cadeo (2023). EnergyWise Single Family Weatherization Impact Evaluation.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Weatherization	20	1.00	1.00		1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Weatherization	26.13%	30.53%	22.51%	20.83%

Measure Life Source: Guidehouse (2018). ComEd Effective Useful Life Research Report. https://www.icc.illinois.gov/docket/P2017-0312/documents/287811/files/501915.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Weatherization	0	0	67.49	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Weatherization	0.14	0.01	0.04	0.91

NTG Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

TRC: Electric - $3800/home; Oil/Other - $4800/home

Incentive: Electric - $3200/home; Oil/Other - $3050/home

WiFi Thermostat

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Thermostat

Program: EnergyWise Single Family

Measure Description

Installation of wifi thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.

Baseline Description

The baseline efficiency case is an HVAC system with either a manual or a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
WiFi Thermostat - AC Only	2024 Electric EnergyWise Single Family WiFi Thermostat - AC Only
WiFi Thermostat - Oil	2024 Electric EnergyWise Single Family WiFi Thermostat - Oil
WiFi Thermostat - Others	2024 Electric EnergyWise Single Family WiFi Thermostat - Others
WiFi Thermostat - Electric	2024 Electric EnergyWise Single Family WiFi Thermostat - Electric

Savings Principle

The high efficiency case is an HVAC system providing space heating with a wifi thermostat installed.

Savings Method

Deemed

Unit

Installed programmable thermostat.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
WiFi Thermostat - AC Only	70.0	0.0800	0.00	0.00	0.00	0.00	0.00
WiFi Thermostat - Oil	51.0	0.0400				2.79	0.00
WiFi Thermostat - Others	27.0	0.0400				0.00	2.79
WiFi Thermostat - Electric	27.0	0.1700				0.00	
	222.6						

Electric kWh Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
WiFi Thermostat	11	0.88	1.00		1.00	1.00	1.00	0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
WiFi Thermostat	6.59%	3.85%	47.32%	42.24%

Measure Life Source: Southern California Edison (2017). Residential Smart Thermostat Workpaper (Work Paper SCE17HC054, Revision #0). https://www.peakload.org/assets/SCE17HC054.0_Residential_Sma.pdf

ISR Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

ISR Note: For mailed-in thermostats, ISR is assumed at 59% based on MA VHEA Study (MA20R26-B-VHEA)

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
WiFi Thermostat	0	0	3.68	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
WiFi Thermostat	0.47	0.01	0.04	0.58

NTG Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

TRC: $300 / unit

Incentive: $200 / unit

Wi-Fi Thermostat, mailed

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Thermostat

Program: EnergyWise Single Family

Measure Description

Installation of a mailed wifi thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.

Baseline Description

The baseline efficiency case is an HVAC system with either a manual or a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
WiFi Thermostat, mailed - AC Only	2024 Electric EnergyWise Single Family WiFi Thermostat, mailed - AC Only
WiFi Thermostat, mailed - Elec	2024 Electric EnergyWise Single Family WiFi Thermostat, mailed - Elec
WiFi Thermostat, mailed - Oil	2024 Electric EnergyWise Single Family WiFi Thermostat, mailed - Oil
WiFi Thermostat, mailed - Others	2024 Electric EnergyWise Single Family WiFi Thermostat, mailed - Others

Savings Principle

The high efficiency case is an HVAC system providing space heating with a mailed wifi thermostat installed.

Savings Method

Deemed

Unit

Installed mailed wifi thermostat

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
WiFi Thermostat, mailed - AC Only	51.0	0.0800	0.00	0.00	0.00	0.00	0.00
WiFi Thermostat, mailed - Elec	222.6	0.1700				0.00	0.00
WiFi Thermostat, mailed - Oil	27.0	0.0400				2.79	0.00
WiFi Thermostat, mailed - Others	27.0	0.0400				0.00	2.79

Electric kWh Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Wi-Fi Thermostat, mailed	11	0.58	1.00		1.00	1.00	1.00	0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Wi-Fi Thermostat, mailed	6.60%	3.85%	47.32%	42.24%

Measure Life Source: Southern California Edison (2017). Residential Smart Thermostat Workpaper (Work Paper SCE17HC054, Revision #0). https://www.peakload.org/assets/SCE17HC054.0_Residential_Sma.pdf

ISR Source: RI_2022 Annual Plan_Gas_HVAC_WH_Calculations_2021-06-10

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Wi-Fi Thermostat, mailed	0	0	3.68	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Wi-Fi Thermostat, mailed	0.47	0.01	0.04	0.58

NTG Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

TRC: $0 / unit

Incentive: $0 / unit

Window

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Building Shell | **Measure Type:** Windows | **Measure Sub Type:**

Program: EnergyWise Single Family

Measure Description

Early replacement of a single pane window either with or without a storm with a triple pane window.

Baseline Description

The baseline efficiency case is a single pane window with or without a storm.

BCR Measures

BCR Measure Name	Unique Identifier
Window -Electric Resistance	2024 Electric EnergyWise Single Family Window -Electric Resistance
Window -Heat Pump	2024 Electric EnergyWise Single Family Window -Heat Pump
Window -Oil	2024 Electric EnergyWise Single Family Window -Oil
Window -Propane	2024 Electric EnergyWise Single Family Window -Propane

Savings Principle

The high efficiency case is an Energy Star qualified triple pane window.

Savings Method

Deemed

Unit

Replacement of window with single pane either with or without a storm with a triple pane window.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Window -Electric Resistance	131.0	0.1300	0.00	0.00	0.00	0.00	0.00
Window -Heat Pump	69.0	0.0500				0.00	0.00
Window -Oil	7.0	0.0100				0.60	0.00
Window -Propane	7.0	0.0100				0.00	0.60

Electric kWh Note: Massachusetts Common Assumption

Electric kW Note: Massachusetts Common Assumption

Gas Heat MMBtu Note: Massachusetts Common Assumption

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Window -Electric Resistance	17	1.00	1.00		1.00			0.33	0.43
Window -Heat Pump								0.37	0.22
Window -Oil								0.37	0.00
Window -Propane								0.37	0.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Window -Electric Resistance	45.00%	44.00%	6.00%	5.00%
Window -Heat Pump	25.25%	29.29%	24.24%	21.21%
Window -Oil	3.96%	3.96%	49.50%	42.57%
Window -Propane	3.96%	3.96%	49.50%	42.57%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group.
https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Window	0	0	6.81	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Annual $ Note: MA values

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Window	0.04	0.00	0.00	0.96

NTG Note: Massachusetts Common Assumption

TRC: $0 / measure

Incentive: $0 / measure

AC Timer

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** AC Timer

Program: EnergyWise Multifamily

Measure Description

Installation of an air conditioner timer

Baseline Description

The baseline case is that no ac timer exists

BCR Measures

BCR Measure Name	Unique Identifier
AC Timer	2024 Electric EnergyWise Multifamily AC Timer

Savings Principle

Reduce usage of ac

Savings Method

Deemed

Unit

Installed ac timer

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
AC Timer			0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
AC Timer	5	1.00	1.00		1.00	1.00	1.00	1.00	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
AC Timer	1.00%	5.00%	60.00%	34.00%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

CFwp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
AC Timer	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
AC Timer	0.00	0.00	0.00	1.00

NTG Source: The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation.

TRC: $0 / EW Bundled costs (see Participant listing)

Incentive: $0 / EW Bundled costs (see Participant listing)

Aerator

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Water Heating | **Measure Type:** Flow Control | **Measure Sub Type:** Faucet Aerator

Program: EnergyWise Multifamily

Measure Description

Installation of a faucet aerator with a flow rate of 1.5 GPM or less on an existing faucet with high flow in a commercial setting with service water heated by electricity.

Baseline Description

The baseline efficiency case is 2.2 GPM or greater faucet.

BCR Measures

BCR Measure Name	Unique Identifier
Aerator - Elec	2024 Electric EnergyWise Multifamily Aerator - Elec
Aerator - Oil	2024 Electric EnergyWise Multifamily Aerator - Oil
Aerator - Other	2024 Electric EnergyWise Multifamily Aerator - Other

Savings Principle

The high efficiency case is a faucet with 1.5 GPM or less aerator installed.

Savings Method

Calculated using site-specific inputs

Unit

Installed faucet aerator.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Aerator - Elec	38.0	0.0091				0.00	0.00
Aerator - Oil	0.0	0.0	0.00	0.00	0.00	0.20	0.00
Aerator - Other	0.0	0.0				0.00	0.20

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Aerator	7	0.90	1.00		1.00	1.00	1.00	0.31	0.81

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Aerator - Elec	41.52%	31.39%	15.22%	11.88%

Measure Life Note: Massachusetts Common Assumption

ISR Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Aerator	359	0	0.59	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Aerator	0.08	0.01	0.00	0.93

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $5 / LI MF Bundled costs (see Participant listing)

Incentive: $5 / LI MF Bundled costs (see Participant listing)

Air Sealing

Sector: Residential | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Building Shell | **Measure Type:** Air Sealing | **Measure Sub Type:**

Program: EnergyWise Multifamily

Measure Description

Thermal shell air leaks are sealed through strategic use and location of air-tight materials.

Baseline Description

The baseline efficiency case is the existing building before the air sealing measure is implemented. The baseline building is characterized by the existing CFM50 measurement (CFM50PRE) for single family homes, or the existing air changes per hour (ACHPRE)

BCR Measures

BCR Measure Name	Unique Identifier
Air Sealing - Elec	2024 Electric EnergyWise Multifamily Air Sealing - Elec
Air Sealing - Elec w/AC	2024 Electric EnergyWise Multifamily Air Sealing - Elec w/AC
Air Sealing - Oil	2024 Electric EnergyWise Multifamily Air Sealing - Oil
Air Sealing - Other	2024 Electric EnergyWise Multifamily Air Sealing - Other

Savings Principle

The high efficiency case is the existing building after the air sealing measure is implemented. The high efficiency building is characterized by the new CFM50 measurement for single family homes (CFM50POST), or the new air changes per hour (ACHPOST) for multi-family facilities, which is measured after the air sealing measure is implemented.

Savings Method

Calculated using site-specific inputs

Unit

Completed air sealing project.

Savings Equation

Gross kWh = Stories × SQFT × (CFM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM

Gross kW = Gross kWh × kW/kWh

Where:

Stories = Total stories in the multi-family building

SQFT = Area of building in square feet

CFM/SQFT_pre = Estimate of pre-retrofit air leakagein CFM/SQFT based on number of stories in the building and air-tightness ratings of the existing roof and floor

CFM/SQFT_post = Estimate of post-retrofit air leakage in CFM/SQFT based on number of stories in the building and air-tightness ratings of theimproved roof and floor

deltakWh/CFM = Average annual kWh reduction per CFM

Gross kWh = Stories × SQFT × (CFM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM

kW/kWh = Average kW reduction per kWh reduction

Hours: 4644

Hours Source: NOAA Weather data: An average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Air Sealing - Elec	Calc	Calc	Calc	0.00	0.00	0.00	0.00
Air Sealing - Elec w/AC						0.00	0.00
Air Sealing - Oil						Calc	0.00
Air Sealing - Other						0.00	Calc

Electric kWh Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Electric kW Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Oil MMBtu Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Propane MMBtu Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Air Sealing - Elec	20	1.00	1.00		1.00	1.00	1.00	0.33	0.22
Air Sealing - Elec w/AC								0.35	0.00
Air Sealing - Oil								0.00	0.00
Air Sealing - Other								0.00	0.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Air Sealing - Elec	25.42%	30.57%	22.44%	21.58%
Air Sealing - Elec w/AC	6.59%	3.85%	47.32%	42.24%

Measure Life Source: Guidehouse (2018). ComEd Effective Useful Life Research Report. https://www.icc.illinois.gov/docket/P2017-0312/documents/287811/files/501915.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Air Sealing	0	0	19.61	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Air Sealing	0.33	0.01	0.00	0.68

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $178 / EW MF Bundled costs (see Participant listing)

Incentive: $178 / EW MF Bundled costs (see Participant listing)

Boiler Reset Control

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Boiler Control

Program: EnergyWise Multifamily

Measure Description

Boiler reset controls are devices that improve the efficiency of an existing boiler system by modulating the hot water temperature set point. Reset controls automatically control boiler water temperature based on outdoor temperature using a software program; load controls sense the thermal demand of the heating system and resets the water temperature based on the demand.

Baseline Description

The baseline efficiency case is a boiler without reset controls

BCR Measures

BCR Measure Name	Unique Identifier
Boiler Reset Control - Oil	2024 Electric EnergyWise Multifamily Boiler Reset Control - Oil
Boiler Reset Control - Other	2024 Electric EnergyWise Multifamily Boiler Reset Control - Other

Savings Principle

The efficient case is a boiler with reset or load controls, which reset the supply water temperature based on outdoor temperatures and/or building load.

Savings Method

Unit

Installation of boiler reset control on existing boiler

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Boiler Reset Control - Oil			0.00	0.00	0.00	35.50	0.00
Boiler Reset Control - Other						0.00	35.50

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Boiler Reset Control	15	1.00	1.00	1.00	0.86	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Boiler Reset Control	0.00%	0.00%	0.00%	0.00%

Measure Life Source: ACEEE (2006). Emerging Technologies Report: Advanced Boiler Controls. Prepared for ACEEE.https://www.aceee.org/files/pdf/2006_BoilerControls.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Boiler Reset Control	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Boiler Reset Control	0.14	0.00	0.00	0.86

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $0 / EW MF Bundled costs (see Participant listing)

Incentive: $0 / EW MF Bundled costs (see Participant listing)

Custom

Sector: Residential | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Custom | **Measure Type:** Custom | **Measure Sub Type:** Custom

Program: EnergyWise Multifamily

Measure Description

Vendors install a variety of measures at multifamily facilities. Measures include

Baseline Description

For retrofit projects, the baseline efficiency case is the same as the existing, or pre-retrofit, case for the

BCR Measures

BCR Measure Name	Unique Identifier
Custom	2024 Electric EnergyWise Multifamily Custom

Savings Principle

The high efficiency scenario is specific to the facility and may include one or more energy efficiency

Savings Method

Calculated using site-specific inputs

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom	multi	1.00	1.00		0.86	0.86	0.86		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom	0.00%	100.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom	0.00	0.00	0.00	1.00

TRC: $12000 / EW MF Bundled costs (see Participant listing)

Incentive: $9000 / EW MF Bundled costs (see Participant listing)

CUSTOM CHP

Sector: Residential **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** CHP **Measure Sub Type:** CHP

Program: EnergyWise Multifamily

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
CUSTOM CHP	2024 Electric EnergyWise Multifamily CUSTOM CHP

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CUSTOM CHP	Calc	Calc	0.00	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
CUSTOM CHP	multi	1.00	1.00			1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
CUSTOM CHP	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
CUSTOM CHP	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
CUSTOM CHP	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / EW MF Bundled costs (see Participant listing)

Incentive: $0 / EW MF Bundled costs (see Participant listing)

CUSTOM CIRCULATOR

Sector: Residential

Fuel: Electric

Program Type: Custom

Measure Category: Water Heating

Measure Type: Water Heater

Measure Sub Type: Demand Circulator

Program: EnergyWise Multifamily

Measure Description

Installation of a demand controller on a re-circulation loop.

Baseline Description

Full time operation of re-circ pump.

BCR Measures

BCR Measure Name	Unique Identifier
CUSTOM CIRCULATOR	2024 Electric EnergyWise Multifamily CUSTOM CIRCULATOR

Savings Principle

The re-circulation pump is controlled by a demand signal or timer to reduce operating hours when no hot water usage occurs.

Savings Method

Calc

Unit

Installed recirc controller

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CUSTOM CIRCULATOR	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Electric kW Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
CUSTOM CIRCULATOR	15	1.00	1.00			1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
CUSTOM CIRCULATOR	0.00%	70.21%	29.79%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

CFwp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
CUSTOM CIRCULATOR	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
CUSTOM CIRCULATOR	0.03	0.00	0.00	0.97

NTG Source: The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation.

TRC: $8000 / EW MF Bundled costs (see Participant listing)

Incentive: $4800 / EW MF Bundled costs (see Participant listing)

DHW

Sector: Residential **Fuel:** Electric **Program Type:** Custom

Measure Category: Water Heating **Measure Type:** Water Heater **Measure Sub Type:** Water Heater

Program: EnergyWise Multifamily

Measure Description

Installation of high efficiency water heating equipment to replace the existing inefficient water heater.

Baseline Description

The baseline efficiency case is a stand-alone tank water heater.

BCR Measures

BCR Measure Name	Unique Identifier
DHW	2024 Electric EnergyWise Multifamily DHW

Savings Principle

The high efficiency case is a stand-alone storage water heater with an energy factor >= 0.66

Savings Method

Calc

Unit

Installed water heating system.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
DHW	Calc	Calc	0.00	0.00	0.00	Calc	Calc

Electric kWh Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Electric kW Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
DHW	13	1.00	1.00		1.00	1.00	1.00	0.31	0.81

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
DHW	41.52%	31.39%	15.22%	11.88%

Measure Life Source: DOE (2008). ENERGY STAR® Residential Water Heaters: Final Criteria Analysis. Prepared for the DOE; Page 10.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

CFwp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
DHW	0	0	0.71	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2018, 2019). TXC 29 Market-Rate Rental Property NEI Study (Phase 1). TXC50 - LIMF Market Rate MF NEI - Phase I.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
DHW	0.00	0.00	0.00	1.00

TRC: $0 / EW MF Bundled costs (see Participant listing)

Incentive: $0 / EW MF Bundled costs (see Participant listing)

Heat Pumps

Sector: Residential | **Fuel:** Electric | **Program Type:** Custom

Measure Category: HVAC | **Measure Type:** Heat Pumps | **Measure Sub Type:** Heat Pump

Program: EnergyWise Multifamily

Measure Description

Installation of a heat pump displacing electric, oil, or propane heat.

Baseline Description

The baseline efficiency case is the existing site conditions

BCR Measures

BCR Measure Name	Unique Identifier
Heat Pumps	2024 Electric EnergyWise Multifamily Heat Pumps

Savings Principle

The high efficiency case will vary by site

Savings Method

Calc

Unit

Installation of heat pump

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heat Pumps	Calc		0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heat Pumps	20	1.00	1.00		1.00		1.00	-0.21	0.21

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heat Pumps	35.10%	45.80%	10.10%	9.00%

Measure Life Source: Michaels Energy (2022). X2001A: Connecticut Measure Life/EUL Update Study-Residential Measures. https://energizect.com/sites/default/files/2022-07/CT%20X2001A%20EUL%20Res%20Measure%20Report%20FINAL060522.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heat Pumps	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heat Pumps	0.00	0.00	0.00	1.00

TRC: $26000 / EW MF Bundled costs (see Participant listing)

Incentive: $19500 / EW MF Bundled costs (see Participant listing)

Heating System Retrofit-Boiler

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Heating | **Measure Sub Type:** Retrofit Boiler

Program: EnergyWise Multifamily

Measure Description

The installation of high efficiency heating systems

Baseline Description

The baseline is the existing heating system.

BCR Measures

BCR Measure Name	Unique Identifier
Heating System Retrofit-Boiler	2024 Electric EnergyWise Multifamily Heating System Retrofit-Boiler

Savings Principle

The high efficiency case includes replacing heating systems with higher efficiency systems.

Savings Method

Calculated using site-specific inputs

Unit

Installed high-efficiency heating system.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heating System Retrofit-Boiler			0.00	0.00	0.00	20.40	0.00

Oil MMBtu Source: The Cadmus Group, Inc. (2012). Low Income Single Family Impact Evaluation. https://ma-eeac.org/wp-content/uploads/Low-Income-Single-Family-Program-Impact-Evaluation_Part-of-the-Massachusetts-Residential-Retrofit-Low-Income-Program-Area-Evaluation.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heating System Retrofit-Boiler	23	1.00	1.00		1.00	1.00	1.00	0.01	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heating System Retrofit-Boiler	49.00%	48.00%	1.00%	2.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

CFwp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heating System Retrofit-Boiler	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heating System Retrofit-Boiler	0.00	0.00	0.00	1.00

NTG Source: The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation.

TRC: $0 / EW MF Bundled costs (see Participant listing)

Incentive: $0 / EW MF Bundled costs (see Participant listing)

HVAC, Custom

Sector: Residential | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Custom | **Measure Type:** HVAC | **Measure Sub Type:**

Program: EnergyWise Multifamily

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
HVAC, Custom	2024 Electric EnergyWise Multifamily HVAC, Custom

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
HVAC, Custom	Calc	Calc	Calc	Calc	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
HVAC, Custom	multi	1.00	1.00	0.86	0.86	1.00	1.00		0.43

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
HVAC, Custom	43.13%	56.87%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Note: National Grid assumption based on regional PA working groups.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
HVAC, Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
HVAC, Custom	0.14	0.00	0.00	0.86

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $0 / EW Bundled costs (see Participant listing)

Incentive: $0 / EW Bundled costs (see Participant listing)

Insulation

Sector: Residential | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Building Shell | **Measure Type:** Insulation | **Measure Sub Type:**

Program: EnergyWise Multifamily

Measure Description

Shell insulation upgrades applied in existing facilities including improved insulation in attics, basements and sidewalls.

Baseline Description

The baseline efficiency case is any existing home shell measures.

BCR Measures

BCR Measure Name	Unique Identifier
Insulation - Elec w/AC	2024 Electric EnergyWise Multifamily Insulation - Elec w/AC
Insulation - Oil	2024 Electric EnergyWise Multifamily Insulation - Oil
Insulation - Other	2024 Electric EnergyWise Multifamily Insulation - Other

Savings Principle

The high efficiency case includes increased weatherization insulation levels.

Savings Method

Calculated using site-specific inputs

Unit

Completed insulation project.

Savings Equation

Gross kWh = SQFT × deltakWh/SQFT × (1/R_pre - 1/R_post)

Gross kW = Gross kWh × kW/kWh

Where:

SQFT = Square feet of insulation installed

deltakWh/SQFT = Average annual kWh reduction per SQFT of insulation

R_pre = R-Value of the existing insulation

R_post =R-Value of the new installed insulation

Gross kWh = Stories × SQFT × (CFM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM

kW/kWh = Average annual kW reduction per kWh reduction

Hours: 4644

Hours Source: NOAA Weather data: An average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Insulation - Elec w/AC	Calc	Calc	0.00	0.00	0.00	Calc	Calc
Insulation - Oil						Calc	Calc
Insulation - Other							

Electric kWh Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Electric kW Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Insulation	25	1.00	1.00					0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Insulation	6.60%	3.85%	47.32%	42.24%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Insulation	0	0	47.95	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Insulation	0.33	0.01	0.00	0.68

TRC: $70 / EW MF Bundled costs (see Participant listing)

Incentive: $52.5 / EW MF Bundled costs (see Participant listing)

Participant

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Participant **Measure Type:** Participant **Measure Sub Type:** Participant

Program: EnergyWise Multifamily

Measure Description

This row identifies a participant for tracking and cost purposes.

Baseline Description

BCR Measures

BCR Measure Name	Unique Identifier
Participant	2024 Electric EnergyWise Multifamily Participant

Savings Principle

Savings Method

Deemed

Unit

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Participant			0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Participant	multi	1.00	1.00		0.86	1.00	1.00	0.77	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Participant	34.00%	33.00%	16.00%	17.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Participant	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Participant	0.00	0.00	0.04	1.04

NTG Source: The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation.

TRC: $860 / participant

Incentive: $712 / EW MF Bundled costs (see Participant listing)

Pipe Wrap DHW

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Water Heating **Measure Type:** Insulation **Measure Sub Type:** Pipe Insulation

Program: EnergyWise Multifamily

Measure Description

Installation of insulation to reduce water heating energy.

Baseline Description

The baseline case is uninsulated heated water pipes.

BCR Measures

BCR Measure Name	Unique Identifier
Pipe Wrap DHW	2024 Electric EnergyWise Multifamily Pipe Wrap DHW
Pipe Wrap DHW - Elec	2024 Electric EnergyWise Multifamily Pipe Wrap DHW - Elec
Pipe Wrap DHW - Oil	2024 Electric EnergyWise Multifamily Pipe Wrap DHW - Oil
Pipe Wrap DHW - Other	2024 Electric EnergyWise Multifamily Pipe Wrap DHW - Other

Savings Principle

The high efficiency case is the installation of high-efficiency domestic hot water equipment such as low-flow showerheads and faucet aerators.

Savings Method

Deemed

Unit

Linear Foot

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Pipe Wrap DHW	24.9	0.0060	0.00	0.00	0.00	0.00	0.00
Pipe Wrap DHW - Elec	24.9	0.0060				0.00	0.00
Pipe Wrap DHW - Oil	0.0	0.0				0.15	0.00
Pipe Wrap DHW - Other	0.0	0.0				0.00	0.15

Electric kWh Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Electric kW Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Oil MMBtu Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Propane MMBtu Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Pipe Wrap DHW	15	0.90	1.00		1.00	1.00	1.00	0.31	0.81

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Pipe Wrap DHW	41.52%	31.39%	15.22%	11.88%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Pipe Wrap DHW	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Pipe Wrap DHW	0.08	0.01	0.00	0.93

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $3 / EW MF Bundled costs (see Participant listing)

Incentive: $3 / EW MF Bundled costs (see Participant listing)

Programmable Thermostat

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Thermostat

Program: EnergyWise Multifamily

Measure Description

Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.

Baseline Description

The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Programmable Thermostat - Elec w/ AC	2024 Electric EnergyWise Multifamily Programmable Thermostat - Elec w/ AC
Programmable Thermostat - Oil	2024 Electric EnergyWise Multifamily Programmable Thermostat - Oil

Savings Principle

The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.

Savings Method

Deemed

Unit

Installed thermostat

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Programmable Thermostat - Elec w/ AC	278.0	0.2363	278.00	0.00	0.00	0.00	0.00
Programmable Thermostat - Oil	29.0	0.0247	29.00			1.60	

Electric kWh Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Electric kW Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Oil MMBtu Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Programmable Thermostat	19	0.95	1.00		1.00	1.00	1.00	0.34	0.17

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Programmable Thermostat	23.21%	27.86%	25.20%	23.73%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Programmable Thermostat	0	0	14.54	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Programmable Thermostat	0.48	0.01	0.00	0.53

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $125 / EW MF Bundled costs (see Participant listing)

Incentive: $125 / EW MF Bundled costs (see Participant listing)

Refrig rebate

Sector: Residential | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Appliances | **Measure Type:** Refrigerators | **Measure Sub Type:** Refrigerator

Program: EnergyWise Multifamily

Measure Description

This measure covers the replacement of an existing inefficient refrigerator with a new ENERGY STAR® rated refrigerator. ENERGY STAR® qualified refrigerators use at least 20% less energy than non-qualified models.

Baseline Description

The baseline efficiency case is the existing refrigerator. It is assumed that low-income customers would otherwise replace their refrigerators with a used inefficient unit.

BCR Measures

BCR Measure Name	Unique Identifier
Refrig rebate	2024 Electric EnergyWise Multifamily Refrig rebate

Savings Principle

The high efficiency case is an ENERGY STAR® rated refrigerator that meets the ENERGY STAR® criteria for full-sized refrigerators (7.75 cubic feet), using at least 20% less energy than models meeting the minimum Federal government standard.

Savings Method

Deemed

Unit

Installed high-efficiency refrigerator.

Savings Equation

delta kWh = ((kWhpre-kWhes) x (RUL/EUL)) + (((kWhstd+kWhused)/2 - kWhes) x ((EUL-RUL)/EUL)) x Focc

Where:

kWhpre = Annual kWh consumption of existing equipment. Value is based on metering or AHAM database. The default value is 874 kWh.

kWhES = Annual kWhconsumption of new ENERGY STAR qualified refrigerator or freezer. This is from the nameplate on the new unit. The default value is 358 kWh.

STD Average annual consumption of equipment meeting federal standard: Calculated by dividing the kWhES by 0.9 (i.e., the Energy Star units are assumed to be 10% more efficient than the kWhstd units). The default value is

398 kWh.

kWhused Average annual consumption of used equipment. Default value is 475 kWh.34

RUL = Remaining Useful life assumed to be 6 years

EUL = Estimated useful life for a new refrigerator is 12 years35

Focc = Occupant adjustment factor used to adjust the energy savings according to the number of occupants in the dwelling unit. See table below. Default is 2.3 occupants per tenant unit

ΔkWh = 330, using the default assumptions

Hours: 8760

Hours Note: The average annual operating hours are 8760 hours/year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Refrig rebate	914.0	0.1645	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Electric kW Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Refrig rebate	15	1.00	1.00		1.00	1.00	1.00	0.79	0.65

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Refrig rebate	29.00%	31.95%	18.18%	20.87%

Measure Life Source: DOE (2021). Technical Support Document: Refrigerators, Refrigerator-freezers, and Freezers. EERE-2017-BT-STD-0014-0030. https://www.regulations.gov/document/EERE-2017-BT-STD-0003-0020

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rates are 100% since savings estimates are based on evaluation results.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Refrig rebate	0	0	20.37	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Refrig rebate	0.00	0.00	0.00	1.00

NTG Source: The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation.

TRC: $0 / EW MF Bundled costs (see Participant listing)

Incentive: $0 / EW MF Bundled costs (see Participant listing)

Showerhead

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Showerhead

Program: EnergyWise Multifamily

Measure Description

Installation of a low flow showerhead with a flow rate of 1.5 GPM or less.

Baseline Description

The baseline efficiency case is a showerhead with a flow of 2.5 gpm. For home audit applications, the baseline is the existing showerhead.

BCR Measures

BCR Measure Name	Unique Identifier
Showerhead - Elec	2024 Electric EnergyWise Multifamily Showerhead - Elec
Showerhead - Oil	2024 Electric EnergyWise Multifamily Showerhead - Oil
Showerhead - Other	2024 Electric EnergyWise Multifamily Showerhead - Other

Savings Principle

The high efficiency is a low-flow showerhead with a flow of 1.5 gpm or less.

Savings Method

Deemed

Unit

Installed low-flow showerhead

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Showerhead - Elec	246.0	0.0590				0.00	0.00
Showerhead - Oil	0.0	0.0	0.00	0.00	0.00	1.40	0.00
Showerhead - Other	0.0	0.0				0.00	1.40

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Showerhead	15	0.90	1.00		1.00	1.00	1.00	0.31	0.81

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Showerhead	41.52%	31.39%	15.22%	11.88%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Showerhead	0	0	0.59	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Showerhead	0.08	0.01	0.00	0.93

TRC: $25 / EW MF Bundled costs (see Participant listing)

Incentive: $25 / EW MF Bundled costs (see Participant listing)

Smart Strips

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Plug Load | **Measure Type:** Smart Strips | **Measure Sub Type:** Smart Strip

Program: EnergyWise Multifamily

Measure Description

The basic measures switches off plug load using current sensors and switching devices which turn off plug load when electrical current drops below threshold low levels. The advanced measure shuts devices off after it no longer senses activity from their infrared controls.

Baseline Description

The baseline efficiency case is the absence power strip and leaving peripheral devices plugged in or using a power surge protector and leaving peripheral devices on

BCR Measures

BCR Measure Name	Unique Identifier
Smart Strips	2024 Electric EnergyWise Multifamily Smart Strips

Savings Principle

The high efficiency case is the use of a smart strip or advanced smart strip.

Savings Method

Deemed

Unit

Rebated smart strip.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: 8760

Hours Note: Since the power strip is assumed to be plugged in all year, the savings are based on 8,760 operational hours per year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Smart Strips	105.0	0.0189	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

Electric kW Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Smart Strips	5	0.84	1.00		0.92	0.92	0.92	0.58	0.86

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Smart Strips	32.24%	34.78%	15.36%	17.62%

Measure Life Note: Massachusetts Common Assumption

ISR Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

RRsp Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

RRwp Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

CFsp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

CFwp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Smart Strips	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Smart Strips	0.31	0.01	0.00	0.70

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $23 / EW MF Bundled costs (see Participant listing)

Incentive: $23 / EW MF Bundled costs (see Participant listing)

Thermostatic Shut-off Valve

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Showerhead

Program: EnergyWise Multifamily

Measure Description

A showerhead with a control that limits flow once water is heated.

Baseline Description

The baseline efficiency case is a showerhead with a flow of 2.5 gpm. For home audit applications, the baseline is the existing showerhead.

BCR Measures

BCR Measure Name	Unique Identifier
Thermostatic Shut-off Valve	2024 Electric EnergyWise Multifamily Thermostatic Shut-off Valve

Savings Principle

The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.

Savings Method

Calc

Unit

Installed showerhead

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Thermostatic Shut-off Valve	69.0	0.0100	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: National Grid (2014). Review of ShowerStart evolve.

Electric kW Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Thermostatic Shut-off Valve	15	1.00	1.00		1.00	1.00	1.00	0.31	0.81

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Thermostatic Shut-off Valve	41.52%	31.39%	15.22%	11.88%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

CFwp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Thermostatic Shut-off Valve	558	0	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: National Grid (2014). Review of ShowerStart evolve.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Thermostatic Shut-off Valve	0.03	0.00	0.00	0.97

NTG Source: The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation.

TRC: $0 / EW MF Bundled costs (see Participant listing)

Incentive: $0 / EW MF Bundled costs (see Participant listing)

TSV Showerhead

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Showerhead

Program: EnergyWise Multifamily

Measure Description

A showerhead with a control that limits flow once water is heated.

Baseline Description

The baseline efficiency case is a showerhead with a flow of 2.5 gpm. For home audit applications, the baseline is the existing showerhead.

BCR Measures

BCR Measure Name	Unique Identifier
TSV Showerhead - Elec	2024 Electric EnergyWise Multifamily TSV Showerhead - Elec
TSV Showerhead - Oil	2024 Electric EnergyWise Multifamily TSV Showerhead - Oil
TSV Showerhead - Other	2024 Electric EnergyWise Multifamily TSV Showerhead - Other

Savings Principle

The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.

Savings Method

Deemed

Unit

Installed showerhead.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
TSV Showerhead - Elec	315.0	0.0756	0.00	0.00	0.00	0.00	0.00
TSV Showerhead - Oil		Calc				1.60	0.00
TSV Showerhead - Other	0.0	Calc				0.00	1.60

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
TSV Showerhead	15	0.90	1.00		1.00		1.00	0.31	0.81

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
TSV Showerhead	41.52%	31.39%	15.22%	11.88%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
TSV Showerhead	2130	0	0.59	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
TSV Showerhead	0.08	0.01	0.00	0.93

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $40 / EW MF Bundled costs (see Participant listing)

Incentive: $40 / EW MF Bundled costs (see Participant listing)

Vending Miser

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Vending Miser | **Measure Type:** Vending Miser | **Measure Sub Type:** Vending Miser

Program: EnergyWise Multifamily

Measure Description

Controls significantly reduce the energy consumption of refrigerated beverage vending machine lighting and refrigeration systems by powering down these systems during periods of inactivity while maintaining a refrigerated product. This measure applies torefrigerated beverage vending machines and glass front refrigerated coolers. This measure does not apply to ENERGY STAR® qualified vending machines, as they already have built-in controls.

Baseline Description

The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, or glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

BCR Measures

BCR Measure Name	Unique Identifier
Vending Miser	2024 Electric EnergyWise Multifamily Vending Miser

Savings Principle

The high efficiency case is a standard efficiency refrigerated beverage vending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

Savings Method

Deemed

Unit

Installed vending miser.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: 8760

Hours Note: It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Vending Miser	1612.0		0.00	0.00	0.00	0.00	0.00

Electric kWh Source: USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Vending Miser	5	1.00	1.00		0.86	0.86	0.86	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Vending Miser	32.00%	35.00%	16.00%	17.00%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRsp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRwp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFsp Note: Coincidence Factors are set to zero since demand savings typically occur during off-peak hours

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Note: Coincidence Factors are set to zero since demand savings typically occur during off-peak hours

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Vending Miser	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Vending Miser	0.00	0.00	0.00	1.00

TRC: $0 / EW MF Bundled costs (see Participant listing)

Incentive: $0 / EW MF Bundled costs (see Participant listing)

VFD

Sector: Residential | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Motors/Drives | **Measure Type:** Variable Speed Drive | **Measure Sub Type:** Motors/Drives

Program: EnergyWise Multifamily

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
VFD	2024 Electric EnergyWise Multifamily VFD

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calc

Unit

Installed VFD

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
VFD	Calc	Calc	Calc	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
VFD	13	1.00	1.00		0.99	1.00	1.00	0.37	0.69

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
VFD	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

RRsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

RRwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
VFD	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
VFD	0.16	0.00	0.00	0.84

NTG Source: TetraTech (2017). 2016 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2017

TRC: $20000 / kWh

Incentive: $12000 / kWh

Water Heating, Custom

Sector: Residential | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Water Heating | **Measure Type:** Water Heater | **Measure Sub Type:** Water Heater

Program: EnergyWise Multifamily

Measure Description

Installation of high efficiency water heating equipment to replace the existing inefficient water heater.

Baseline Description

The baseline efficiency case is a stand-alone tank water heater.

BCR Measures

BCR Measure Name	Unique Identifier
Water Heating, Custom	2024 Electric EnergyWise Multifamily Water Heating, Custom

Savings Principle

The high efficiency case is a stand-alone storage water heater with an energy factor >= 0.66

Savings Method

Calc

Unit

Installed water heating system.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Water Heating, Custom	Calc	Calc	0.00	0.00	0.00	Calc	Calc

Electric kWh Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Electric kW Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Water Heating, Custom	multi	1.00	1.00		0.86	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Water Heating, Custom	0.00%	0.00%	0.00%	0.00%

Measure Life Source: DOE (2008). ENERGY STAR® Residential Water Heaters: Final Criteria Analysis. Prepared for the DOE; Page 10.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

CFwp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Water Heating, Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Water Heating, Custom	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

Wi-Fi Thermostat

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Thermostat | **Measure Sub Type:** Wi-Fi

Program: EnergyWise Multifamily

Measure Description

Installation of wifi thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.

Baseline Description

The baseline efficiency case is an HVAC system with either a manual or a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Wi-Fi Thermostat	2024 Electric EnergyWise Multifamily Wi-Fi Thermostat

Savings Principle

The high efficiency case is an HVAC system with a wi-fi programmable thermostat installed.

Savings Method

Deemed

Unit

Installation of WiFi programmable thermostat

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Wi-Fi Thermostat	64.0	0.1550	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Wi-Fi Thermostat	11	1.00	1.00		1.00	1.00	1.00	0.34	0.17

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Wi-Fi Thermostat	23.21%	27.86%	25.20%	23.73%

Measure Life Source: Southern California Edison (2017). Residential Smart Thermostat Workpaper (Work Paper SCE17HC054, Revision #0). https://www.peakload.org/assets/SCE17HC054.0_Residential_Sma.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Wi-Fi Thermostat	0	0	3.68	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Wi-Fi Thermostat	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

Existing Dual Fuel

Sector: Residential

Fuel: Electric

Program Type: Custom

Measure Category: Whole Home

Measure Type: Behavior

Measure Sub Type: Home Energy Reports

Program: Home Energy Reports

Measure Description

A Home Energy report sent to electric and gas customers that displays home energy consumption in comparison with peers and prompts energy conserving behavior.

Baseline Description

No Home Energy Report.

BCR Measures

BCR Measure Name	Unique Identifier
Existing Dual Fuel	2024 Electric Home Energy Reports Existing Dual Fuel

Savings Principle

A home that receives Home Energy Reports.

Savings Method

Calculated by comparing consumption of treatment (with reports) and control groups (no reports)

Unit

Per participant

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Existing Dual Fuel	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Supplied by vendor

Electric kW Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Existing Dual Fuel	1	1.00	1.00		1.08	1.08	1.08	0.55	0.85

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Existing Dual Fuel	35.11%	30.72%	19.04%	15.12%

Measure Life Source: Opinion Dynamics with Navigant Consulting (2012). Massachusetts Three Year Cross-Cutting Behavioral Program Evaluation Integrated Report July 2012. Prepared for Massachusetts EEAC & Behavioral Research Team

ISR Source: Illume. (2017). Rhode Island Home Energy Report Program Impact and Process Evaluation. http://rieermc.ri.gov/wp-content/uploads/2018/03/national-grid-rhode-island-2017-her-program_final.pdf

ISR Note: In-service rates are set to 100% because savings represent average for all treatment household (including opt outs)

SPF Note: Savings persistence is 100% since measure life is 1 year.

RRe Source: Cadeo/Illume (2020). 2017-2019 Impact Evaluation of the Home Energy Reports Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ngrid-ri-behavior-evaluation-28aug2020.pdf

RRsp Source: Cadeo/Illume (2020). 2017-2019 Impact Evaluation of the Home Energy Reports Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ngrid-ri-behavior-evaluation-28aug2020.pdf

RRwp Source: Cadeo/Illume (2020). 2017-2019 Impact Evaluation of the Home Energy Reports Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ngrid-ri-behavior-evaluation-28aug2020.pdf

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Existing Dual Fuel	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Existing Dual Fuel	0.00	0.00	0.00	1.00

NTG Note: Net-to-gross is set to 100% since the HER program is implemented as a randomized control trial (RCT). RCT produces net savings accounting for free-ridership.

TRC: $0 / participant

Incentive: $0 / participant

Existing Electric

Sector: Residential

Fuel: Electric

Program Type: Custom

Measure Category: Whole Home

Measure Type: Behavior

Measure Sub Type: Home Energy Reports

Program: Home Energy Reports

Measure Description

A Home Energy report sent to electric customers that displays home energy consumption in comparison with peers and prompts energy conserving behavior.

Baseline Description

No Home Energy Report.

BCR Measures

BCR Measure Name	Unique Identifier
Existing Electric	2024 Electric Home Energy Reports Existing Electric

Savings Principle

A home that receives Home Energy Reports.

Savings Method

Calculated by comparing consumption of treatment (with reports) and control groups (no reports)

Unit

Per participant

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Existing Electric	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Supplied by vendor

Electric kW Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Existing Electric	1	1.00	1.00		1.08	1.08	1.08	0.55	0.85

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Existing Electric	35.11%	30.72%	19.04%	15.12%

Measure Life Source: Opinion Dynamics with Navigant Consulting (2012). Massachusetts Three Year Cross-Cutting Behavioral Program Evaluation Integrated Report July 2012. Prepared for Massachusetts EEAC & Behavioral Research Team

ISR Source: Illume. (2017). Rhode Island Home Energy Report Program Impact and Process Evaluation. http://rieermc.ri.gov/wp-content/uploads/2018/03/national-grid-rhode-island-2017-her-program_final.pdf

ISR Note: In-service rates are set to 100% because savings represent average for all treatment household (including opt outs)

SPF Note: Savings persistence is 100% since measure life is 1 year.

RRe Source: Cadeo/Illume (2020). 2017-2019 Impact Evaluation of the Home Energy Reports Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ngrid-ri-behavior-evaluation-28aug2020.pdf

RRsp Source: Cadeo/Illume (2020). 2017-2019 Impact Evaluation of the Home Energy Reports Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ngrid-ri-behavior-evaluation-28aug2020.pdf

RRwp Source: Cadeo/Illume (2020). 2017-2019 Impact Evaluation of the Home Energy Reports Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ngrid-ri-behavior-evaluation-28aug2020.pdf

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Existing Electric	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Existing Electric	0.00	0.00	0.00	1.00

NTG Note: Net-to-gross is set to 100% since the HER program is implemented as a randomized control trial (RCT). RCT produces net savings accounting for free-ridership.

TRC: $0 / participant

Incentive: $0 / participant

New Movers Dual Fuel

Sector: Residential

Fuel: Electric

Program Type: Custom

Measure Category: Whole Home

Measure Type: Behavior

Measure Sub Type: Home Energy Reports

Program: Home Energy Reports

Measure Description

A Home Energy report sent to electric and gas customers that displays home energy consumption in comparison with peers and prompts energy conserving behavior.

Baseline Description

No Home Energy Report.

BCR Measures

BCR Measure Name	Unique Identifier
New Movers Dual Fuel	2024 Electric Home Energy Reports New Movers Dual Fuel

Savings Principle

A home that receives Home Energy Reports.

Savings Method

Calculated by comparing consumption of treatment (with reports) and control groups (no reports)

Unit

Per participant

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
New Movers Dual Fuel	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Supplied by vendor

Electric kW Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
New Movers Dual Fuel	1	1.00	1.00		0.67	0.67	0.67	0.55	0.85

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
New Movers Dual Fuel	35.11%	30.72%	19.04%	15.12%

Measure Life Source: Opinion Dynamics with Navigant Consulting (2012). Massachusetts Three Year Cross-Cutting Behavioral Program Evaluation Integrated Report July 2012. Prepared for Massachusetts EEAC & Behavioral Research Team

ISR Source: Illume. (2017). Rhode Island Home Energy Report Program Impact and Process Evaluation. http://rieermc.ri.gov/wp-content/uploads/2018/03/national-grid-rhode-island-2017-her-program_final.pdf

ISR Note: In-service rates are set to 100% because savings represent average for all treatment household (including opt outs)

SPF Note: Savings persistence is 100% since measure life is 1 year.

RRe Source: Cadeo/Illume (2020). 2017-2019 Impact Evaluation of the Home Energy Reports Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ngrid-ri-behavior-evaluation-28aug2020.pdf

RRsp Source: Cadeo/Illume (2020). 2017-2019 Impact Evaluation of the Home Energy Reports Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ngrid-ri-behavior-evaluation-28aug2020.pdf

RRwp Source: Cadeo/Illume (2020). 2017-2019 Impact Evaluation of the Home Energy Reports Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ngrid-ri-behavior-evaluation-28aug2020.pdf

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
New Movers Dual Fuel	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
New Movers Dual Fuel	0.00	0.00	0.00	1.00

NTG Note: Net-to-gross is set to 100% since the HER program is implemented as a randomized control trial (RCT). RCT produces net savings accounting for free-ridership.

TRC: $0 / participant

Incentive: $0 / participant

New Movers Electric

Sector: Residential

Fuel: Electric

Program Type: Custom

Measure Category: Whole Home

Measure Type: Behavior

Measure Sub Type: Home Energy Reports

Program: Home Energy Reports

Measure Description

A Home Energy report sent to electric customers that displays home energy consumption in comparison with peers and prompts energy conserving behavior.

Baseline Description

No Home Energy Report.

BCR Measures

BCR Measure Name	Unique Identifier
New Movers Electric	2024 Electric Home Energy Reports New Movers Electric

Savings Principle

A home that receives Home Energy Reports.

Savings Method

Calculated by comparing consumption of treatment (with reports) and control groups (no reports)

Unit

Per participant

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
New Movers Electric	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Supplied by vendor

Electric kW Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
New Movers Electric	1	1.00	1.00		0.67	0.67	0.67	0.55	0.85

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
New Movers Electric	35.11%	30.72%	19.04%	15.12%

Measure Life Source: Opinion Dynamics with Navigant Consulting (2012). Massachusetts Three Year Cross-Cutting Behavioral Program Evaluation Integrated Report July 2012. Prepared for Massachusetts EEAC & Behavioral Research Team

ISR Source: Illume. (2017). Rhode Island Home Energy Report Program Impact and Process Evaluation. http://rieermc.ri.gov/wp-content/uploads/2018/03/national-grid-rhode-island-2017-her-program_final.pdf

ISR Note: In-service rates are set to 100% because savings represent average for all treatment household (including opt outs)

SPF Note: Savings persistence is 100% since measure life is 1 year.

RRe Source: Cadeo/Illume (2020). 2017-2019 Impact Evaluation of the Home Energy Reports Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ngrid-ri-behavior-evaluation-28aug2020.pdf

RRsp Source: Cadeo/Illume (2020). 2017-2019 Impact Evaluation of the Home Energy Reports Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ngrid-ri-behavior-evaluation-28aug2020.pdf

RRwp Source: Cadeo/Illume (2020). 2017-2019 Impact Evaluation of the Home Energy Reports Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ngrid-ri-behavior-evaluation-28aug2020.pdf

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
New Movers Electric	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
New Movers Electric	0.00	0.00	0.00	1.00

NTG Note: Net-to-gross is set to 100% since the HER program is implemented as a randomized control trial (RCT). RCT produces net savings accounting for free-ridership.

TRC: $0 / participant

Incentive: $0 / participant

Dryer Most Efficient

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Appliances **Measure Type:** Clothes Dryers **Measure Sub Type:** Dryer

Program: Residential Consumer Products

Measure Description

The installation of an ENERGY STAR® Most Efficient EnergyStar Dryer.

Baseline Description

A new electric dryer.

BCR Measures

BCR Measure Name	Unique Identifier
Dryer Most Efficient	2024 Electric Residential Consumer Products Dryer Most Efficient

Savings Principle

ENERGY STAR® qualified electric dryer on the Most Efficient list.

Savings Method

Deemed

Unit

Installed EnergyStar dryer.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Dryer Most Efficient	212.8	0.0612	212.79	0.00	0.00	0.00	0.00

Electric kWh Source: EPA Research (2020). Energy Star Retail Products Platform.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Dryer Most Efficient	16	0.99	1.00		1.00	1.00	1.00	0.45	0.58

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Dryer Most Efficient	38.94%	29.95%	16.90%	14.21%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Note: National Grid assumption based on regional PA working groups.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Dryer Most Efficient	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Dryer Most Efficient	0.48	0.00	0.00	0.52

NTG Source: NMR Group, Inc. (2021). Residential Products Net-to-Gross Study. https://ma-eeac.org/wp-content/uploads/MA20X04-E-PRODNTG_Res-Products-NTG-Report_FINAL_2021.06.08.pdf

TRC: $75 / measure

Incentive: $25 / measure

Advanced Power Strips

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Plug Load **Measure Type:** Smart Strips **Measure Sub Type:** Smart Strip

Program: Residential Consumer Products

Measure Description

The basic measures switches off plug load using current sensors and switching devices which turn off plug load when electrical current drops below threshold low levels. The advanced measure shuts devices off after it no longer senses activity from their infrared controls.

Baseline Description

The baseline efficiency case is the absence power strip and leaving peripheral devices plugged in or using a power surge protector and leaving peripheral devices on

BCR Measures

BCR Measure Name	Unique Identifier
Advanced Power Strips - Tier 2	2024 Electric Residential Consumer Products Advanced Power Strips - Tier 2
Advanced Power Strips - Tier 2 OS	2024 Electric Residential Consumer Products Advanced Power Strips - Tier 2 OS

Savings Principle

Savings Method

Deemed

Unit

Rebated smart strip.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: 8760

Hours Note: Since the power strip is assumed to be plugged in all year, the savings are based on 8,760 operational hours per year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Advanced Power Strips - Tier 2 Advanced Power Strips - Tier 2 OS	207.0	0.0400	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Advanced Power Strips	5	0.74	1.00		0.92	0.92	0.92	0.58	0.86

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Advanced Power Strips	32.24%	34.78%	15.36%	17.62%

Measure Life Note: Massachusetts Common Assumption

ISR Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

RRsp Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

RRwp Note: National Grid assumption based on regional PA working groups.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Advanced Power Strips	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Advanced Power Strips	0.00	0.00	0.00	1.00

NTG Note: Realization rate is assumed 100% because energy savings are custom calculated.

TRC: Tier 2 - $100/measure; Tier 2 OS - $200/measure

Incentive: $35 / measure

Clothes Washer Most Efficient

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Appliances **Measure Type:** Clothes Washers **Measure Sub Type:** Washer

Program: Residential Consumer Products

Measure Description

This measure promotes the purchase of an ENERGY STAR® most efficient clothes washer instead of a standard efficiency model.

Baseline Description

Standard efficiency.

BCR Measures

BCR Measure Name	Unique Identifier
Clothes Washer Most Efficient	2024 Electric Residential Consumer Products Clothes Washer Most Efficient

Savings Principle

ENERGY STAR® qualified clothes washer on the Most Efficient list.

Savings Method

Deemed

Unit

Per clothes washer

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Clothes Washer Most Efficient	265.5	0.0200	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: EPA Research (2020). Energy Star Retail Products Platform.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Clothes Washer Most Efficient	14	1.00	1.00		1.00	1.00	1.00	0.89	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Clothes Washer Most Efficient	26.00%	40.00%	14.00%	20.00%

Measure Life Source: DOE (2017). Technical Support Document: Residential Clothes Washer. EERE-2017-BT-STD-0003-0030. https://www.regulations.gov/document/EERE-2017-BT-STD-0014-0030

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Note: National Grid assumption based on regional PA working groups.

CFsp Source: The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.

CFwp Source: The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Clothes Washer Most Efficient	2083	2083	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Clothes Washer Most Efficient	0.10	0.00	0.00	0.90

TRC: $125 / measure

Incentive: $25 / measure

Dehumidifier

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Appliances | **Measure Type:** Dehumidifiers | **Measure Sub Type:** Dehumidifier

Program: Residential Consumer Products

Measure Description

The Installation of high efficiency dehumidifiers and the turn-in of existing inefficient dehumidifiers.

Baseline Description

Standard efficiency.

BCR Measures

BCR Measure Name	Unique Identifier
Dehumidifier	2024 Electric Residential Consumer Products Dehumidifier

Savings Principle

The high efficiency case is an ENERGY STAR® replacement unit with an efficiency of 1.47 L/kWh. The high efficiency case is an ENERGY STAR® replacement unit with an efficiency of 1.47 L/kWh.

Savings Method

Calculated using deemed inputs

Unit

Per most efficient dehumidifier

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Dehumidifier	82.3	0.0189	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Dehumidifier	17	0.99	1.00		1.00	1.00	1.00	0.82	0.17

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Dehumidifier	21.99%	23.34%	24.93%	29.74%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Note: National Grid assumption based on regional PA working groups.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Dehumidifier	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Dehumidifier	0.51	0.00	0.00	0.49

NTG Source: NMR Group, Inc. (2021). Residential Products Net-to-Gross Study. https://ma-eeac.org/wp-content/uploads/MA20X04-E-PRODNTG_Res-Products-NTG-Report_FINAL_2021.06.08.pdf

TRC: $60 / measure

Incentive: $40 / measure

Dehumidifier Recycling

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Appliances **Measure Type:** Dehumidifiers **Measure Sub Type:** Dehumidifier

Program: Residential Consumer Products

Measure Description

Recycling of old dehumidifiers

Baseline Description

Operating inefficient unit.

BCR Measures

BCR Measure Name	Unique Identifier
Dehumidifier Recycling	2024 Electric Residential Consumer Products Dehumidifier Recycling

Savings Principle

Recycling of inefficient unit.

Savings Method

Deemed

Unit

Per dehumidifier

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Dehumidifier Recycling	407.1	0.0350	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Dehumidifier Recycling	4	1.00	1.00		1.00	1.00	1.00	0.82	0.17

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Dehumidifier Recycling	21.99%	23.34%	24.93%	29.74%

Measure Life Source: Environmental Protection Agency (2018). Savings Calculator for Energy Star Qualified Appliances.

Measure Life Note: Assume 1/3 of measure life

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Note: National Grid assumption based on regional PA working groups.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Dehumidifier Recycling	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Dehumidifier Recycling	0.59	0.00	0.00	0.41

NTG Source: NMR Group, Inc. (2021). Appliance Recycling Net Savings Update (MA20X03-E-ARNTG). https://ma-eeac.org/wp-content/uploads/MA-20X03-E-Appliance-Recycling-NTGReport_FINAL_2021.07.23-clean.pdf

TRC: $65 / measure

Incentive: $35 / measure

EnergyStar Dryer

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Appliances **Measure Type:** Clothes Dryers **Measure Sub Type:** Dryer

Program: Residential Consumer Products

Measure Description

The installation of an EnergyStar clothes dryer .

Baseline Description

A new electric dryer.

BCR Measures

BCR Measure Name	Unique Identifier
EnergyStar Dryer	2024 Electric Residential Consumer Products EnergyStar Dryer

Savings Principle

An EnergyStar electric dryer.

Savings Method

Deemed

Unit

Installed EnergyStar dryer.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
EnergyStar Dryer	160.0	0.0460	160.00	0.00	0.00	0.00	0.00

Electric kWh Source: MA TRM, 2016-2018: Energy Star Clothes Dryer

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
EnergyStar Dryer	16	0.99	1.00		1.00	1.00	1.00	0.45	0.58

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
EnergyStar Dryer	38.94%	29.95%	16.90%	14.21%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Note: National Grid assumption based on regional PA working groups.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
EnergyStar Dryer	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
EnergyStar Dryer	0.48	0.00	0.00	0.52

NTG Source: NMR Group, Inc. (2021). Residential Products Net-to-Gross Study. https://ma-eeac.org/wp-content/uploads/MA20X04-E-PRODNTG_Res-Products-NTG-Report_FINAL_2021.06.08.pdf

TRC: $75 / measure

Incentive: $60 / measure

Freezer Recycling

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Appliances **Measure Type:** Recycling **Measure Sub Type:** Freezer Recycling

Program: Residential Consumer Products

Measure Description

The retirement of old, inefficient secondary refrigerators and freezers.

Baseline Description

The baseline efficiency case is an old, inefficient secondary working refrigerator or freezer. Estimated average usage is based on combined weight of freezer energy use and refrigerator energy use.

BCR Measures

BCR Measure Name	Unique Identifier
Freezer Recycling	2024 Electric Residential Consumer Products Freezer Recycling

Savings Principle

The high efficiency case assumes no replacement of secondary unit.

Savings Method

Deemed

Unit

Removal of existing refrigerator or freezer.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: 8760

Hours Note: The average annual operating hours are 8760 hours/year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Freezer Recycling	754.0	0.1100	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR Group, Inc. (2021). Rhode Island Appliance Recycling. http://rieermc.ri.gov/wp-content/uploads/2021/12/ng-ri-21-re-appliance-recycling-impact-and-incentives-report_final_23nov2021.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Freezer Recycling	8	1.00	1.00		0.83	0.83	0.83	0.91	0.68

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Freezer Recycling	28.67%	33.56%	17.07%	20.69%

Measure Life Source: EPA Research (2014), Energy Star Commercial Equipment Calculator, Freezer Calcs, https://www.energystar.gov/sites/default/files/asset/document/commercial_kitchen_equipment_calculator.xlsx. Assume 2/3rd of measure life for recycling - MA Common assumption

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: NMR Group, Inc. (2021). Rhode Island Appliance Recycling. http://rieermc.ri.gov/wp-content/uploads/2021/12/ng-ri-21-re-appliance-recycling-impact-and-incentives-report_final_23nov2021.pdf

RRsp Source: NMR Group, Inc. (2021). Rhode Island Appliance Recycling. http://rieermc.ri.gov/wp-content/uploads/2021/12/ng-ri-21-re-appliance-recycling-impact-and-incentives-report_final_23nov2021.pdf

RRwp Source: NMR Group, Inc. (2021). Rhode Island Appliance Recycling. http://rieermc.ri.gov/wp-content/uploads/2021/12/ng-ri-21-re-appliance-recycling-impact-and-incentives-report_final_23nov2021.pdf

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Freezer Recycling	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Freezer Recycling	0.50	0.00	0.00	0.50

NTG Source: NMR Group, Inc. (2021). Rhode Island Appliance Recycling. http://rieermc.ri.gov/wp-content/uploads/2021/12/ng-ri-21-re-appliance-recycling-impact-and-incentives-report_final_23nov2021.pdf

TRC: $200 / measure

Incentive: $50 / measure

Low E Storm Windows

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: Building Shell

Measure Type: Windows

Measure Sub Type: Storm Windows, electric heat

Program: Residential Consumer Products

Measure Description

The installation of Low E storm windows over existing windows.

Baseline Description

The base case is existing windows.

BCR Measures

BCR Measure Name	Unique Identifier
Low E Storm Windows, electric heat Low E Storm Windows, gas heat Low E Storm Windows, other heat	2024 Electric Residential Consumer Products Low E Storm Windows, electric heat 2024 Electric Residential Consumer Products Low E Storm Windows, gas heat 2024 Electric Residential Consumer Products Low E Storm Windows, other heat

Savings Principle

The high efficiency case is Low E storm windows installed over existing windows.

Savings Method

Deemed

Unit

Installed Low E storm windows.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Low E Storm Windows, electric heat	229.0	0.1800	229.00			0.00	
Low E Storm Windows, gas heat	5.0	0.0039	5.00	0.00	0.00	0.00	0.00
Low E Storm Windows, other heat	5.0	0.0039	5.00			0.76	

Electric kWh Source: Pacific Northwest National Laboratory for the U.S. Department of Energy (2015). Energy Savings of Low-E Storm Windows and Panels across US Climate Zones.
https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-24826.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Gas Heat MMBtu Source: Pacific Northwest National Laboratory for the U.S. Department of Energy (2015). Energy Savings of Low-E Storm Windows and Panels across US Climate Zones.
https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-24826.pdf

Oil MMBtu Source: Pacific Northwest National Laboratory for the U.S. Department of Energy (2015). Energy Savings of Low-E Storm Windows and Panels across US Climate Zones.
https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-24826.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Low E Storm Windows	20	1.00	1.00		1.00	1.00	1.00	0.34	0.20

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Low E Storm Windows	25.41%	29.66%	23.25%	21.68%

Measure Life Source: Pacific Northwest National Laboratory for the U.S. Department of Energy (2015). Energy Savings of Low-E Storm Windows and Panels across US Climate Zones.
https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-24826.pdf

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Note: National Grid assumption based on regional PA working groups.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Low E Storm Windows	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Low E Storm Windows	0.04	0.00	0.00	0.96

TRC: $55 / measure

Incentive: $25 / measure

Low Flow Showerhead w/TSV

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Showerhead

Program: Residential Consumer Products

Measure Description

A showerhead with a control that limits flow once water is heated.

Baseline Description

The baseline case is a showerhead with a flow of 2.5 gallons per minute, or for the case of the adapter, a low flow showerhead with flow of 1.5 gpm or less.

BCR Measures

BCR Measure Name	Unique Identifier
Low Flow Showerhead w/ TSV - Elec Low Flow Showerhead w/ TSV - Oil Low Flow Showerhead w/ TSV - Other	2024 Electric Residential Consumer Products Low Flow Showerhead w/ TSV - Elec 2024 Electric Residential Consumer Products Low Flow Showerhead w/ TSV - Oil 2024 Electric Residential Consumer Products Low Flow Showerhead w/ TSV - Other

Savings Principle

The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.

Savings Method

Deemed

Unit

Installed low-flow showerhead

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Low Flow Showerhead w/ TSV - Elec	247.0	0.0600				0.00	0.00
Low Flow Showerhead w/ TSV - Oil	0.0	0.0	0.00	0.00	0.00	1.32	0.00
Low Flow Showerhead w/ TSV - Other	0.0	0.0				0.00	1.22

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Low Flow Showerhead w/TSV	15	0.78	1.00		1.00	1.00	1.00	0.31	0.81

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Low Flow Showerhead w/TSV	41.52%	31.39%	15.22%	11.88%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Note: National Grid assumption based on regional PA working groups.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Low Flow Showerhead w/TSV	3022	0	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: PGE Low Flow Showerhead and Thermostatic Restriction Valve

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Low Flow Showerhead w/TSV	0.00	0.00	0.00	1.00

TRC: $40 / measure

Incentive: $15 / measure

Pool pump (variable)

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Pump

Program: Residential Consumer Products

Measure Description

The installation of a 2-speed or variable speed drive pool pump. Operating a pool pump for a longer period of time at a lower wattage can move the same amount of water using significantly less energy.

Baseline Description

The baseline efficiency case is a single speed pump.

BCR Measures

BCR Measure Name	Unique Identifier
Pool pump (variable)	2024 Electric Residential Consumer Products Pool pump (variable)

Savings Principle

The high efficiency case is a 2-speed or variable speed pump.

Savings Method

Calculated using deemed inputs

Unit

Installed efficient pool pump.

Savings Equation

Gross kWh = Qty × kWh_base × %SAVE

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

kWh_base = Deemed average annual kWh consumption per baseline unit.

%SAVE = Deemed average savings factor.

DeltakW = Deemed average kW reduction per unit.

Hours: N/A

Hours Note: Hours are considered on a case-by-case basis since they are dependent on seasonal factors, pool size, and treatment conditions.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Pool pump (variable)	1284.0	1.3500	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

Electric kW Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Pool pump (variable)	6	1.00	1.00		1.00	1.00	1.00	0.55	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Pool pump (variable)	4.85%	2.38%	54.55%	38.22%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Note: National Grid assumption based on regional PA working groups.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Pool pump (variable)	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Pool pump (variable)	0.11	0.00	0.00	0.89

NTG Source: NMR Group, Inc. (2021). Residential Products Net-to-Gross Study. https://ma-eeac.org/wp-content/uploads/MA20X04-E-PRODNTG_Res-Products-NTG-Report_FINAL_2021.06.08.pdf

TRC: $670 / measure

Incentive: $500 / measure

Refrigerator Most Efficient

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Appliances **Measure Type:** Refrigerators **Measure Sub Type:** Refrigerator

Program: Residential Consumer Products

Measure Description

The installation of an ENERGY STAR® Most Efficient Refrigerator.

Baseline Description

For Top Ten® and Most Efficient® refrigerators, the baseline is a 50% mix of available Energy Star® and Federal standard compliant refrigerators. For Energy Star® refrigerators, the baseline is a refrigerator that meets Federal standards.

BCR Measures

BCR Measure Name	Unique Identifier
Refrigerator Most Efficient	2024 Electric Residential Consumer Products Refrigerator Most Efficient

Savings Principle

The high efficiency case is an Energy Star® refrigerator or a model that is ENERGY STAR® rated and included in the Most Efficient® or Top Ten USA® ranking.

Savings Method

Deemed

Unit

Installed high-efficiency refrigerator

Savings Equation

Gross kWh = Qty × (kWh_base - kWh_ee)

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

kWh_base = Deemed average demand per baseline unit.

kWh_ee = Deemed average demand per high-efficiency unit.

DeltakW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Refrigerator Most Efficient	95.7	0.0200	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: EPA Research (2020). Energy Star Retail Products Platform.

Electric kW Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Refrigerator Most Efficient	12	1.00	1.00		1.00	1.00	1.00	0.79	0.65

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Refrigerator Most Efficient	29.00%	31.95%	18.18%	20.87%

Measure Life Source: Environmental Protection Agency (2018). Savings Calculator for Energy Star Qualified Appliances.

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Note: National Grid assumption based on regional PA working groups.

CFsp Source: The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.

CFwp Source: The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Refrigerator Most Efficient	0	0	0.00	0.00	0.00	1.46	0.00	0.00

One-time $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Refrigerator Most Efficient	0.25	0.00	0.00	0.75

NTG Note: Consistent with MA TRM

TRC: $115 / measure

Incentive: $25 / measure

Refrigerator Recycling

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: Appliances

Measure Type: Recycling

Measure Sub Type: Refrigerator Recycling

Program: Residential Consumer Products

Measure Description

The retirement of old, inefficient secondary refrigerators and freezers.

Baseline Description

The baseline efficiency case is an old, inefficient secondary working refrigerator or freezer. Estimated average usage is based on combined weight of freezer energy use and refrigerator energy use.

BCR Measures

BCR Measure Name	Unique Identifier
Refrigerator Recycling	2024 Electric Residential Consumer Products Refrigerator Recycling

Savings Principle

The high efficiency case assumes no replacement of secondary unit.

Savings Method

Deemed

Unit

Removal of existing refrigerator or freezer.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: 8760

Hours Note: The average annual operating hours are 8760 hours/year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Refrigerator Recycling	983.0	0.1800	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR Group, Inc. (2021). Rhode Island Appliance Recycling. http://rieermc.ri.gov/wp-content/uploads/2021/12/ng-ri-21-re-appliance-recycling-impact-and-incentives-report_final_23nov2021.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Refrigerator Recycling	4	1.00	1.00		0.90	0.90	0.90	0.79	0.65

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Refrigerator Recycling	29.00%	31.95%	18.18%	20.87%

Measure Life Note: Massachusetts Common Assumption

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: NMR Group, Inc. (2021). Rhode Island Appliance Recycling. http://rieermc.ri.gov/wp-content/uploads/2021/12/ng-ri-21-re-appliance-recycling-impact-and-incentives-report_final_23nov2021.pdf

RRsp Source: NMR Group, Inc. (2021). Rhode Island Appliance Recycling. http://rieermc.ri.gov/wp-content/uploads/2021/12/ng-ri-21-re-appliance-recycling-impact-and-incentives-report_final_23nov2021.pdf

RRwp Source: NMR Group, Inc. (2021). Rhode Island Appliance Recycling. http://rieermc.ri.gov/wp-content/uploads/2021/12/ng-ri-21-re-appliance-recycling-impact-and-incentives-report_final_23nov2021.pdf

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Refrigerator Recycling	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Refrigerator Recycling	0.54	0.00	0.00	0.46

NTG Source: NMR Group, Inc. (2021). Rhode Island Appliance Recycling. http://rieermc.ri.gov/wp-content/uploads/2021/12/ng-ri-21-re-appliance-recycling-impact-and-incentives-report_final_23nov2021.pdf

TRC: $212 / measure

Incentive: $95 / measure

Room AC (10.8)

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Cooling **Measure Sub Type:** Room AC

Program: Residential Consumer Products

Measure Description

The installation of ENERGY STAR® qualified room air conditioners. ENERGY STAR® qualified air conditioners are typically 10% more efficient than models meeting federal standards.

Baseline Description

The baseline efficiency case is a window AC unit that meets the minimum federal efficiency standard for efficiency which currently is EER 9.8.

BCR Measures

BCR Measure Name	Unique Identifier
Room AC (10.8)	2024 Electric Residential Consumer Products Room AC (10.8)

Savings Principle

The high efficiency level is a room AC unit meeting or exceeding the federal efficiency standard by 10% or more. Average size is 10,000 Btu and average EERs is 10.8.

Savings Method

Deemed

Unit

Installed high-efficiency room air-conditioner.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Room AC (10.8)	36.0	0.0600	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Environmental Protection Agency (2018). Savings Calculator for Energy Star Qualified Appliances.

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Room AC (10.8)	12	1.00	1.00		1.00	1.00	1.00	0.33	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Room AC (10.8)	2.88%	2.15%	47.53%	47.43%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Note: National Grid assumption based on regional PA working groups.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Room AC (10.8)	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Room AC (10.8)	0.44	0.00	0.00	0.56

NTG Source: NMR Group, Inc. (2021). Residential Products Net-to-Gross Study. https://ma-eeac.org/wp-content/uploads/MA20X04-E-PRODNTG_Res-Products-NTG-Report_FINAL_2021.06.08.pdf

TRC: $44 / measure

Incentive: $40 / measure

Dehumidifier Most Efficient

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Appliances | **Measure Type:** Dehumidifiers | **Measure Sub Type:** Dehumidifier

Program: Residential Consumer Products

Measure Description

The installation of an ENERGY STAR® Most Efficient Dehumidifier with a capacity of >25 and ≤ 50 pints/day.

Baseline Description

The baseline for this measure is an ENERGY STAR® dehumidifier.

BCR Measures

BCR Measure Name	Unique Identifier
Dehumidifier Most Efficient	2024 Electric Residential Consumer Products Dehumidifier Most Efficient

Savings Principle

ENERGY STAR® qualified dehumidifier on the Most Efficient list.

Savings Method

Calculated using deemed inputs

Unit

Per dehumidifier

Savings Equation

ΔkWh = (((Avg Capacity * 0.473) / 24) * Hours) * (1 / (L/kWh_Base) – 1 / (L/kWh_Eff))

Where:

Avg Capacity = Average capacity of the unit (pints/day)

0.473 = Constant to convert Pints to Liters

24 = Constant to convert Liters/day to Liters/hour

Hours = Run hours per year

L/kWh = Liters of water per kWh consumed

L/kWh_Base = ≥1.80

L/kWh_Eff = ≥3.30

Hours: 2200

Hours Note: Based on Mattison et al., "Dehumidifiers: A Major Consumer of Residential Electricity", Cautley et al., "Dehumidification and Subslab Ventilation in Wisconsin Homes" and Yang et al., "Dehumidifier Use in the U.S. Residential Sector", all indicating average usage around 2,200 hours per year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Dehumidifier Most Efficient	47.0	0.0110	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Dehumidifier Most Efficient	17	0.99	1.00		1.00	1.00	1.00	0.82	0.17

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Dehumidifier Most Efficient	21.99%	23.34%	24.93%	29.74%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Note: National Grid assumption based on regional PA working groups.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Dehumidifier Most Efficient	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Dehumidifier Most Efficient	0.00	0.00	0.00	1.00

TRC: $75 / measure

Incentive: $15 / measure

Room AC Most Efficient

Sector: Residential **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Cooling **Measure Sub Type:** Room AC

Program: Residential Consumer Products

Measure Description

The installation of an ENERGY STAR® Most Efficient Room AC.

Baseline Description

The baseline for this measure is a new room air conditioner that meets the federal standard requirements.

BCR Measures

BCR Measure Name	Unique Identifier
Room AC Most Efficient	2024 Electric Residential Consumer Products Room AC Most Efficient

Savings Principle

ENERGY STAR® qualified room air conditioner on the Most Efficient list.

Savings Method

Deemed

Unit

Installed most efficient room air-conditioner.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Room AC Most Efficient	145.0	0.2200	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: EPA Research (2020). Energy Star Retail Products Platform.

Electric kW Source: EPA Research (2020). Energy Star Retail Products Platform.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Room AC Most Efficient	12	1.00	1.00		1.00	1.00	1.00	0.33	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Room AC Most Efficient	2.88%	2.15%	47.53%	47.43%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Note: National Grid assumption based on regional PA working groups.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Room AC Most Efficient	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Room AC Most Efficient	0.44	0.00	0.00	0.56

NTG Source: NMR Group, Inc. (2021). Residential Products Net-to-Gross Study. https://ma-eeac.org/wp-content/uploads/MA20X04-E-PRODNTG_Res-Products-NTG-Report_FINAL_2021.06.08.pdf

TRC: $100 / measure

Incentive: $15 / measure

Room air cleaners

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Plug Load | **Measure Type:** Room Air Cleaners | **Measure Sub Type:** Room Air Cleaner

Program: Residential Consumer Products

Measure Description

Rebates provided for the purchase of an ENERGY STAR® qualified room air cleaner. ENERGY STAR® air cleaners are 40% more energy-efficient than standard models.

Baseline Description

The baseline efficiency case is a conventional unit with clean air delivery rate (CADR) of 51-100.

BCR Measures

BCR Measure Name	Unique Identifier
Room air cleaners	2024 Electric Residential Consumer Products Room air cleaners

Savings Principle

The high efficiency case is an ENERGY STAR® qualified air cleaner with a CADR of 51-100.

Savings Method

Deemed

Unit

Rebated ENERGY STAR® room air cleaner

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: 5840

Hours Source: Environmental Protection Agency (2012), Savings Calculator for Energy Star Qualified Appliances

Hours Note: The Savings are based on 16 operating hours per day, 365 days per year

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Room air cleaners	391.0	0.0900	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Environmental Protection Agency (2018). Savings Calculator for Energy Star Qualified Appliances.

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Room air cleaners	9	0.97	1.00		1.00	1.00	1.00	0.82	0.17

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Room air cleaners	21.99%	23.34%	24.93%	29.74%

Measure Life Source: Environmental Protection Agency (2018). Savings Calculator for Energy Star Qualified Appliances.

ISR Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Note: National Grid assumption based on regional PA working groups.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Room air cleaners	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Room air cleaners	0.37	0.00	0.00	0.63

NTG Source: NMR Group, Inc. (2021). Residential Products Net-to-Gross Study. https://ma-eeac.org/wp-content/uploads/MA20X04-E-PRODNTG_Res-Products-NTG-Report_FINAL_2021.06.08.pdf

TRC: $83 / measure

Incentive: $45 / measure

Smart Strips

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Plug Load | **Measure Type:** Smart Strips | **Measure Sub Type:** Smart Strip

Program: Residential Consumer Products

Measure Description

The basic measures switches off plug load using current sensors and switching devices which turn off plug load when electrical current drops below threshold low levels. The advanced measure shuts devices off after it no longer senses activity from their infrared controls.

Baseline Description

The baseline efficiency case is the absence power strip and leaving peripheral devices plugged in or using a power surge protector and leaving peripheral devices on

BCR Measures

BCR Measure Name	Unique Identifier
Smart Strips	2024 Electric Residential Consumer Products Smart Strips

Savings Principle

The high efficiency case is the use of a smart strip or advanced smart strip.

Savings Method

Deemed

Unit

Per smart strip

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: 8760

Hours Note: Since the power strip is assumed to be plugged in all year, the savings are based on 8,760 operational hours per year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Smart Strips	105.0	0.0200	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Smart Strips	5	0.81	1.00		0.92	0.92	0.92	0.58	0.86

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Smart Strips	32.24%	34.78%	15.36%	17.62%

Measure Life Note: Massachusetts Common Assumption

ISR Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

RRsp Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

RRwp Note: National Grid assumption based on regional PA working groups.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Smart Strips	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Smart Strips	0.00	0.00	0.00	1.00

NTG Note: Realization rate is assumed 100% because energy savings are custom calculated.

TRC: $32 / measure

Incentive: $10 / measure

Thermostatic Shut-Off Valve

Sector: Residential | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Water Heating | **Measure Type:** Flow Control | **Measure Sub Type:** Low Flow Showerhead

Program: Residential Consumer Products

Measure Description

A showerhead with a control that limits flow once water is heated (thermostatic shut-off valve).

Baseline Description

The Baseline Efficiency case is an existing standard-flow showerhead (2.5 GPM) with no thermostatic shut-off valve.

BCR Measures

BCR Measure Name	Unique Identifier
Thermostatic Shutoff Valve - Elec	2024 Electric Residential Consumer Products Thermostatic Shutoff Valve - Elec
Thermostatic Shut-off Valve - Oil	2024 Electric Residential Consumer Products Thermostatic Shut-off Valve - Oil
Thermostatic Shut-off Valve - Other	2024 Electric Residential Consumer Products Thermostatic Shut-off Valve - Other

Savings Principle

The high efficiency case is a standard-flow showerhead (2.5 GPM) with the addition of the stand-alone thermostatic shut-off valve.

Savings Method

Deemed

Unit

Per Showerhead

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Thermostatic Shutoff Valve - Elec	76.0	0.0200				0.00	0.00
Thermostatic Shut-off Valve - Oil	0.0	0.0	0.00	0.00	0.00	0.43	0.00
Thermostatic Shut-off Valve - Other	0.0	0.0				0.00	0.38

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Thermostatic Shut-Off Valve	15	0.78	1.00		1.00	1.00	1.00	0.31	0.81

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Thermostatic Shut-Off Valve	41.52%	31.39%	15.22%	11.88%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Thermostatic Shut-Off Valve	621	621	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: National Grid (2014). Review of ShowerStart evolve.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Thermostatic Shut-Off Valve	0.03	0.00	0.00	0.97

NTG Source: The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation.

TRC: $30 / measure

Incentive: $11.5 / measure

Tricklestar Keyboard

Sector: Residential

Fuel: Electric

Program Type: Prescriptive

Measure Category: Other

Measure Type: Tricklestar Keyboards

Measure Sub Type: Tricklestar Keyboard

Program: Residential Consumer Products

Measure Description

The basic measures puts the PC/laptop to sleep when the user is absent from the PC.

Baseline Description

The baseline efficiency is using a normal keyboard.

BCR Measures

BCR Measure Name	Unique Identifier
Tricklestar Keyboard	2024 Electric Residential Consumer Products Tricklestar Keyboard

Savings Principle

The high efficiency case is using a tricklestar keyboard

Savings Method

Deemed

Unit

Per tricklestar keyboard

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Tricklestar Keyboard	105.0	0.0670	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

Electric kW Source: Energuide.be (2023). How much power does a computer use? And how much CO2 does that represent? https://www.energuide.be/en/questions-answers/how-much-power-does-a-computer-use-and-how-much-co2-does-that-represent/54/

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Tricklestar Keyboard	5	0.81	1.00		0.92	0.92	0.92	0.58	0.86

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Tricklestar Keyboard	32.24%	34.78%	15.36%	17.62%

Measure Life Note: Massachusetts Common Assumption

ISR Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Tricklestar Keyboard	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Tricklestar Keyboard	0.31	0.01	0.00	0.70

NTG Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

TRC: $100 / measure

Incentive: $25 / $ per measure

Codes and Standards

Sector: Residential

Fuel: Gas

Program Type: Custom

Measure Category: Whole Home

Measure Type: Codes and Standards

Measure Sub Type: Codes and Standards

Program: Residential New Construction

Measure Description

Energy efficiency code trainings and advocacy work to improve energy efficiency of buildings and equipment within Rhode Island.

Baseline Description

Un-influenced adoption curve of federal minimum codes and standards.

BCR Measures

BCR Measure Name	Unique Identifier
Codes and Standards	2024 Gas Residential New Construction Codes and Standards

Savings Principle

Accelerated adoption of advancing energy codes and equipment standards.

Savings Method

Calculated based on attribution study

Unit

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Codes and Standards	Calc		0.00	0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: NMR (2017). Rhode Island Code Compliance Enhancement Initiative Attribution and Savings Study. http://rieermc.ri.gov/wp-content/uploads/2018/03/ri-ccei-attribution-and-savings-final-report-12-12-17-clean.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Codes and Standards	20	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Codes and Standards	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

CFwp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Codes and Standards	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Codes and Standards	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $0 / $150k for res+C&I C&S

Incentive: $0 / $150k for res+C&I C&S

Cooling

Sector: Residential **Fuel:** Gas **Program Type:** Custom

Measure Category: Whole Home **Measure Type:** Insulation **Measure Sub Type:** Efficient Cooling

Program: Residential New Construction

Measure Description

To capture lost opportunities, encourage the construction of energy-efficient homes, and drive the market to one in which new homes are moving towards net-zero energy.

Baseline Description

The User Defined Reference Home was revised in 2023 as a result of a baseline study.

BCR Measures

BCR Measure Name	Unique Identifier
Cooling - Tier 1	2024 Gas Residential New Construction Cooling - Tier 1
Cooling - Tier 2	2024 Gas Residential New Construction Cooling - Tier 2
Cooling - Tier 3	2024 Gas Residential New Construction Cooling - Tier 3

Savings Principle

The high efficiency case is represented by the specific energy characteristics of each "as-built" home completed through the program.

Savings Method

Calculated using site-specific inputs

Unit

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Cooling - Tier 1							
Cooling - Tier 2	Calc	Calc	0.00	0.00	0.00	0.00	0.00
Cooling - Tier 3							

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Electric kW Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Gas Heat MMBtu Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Cooling	25	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Cooling	0.90%	4.12%	53.82%	41.17%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

CFwp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Cooling	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Cooling	0.25	0.00	0.00	0.75

NTG Source: NMR Group, Inc (2021). Low Rise Residential New Construction NTG Study (MA20X05-B-RNCNTG). https://ma-eeac.org/wp-content/uploads/MA20X05-B-RNCNTG_Low-rise-RNC-NTG_FinalDraft-07272021.pdf

NTG Note: Net-to-gross negotiated with C-Team based on MA results

TRC: $0 / home

Incentive: $0 / home

CP

Sector: Residential **Fuel:** Gas **Program Type:** Custom

Measure Category: Whole Home **Measure Type:** Custom **Measure Sub Type:** CP

Program: Residential New Construction

Measure Description

To capture lost opportunities, encourage the construction of energy-efficient homes, and drive the market to one in which new homes are moving towards net-zero energy.

Baseline Description

The User Defined Reference Home was revised in 2023 as a result of a baseline study.

BCR Measures

BCR Measure Name	Unique Identifier
CP - Heating	2024 Gas Residential New Construction CP - Heating
CP - DHW	2024 Gas Residential New Construction CP - DHW
CP - Cooling	2024 Gas Residential New Construction CP - Cooling

Savings Principle

The high efficiency case is represented by the specific energy characteristics of each "as-built" home completed through the program.

Savings Method

Calculated using site-specific inputs

Unit

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CP - Heating							
CP - DHW	Calc	Calc	Calc	0.00	0.00	0.00	0.00
CP - Cooling							

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Electric kW Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Gas Heat MMBtu Source: DOE (2015). Technical Support Document: Commercial Warm Air Furnaces. EERE-2013-BT-STD-0021-0050. https://www.regulations.gov/document/EERE-2013-BT-STD-0021-0050

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
CP	Multi	1.00	1.00					0.00	0.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
CP - Heating	37.81%	61.53%	0.17%	0.49%
CP - DHW	0.00%	0.00%	0.00%	0.00%
CP - Cooling	0.90%	4.12%	53.82%	41.17%

Measure Life Note: Massachusetts Common Assumption

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
CP	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
CP	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

Incentive: Heating -$310/home, DHW - $50/home

DHW

Sector: Residential

Fuel: Gas

Program Type: Custom

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Flow Control Measures

Program: Residential New Construction

Measure Description

DHW measures including high-efficiency low-flow showerheads and faucet aerators save water and water heating energy.

Baseline Description

The baseline efficiency case is the existing domestic hot water equipment.

BCR Measures

BCR Measure Name	Unique Identifier
DHW- Tier 1	2024 Gas Residential New Construction DHW- Tier 1
DHW - Tier 2	2024 Gas Residential New Construction DHW - Tier 2
DHW - Tier 3	2024 Gas Residential New Construction DHW - Tier 3

Savings Principle

The high efficiency case is the installation of high-efficiency domestic hot water equipment such as low-flow showerheads and faucet aerators.

Savings Method

Calc

Unit

Installed DHW efficiency measure.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
DHW- Tier 1							
DHW - Tier 2	Calc	Calc	Calc	0.00	0.00	0.00	0.00
DHW - Tier 3							

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Electric kW Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Gas Heat MMBtu Source: DOE (2015). Technical Support Document: Commercial Warm Air Furnaces. EERE-2013-BT-STD-0021-0050. https://www.regulations.gov/document/EERE-2013-BT-STD-0021-0050

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
DHW	15	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
DHW	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

CFwp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
DHW	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
DHW	0.25	0.00	0.00	0.75

NTG Source: NMR Group, Inc (2021). Low Rise Residential New Construction NTG Study (MA20X05-B-RNCNTG). https://ma-eeac.org/wp-content/uploads/MA20X05-B-RNCNTG_Low-rise-RNC-NTG_FinalDraft-07272021.pdf

NTG Note: Net-to-gross negotiated with C-Team based on MA results

TRC: $440 / home

Incentive: Tier 1 - $50/home, Tier 2 and 3 - $150/home

Heating

Sector: Residential **Fuel:** Gas **Program Type:** Custom

Measure Category: HVAC **Measure Type:** Heating **Measure Sub Type:** Efficient Heating

Program: Residential New Construction

Measure Description

This measure involves the installation of a high-efficiency natural gas heating system.

Baseline Description

The baseline efficiency case is a standard efficiency natural gas heating system.

BCR Measures

BCR Measure Name	Unique Identifier
Heating - Tier 1	2024 Gas Residential New Construction Heating - Tier 1
Heating - Tier 2	2024 Gas Residential New Construction Heating - Tier 2
Heating - Tier 3	2024 Gas Residential New Construction Heating - Tier 3

Savings Principle

The high efficiency case is the installation of a high-efficiency natural gas heating system.

Savings Method

Deemed

Unit

Installed high-efficiency natural gas heating system.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heating - Tier 1 Heating - Tier 2 Heating - Tier 3	Calc	Calc	Calc	0.00	0.00	0.00	0.00

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Electric kW Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Gas Heat MMBtu Source: DOE (2015). Technical Support Document: Commercial Warm Air Furnaces. EERE-2013-BT-STD-0021-0050. https://www.regulations.gov/document/EERE-2013-BT-STD-0021-0050

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heating	25	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heating	37.81%	61.53%	0.17%	0.49%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

CFwp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heating	0	0	148.16	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heating	0.25	0.00	0.00	0.75

NTG Source: NMR Group, Inc (2021). Low Rise Residential New Construction NTG Study (MA20X05-B-RNCNTG). https://ma-eeac.org/wp-content/uploads/MA20X05-B-RNCNTG_Low-rise-RNC-NTG_FinalDraft-07272021.pdf

NTG Note: Net-to-gross negotiated with C-Team based on MA results

Incentive: Tier 1 - $1050/home, Tier 2 - $1975/home, Tier 3 - $2300/home

MFHR, Gas

Sector: Residential | **Fuel:** Gas | **Program Type:** Custom

Measure Category: Whole Home | **Measure Type:** Custom | **Measure Sub Type:** Adaptive Reuse

Program: Residential New Construction

Measure Description

To capture lost opportunities, encourage the construction of energy-efficient homes, and drive the market to one in which new homes are moving towards net-zero energy.

Baseline Description

The User Defined Reference Home was revised in 2023 as a result of a baseline study.

BCR Measures

BCR Measure Name	Unique Identifier
MFHR - Cooling MFHR - Heating MFHR - Water Heating	2024 Gas Residential New Construction MFHR - Cooling 2024 Gas Residential New Construction MFHR - Heating 2024 Gas Residential New Construction MFHR - Water Heating

Savings Principle

The high efficiency case is represented by the specific energy characteristics of each “as-built” home completed through the program.

Savings Method

Calculated using site-specific inputs

Unit

Completed ESH heating, cooling, or DHW project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
MFHR - Cooling MFHR - Heating MFHR - Water Heating	Calc	Calc	0.00	Calc	0.00	Calc	Calc

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Electric kW Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Gas Heat MMBtu Source: DOE (2015). Technical Support Document: Commercial Warm Air Furnaces. EERE-2013-BT-STD-0021-0050. https://www.regulations.gov/document/EERE-2013-BT-STD-0021-0050

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
MFHR, Gas	multi	1.00	1.00	1.00		1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
MFHR, Gas	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
MFHR, Gas	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
MFHR, Gas	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $1295 / home

Incentive: Heating -$700 / home

Renovation Rehab Cooling, Gas

Sector: Residential **Fuel:** Gas **Program Type:** Custom

Measure Category: Whole Home **Measure Type:** Custom **Measure Sub Type:** Gas Cooling

Program: Residential New Construction

Measure Description

The gas cooling savings resulting from Renovation Rehab projects that include the installation of roof, wall, and basement insulation.

Baseline Description

The baseline case is the current version of the RI energy code and/or UDRH performance.

BCR Measures

BCR Measure Name	Unique Identifier
Renovation Rehab - Cooling Tier 1, Gas	2024 Gas Residential New Construction Renovation Rehab - Cooling Tier 1, Gas
Renovation Rehab - Cooling Tier 2, Gas	2024 Gas Residential New Construction Renovation Rehab - Cooling Tier 2, Gas
Renovation Rehab - Cooling Tier 3, Gas	2024 Gas Residential New Construction Renovation Rehab - Cooling Tier 3, Gas

Savings Principle

The efficient case is the post-retrofit performance of a house participating the program

Savings Method

Calculated using site-specific inputs

Unit

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Renovation Rehab - Cooling Tier 1, Gas	Calc	Calc	Calc	0.00	0.00	0.00	0.00
Renovation Rehab - Cooling Tier 2, Gas							
Renovation Rehab - Cooling Tier 3, Gas							

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Electric kW Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Gas Heat MMBtu Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Renovation Rehab Cooling, Gas	25	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Renovation Rehab Cooling, Gas	2.50%	4.80%	42.58%	50.13%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

CFwp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Renovation Rehab Cooling, Gas	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc (2021). RNC NEI Quick Hit Assessment (MA20X14-B-RINCNEI). https://ma-eeac.org/wp-content/uploads/MA20X14_RNC-NEI_Final-Report_-2021.10.06.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Renovation Rehab Cooling, Gas	0.22	0.02	0.12	0.92

NTG Source: NMR Group, Inc (2021). Residential Self-report Net-to-Gross Methodology Update and Sensitivity Analysis (MA21X22-B-RSRNTGUP). https://ma-eeac.org/wp-content/uploads/MA21X22-B-RSRNTGUP_Res-SR-NTG-Method-Update_Final-Report_2022.05.24.pdf

NTG Note: Net-to-gross negotiated with C-Team based on MA results

TRC: $0 / home

Incentive: $0 / home

Renovation Rehab CP, Gas

Sector: Residential **Fuel:** Gas **Program Type:** Custom

Measure Category: Whole Home **Measure Type:** Custom **Measure Sub Type:** CP

Program: Residential New Construction

Measure Description

The heating, cooling, and DHW savings resulting from CP Renovation Rehab projects.The cooling and heating savings resulting from Renovation Rehab projects that include the installation of roof, wall, and basement insulation. The DHW savings resulting fromRenovation Rehab projects that include more efficient water heating systems.

Baseline Description

The baseline case is the current version of the RI energy code and/or UDRH performance.

BCR Measures

BCR Measure Name	Unique Identifier
Renovation Rehab CP - Heating, Gas	2024 Gas Residential New Construction Renovation Rehab CP - Heating, Gas
Renovation Rehab CP - Cooling, Gas	2024 Gas Residential New Construction Renovation Rehab CP - Cooling, Gas
Renovation Rehab CP - DHW, Gas	2024 Gas Residential New Construction Renovation Rehab CP - DHW, Gas

Savings Principle

The efficient case is the post-retrofit performance of a house participating the program

Savings Method

Calculated using site-specific inputs

Unit

Complete Renovation Rehab project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Renovation Rehab CP - Heating, Gas							
Renovation Rehab CP - Cooling, Gas	Calc	Calc	Calc	0.00	0.00	0.00	0.00
Renovation Rehab CP - DHW, Gas							

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Electric kW Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Gas Heat MMBtu Source: DOE (2015). Technical Support Document: Commercial Warm Air Furnaces. EERE-2013-BT-STD-0021-0050. https://www.regulations.gov/document/EERE-2013-BT-STD-0021-0050

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Renovation Rehab CP, Gas	Multi	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Renovation Rehab CP - Heating, Gas	37.81%	61.53%	0.17%	0.49%
Renovation Rehab CP - Cooling, Gas	2.50%	4.80%	42.58%	50.13%
Renovation Rehab CP - DHW, Gas	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

CFwp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Renovation Rehab CP, Gas	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Renovation Rehab CP, Gas	0.22	0.02	0.12	0.92

NTG Source: NMR Group, Inc (2021). Residential Self-report Net-to-Gross Methodology Update and Sensitivity Analysis (MA21X22-B-RSRNTGUP). https://ma-eeac.org/wp-content/uploads/MA21X22-B-RSRNTGUP_Res-SR-NTG-Method-Update_Final-Report_2022.05.24.pdf

NTG Note: Net-to-gross negotiated with C-Team based on MA results

TRC: $866 / home

Incentive: $310 / home

Renovation Rehab DHW, Gas

Sector: Residential **Fuel:** Gas **Program Type:** Custom

Measure Category: Whole Home **Measure Type:** Custom **Measure Sub Type:** DHW

Program: Residential New Construction

Measure Description

The DHW savings resulting from Renovation Rehab projects that include more efficient water heating systems.

Baseline Description

The baseline case is the current version of the RI energy code and/or UDRH performance.

BCR Measures

BCR Measure Name	Unique Identifier
Renovation Rehab - DHW Tier 1, Gas	2024 Gas Residential New Construction Renovation Rehab - DHW Tier 1, Gas
Renovation Rehab - DHW Tier 2, Gas	2024 Gas Residential New Construction Renovation Rehab - DHW Tier 2, Gas
Renovation Rehab - DHW Tier 3, Gas	2024 Gas Residential New Construction Renovation Rehab - DHW Tier 3, Gas

Savings Principle

The efficient case is the post-retrofit performance of a house participating the program

Savings Method

Calculated using site-specific inputs

Unit

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Renovation Rehab - DHW Tier 1, Gas	Calc	Calc	Calc	0.00	0.00	0.00	0.00
Renovation Rehab - DHW Tier 2, Gas							
Renovation Rehab - DHW Tier 3, Gas							

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Electric kWh Note: Supplied by vendor

Electric kW Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Electric kW Note: Supplied by vendor

Gas Heat MMBtu Source: DOE (2015). Technical Support Document: Commercial Warm Air Furnaces. EERE-2013-BT-STD-0021-0050. https://www.regulations.gov/document/EERE-2013-BT-STD-0021-0050

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Renovation Rehab DHW, Gas	15	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Renovation Rehab DHW, Gas	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

CFwp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Renovation Rehab DHW, Gas	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Renovation Rehab DHW, Gas	0.22	0.02	0.12	0.92

NTG Source: NMR Group, Inc (2021). Residential Self-report Net-to-Gross Methodology Update and Sensitivity Analysis (MA21X22-B-RSRNTGUP). https://ma-eeac.org/wp-content/uploads/MA21X22-B-RSRNTGUP_Res-SR-NTG-Method-Update_Final-Report_2022.05.24.pdf

NTG Note: Net-to-gross negotiated with C-Team based on MA results

TRC: $440 / home

Incentive: Tier 1 - $50/home; Tier 2 and 3 - $150/home

Renovation Rehab Heating, Gas

Sector: Residential **Fuel:** Gas **Program Type:** Custom

Measure Category: Whole Home **Measure Type:** Custom **Measure Sub Type:** Heating

Program: Residential New Construction

Measure Description

The heating savings resulting from Renovation Rehab projects that include the installation of roof, wall, and basement insulation.

Baseline Description

The baseline case is the current version of the RI energy code and/or UDRH performance.

BCR Measures

BCR Measure Name	Unique Identifier
Renovation Rehab - Heating Tier 1, Gas	2024 Gas Residential New Construction Renovation Rehab - Heating Tier 1, Gas
Renovation Rehab - Heating Tier 2, Gas	2024 Gas Residential New Construction Renovation Rehab - Heating Tier 2, Gas
Renovation Rehab - Heating Tier 3, Gas	2024 Gas Residential New Construction Renovation Rehab - Heating Tier 3, Gas

Savings Principle

The efficient case is the post-retrofit performance of a house participating the program

Savings Method

Calculated using site-specific inputs

Unit

Complete Renovation Rehab project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Renovation Rehab - Heating Tier 1, Gas	Calc	Calc	Calc	0.00	0.00	0.00	0.00
Renovation Rehab - Heating Tier 2, Gas							
Renovation Rehab - Heating Tier 3, Gas							

Electric kWh Source: NMR Group (2023). Residential New Construction Baseline Study.

Electric kW Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Electric kW Note: Calculated, per 100ft2

Gas Heat MMBtu Source: DOE (2015). Technical Support Document: Commercial Warm Air Furnaces. EERE-2013-BT-STD-0021-0050. https://www.regulations.gov/document/EERE-2013-BT-STD-0021-0050

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Renovation Rehab Heating, Gas	25	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Renovation Rehab Heating, Gas	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

CFwp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Renovation Rehab Heating, Gas	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Renovation Rehab Heating, Gas	0.22	0.02	0.12	0.92

NTG Source: NMR Group, Inc (2021). Residential Self-report Net-to-Gross Methodology Update and Sensitivity Analysis (MA21X22-B-RSRNTGUP). https://ma-eeac.org/wp-content/uploads/MA21X22-B-RSRNTGUP_Res-SR-NTG-Method-Update_Final-Report_2022.05.24.pdf

NTG Note: Net-to-gross negotiated with C-Team based on MA results

TRC: Tier 1 - $2022/home, Tier 2 - $3044/home

Incentive: Tier 1 - $1050/home; Tier 2 - $1450/home

Showerhead

Sector: Residential

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Showerhead

Program: Residential New Construction

Measure Description

Installation of a low flow showerhead with a flow rate of 1.5 GPM or less.

Baseline Description

The baseline efficiency case is a showerhead with a flow of 2.5 gpm. For home audit applications, the baseline is the existing showerhead.

BCR Measures

BCR Measure Name	Unique Identifier
Showerhead	2024 Gas Residential New Construction Showerhead

Savings Principle

The high efficiency is a low-flow showerhead with a flow of 1.5 gpm or less.

Savings Method

Deemed

Unit

Installed showerhead.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Showerhead				0.47	0.00	0.00	0.00

Gas DHW MMBtu Source: DOE (2015). Technical Support Document: Commercial Warm Air Furnaces. EERE-2013-BT-STD-0021-0050. https://www.regulations.gov/document/EERE-2013-BT-STD-0021-0050

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Showerhead	15	0.98	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Showerhead	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

ISR Note: For mailed-in showerheads, ISR is assumed at 53% based on MA VHEA Study (MA20R26-B-VHEA)

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2016). RI Impact Evaluation of 2014 EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160816_py2014_ri_energywise_report.pdf

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Showerhead	1565	0	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

One-time $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Showerhead	0.27	0.01	0.04	0.78

NTG Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

TRC: $22 / unit

Incentive: $0 / unit

Boiler Reset Controls

Sector: Residential | **Fuel:** Gas | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Boiler Control

Program: Residential HVAC

Measure Description

Boiler reset controls are devices that improve the efficiency of an existing boiler system by modulating the hot water temperature set point. Reset controls automatically control boiler water temperature based on outdoor temperature using a software program; load controls sense the thermal demand of the heating system and resets the water temperature based on the demand.

Baseline Description

The baseline efficiency case is a boiler without reset or load controls.

BCR Measures

BCR Measure Name	Unique Identifier
Boiler Reset Controls	2024 Gas Residential HVAC Boiler Reset Controls

Savings Principle

The efficient case is a boiler with reset or load controls, which reset the supply water temperature based on outdoor temperatures and/or building load.

Savings Method

Deemed

Unit

Installation of boiler reset control on existing boiler

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Boiler Reset Controls				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: Navigant (2018). Home Energy Services Impact Evaluation (Res 34). https://ma-eeac.org/wp-content/uploads/RES34_HES-Impact-Evaluation-Report-with-ES_FINAL_29AUG2018.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Boiler Reset Controls	15	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Boiler Reset Controls	0.00%	0.00%	0.00%	0.00%

Measure Life Source: ACEEE (2006). Emerging Technologies Report: Advanced Boiler Controls. Prepared for ACEEE.https://www.aceee.org/files/pdf/2006_BoilerControls.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Boiler Reset Controls	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Boiler Reset Controls	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $300 / measure

Incentive: $225 / measure

Combo Condensing Boiler/Water Heater

Sector: Residential **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Heating **Measure Sub Type:** Boiler

Program: Residential HVAC

Measure Description

This measure promotes the installation of a combined condensing high-efficiency boiler and water heating unit. Combined boiler and water heating systems are more efficient than separate systems because they eliminate the standby heat losses of an additional tank.

Baseline Description

For heating, the end of life baseline efficiency case is a 86.5% rated with an actual efficiency of 83.7%. For the early retirement portion, the baseline efficiency has a rated AFUE of 85.5 with a 77.4% actual AFUE Efficiency. For water heating, there isa blend of 24% indirect water heater and 76% storage water heater.

BCR Measures

BCR Measure Name	Unique Identifier
Combo Condensing Boiler/Water Heater - 90% AFUE	2024 Gas Residential HVAC Combo Condensing Boiler/Water Heater - 90% AFUE
Combo Condensing Boiler/Water Heater - 95% AFUE	2024 Gas Residential HVAC Combo Condensing Boiler/Water Heater - 95% AFUE

Savings Principle

The high efficiency case is an integrated water heater/condensing boiler with a 90% AFUE boiler and a 0.90 EF, integrated water heater/condensing boiler with a 95% AFUE boiler and a 0.95 EF water heater.

Savings Method

Deemed

Unit

Installation of new high-efficiency integrated boiler/water heater

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Combo Condensing Boiler/Water Heater - 90% AFUE				0.00	0.00	0.00	0.00
Combo Condensing Boiler/Water Heater - 95% AFUE							

Gas Heat MMBtu Source: Guidehouse (2021). Comprehensive TRM Review/RI_2022 Annual Plan_Gas_HVAC_WH_Calculations_2021-06-10

Gas Heat MMBtu Note: Baseline update can be found in first source and calculations for savings can be found in second source.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Combo Condensing Boiler/Water Heater	23	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Combo Condensing Boiler/Water Heater	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Combo Condensing Boiler/Water Heater	0	0	2.77	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Combo Condensing Boiler/Water Heater	0.36	0.13	0.00	0.76

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $3807 / measure

Incentive: $1000 / measure

Combo Furnace

Sector: Residential **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Heating **Measure Sub Type:** Furnace

Program: Residential HVAC

Measure Description

This measure promotes the installation of a combined condensing high-efficiency furnace and water heating unit. Combined furnace and water heating systems are more efficient than separate systems because they eliminate the standby heat losses of an additional tank.

Baseline Description

The baseline efficiency case is an 95% AFUE furnace with a 0.63 EF water heater.

BCR Measures

BCR Measure Name	Unique Identifier
Combo Furnace	2024 Gas Residential HVAC Combo Furnace

Savings Principle

The high efficiency case is an integrated water heater/condensing furnace with a 97% AFUE furnace and a 0.95 EF water heater.

Savings Method

Deemed

Unit

Installation of new high-efficiency integrated furnace/water heater

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Combo Furnace				0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Combo Furnace	17	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Combo Furnace	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Combo Furnace	0	0	47.79	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Combo Furnace	0.36	0.13	0.00	0.76

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $995 / measure

Incentive: $950 / measure

ENERGY STAR COND WATER HEATER 0.80 UEF

Sector: Residential

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Water Heater

Measure Sub Type: Condensing Water Heater

Program: Residential HVAC

Measure Description

Condensing water heaters recover energy by using either a larger heat exchanger or a second heat exchanger to reduce the flue-gas temperature to the point that water vapor condenses, thus releasing even more energy.

Baseline Description

The baseline efficiency case is a standalone tank water heater with an UEF of 0.58 for medium draw and 0.63 for high draw of 0.61. For

BCR Measures

BCR Measure Name	Unique Identifier
ENERGY STAR COND WATER HEATER 0.80 UEF	2024 Gas Residential HVAC ENERGY STAR COND WATER HEATER 0.80 UEF

Savings Principle

The high efficiency case is a stand-alone storage water heater with a medium draw and UEF >= 0.64 or high draw and UEF >= 0.68, a condensing water heater with an UEF >= 0.80, a tankless water heater with an UEF >= 0.87, or an indirect water heater attached to an ENERGY STAR® rated forced hot water gas boiler.

Savings Method

Deemed

Unit

Installation of new high-efficiency water heater

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
ENERGY STAR COND WATER HEATER 0.80 UEF	-43.0	-0.0200	0.00	7.00	0.00	0.00	0.00

Electric kWh Source: Water Heater UEF screening_2019-21_revised 2018.09.06

Electric kW Source: Water Heater UEF screening_2019-21_revised 2018.09.06

Gas DHW MMBtu Source: Water Heater UEF screening_2019-21_revised 2018.09.06

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
ENERGY STAR COND WATER HEATER 0.80 UEF	15	1.00	1.00	1.00	1.00	1.00	1.00	0.21	0.40

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
ENERGY STAR COND WATER HEATER 0.80 UEF	40.94%	34.19%	13.30%	11.56%

Measure Life Source: DOE (2008). ENERGY STAR® Residential Water Heaters: Final Criteria Analysis. Prepared for the DOE.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
ENERGY STAR COND WATER HEATER 0.80 UEF	0	0	0.71	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
ENERGY STAR COND WATER HEATER 0.80 UEF	0.34	0.12	0.00	0.77

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $1285 / measure

Incentive: $500 / measure

ENERGY STAR ON DEMAND WATER HEATER 0.87 UEF

Sector: Residential

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Water Heater

Measure Sub Type: Tankless Water Heater

Program: Residential HVAC

Measure Description

Condensing water tankless water heaters recover energy by using either a larger heat exchanger or a second heat exchanger to reduce the flue-gas temperature to the point that water vapor condenses, thus releasing even more energy and circulating water through a heat exchanger to be heated for immediate use, eliminating the standby heat loss associated with a storage tank.

Baseline Description

The baseline efficiency case is a high draw standalone tank water heater with an UEF of 0.63. For the early retirement portion, the UEF is equal to 0.60.

BCR Measures

BCR Measure Name	Unique Identifier
ENERGY STAR ON DEMAND WATER HEATER 0.87 UEF	2024 Gas Residential HVAC ENERGY STAR ON DEMAND WATER HEATER 0.87 UEF

Savings Principle

The high efficiency case is a stand-alone storage water heater with a medium draw and UEF >= 0.64 or high draw and UEF >= 0.68, a condensing water heater with an UEF >= 0.80, a tankless water heater with an UEF >= 0.87, or an indirect water heater attached to an ENERGY STAR® rated forced hot water gas boiler.

Savings Method

Deemed

Unit

Installed condensing tankless water heater

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
ENERGY STAR ON DEMAND WATER HEATER 0.87 UEF	-43.0	-0.0200	0.00	7.00	0.00	0.00	0.00

Electric kWh Source: Water Heater UEF screening_2019-21_revised 2018.09.06

Electric kW Source: Water Heater UEF screening_2019-21_revised 2018.09.06

Gas DHW MMBtu Source: Guidehouse (2021). Comprehensive TRM Review/RI_2022 Annual Plan_Gas_HVAC_WH_Calculations_2021-06-10

Gas DHW MMBtu Note: Baseline update can be found in first source and calculations for savings can be found in second source.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
ENERGY STAR ON DEMAND WATER HEATER 0.87 UEF	19	1.00	1.00	1.00	1.00	1.00	1.00	0.21	0.40

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
ENERGY STAR ON DEMAND WATER HEATER 0.87 UEF	40.94%	34.19%	13.30%	11.56%

Measure Life Source: DOE (2008). ENERGY STAR® Residential Water Heaters: Final Criteria Analysis. Prepared for the DOE.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
ENERGY STAR ON DEMAND WATER HEATER 0.87 UEF	0	0	1.24	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
ENERGY STAR ON DEMAND WATER HEATER 0.87 UEF	0.34	0.12	0.00	0.77

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $754 / measure

Incentive: $600 / measure

ENERGY STAR STORAGE WATER HEATER .64 UEF (med draw)

Sector: Residential

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Water Heater

Measure Sub Type: Efficient Standard Tank Water Heater

Program: Residential HVAC

Measure Description

Stand-alone storage water heaters are high efficiency water heaters that are not combined with space heating devices.

Baseline Description

The baseline efficiency case is a standalone tank water heater with a medium draw of a UEF of 0.58 and high draw of 0.63. For the early retirement portion, the medium draw UEF is equal to 0.56 and high draw is equal to 0.60.

BCR Measures

BCR Measure Name	Unique Identifier
ENERGY STAR STORAGE WATER HEATER .64 UEF (med draw)	2024 Gas Residential HVAC ENERGY STAR STORAGE WATER HEATER .64 UEF (med draw)

Savings Principle

The high efficiency case is a stand-alone storage water heater with a medium draw and UEF >= 0.64 or high draw and UEF >= 0.68, a condensing water heater with an UEF >= 0.80, a tankless water heater with an UEF >= 0.87, or an indirect water heater attached to an ENERGY STAR® rated forced hot water gas boiler.

Savings Method

Deemed

Unit

Installation of new high-efficiency water heater

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
ENERGY STAR STORAGE WATER HEATER .64 UEF (med draw)	-43.0	-0.0200	0.00	2.50	0.00	0.00	0.00

Electric kWh Source: Water Heater UEF screening_2019-21_revised 2018.09.06

Electric kW Source: Water Heater UEF screening_2019-21_revised 2018.09.06

Gas DHW MMBtu Source: Guidehouse (2021). Comprehensive TRM Review/RI_2022 Annual Plan_Gas_HVAC_WH_Calculations_2021-06-10

Gas DHW MMBtu Note: Baseline update can be found in first source and calculations for savings can be found in second source.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
ENERGY STAR STORAGE WATER HEATER .64 UEF (med draw)	9	1.00	1.00	1.00	1.00	1.00	1.00	0.21	0.40

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
ENERGY STAR STORAGE WATER HEATER .64 UEF (med draw)	40.94%	34.19%	13.30%	11.56%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review/RI_2022 Annual Plan_Gas_HVAC_WH_Calculations_2021-06-10

Measure Life Note: Baseline update can be found in first source and calculations for savings can be found in second source.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
ENERGY STAR STORAGE WATER HEATER .64 UEF (med draw)	0	0	1.31	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
ENERGY STAR STORAGE WATER HEATER .64 UEF (med draw)	0.34	0.12	0.00	0.77

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $167 / measure

Incentive: $75 / measure

Forced Hot Water Boiler

Sector: Residential | **Fuel:** Gas | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Heating | **Measure Sub Type:** Boiler

Program: Residential HVAC

Measure Description

Installation of a new space heating gas-fired condensing boiler.

Baseline Description

The end of life baseline efficiency case is a boiler with a rated AFUE equal to 86.5% and an actual efficiency of 83.7%. For the early retirement portion of the savings, the baseline efficiency is a rated 85.5% AFUE and an actual efficiency of 77.4%.

BCR Measures

BCR Measure Name	Unique Identifier
Forced Hot Water Boiler - >=90% AFUE	2024 Gas Residential HVAC Forced Hot Water Boiler - >=90% AFUE
Forced Hot Water Boiler - >=95% AFUE	2024 Gas Residential HVAC Forced Hot Water Boiler - >=95% AFUE

Savings Principle

The high efficiency case is a boiler with an AFUE greater than or equal to 90% or 95%.

Savings Method

Deemed

Unit

Installation of new high-efficiency boiler

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Forced Hot Water Boiler - >=90% AFUE				0.00	0.00	0.00	0.00
Forced Hot Water Boiler - >=95% AFUE							

Gas Heat MMBtu Source: Guidehouse (2021). Comprehensive TRM Review/RI_2022 Annual Plan_Gas_HVAC_WH_Calculations_2021-06-10

Gas Heat MMBtu Note: Baseline update can be found in first source and calculations for savings can be found in second source.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Forced Hot Water Boiler	17	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Forced Hot Water Boiler	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review/RI_2022 Annual Plan_Gas_HVAC_WH_Calculations_2021-06-10

Measure Life Note: Baseline update can be found in first source and calculations for savings can be found in second source.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Forced Hot Water Boiler	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Forced Hot Water Boiler	0.36	0.13	0.00	0.76

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $3711 / measure

Incentive: $800 / measure

Furnace w/ECM

Sector: Residential **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Heating **Measure Sub Type:** Furnace

Program: Residential HVAC

Measure Description

Installation of a new high efficiency space heating gas-fired furnace with an electronically commutated motor (ECM) for the fan.

Baseline Description

The baseline efficiency in an 95% AFUE furnace.

BCR Measures

BCR Measure Name	Unique Identifier
Furnace w/ ECM - 97% AFUE	2024 Gas Residential HVAC Furnace w/ ECM - 97% AFUE

Savings Principle

The high efficiency case is a new furnace with AFUE >= 97% and an electronically commutated motor.

Savings Method

Deemed

Unit

Installation of new high-efficiency furnace with ECM

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Furnace w/ ECM - 97% AFUE				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: Guidehouse (2021). Comprehensive TRM Review/RI_2022 Annual Plan_Gas_HVAC_WH_Calculations_2021-06-10

Gas Heat MMBtu Note: Baseline update can be found in first source and calculations for savings can be found in second source.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Furnace w/ECM	17	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Furnace w/ECM	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

Measure Life Note: Baseline update can be found in first source and calculations for savings can be found in second source.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Furnace w/ECM	0	0	47.79	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Furnace w/ECM	0.36	0.13	0.00	0.76

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $1851 / measure

Incentive: $550 / measure

Heat Recovery Ventilator

Sector: Residential

Fuel: Gas

Program Type: Prescriptive

Measure Category: HVAC

Measure Type: Ventilation

Measure Sub Type: Heat Recovery Ventilator

Program: Residential HVAC

Measure Description

Heat Recovery Ventilators (HRV) can help make mechanical ventilation more cost effective by reclaiming energy from exhaust airflows. An electric penalty results due to the increased electricity consumed by the system fans.

Baseline Description

The baseline efficiency case is an ASHRAE 62.2-compliant exhaust fan system with no heat recovery.

BCR Measures

BCR Measure Name	Unique Identifier
Heat Recovery Ventilator	2024 Gas Residential HVAC Heat Recovery Ventilator

Savings Principle

The high efficiency case is an exhaust fan system with heat recovery.

Savings Method

Deemed

Unit

Installation of heat recovery ventilation system

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heat Recovery Ventilator	-171.0	-0.0200	-171.00	0.00	0.00	0.00	0.00

Electric kWh Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

Electric kW Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

Gas Heat MMBtu Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heat Recovery Ventilator	20	1.00	1.00	1.00	1.00	1.00	1.00		0.45

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heat Recovery Ventilator	44.58%	55.42%	0.00%	0.00%

Measure Life Source: GDS Associates, Inc. and Summit Blue Consulting (2009), Natural Gas Energy Efficiency Potential in Massachusetts, Appendix B-2,

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heat Recovery Ventilator	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heat Recovery Ventilator	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $960 / measure

Incentive: $500 / measure

Low Flow Showerhead

Sector: Residential

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Water Heater

Measure Sub Type: Low Flow Showerhead

Program: Residential HVAC

Measure Description

1.75 GPD or less

Baseline Description

Standard Showerhead

BCR Measures

BCR Measure Name	Unique Identifier
Low Flow Showerhead	2024 Gas Residential HVAC Low Flow Showerhead

Savings Principle

Savings Method

Deemed

Unit

Per Showerhead

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Low Flow Showerhead			0.00	1.20	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Low Flow Showerhead	15	0.78	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Low Flow Showerhead	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Low Flow Showerhead	2401	2401	0.00	0.00	0.00	0.03	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Low Flow Showerhead	0.03	0.12	0.00	1.09

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $20 / measure

Incentive: $7 / measure

Programmable Thermostat

Sector: Residential | **Fuel:** Gas | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Thermostat

Program: Residential HVAC

Measure Description

Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.

Baseline Description

The baseline efficiency case for cooling is a manual thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Programmable Thermostat	2024 Gas Residential HVAC Programmable Thermostat

Savings Principle

Savings Method

Deemed

Unit

Per Thermostat

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Programmable Thermostat				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Programmable Thermostat	19	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Programmable Thermostat	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Programmable Thermostat	0	0	4.25	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Programmable Thermostat	0.25	0.12	0.00	0.87

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $92 / measure

Incentive: $25 / measure

Room Response Control - Gas

Sector: Residential **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** Thermostat

Program: Residential HVAC

Measure Description

The installation of room response control measures for gas heating.

Baseline Description

The baseline is a home with no room response control measures for gas heating.

BCR Measures

BCR Measure Name	Unique Identifier
Room Response Control - Gas	2024 Gas Residential HVAC Room Response Control - Gas

Savings Principle

The high efficiency case is the installation of room response control measures for gas heating.

Savings Method

Deemed

Unit

Installed room response controls.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Room Response Control - Gas				0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Room Response Control - Gas	15	1.00	1.00	1.00		1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Room Response Control - Gas	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats.https://www.energystar.gov/ia/partners/promotions/cool_change/downloads/CalculatorProgrammableThermostat.xls

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Room Response Control - Gas	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Room Response Control - Gas	0.00	0.00	0.00	1.00

TRC: $160 / measure

Incentive: $75 / measure

Thermostatic Shut-Off Valve

Sector: Residential

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Water Heater

Measure Sub Type: Low Flow Showerhead

Program: Residential HVAC

Measure Description

A showerhead with a thermostatic shut off valve.

Baseline Description

The Baseline Efficiency case is an existing standard-flow showerhead (2.5 GPM) with no thermostatic shut-off valve.

BCR Measures

BCR Measure Name	Unique Identifier
Thermostatic Shut-Off Valve	2024 Gas Residential HVAC Thermostatic Shut-Off Valve

Savings Principle

Savings Method

Deemed

Unit

Per Showerhead

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Thermostatic Shut-Off Valve			0.00	0.38	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Thermostatic Shut-Off Valve	15	0.78	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Thermostatic Shut-Off Valve	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Thermostatic Shut-Off Valve	621	621	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: National Grid (2014). Review of ShowerStart evolve.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Thermostatic Shut-Off Valve	0.03	0.12	0.00	1.09

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $23 / measure

Incentive: $11 / measure

Triple Pane Windows

Sector: Residential | **Fuel:** Gas | **Program Type:** Prescriptive

Measure Category: Building Shell | **Measure Type:** Windows | **Measure Sub Type:** Windows, triple pane

Program: Residential HVAC

Measure Description

Early replacement of a single pane window either with or without a storm with a triple pane window.

Baseline Description

The baseline efficiency case is a single pane window with or without a storm.

BCR Measures

BCR Measure Name	Unique Identifier
Triple Pane Windows	2024 Gas Residential HVAC Triple Pane Windows

Savings Principle

The high efficiency case is an Energy Star qualified triple pane window.

Savings Method

Deemed

Unit

Replacement of window with single pane either with or without a storm with a triple pane window.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Triple Pane Windows	7.0	0.0100	7.00	0.00	0.00	0.00	0.00

Electric kWh Note: Massachusetts Common Assumption

Electric kW Note: Massachusetts Common Assumption

Gas Heat MMBtu Note: Massachusetts Common Assumption

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Triple Pane Windows	17	1.00	1.00	1.00	1.00	1.00	1.00	0.37	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Triple Pane Windows	3.96%	3.96%	49.50%	42.57%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRsp Note: Massachusetts Common Assumption

RRwp Note: Massachusetts Common Assumption

CFsp Source: Guidehouse (2020). Massachusetts Residential Baseline Study. https://ma-eeac.org/wp-content/uploads/RES-1-Residential-Baseline-Study-Ph4-Comprehensive-Report-2020-04-02.pdf

CFwp Source: Guidehouse (2020). Massachusetts Residential Baseline Study. https://ma-eeac.org/wp-content/uploads/RES-1-Residential-Baseline-Study-Ph4-Comprehensive-Report-2020-04-02.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Triple Pane Windows	0	0	6.81	0.00	0.00	0.00	0.00	0.00

One-time $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Triple Pane Windows	0.04	0.00	0.00	0.96

NTG Note: Massachusetts Common Assumption

TRC: $251 / measure

Incentive: $75 / measure

TSV Showerhead

Sector: Residential

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Water Heater

Measure Sub Type: Low Flow Showerhead

Program: Residential HVAC

Measure Description

TSV + 1.75 GPD or less

Baseline Description

Standard Showerhead

BCR Measures

BCR Measure Name	Unique Identifier
TSV Showerhead	2024 Gas Residential HVAC TSV Showerhead

Savings Principle

Savings Method

Deemed

Unit

Per Showerhead

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
TSV Showerhead			0.00	1.22	0.00	0.00	0.00

Gas DHW MMBtu Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
TSV Showerhead	15	0.78	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
TSV Showerhead	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
TSV Showerhead	3022	3022	0.00	0.00	0.00	0.03	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
TSV Showerhead	0.03	0.12	0.00	1.09

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $32 / measure

Incentive: $15 / measure

Wi-Fi Thermostat, Gas

Sector: Residential | **Fuel:** Gas | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Thermostat

Program: Residential HVAC

Measure Description

Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.

Baseline Description

For the installation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the installation of a wi-fi programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
WiFi Thermostat, Gas - Heat Only	2024 Gas Residential HVAC WiFi Thermostat, Gas - Heat Only
WiFi Thermostat, Gas - Cooling and Heating	2024 Gas Residential HVAC WiFi Thermostat, Gas - Cooling and Heating

Savings Principle

The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed.

Savings Method

Deemed

Unit

Installation of programmable thermostat

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
WiFi Thermostat, Gas - Heat Only	0.0	0.0	0.00				
WiFi Thermostat, Gas - Cooling and Heating	18.0 0.0	0.0300 0.0	18.00 0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Wi-Fi Thermostat, Gas	11	1.00	1.00	1.00	1.00	1.00	1.00	0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Wi-Fi Thermostat, Gas	6.59%	3.85%	47.32%	42.24%

Measure Life Source: Southern California Edison (2017). Residential Smart Thermostat Workpaper (Work Paper SCE17HC054, Revision #0). https://www.peakload.org/assets/SCE17HC054.0_Residential_Sma.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Wi-Fi Thermostat, Gas	0	0	4.25	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Wi-Fi Thermostat, Gas	0.25	0.12	0.00	0.87

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $268 / measure

Incentive: $75 / measure

Aerator

Sector: Residential **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Water Heating **Measure Type:** Flow Control **Measure Sub Type:** Aerator

Program: EnergyWise Single Family

Measure Description

Installation of a faucet aerator with a flow rate of 1.5 GPM or less on an existing faucet with high flow in a residential setting with service water heated by gas.

Baseline Description

The baseline efficiency case is 2.2 GPM or greater flow rate.

BCR Measures

BCR Measure Name	Unique Identifier
Aerator	2024 Gas EnergyWise Single Family Aerator

Savings Principle

The high efficiency case is a faucet with 1.5 GPM or less installed.

Savings Method

Deemed

Unit

Installed aerator

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Aerator			0.00	0.14	0.00	0.00	0.00

Gas DHW MMBtu Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Aerator	7	0.98	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Aerator	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

ISR Note: For mailed-in faucet aerators, ISR is assumed at 59% based on MA VHEA Study (MA20R26-B-VHEA)

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2016). RI Impact Evaluation of 2014 EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160816_py2014_ri_energywise_report.pdf

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Aerator	296	0	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Aerator	0.27	0.01	0.04	0.78

NTG Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

TRC: $7 / unit

Incentive: $7 / unit

Air Sealing Kit, Gas

Sector: Residential

Fuel: Gas

Program Type: Prescriptive

Measure Category: Building Shell

Measure Type: Air Sealing

Measure Sub Type: Air Sealing/Infiltration

Program: EnergyWise Single Family

Measure Description

The installation of recessed lighting cans that provide air sealing benefits.

Baseline Description

The baseline is leaky recessed lighting cans.

BCR Measures

BCR Measure Name	Unique Identifier
Air Sealing Kit, Gas	2024 Gas EnergyWise Single Family Air Sealing Kit, Gas

Savings Principle

The high efficiency case is the existing building after the air sealing measure is implemented.

Savings Method

Deemed

Unit

Installed kit

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Air Sealing Kit, Gas				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Air Sealing Kit, Gas	12	1.00	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Air Sealing Kit, Gas	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Rise Engineering (2015). Memo on Pilot Findings for LED inserts for Recessed Light Cans.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2016). RI Impact Evaluation of 2014 EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160816_py2014_ri_energywise_report.pdf

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Air Sealing Kit, Gas	0	0	2.37	0.00	0.00	16.67	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

One-time $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Air Sealing Kit, Gas	0.00	0.00	0.04	1.04

NTG Source: Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

TRC: $0 / unit

Incentive: $0 / unit

Participants (Unique Account Numbers)

Sector: Residential **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Participant **Measure Type:** Participant **Measure Sub Type:** Participant

Program: EnergyWise Single Family

Measure Description

This row identifies a participant for tracking and cost purposes.

Baseline Description

N/A

BCR Measures

BCR Measure Name	Unique Identifier
Participants (Unique Account Numbers)	2024 Gas EnergyWise Single Family Participants (Unique Account Numbers)

Savings Principle

N/A

Savings Method

N/A

Unit

N/A

Savings Equation

N/A

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Participants (Unique Account Numbers)			0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Participants (Unique Account Numbers)	multi	1.00	1.00		1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Participants (Unique Account Numbers)	0.00%	0.00%	0.00%	0.00%

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Participants (Unique Account Numbers)	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Participants (Unique Account Numbers)	0.00	0.00	0.00	1.00

TRC: $0 / unit

Incentive: $0 / unit

Pipe Wrap

Sector: Residential **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Water Heating **Measure Type:** Insulation **Measure Sub Type:** Pipe Insulation

Program: EnergyWise Single Family

Measure Description

Installation of insulation to reduce water heating energy.

Baseline Description

The baseline case is uninsulated heated water pipes.

BCR Measures

BCR Measure Name	Unique Identifier
Pipe Wrap	2024 Gas EnergyWise Single Family Pipe Wrap

Savings Principle

The high efficiency case is the installation of high-efficiency domestic hot water equipment such as low-flow showerheads and faucet aerators.

Savings Method

Deemed

Unit

Installed pipe wrap

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Pipe Wrap			0.00	0.30	0.00	0.00	0.00

Gas DHW MMBtu Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Pipe Wrap	7	0.98	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Pipe Wrap	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2016). RI Impact Evaluation of 2014 EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160816_py2014_ri_energywise_report.pdf

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Pipe Wrap	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Pipe Wrap	0.27	0.01	0.04	0.78

NTG Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

TRC: $7 / unit

Incentive: $7 / unit

Programmable thermostat

Sector: Residential | **Fuel:** Gas | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Thermostat

Program: EnergyWise Single Family

Measure Description

Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.

Baseline Description

For the installation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Programmable thermostat	2024 Gas EnergyWise Single Family Programmable thermostat

Savings Principle

The high efficiency case is an HVAC system with a programmable thermostat installed.

Savings Method

Deemed

Unit

Installation of programmable thermostat

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Programmable thermostat	27.0	0.0430	27.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Electric kW Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Gas Heat MMBtu Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Programmable thermostat	19	1.00	1.00	1.00	1.00			0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Programmable thermostat	6.59%	3.85%	47.32%	42.24%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

ISR Note: For mailed-in thermostats, ISR is assumed at 59% based on MA VHEA Study (MA20R26-B-VHEA)

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2016). RI Impact Evaluation of 2014 EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160816_py2014_ri_energywise_report.pdf

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Programmable thermostat	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Programmable thermostat	0.47	0.01	0.04	0.58

NTG Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

TRC: $100 / unit

Incentive: $100 / unit

Showerhead

Sector: Residential **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Water Heating **Measure Type:** Flow Control **Measure Sub Type:** LF Showerhead

Program: EnergyWise Single Family

Measure Description

Installation of a low flow showerhead with a flow rate of 1.5 GPM or less.

Baseline Description

The baseline efficiency case is a showerhead with a flow of 2.5 gpm. For home audit applications, the baseline is the existing showerhead.

BCR Measures

BCR Measure Name	Unique Identifier
Showerhead	2024 Gas EnergyWise Single Family Showerhead

Savings Principle

The high efficiency is a low-flow showerhead with a flow of 1.5 gpm or less.

Savings Method

Deemed

Unit

Installed showerhead.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Showerhead			0.00	1.11	0.00	0.00	0.00

Gas DHW MMBtu Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Showerhead	15	0.98	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Showerhead	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

ISR Note: For mailed-in showerheads, ISR is assumed at 53% based on MA VHEA Study (MA20R26-B-VHEA)

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2016). RI Impact Evaluation of 2014 EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160816_py2014_ri_energywise_report.pdf

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Showerhead	1565	0	0.00	0.00	0.00	0.03	0.00	0.00

Water/Sewer Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

One-time $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Showerhead	0.27	0.01	0.04	0.78

NTG Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

TRC: $30 / unit

Incentive: $30 / unit

Triple Pane Windows

Sector: Residential | **Fuel:** Gas | **Program Type:** Prescriptive

Measure Category: Building Shell | **Measure Type:** Windows | **Measure Sub Type:** Windows, triple pane

Program: EnergyWise Single Family

Measure Description

Early replacement of a single pane window either with or without a storm with a triple pane window.

Baseline Description

The baseline efficiency case is a single pane window with or without a storm.

BCR Measures

BCR Measure Name	Unique Identifier
Triple Pane Windows	2024 Gas EnergyWise Single Family Triple Pane Windows

Savings Principle

The high efficiency case is an Energy Star qualified triple pane window.

Savings Method

Deemed

Unit

Replacement of window with single pane either with or without a storm with a triple pane window.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Triple Pane Windows	7.0	0.0100	7.00	0.00	0.00	0.00	0.00

Electric kWh Note: Massachusetts Common Assumption

Electric kW Note: Massachusetts Common Assumption

Gas Heat MMBtu Note: Massachusetts Common Assumption

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Triple Pane Windows	17	1.00	1.00		1.00	1.00	1.00	0.37	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Triple Pane Windows	3.96%	3.96%	49.50%	42.57%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRsp Note: Massachusetts Common Assumption

RRwp Note: Massachusetts Common Assumption

CFsp Source: Guidehouse (2020). Massachusetts Residential Baseline Study. https://ma-eeac.org/wp-content/uploads/RES-1-Residential-Baseline-Study-Ph4-Comprehensive-Report-2020-04-02.pdf

CFwp Source: Guidehouse (2020). Massachusetts Residential Baseline Study. https://ma-eeac.org/wp-content/uploads/RES-1-Residential-Baseline-Study-Ph4-Comprehensive-Report-2020-04-02.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Triple Pane Windows	0	0	6.81	0.00	0.00	0.00	0.00	0.00

One-time $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Triple Pane Windows	0.04	0.00	0.00	0.96

NTG Note: Massachusetts Common Assumption

TRC: $251 / measure

Incentive: $75 / measure

Weatherization

Sector: Residential **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Whole Home **Measure Type:** Weatherization **Measure Sub Type:** EW SF

Program: EnergyWise Single Family

Measure Description

Installation of weatherization measures such as air sealing and insulation in gas heated homes. Electric savings are achieved from reduced run time of the HVAC system fan(s).

Baseline Description

The baseline efficiency case is the existing home shell.

BCR Measures

BCR Measure Name	Unique Identifier
Weatherization	2024 Gas EnergyWise Single Family Weatherization

Savings Principle

The high efficiency case can be a combination of increased insulation, air sealing, duct sealing, and other improvements to the home shell.

Savings Method

Deemed

Unit

Household with weatherization measures installed

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Weatherization	70.0	0.0370	70.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo (2023). EnergyWise Single Family Weatherization Impact Evaluation.

Electric kW Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Gas Heat MMBtu Source: Cadeo (2023). EnergyWise Single Family Weatherization Impact Evaluation.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Weatherization	20	1.00	1.00	1.00	1.00			0.34	0.21

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Weatherization	25.35%	29.86%	23.07%	21.72%

Measure Life Source: Guidehouse (2018). ComEd Effective Useful Life Research Report. https://www.icc.illinois.gov/docket/P2017-0312/documents/287811/files/501915.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2016). RI Impact Evaluation of 2014 EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160816_py2014_ri_energywise_report.pdf

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Weatherization	0	0	67.49	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Weatherization	0.14	0.01	0.04	0.91

NTG Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

TRC: $4800 / participant

Incentive: $3900 / participant

WiFi thermostat

Sector: Residential **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** Thermostat

Program: EnergyWise Single Family

Measure Description

Installation of a wifi thermostat which gives the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.

Baseline Description

For the installation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
WiFi thermostat	2024 Gas EnergyWise Single Family WiFi thermostat

Savings Principle

The high efficiency case is an HVAC system with a wi-fi programmable thermostat installed.

Savings Method

Deemed

Unit

Installation of WiFi programmable thermostat

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
WiFi thermostat	27.0	0.0430	27.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Electric kW Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Gas Heat MMBtu Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
WiFi thermostat	11	0.88	1.00	1.00	1.00			0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
WiFi thermostat	6.59%	3.85%	47.32%	42.24%

Measure Life Source: Southern California Edison (2017). Residential Smart Thermostat Workpaper (Work Paper SCE17HC054, Revision #0). https://www.peakload.org/assets/SCE17HC054.0_Residential_Sma.pdf

ISR Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

ISR Note: For mailed-in thermostats, ISR is assumed at 59% based on MA VHEA Study (MA20R26-B-VHEA)

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2016). RI Impact Evaluation of 2014 EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160816_py2014_ri_energywise_report.pdf

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
WiFi thermostat	0	0	4.25	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
WiFi thermostat	0.47	0.01	0.04	0.58

NTG Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

TRC: $300 / unit

Incentive: $200 / unit

Air Sealing

Sector: Residential

Fuel: Gas

Program Type: Custom

Measure Category: Building Shell

Measure Type: Air Sealing

Measure Sub Type: Air Sealing/Infiltration

Program: EnergyWise Multifamily

Measure Description

Thermal shell air leaks are sealed through strategic use and location of air-tight materials.

Baseline Description

The baseline efficiency case is the existing building before the air sealing measure is implemented. The baseline building is characterized by the existing CFM50 measurement (CFM50PRE) for single family homes, or the existing air changes per hour (ACHPRE)

BCR Measures

BCR Measure Name	Unique Identifier
Air Sealing	2024 Gas EnergyWise Multifamily Air Sealing

Savings Principle

The high efficiency case is the existing building after the air sealing measure is implemented. The high efficiency building is characterized by the new CFM50 measurement for single family homes (CFM50POST), or the new air changes per hour (ACHPOST) for multi-family facilities, which is measured after the air sealing measure is implemented.

Savings Method

Calculated using site-specific inputs

Unit

Completed air sealing project.

Savings Equation

Gross MMBtu Gas = (CFM50_pre - CFM50_post) / LBL × HDD × (Hours per Day) × (Minutes per Hour) × (Btu/ft3-°F) × CorrectionFactor / SeasonalEff / (Btu per MMBtu)

Where:

CFM50_pre = CFM50 measurement before air sealing

CFM50_post = CFM50 measurement after air sealing (cu.ft./min)

LBL = LBL factor - This factor is determined as the product of the N-factor and a Height Correction Factor according to BPI Protocol

4644 HDD = Heating degree days (deg. F-day); This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data. http://www.ncdc.noaa.gov

24 Hours per Day = Conversion factor

60 Minutes per Hour = Conversion factor

0.018 Btu/ft3-°F = Heat capacity of 1 cubic foot of air at 70 °F

1 CorrectionFactor = Correction factor determined by auditor (e.g. for seasonal homes): Default

0.7 SeasonalEff = Heating system seasonal efficiency factor determined by auditor for homes heated with natural gas: Default

1,000,000 Btuper MMBtu = Conversion factor

Hours: 4644

Hours Source: NOAA Weather data: An average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.

Hours Note: Heating hours are characterized by the heating degree days for the facility, 4644.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Air Sealing	Calc	Calc	Calc	0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Air Sealing	20	1.00	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Air Sealing	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2018). ComEd Effective Useful Life Research Report. https://www.icc.illinois.gov/docket/P2017-0312/documents/287811/files/501915.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Air Sealing	0	0	19.61	0.00	0.00	137.66	0.00	0.00

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

One-time $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Air Sealing	0.33	0.01	0.00	0.68

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $355 / EW MF Bundled costs (see Participant listing)

Incentive: $355 / EW MF Bundled costs (see Participant listing)

Boiler, Hot Water

Sector: Residential | **Fuel:** Gas | **Program Type:** Custom

Measure Category: Water Heating | **Measure Type:** Boiler | **Measure Sub Type:**

Program: EnergyWise Multifamily

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Boiler, Hot Water	2024 Gas EnergyWise Multifamily Boiler, Hot Water

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Boiler, Hot Water				Calc	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Boiler, Hot Water	multi	1.00	1.00	1.00		1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Boiler, Hot Water	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Boiler, Hot Water	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Boiler, Hot Water	0.00	0.00	0.00	1.00

TRC: $0 / EW Bundled costs (see Participant listing)

Incentive: $0 / EW Bundled costs (see Participant listing)

Custom

Sector: Residential | **Fuel:** Gas | **Program Type:** Custom

Measure Category: Custom | **Measure Type:** Custom | **Measure Sub Type:** Custom

Program: EnergyWise Multifamily

Measure Description

Vendors install a variety of measures at multifamily facilities. Measures include

Baseline Description

For retrofit projects, the baseline efficiency case is the same as the existing, or pre-retrofit, case for the

BCR Measures

BCR Measure Name	Unique Identifier
Custom	2024 Gas EnergyWise Multifamily Custom

Savings Principle

The high efficiency scenario is specific to the facility and may include one or more energy efficiency

Savings Method

Calc

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom	Calc	Calc	Calc	Calc	Calc	0.00	0.00

Gas Heat MMBtu Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom	multi	1.00	1.00	0.99	0.99				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom	0.00	0.00	0.00	1.00

TRC: $0 / EW MF Bundled costs (see Participant listing)

Incentive: $0 / EW MF Bundled costs (see Participant listing)

Demand Circulator

Sector: Residential

Fuel: Gas

Program Type: Custom

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Demand Circulator

Program: EnergyWise Multifamily

Measure Description

Installation of a demand controller on a re-circulation loop.

Baseline Description

Full time operation of re-circ pump.

BCR Measures

BCR Measure Name	Unique Identifier
Demand Circulator	2024 Gas EnergyWise Multifamily Demand Circulator

Savings Principle

The re-circulation pump is controlled by a demand signal or timer to reduce operating hours when no hot water usage occurs.

Savings Method

Calc

Unit

Installed recirc controller

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Demand Circulator				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Demand Circulator	multi	1.00	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Demand Circulator	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Demand Circulator	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Demand Circulator	0.00	0.00	0.00	1.00

TRC: $3000 / EW MF Bundled costs (see Participant listing)

Incentive: $1800 / EW MF Bundled costs (see Participant listing)

DHW, MF

Sector: Residential **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Water Heating **Measure Type:** Flow Control **Measure Sub Type:** DHW

Program: EnergyWise Multifamily

Measure Description

The installation of a high efficiency water heating measure, such as faucet aerators, showerheads, spray valves, and salon nozzles.

Baseline Description

Standard efficiency DHW fixture.

BCR Measures

BCR Measure Name	Unique Identifier
DHW, MF	2024 Gas EnergyWise Multifamily DHW, MF

Savings Principle

High efficiency / low flow DHW fixture.

Savings Method

Deemed

Unit

Installed water heating measure

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
DHW, MF			0.00	1.30	0.00	0.00	0.00

Gas DHW MMBtu Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
DHW, MF	multi	0.90	1.00	1.00		1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
DHW, MF	0.00%	0.00%	0.00%	0.00%

ISR Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
DHW, MF	1786	1786	1.31	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
DHW, MF	0.08	0.01	0.00	0.93

TRC: $0 / EW Bundled costs (see Participant listing)

Incentive: $0 / EW Bundled costs (see Participant listing)

Duct Insulation, MF

Sector: Residential **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Envelope **Measure Type:** Ducting **Measure Sub Type:** Duct Insulation

Program: EnergyWise Multifamily

Measure Description

For existing ductwork in non-conditioned spaces, insulate ductwork.

Baseline Description

The baseline efficiency case is existing, un-insulated ductwork in unconditioned spaces (e.g. attic or basement).

BCR Measures

BCR Measure Name	Unique Identifier
Duct Insulation, MF	2024 Gas EnergyWise Multifamily Duct Insulation, MF

Savings Principle

The high efficiency condition is insulated ductwork in unconditioned spaces.

Savings Method

Deemed

Unit

Completed duct insulation job.

Savings Equation

MMBTUannual = (((1/Rexist)-(1/Rnew)) x HDD x 24 x Area) / (1,000,000) X Nheat

kWhannual = MMBtuannaul x 293.1

kW = kWhannual x kW/kWhNheating

Where:

Rexist = Existing effective R-value (R-ExistingInsulation + R-Assembly), ft2-°F/Btuh

Rnew = New total effective R-value (R-ProposedMeasure + R-ExistingInsulation + R-Assembly), ft2-°F/Btuh

Area = Square footage of insulated area

ηheat = Efficiency of the heating system (AFUE or COP)

293.1 = Conversion constant (1MMBtu = 293.1 kWh)

24 = Conversion for hours per day

HDD = Heating Degree Days; dependent on location, see table below

1,000,000 = Conversion from Btu to MMBtu

kW/kWh heating = Average annual kW reduction per kWh reduction: 0.00050 kW/kWh

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Duct Insulation, MF				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Duct Insulation, MF	25	1.00	1.00	1.00		1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Duct Insulation, MF	0.00%	0.00%	0.00%	0.00%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Duct Insulation, MF	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Duct Insulation, MF	0.33	0.01	0.00	0.68

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $4 / EW Bundled costs (see Participant listing)

Incentive: $3 / EW Bundled costs (see Participant listing)

Duct Sealing

Sector: Residential | **Fuel:** Gas | **Program Type:** Custom

Measure Category: HVAC | **Measure Type:** Ducting | **Measure Sub Type:** Duct Sealing

Program: EnergyWise Multifamily

Measure Description

Ducts are sealed by reconnecting disconnected duct joints and sealing gaps or seams with mastic and fiber-mesh tape as appropriate

Baseline Description

The baseline efficiency case is the existing facility or equipment prior to the implementation of duct sealing.

BCR Measures

BCR Measure Name	Unique Identifier
Duct Sealing	2024 Gas EnergyWise Multifamily Duct Sealing

Savings Principle

The baseline efficiency case is the existing facility or equipment after the implementation of duct sealing.

Savings Method

Calc

Unit

Savings Equation

MMBtu = Annualheatingconsumption x %SAVE x (1/1000000)

Where:

AnnualHeatingConsumption = The total annual heating consumption for the facility (Btu)

%SAVE = Average reduction in energy consumption.

1/1,000,000 = Conversion from Btu to MMBtu

Savings Factors for Multifamily Duct Sealing

Measure Type %SAVE158

Savings Factors for Multifamily Duct Sealing

Surface Area < 50 SQFT 7%

Surface Area > 50 SQFT and < 200 SQFT 3%

Surface Area > 200 SQFT 1%

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Duct Sealing	Calc	Calc	Calc	0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Duct Sealing	20	1.00	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Duct Sealing	0.00%	0.00%	0.00%	0.00%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Duct Sealing	0	0	0.23	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Duct Sealing	0.33	0.01	0.00	0.68

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $84 / EW MF Bundled costs (see Participant listing)

Incentive: $84 / EW MF Bundled costs (see Participant listing)

Faucet aerator

Sector: Residential **Fuel:** Gas **Program Type:** Custom

Measure Category: Water Heating **Measure Type:** Flow Control **Measure Sub Type:** Faucet Aerator

Program: EnergyWise Multifamily

Measure Description

Installation of a faucet aerator with a flow rate of 1.5 GPM or less on an existing faucet with high flow in a commercial setting with service water heated by natural gas.

Baseline Description

The baseline efficiency case is 2.2 GPM or greater faucet.

BCR Measures

BCR Measure Name	Unique Identifier
Faucet aerator	2024 Gas EnergyWise Multifamily Faucet aerator

Savings Principle

The high efficiency case is a faucet with 1.5 GPM or less aerator installed.

Savings Method

Deemed

Unit

Installed faucet aerator.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Faucet aerator			0.00	0.20	0.00	0.00	0.00

Gas DHW MMBtu Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Faucet aerator	7	0.90	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Faucet aerator	0.00%	0.00%	0.00%	0.00%

Measure Life Source: The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.

ISR Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Faucet aerator	359	0	0.59	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Faucet aerator	0.08	0.01	0.00	0.93

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $7 / EW MF Bundled costs (see Participant listing)

Incentive: $7 / EW MF Bundled costs (see Participant listing)

Heating, Custom

Sector: Residential **Fuel:** Gas **Program Type:** Custom

Measure Category: HVAC **Measure Type:** Heating System **Measure Sub Type:** Heating

Program: EnergyWise Multifamily

Measure Description

Installation of high efficiency heating equipment to replace existing inefficient furnace, hydronic boiler or steam boiler.

Baseline Description

The baseline efficiency case is the existing inefficient heating system.

BCR Measures

BCR Measure Name	Unique Identifier
Heating, Custom	2024 Gas EnergyWise Multifamily Heating, Custom

Savings Principle

The high efficiency case is characterized by the rated efficiency (AFUEEE) of the new high efficiency furnace or boiler.

Savings Method

Calc

Unit

Installed heating system.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heating, Custom	Calc		Calc	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heating, Custom	multi	1.00	1.00	1.00		1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heating, Custom	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heating, Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heating, Custom	0.00	0.00	0.00	1.00

TRC: $47000 / EW Bundled costs (see Participant listing)

Incentive: $28200 / EW Bundled costs (see Participant listing)

Heat Pump, Custom

Sector: Residential **Fuel:** Gas **Program Type:** Custom

Measure Category: HVAC **Measure Type:** Heat Pumps **Measure Sub Type:** Heat Pump

Program: EnergyWise Multifamily

Measure Description

Installation of a heat pump to displace electric, oil, or propane heat.

Baseline Description

The baseline efficiency case is existing site conditions.

BCR Measures

BCR Measure Name	Unique Identifier
Heat Pump, Custom	2024 Gas EnergyWise Multifamily Heat Pump, Custom

Savings Principle

The high efficiency case varies depending on the equipment installed.

Savings Method

Calc

Unit

Installed heat pump.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heat Pump, Custom	Calc		Calc	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heat Pump, Custom	multi	1.00	1.00	1.00		1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heat Pump, Custom	36.40%	48.20%	8.00%	7.40%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heat Pump, Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heat Pump, Custom	0.00	0.00	0.00	1.00

TRC: $0 / EW Bundled costs (see Participant listing)

Incentive: $0 / EW Bundled costs (see Participant listing)

Hot Water, Custom

Sector: Residential

Fuel: Gas

Program Type: Custom

Measure Category: Water Heating

Measure Type: Water Heater

Measure Sub Type: Efficient Water Heater

Program: EnergyWise Multifamily

Measure Description

Installation of high efficiency water heating equipment to replace the existing inefficient water heater.

Baseline Description

The baseline efficiency case is a stand-alone tank water heater with an energy factor of 0.575.

BCR Measures

BCR Measure Name	Unique Identifier
Hot Water, Custom	2024 Gas EnergyWise Multifamily Hot Water, Custom

Savings Principle

The high efficiency case includes the new efficient water heater with an Energy Factor > 0.60.

Savings Method

Calc

Unit

Installed water heating system.

Savings Equation

Delta MMBtu = Units x (18 MMBTu/Units) x ((1/EFbase) - (1/EFee)

Unit = Total number of dwelling units utilizing the water heater

18 MMBtu/Unit = Average annual water heating energy demand per dwelling unit401

EFBASE = Energy Factor for the baseline waterheater

EFEE = Energy Factor for the new efficient water heater

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Hot Water, Custom	Calc		Calc	0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Hot Water, Custom	multi	1.00	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Hot Water, Custom	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Hot Water, Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Hot Water, Custom	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

Low Flow Showerhead

Sector: Residential

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Showerhead

Program: EnergyWise Multifamily

Measure Description

The installation of a low flow showerhead with a flow rate of 1.5 GPM or less. The installation of TSV is a control that limits flow once water is heated.

Baseline Description

The baseline efficiency case is a showerhead with a flow of 2.5 gpm. For home audit applications, the baseline is the existing showerhead. For the case of the adapter, a low flow showerhead with flow of 1.5 gpm or less.

BCR Measures

BCR Measure Name	Unique Identifier
Low Flow Showerhead - Showerhead	2024 Gas EnergyWise Multifamily Low Flow Showerhead - Showerhead
Low Flow Showerhead - w/TSV	2024 Gas EnergyWise Multifamily Low Flow Showerhead - w/TSV
Thermostatic Shut-Off Valve	2024 Gas EnergyWise Multifamily Thermostatic Shut-Off Valve

Savings Principle

The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.

Savings Method

Deemed

Unit

Installed low-flow showerhead

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Low Flow Showerhead - Showerhead			0.00	1.30	0.00	0.00	0.00
Low Flow Showerhead - w/TSV				1.41			
Thermostatic Shut-Off Valve				0.34			

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Low Flow Showerhead	15	1.00	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Low Flow Showerhead	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Low Flow Showerhead	0	0	0.59	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Low Flow Showerhead	0.08	0.01	0.00	0.93

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: LF Showehead - $25/measure, LF Showerhead w/TSV - $40/measure, TSV - $30/measure

Incentive: LF Showehead - $25/measure, LF Showerhead w/TSV - $40/measure, TSV - $30/measure

MF Shell Insulation

Sector: Residential | **Fuel:** Gas | **Program Type:** Custom

Measure Category: Building Shell | **Measure Type:** Insulation | **Measure Sub Type:** Shell

Program: EnergyWise Multifamily

Measure Description

Insulation upgrades are applied in existing multifamily facilities.

Baseline Description

The baseline efficiency case is characterized by the total R-value of the existing attic, basement or sidewall (Rexisit). This is calculated as the R-value of the existing insulation, estimated by the program contractor, plus the R-value of the ceiling, floor, or wall (for all projects: RCEILING = 3.36; RFLOOR = 6.16; RWALL = 6.65)

BCR Measures

BCR Measure Name	Unique Identifier
MF Shell Insulation	2024 Gas EnergyWise Multifamily MF Shell Insulation

Savings Principle

The high efficiency case is characterized by the total R-value of the attic after the installation of additional attic, basement or sidewall insulation. This is calculated as the sum of the existing R-value (RBASE) plus the R-value of the added insulation(RADD).

Savings Method

Calculated using site-specific inputs

Unit

Completed insulation project.

Savings Equation

MMBTUannual = (((1/Rexist)-(1/Rnew)) x HDD x 24 x Area) / (1,000,000) X Nheat

kWhannual = MMBtuannaul x 293.1

kW = kWhannual x kW/kWhNheating

Where:

Rexist = Existing effective R-value (R-ExistingInsulation + R-Assembly), ft2-°F/Btuh

Rnew = New total effective R-value (R-ProposedMeasure + R-ExistingInsulation + R-Assembly), ft2-°F/Btuh

Area = Square footage of insulated area

ηheat = Efficiency of the heating system (AFUE or COP)

293.1 = Conversion constant (1MMBtu = 293.1 kWh)

24 = Conversion for hours per day

HDD = Heating Degree Days; dependent on location, see table below

1,000,000 = Conversion from Btu to MMBtu

kW/kWh heating = Average annual kW reduction per kWh reduction: 0.00050 kW/kWh

Hours: 4644

Hours Source: NOAA Weather data: An average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.

Hours Note: Heating hours are characterized by the heating degree days for the facility, 4644.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
MF Shell Insulation	Calc	Calc	Calc	0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
MF Shell Insulation	multi	1.00	1.00	1.00	1.00			0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
MF Shell Insulation	6.59%	3.85%	47.32%	42.24%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
MF Shell Insulation	0	0	47.95	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
MF Shell Insulation	0.33	0.01	0.00	0.68

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $185 / EW MF Bundled costs (see Participant listing)

Incentive: $138 / EW MF Bundled costs (see Participant listing)

Participant

Sector: Residential **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Participant **Measure Type:** Participant **Measure Sub Type:** EW MF

Program: EnergyWise Multifamily

Measure Description

This row identifies a participant for tracking and cost purposes.

Baseline Description

BCR Measures

BCR Measure Name	Unique Identifier
Participant	2024 Gas EnergyWise Multifamily Participant

Savings Principle

Savings Method

Unit

Savings Equation

N/A

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Participant			0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Participant	multi	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Participant	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Participant	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Participant	0.00	0.00	0.00	1.00

TRC: $0 / participant

Incentive: $0 / participant

Pipe Wrap (Water Heating)

Sector: Residential **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Water Heating **Measure Type:** Insulation **Measure Sub Type:** Pipe Insulation

Program: EnergyWise Multifamily

Measure Description

Installation of DHW pipe wraps

Baseline Description

The baseline efficiency case is the existing hot water equipment.

BCR Measures

BCR Measure Name	Unique Identifier
Pipe Wrap (Water Heating)	2024 Gas EnergyWise Multifamily Pipe Wrap (Water Heating)

Savings Principle

The high efficiency case includes pipe wrap.

Savings Method

Deemed

Unit

Installed pipe wrap job

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Pipe Wrap (Water Heating)			0.00	0.15	0.00	0.00	0.00

Gas DHW MMBtu Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Gas DHW MMBtu Note: 3 feet per piece

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Pipe Wrap (Water Heating)	15	0.90	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Pipe Wrap (Water Heating)	0.00%	0.00%	0.00%	0.00%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Pipe Wrap (Water Heating)	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Pipe Wrap (Water Heating)	0.08	0.01	0.00	0.93

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $3 / EW MF Bundled costs (see Participant listing)

Incentive: $3 / EW MF Bundled costs (see Participant listing)

Programmable thermostat

Sector: Residential | **Fuel:** Gas | **Program Type:** Custom

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Thermostat

Program: EnergyWise Multifamily

Measure Description

Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.

Baseline Description

For the installation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the installation of a wi-fi programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Programmable thermostat	2024 Gas EnergyWise Multifamily Programmable thermostat

Savings Principle

The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed.

Savings Method

Deemed

Unit

Installation of programmable thermostat

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Programmable thermostat	29.0	0.0461	29.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Electric kW Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Gas Heat MMBtu Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Programmable thermostat	19	0.95	1.00	1.00	1.00			0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Programmable thermostat	6.59%	3.85%	47.32%	42.24%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Programmable thermostat	0	0	12.12	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Programmable thermostat	0.48	0.01	0.00	0.53

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $230 / EW MF Bundled costs (see Participant listing)

Incentive: $125 / EW MF Bundled costs (see Participant listing)

VFD

Sector: Residential **Fuel:** Gas **Program Type:** Custom

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: EnergyWise Multifamily

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
VFD	2024 Gas EnergyWise Multifamily VFD

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calc

Unit

Installed VFD

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
VFD	Calc	Calc	Calc	Calc	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
VFD	multi	1.00	1.00	0.99					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
VFD	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2022). Impact Evaluations of PY2020 Custom Gas Installations in Rhode Island. http://rieermc.ri.gov/wp-content/uploads/2023/01/rhode-island-energy-py2020-custom-gas-program-report_final.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
VFD	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
VFD	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / Gross therm

Incentive: $0 / Gross therm

Wi-Fi programmable thermostat (controls gas heat only)

Sector: Residential **Fuel:** Gas **Program Type:** Custom

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** Thermostat

Program: EnergyWise Multifamily

Measure Description

Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.

Baseline Description

For the installation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the installation of a wi-fi programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Wi-Fi programmable thermostat (controls gas heat only)	2024 Gas EnergyWise Multifamily Wi-Fi programmable thermostat (controls gas heat only)

Savings Principle

The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed.

Savings Method

Deemed

Unit

Installation of programmable thermostat

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Wi-Fi programmable thermostat (controls gas heat only)	31.0	0.0493	31.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Electric kW Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Gas Heat MMBtu Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Wi-Fi programmable thermostat (controls gas heat only)	11	0.95	1.00	1.00	1.00			0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Wi-Fi programmable thermostat (controls gas heat only)	6.59%	3.85%	47.32%	42.24%

Measure Life Source: Southern California Edison (2017). Residential Smart Thermostat Workpaper (Work Paper SCE17HC054, Revision #0). https://www.peakload.org/assets/SCE17HC054.0_Residential_Sma.pdf

ISR Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

CFwp Source: Navigant (2018). Res 1 - MA Baseline Load Shape Study. https://ma-eeac.org/wp-content/uploads/RES-1-FINAL-Comprehensive-Report-2018-07-27.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Wi-Fi programmable thermostat (controls gas heat only)	0	0	12.12	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Wi-Fi programmable thermostat (controls gas heat only)	0.48	0.01	0.00	0.53

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $340 / EW MF Bundled costs (see Participant listing)

Incentive: $295 / EW MF Bundled costs (see Participant listing)

Existing Dual Fuel

Sector: Residential

Fuel: Gas

Program Type: Prescriptive

Measure Category: Whole Home

Measure Type: Behavior

Measure Sub Type: Home Energy Reports

Program: Home Energy Reports

Measure Description

A Home Energy report sent to electric and gas customers that displays home energy consumption in comparison with peers and prompts energy conserving behavior.

Baseline Description

No Home Energy Report.

BCR Measures

BCR Measure Name	Unique Identifier
Existing Dual Fuel	2024 Gas Home Energy Reports Existing Dual Fuel

Savings Principle

A home that receives Home Energy Reports.

Savings Method

Calculated by comparing consumption of treatment (with reports) and control groups (no reports)

Unit

Per participant

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Existing Dual Fuel			0.00	Calc	0.00	0.00	0.00

Gas Heat MMBtu Note: Supplied by vendor

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Existing Dual Fuel	1	1.00	1.00	0.92					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Existing Dual Fuel	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Opinion Dynamics with Navigant Consulting (2012). Massachusetts Three Year Cross-Cutting Behavioral Program Evaluation Integrated Report July 2012. Prepared for Massachusetts EEAC & Behavioral Research Team

ISR Source: Illume. (2017). Rhode Island Home Energy Report Program Impact and Process Evaluation. http://rieermc.ri.gov/wp-content/uploads/2018/03/national-grid-rhode-island-2017-her-program_final.pdf

ISR Note: In-service rates are set to 100% because savings represent average for all treatment household (including opt outs)

SPF Note: Savings persistence is 100% since measure life is 1 year.

RRe Source: Cadeo/Illume (2020). 2017-2019 Impact Evaluation of the Home Energy Reports Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ngrid-ri-behavior-evaluation-28aug2020.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Existing Dual Fuel	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Existing Dual Fuel	0.00	0.00	0.00	1.00

NTG Note: Net-to-gross is set to 100% since the HER program is implemented as a randomized control trial (RCT). RCT produces net savings accounting for free-ridership.

TRC: $0 / participant

Incentive: $0 / participant

Existing Gas

Sector: Residential

Fuel: Gas

Program Type: Prescriptive

Measure Category: Whole Home

Measure Type: Behavior

Measure Sub Type: Home Energy Reports

Program: Home Energy Reports

Measure Description

A Home Energy report sent to gas customers that displays home energy consumption in comparison with peers and prompts energy conserving behavior.

Baseline Description

No Home Energy Report.

BCR Measures

BCR Measure Name	Unique Identifier
Existing Gas	2024 Gas Home Energy Reports Existing Gas

Savings Principle

A home that receives Home Energy Reports.

Savings Method

Calculated by comparing consumption of treatment (with reports) and control groups (no reports)

Unit

Per participant

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Existing Gas			0.00	Calc	0.00	0.00	0.00

Gas Heat MMBtu Note: Supplied by vendor

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Existing Gas	1	1.00	1.00	0.92					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Existing Gas	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Opinion Dynamics with Navigant Consulting (2012). Massachusetts Three Year Cross-Cutting Behavioral Program Evaluation Integrated Report July 2012. Prepared for Massachusetts EEAC & Behavioral Research Team

ISR Source: Illume. (2017). Rhode Island Home Energy Report Program Impact and Process Evaluation. http://rieermc.ri.gov/wp-content/uploads/2018/03/national-grid-rhode-island-2017-her-program_final.pdf

ISR Note: In-service rates are set to 100% because savings represent average for all treatment household (including opt outs)

SPF Note: Savings persistence is 100% since measure life is 1 year.

RRe Source: Cadeo/Illume (2020). 2017-2019 Impact Evaluation of the Home Energy Reports Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ngrid-ri-behavior-evaluation-28aug2020.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Existing Gas	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Existing Gas	0.00	0.00	0.00	1.00

NTG Note: Net-to-gross is set to 100% since the HER program is implemented as a randomized control trial (RCT). RCT produces net savings accounting for free-ridership.

TRC: $0 / participant

Incentive: $0 / participant

New Movers Dual Fuel

Sector: Residential

Fuel: Gas

Program Type: Prescriptive

Measure Category: Whole Home

Measure Type: Behavior

Measure Sub Type: Home Energy Reports

Program: Home Energy Reports

Measure Description

A Home Energy report sent to electric and gas customers that displays home energy consumption in comparison with peers and prompts energy conserving behavior.

Baseline Description

No Home Energy Report.

BCR Measures

BCR Measure Name	Unique Identifier
New Movers Dual Fuel	2024 Gas Home Energy Reports New Movers Dual Fuel

Savings Principle

A home that receives Home Energy Reports.

Savings Method

Calculated by comparing consumption of treatment (with reports) and control groups (no reports)

Unit

Per participant

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
New Movers Dual Fuel			0.00	Calc	0.00	0.00	0.00

Gas Heat MMBtu Note: Supplied by vendor

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
New Movers Dual Fuel	1	1.00	1.00	0.50					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
New Movers Dual Fuel	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Opinion Dynamics with Navigant Consulting (2012). Massachusetts Three Year Cross-Cutting Behavioral Program Evaluation Integrated Report July 2012. Prepared for Massachusetts EEAC & Behavioral Research Team

ISR Source: Illume. (2017). Rhode Island Home Energy Report Program Impact and Process Evaluation. http://rieermc.ri.gov/wp-content/uploads/2018/03/national-grid-rhode-island-2017-her-program_final.pdf

ISR Note: In-service rates are set to 100% because savings represent average for all treatment household (including opt outs)

SPF Note: Savings persistence is 100% since measure life is 1 year.

RRe Source: Cadeo/Illume (2020). 2017-2019 Impact Evaluation of the Home Energy Reports Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ngrid-ri-behavior-evaluation-28aug2020.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
New Movers Dual Fuel	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
New Movers Dual Fuel	0.00	0.00	0.00	1.00

NTG Note: Net-to-gross is set to 100% since the HER program is implemented as a randomized control trial (RCT). RCT produces net savings accounting for free-ridership.

TRC: $0 / participant

Incentive: $0 / participant

New Movers Gas only

Sector: Residential

Fuel: Gas

Program Type: Prescriptive

Measure Category: Whole Home

Measure Type: Behavior

Measure Sub Type: Home Energy Reports

Program: Home Energy Reports

Measure Description

A Home Energy report sent to electric and gas customers that displays home energy consumption in comparison with peers and prompts energy conserving behavior.

Baseline Description

No Home Energy Report.

BCR Measures

BCR Measure Name	Unique Identifier
New Movers Gas only	2024 Gas Home Energy Reports New Movers Gas only

Savings Principle

A home that receives Home Energy Reports.

Savings Method

Calculated by comparing consumption of treatment (with reports) and control groups (no reports)

Unit

Per participant

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
New Movers Gas only			0.00	Calc	0.00	0.00	0.00

Gas Heat MMBtu Note: Supplied by vendor

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
New Movers Gas only	1	1.00	1.00	0.50					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
New Movers Gas only	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Opinion Dynamics with Navigant Consulting (2012). Massachusetts Three Year Cross-Cutting Behavioral Program Evaluation Integrated Report July 2012. Prepared for Massachusetts EEAC & Behavioral Research Team

ISR Source: Illume. (2017). Rhode Island Home Energy Report Program Impact and Process Evaluation. http://rieermc.ri.gov/wp-content/uploads/2018/03/national-grid-rhode-island-2017-her-program_final.pdf

ISR Note: In-service rates are set to 100% because savings represent average for all treatment household (including opt outs)

SPF Note: Savings persistence is 100% since measure life is 1 year.

RRe Source: Cadeo/Illume (2020). 2017-2019 Impact Evaluation of the Home Energy Reports Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ngrid-ri-behavior-evaluation-28aug2020.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
New Movers Gas only	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
New Movers Gas only	0.00	0.00	0.00	1.00

NTG Note: Net-to-gross is set to 100% since the HER program is implemented as a randomized control trial (RCT). RCT produces net savings accounting for free-ridership.

TRC: $0 / participant

Incentive: $0 / participant

ACTIMER

Sector: Income Eligible **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** AC Timer

Program: Income Eligible Single Family

Measure Description

Installation of an air conditioner timer

Baseline Description

The baseline case is that no ac timer exists

BCR Measures

BCR Measure Name	Unique Identifier
ACTIMER	2024 Electric Income Eligible Single Family ACTIMER

Savings Principle

Reduce usage of ac

Savings Method

Deemed

Unit

Installed ac timer

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
ACTIMER			0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
ACTIMER	5	1.00	1.00		1.00	1.00	1.00	1.00	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
ACTIMER	27.00%	40.00%	13.00%	20.00%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

CFwp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
ACTIMER	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
ACTIMER	0.00	0.00	0.00	1.00

NTG Source: The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation.

TRC: $0 / EW Bundled costs (see Participant listing)

Incentive: $0 / EW Bundled costs (see Participant listing)

Basic Educational Measures

Sector: Income Eligible **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Whole Home **Measure Type:** Audit **Measure Sub Type:** Educational Kit

Program: Income Eligible Single Family

Measure Description

Installation of basic educational measures during an audit to help customers become more aware of energy efficiency.

Baseline Description

The baseline efficiency case assumes no measures installed.

BCR Measures

BCR Measure Name	Unique Identifier
Basic Educational Measures	2024 Electric Income Eligible Single Family Basic Educational Measures

Savings Principle

The high efficiency case includes basic educational measures such as CFLs, low flow showerheads, pool

and air conditioner timers, torchieres, and programmable thermostats.

Savings Method

Deemed

Unit

Completed audit.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Basic Educational Measures	21.0	0.0040	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Basic Educational Measures	5	1.00	1.00		1.00	1.00	1.00	0.58	0.86

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Basic Educational Measures	32.24%	34.78%	15.36%	17.62%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Basic Educational Measures	0	0	12.19	0.00	0.00	0.00	0.01	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Basic Educational Measures	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $180 / kit

Incentive: $180 / kit

Dehumidifier Rebate

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Appliances | **Measure Type:** Dehumidifiers | **Measure Sub Type:** Dehumidifier

Program: Income Eligible Single Family

Measure Description

The Installation of high efficiency dehumidifiers and the turn-in of existing inefficient dehumidifiers.

Baseline Description

The baseline efficiency case is the existing dehumidifier. It is assumed that low-income customers would otherwise replace their dehumidifiers with a used inefficient unit.

BCR Measures

BCR Measure Name	Unique Identifier
Dehumidifier Rebate	2024 Electric Income Eligible Single Family Dehumidifier Rebate

Savings Principle

The high efficiency case is an ENERGY STAR® replacement unit with an efficiency of 1.47 L/kWh. The high efficiency case is an ENERGY STAR® replacement unit with an efficiency of 1.47 L/kWh.

Savings Method

Calculated using deemed inputs

Unit

Per dehumidifier

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Dehumidifier Rebate	489.4	0.1100	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Dehumidifier Rebate	17	1.00	1.00		1.00	1.00	1.00	0.82	0.17

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Dehumidifier Rebate	21.99%	23.34%	24.93%	29.74%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Dehumidifier Rebate	0	0	0.00	0.00	0.00	0.00	0.01	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Dehumidifier Rebate	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $375 / measure

Incentive: $375 / measure

Domestic Hot Water Measure, Oil

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Water Heating | **Measure Type:** Flow Control | **Measure Sub Type:** Flow Control Measures

Program: Income Eligible Single Family

Measure Description

Domestic hot water measures include high-efficiency low-flow showerheads and faucet aerators that can save water and water heating energy.

Baseline Description

The baseline efficiency case is the existing domestic hot water equipment.

BCR Measures

BCR Measure Name	Unique Identifier
Domestic Hot Water Measure, Oil	2024 Electric Income Eligible Single Family Domestic Hot Water Measure, Oil

Savings Principle

The high efficiency case is the installation of high-efficiency domestic hot water equipment such as low-flow showerheads and faucet aerators.

Savings Method

Deemed

Unit

Installed DHW efficiency measure.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Domestic Hot Water Measure, Oil			0.00	0.00	0.00	0.90	0.00

Electric kWh Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Oil MMBtu Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Domestic Hot Water Measure, Oil	13	1.00	1.00		1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Domestic Hot Water Measure, Oil	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

Measure Life Note: National Grid assumption based on regional PA working groups.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Domestic Hot Water Measure, Oil	4028	0	0.00	0.00	0.00	1.74	0.01	0.00

Water/Sewer Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

One-time $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Domestic Hot Water Measure, Oil	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $20 / measure

Incentive: $20 / measure

Early Retirement Clothes Washer & Dryer

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Appliances | **Measure Type:** ER CW & Dryer | **Measure Sub Type:** ER ele DHW washer & ele dryer

Program: Income Eligible Single Family

Measure Description

The replacement and recycling of a working top-loading clothes washer with an agitator with an Energy Star rated washing machine.

Baseline Description

The baseline efficiency case is the existing clothes washer & dryer.

BCR Measures

BCR Measure Name	Unique Identifier
Early Retirement Clothes Washer Elec DHW & Elec Dryer	2024 Electric Income Eligible Single Family Early Retirement Clothes Washer Elec DHW & Elec Dryer
Early Retirement Clothes Washer Elec DHW & Gas Dryer	2024 Electric Income Eligible Single Family Early Retirement Clothes Washer Elec DHW & Gas Dryer
Early Retirement Clothes Washer Gas DHW & Elec Dryer	2024 Electric Income Eligible Single Family Early Retirement Clothes Washer Gas DHW & Elec Dryer
Early Retirement Clothes Washer Gas DHW & Gas Dryer	2024 Electric Income Eligible Single Family Early Retirement Clothes Washer Gas DHW & Gas Dryer
Early Retirement Clothes Washer Oil DHW & Elec Dryer	2024 Electric Income Eligible Single Family Early Retirement Clothes Washer Oil DHW & Elec Dryer
Early Retirement Clothes Washer Propane DHW & Elec Dryer	2024 Electric Income Eligible Single Family Early Retirement Clothes Washer Propane DHW & Elec Dryer

Savings Principle

The high efficiency case is a new high efficiency washer & dryer.

Savings Method

Calculated using deemed inputs

Unit

Installed high-efficiency washer & dryer.

Savings Equation

ΔkWh = [(Capacity x 1/IMEFbase x Ncycles) * (%CWkwhbase + %DHWkwhbase + %Dryerkwhbase)] - [(Capacity x 1/IMEFeff x Ncycles) x (%CWkwheff + %DHWkwheff + %Dryerkwheff)]

ΔMMBTUs = [(Capacity x 1/MEFbase x Ncycles) x ((%DHWffbase x reff) + %Dryerffbase] - [(Capacity x 1/MEFeff x Ncycles) x (%DHWffeff x reff) + %Dryergaseff]xMMBTUconvert

where:

Capacity = washer volume in ft3. Existing top loading washer is 3.09 ft3, new standard efficiency top loading washer is 3.38 ft3, ENERGY STAR front loading is 3.90 ft

IMEF = Integrated Modified Energy Factor and is measured in ft3 /kWh/cycle

Ncycles = 283 loads per year1

%CWkwh = % of total kWh energy consumption for clothes washer operation (different for baseline and efficient unit).

%DHWkwh = % of total kWh energy consumption used for water heating (different for baseline and efficient unit). If water is heated by gas or propane this is 0%

%DHWff = % of total kWh energy consumption for dryer operation (different for baseline and efficient unit). If the dryer is gas this is 0%

%Dryerkwh = % of total fossil fuel energy consumption used for water heating (different for baseline and efficient unit). If water is heated by electric this is 0%.

%Dryerff = % of total fossil fuel energy consumption for dryer operation (different for baseline and efficient unit). If the dryer is electric this is 0%.

r_eff = recovery energy factor used to account for the difference in recovery efficiencies of electric and gas/oil/propane hot water heaters. Electric water heaters are 100% efficient while other water heaters are 75% efficient. The ratio is 1.33 (100%/75%)

MMBTU_convert = Conversion factor from kWh to MMBTU is 0.003412

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Early Retirement Clothes Washer Elec DHW & Elec Dryer	588.0	0.1600	0.00	0.00	0.00	0.00	0.00
Early Retirement Clothes Washer Elec DHW & Gas Dryer	307.0	0.0800		0.96		0.00	0.00
Early Retirement Clothes Washer Gas DHW & Elec Dryer	327.0	0.0900		1.28		0.00	0.00
Early Retirement Clothes Washer Gas DHW & Gas Dryer	46.0	0.0100		2.24		1.28	1.28
Early Retirement Clothes Washer Oil DHW & Elec Dryer	327.0	0.0900					
Early Retirement Clothes Washer Propane DHW & Elec Dryer							

Electric kWh Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Gas DHW MMBtu Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Oil MMBtu Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Propane MMBtu Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Early Retirement Clothes Washer & Dryer	14	1.00	1.00		1.00	1.00	1.00	0.49	0.52

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Early Retirement Clothes Washer & Dryer	36.44%	29.90%	18.29%	15.36%

Measure Life Source: DOE (2017). Technical Support Document: Residential Clothes Washer. EERE-2017-BT-STD-0003-0030. https://www.regulations.gov/document/EERE-2017-BT-STD-0014-0030

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Early Retirement Clothes Washer & Dryer	4777	0	0.00	0.00	0.00	0.00	0.01	0.00

Water/Sewer Note: Massachusetts Common Assumption

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Early Retirement Clothes Washer & Dryer	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $870 / measure

Incentive: $870 / measure

Heat Pumps - Oil

Sector: Income Eligible

Fuel: Electric

Program Type: Prescriptive

Measure Category: HVAC

Measure Type: Heat Pumps

Measure Sub Type: Heat Pump Electrification

Program: Income Eligible Single Family

Measure Description

Full displacement of an existing inefficient propane or oil furnace with a high efficiency central ducted heat pump

Baseline Description

The baseline is an existing inefficient furnace at 77.7% AFUE for a properly functioning unit and 83% AFUE when the customer would have installed a new furnace without program intervention.

BCR Measures

BCR Measure Name	Unique Identifier
Heat Pumps - Oil	2024 Electric Income Eligible Single Family Heat Pumps - Oil

Savings Principle

The high efficiency case is a new 4.7 ton 16 SEER/9.5 HSPF ducted central heat pump.

Savings Method

Deemed

Unit

Installation of a high efficiency central ducted heat pump

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heat Pumps - Oil	-8437.0	-3.5300	0.00	0.00	0.00	83.91	0.00

Electric kWh Source: Guidehouse (2021). Energy Optimization Fuel Displacement Impact and Process Study (MA20R24-B-EOEVAL). https://ma-eeac.org/wp-content/uploads/MA20R24-B-EOEval_Fuel-Displacement-Report_2021-10-13_Final.pdf

Electric kW Source: Guidehouse (2021). Energy Optimization Fuel Displacement Impact and Process Study (MA20R24-B-EOEVAL). https://ma-eeac.org/wp-content/uploads/MA20R24-B-EOEval_Fuel-Displacement-Report_2021-10-13_Final.pdf

Oil MMBtu Source: Guidehouse (2021). Energy Optimization Fuel Displacement Impact and Process Study (MA20R24-B-EOEVAL). https://ma-eeac.org/wp-content/uploads/MA20R24-B-EOEval_Fuel-Displacement-Report_2021-10-13_Final.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heat Pumps - Oil	15	1.00	1.00		1.00	1.00	1.00	-0.02	0.65

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heat Pumps - Oil	44.30%	55.00%	0.40%	0.30%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Note: Consistent with MA TRM

CFwp Note: Consistent with MA TRM

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heat Pumps - Oil	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

One-time $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heat Pumps - Oil	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $0 / measure

Incentive: $0 / measure

Heating System Retrofit-Boiler

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Heating | **Measure Sub Type:** Retrofit Boiler

Program: Income Eligible Single Family

Measure Description

The installation of high efficiency boiler.

Baseline Description

The baseline is the existing heating system.

BCR Measures

BCR Measure Name	Unique Identifier
Heating System Retrofit - Boiler, Oil	2024 Electric Income Eligible Single Family Heating System Retrofit - Boiler, Oil
Heating System Retrofit - Boiler, Other	2024 Electric Income Eligible Single Family Heating System Retrofit - Boiler, Other

Savings Principle

The high efficiency case includes replacing heating systems with higher efficiency systems.

Savings Method

Calculated using site-specific inputs

Unit

Heating system

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heating System Retrofit - Boiler, Oil	10.0	0.0050	0.00	0.00	0.00	7.80	0.00
Heating System Retrofit - Boiler, Other	16.0	0.0090				0.00	7.90

Electric kWh Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Oil MMBtu Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Propane MMBtu Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heating System Retrofit-Boiler	23	1.00	1.00		1.00	1.00	1.00		0.45

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heating System Retrofit-Boiler	45.00%	55.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

CFwp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heating System Retrofit-Boiler	0	0	315.01	0.00	0.00	0.00	0.01	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heating System Retrofit-Boiler	0.00	0.00	0.00	1.00

TRC: $7300 / LI MF Bundled costs (see Participant listing)

Incentive: $7300 / LI MF Bundled costs (see Participant listing)

Heating System Retrofit-Furnace

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Heating | **Measure Sub Type:** Retrofit Furnace

Program: Income Eligible Single Family

Measure Description

The installation of high efficiency furnace.

Baseline Description

The baseline is the existing heating system.

BCR Measures

BCR Measure Name	Unique Identifier
Heating System Retrofit - Furnace, Oil	2024 Electric Income Eligible Single Family Heating System Retrofit - Furnace, Oil
Heating System Retrofit - Furnace, Other	2024 Electric Income Eligible Single Family Heating System Retrofit - Furnace, Other

Savings Principle

The high efficiency case includes replacing heating systems with higher efficiency systems.

Savings Method

Calculated using site-specific inputs

Unit

Heating system

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heating System Retrofit - Furnace, Oil	10.0	0.0050	0.00	0.00	0.00	7.80	0.00
Heating System Retrofit - Furnace, Other	16.0	0.0090				0.00	7.90

Electric kWh Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Oil MMBtu Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Propane MMBtu Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heating System Retrofit-Furnace	17	1.00	1.00		1.00	1.00	1.00		0.45

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heating System Retrofit-Furnace	45.00%	55.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heating System Retrofit-Furnace	0	0	315.01	0.00	0.00	0.00	0.01	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heating System Retrofit-Furnace	0.00	0.00	0.00	1.00

TRC: $7300 / LI MF Bundled costs (see Participant listing)

Incentive: $7300 / LI MF Bundled costs (see Participant listing)

HP Water Heaters

Sector: Income Eligible

Fuel: Electric

Program Type: Prescriptive

Measure Category: Appliances

Measure Type: Heat Pump Water Heaters

Measure Sub Type: Heat Pump Water Heaters

Program: Income Eligible Single Family

Measure Description

Installation of a heat pump water heater (HPWH) <55 gallons instead of an electric resistance water heater.

Baseline Description

The baseline efficiency case is a new, standard efficiency electric resistance hot water heater <55 gallons.

BCR Measures

BCR Measure Name	Unique Identifier
HP Water Heaters	2024 Electric Income Eligible Single Family HP Water Heaters

Savings Principle

The high efficiency case is a high efficiency heat pump water heater <55 gallons.

Savings Method

Deemed

Unit

Per Water Heater

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
HP Water Heaters	1712.0	0.1250	0.00	0.50	0.00	0.10	0.07

Electric kWh Source: Guidehouse (2021). Heat Pump Water Heaters - 2021 Quick Hit Study. https://ma-eeac.org/wp-content/uploads/MA21R39-E-HPWHQH_Task-3-Findings-Memo_15Oct2021-1.pdf

Gas DHW MMBtu Source: Guidehouse (2021). Heat Pump Water Heaters - 2021 Quick Hit Study. https://ma-eeac.org/wp-content/uploads/MA21R39-E-HPWHQH_Task-3-Findings-Memo_15Oct2021-1.pdf

Oil MMBtu Source: Guidehouse (2021). Heat Pump Water Heaters - 2021 Quick Hit Study. https://ma-eeac.org/wp-content/uploads/MA21R39-E-HPWHQH_Task-3-Findings-Memo_15Oct2021-1.pdf

Propane MMBtu Source: Guidehouse (2021). Heat Pump Water Heaters - 2021 Quick Hit Study. https://ma-eeac.org/wp-content/uploads/MA21R39-E-HPWHQH_Task-3-Findings-Memo_15Oct2021-1.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
HP Water Heaters	15	1.00	1.00		1.00	1.00	1.00	0.41	0.75

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
HP Water Heaters	39.13%	32.97%	14.89%	13.01%

Measure Life Source: Michaels Energy (2022). X2001A: Connecticut Measure Life/EUL Update Study-Residential Measures. https://energizect.com/sites/default/files/2022-07/CT%20X2001A%20EUL%20Res%20Measure%20Report%20FINAL060522.pdf

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
HP Water Heaters	0	0	4.70	0.00	0.00	0.00	0.01	0.00

Annual $ Source: NMR, Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. https://ma-eeac.org/wp-content/uploads/Residential-and-Low-Income-Non-Energy-Impacts-Evaluation-1.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
HP Water Heaters	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $2131 / measure

Incentive: $2131 / measure

LED

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Lighting | **Measure Type:** LED | **Measure Sub Type:**

Program: Income Eligible Single Family

Measure Description

The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.

Baseline Description

The baseline efficiency case is a combination of an incandescent bulb and halogen bulb

BCR Measures

BCR Measure Name	Unique Identifier
	2024 Electric Income Eligible Single Family LED - Bulbs
LED - Bulbs	2024 Electric Income Eligible Single Family LED - Reflectors
LED - Reflectors	
LED - EISA EXEMPT	2024 Electric Income Eligible Single Family LED - EISA EXEMPT

Savings Principle

The high efficiency case is and ENERGY STAR® qualified LED lamp.

Savings Method

Deemed

Unit

Rebated lamp or fixture.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: 1022

Hours Source: Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.

Hours Note: The average annual operating hours are 1,022 hours/year for rebated lights and calculated by vendor for home audit applications.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
LED - Bulbs	18.0	0.0045					
LED - Reflectors	19.0	0.0050	0.00	0.00	0.00	0.00	0.00
LED - EISA EXEMPT	15.0	0.0040					

Electric kWh Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
LED	1	1.00	1.00		1.00	1.00	1.00	0.55	0.85

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
LED	35.11%	30.72%	19.04%	15.12%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
LED	0	0	0.00	0.03	0.00	3.04	0.01	0.00

One-time $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
LED	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $0 / measure

Incentive: $0 / measure

Minisplit Heat Pumps - Fuel Switching

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Appliances | **Measure Type:** Heat Pumps | **Measure Sub Type:** Ductless

Program: Income Eligible Single Family

Measure Description

The purchase and installation of high efficiency mini-split heat pump system to replace an electric resistance heating system. The purchase and installation of high efficiency mini-split heat pump system rather than the purchase of a standard efficiency oil boiler or to replace a standard efficiency oil boiler.

Baseline Description

The baseline efficiency case for heating is a residential electric resistance heating system. The baseline efficiency case for heating is a residential oil boiler with 82 AFUE. The baseline efficiency case for cooling is a residential window AC unit withEER 9.8.

BCR Measures

BCR Measure Name	Unique Identifier
MSHP - Electric Resistance	2024 Electric Income Eligible Single Family MSHP - Electric Resistance
MSHP - Oil Fuel Switching	2024 Electric Income Eligible Single Family MSHP - Oil Fuel Switching

Savings Principle

The high efficiency case is an ENERGY STAR® qualified air-source heat pump.

Savings Method

Deemed

Unit

Installed high- efficiency air-source heat pump system for heating and cooling.

Savings Equation

Heating Gross kWh = Qty*deltakWh_heating

Cooling Gross kWh = Qty*deltakWh_cooling

Cooling Gross kW = Qty*deltakW

Where:

Qty = Total number of units.

deltakWh_heating = Average annual heating kWh reduction per unit.

deltakWh_cooling = Average annual cooling kWh reduction per unit.

deltakW = Average annual kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
MSHP - Electric Resistance	6549.0	2.8300	0.00	0.00	0.00	0.00	0.00
MSHP - Oil Fuel Switching	-8765.0	-2.1300				102.27	

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
MSHP - Electric Resistance	17	1.00	1.00		1.00		1.00	0.00	0.62
MSHP - Oil Fuel Switching								0.00	0.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
MSHP - Electric Resistance	42.92%	57.08%	0.00%	0.00%
MSHP - Oil Fuel Switching	36.40%	48.20%	8.00%	7.40%

Measure Life Source: Michaels Energy (2022). X2001A: Connecticut Measure Life/EUL Update Study-Residential Measures. https://energizect.com/sites/default/files/2022-07/CT%20X2001A%20EUL%20Res%20Measure%20Report%20FINAL060522.pdf

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Minisplit Heat Pumps - Fuel Switching	0	0	348.16	0.00	0.00	0.00	0.01	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Minisplit Heat Pumps - Fuel Switching	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $17500 / home

Incentive: $17500 / home

Programmable Thermostat

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Thermostat

Program: Income Eligible Single Family

Measure Description

Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.

Baseline Description

The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Programmable Thermostat - AC Only Programmable Thermostat - Electric Programmable Thermostat - Oil Programmable Thermostat - Gas Programmable Thermostat - Other	2024 Electric Income Eligible Single Family Programmable Thermostat - AC Only 2024 Electric Income Eligible Single Family Programmable Thermostat - Electric 2024 Electric Income Eligible Single Family Programmable Thermostat - Oil 2024 Electric Income Eligible Single Family Programmable Thermostat - Gas 2024 Electric Income Eligible Single Family Programmable Thermostat - Other

Savings Principle

The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.

Savings Method

Deemed

Unit

Installed programmable thermostat.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Programmable Thermostat - AC Only	72.0	0.0380	72.00			0.00	0.00
Programmable Thermostat - Electric	251.7	0.1940	251.70			0.00	0.00
Programmable Thermostat - Oil	8.7	0.0140	8.70	0.00	0.00	0.00	0.00
Programmable Thermostat - Gas	11.2	0.0180	11.20			2.07	0.00
Programmable Thermostat - Other	11.2	0.0180	11.20			0.00	2.07

Electric kWh Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Gas Heat MMBtu Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Oil MMBtu Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Propane MMBtu Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Programmable Thermostat - AC Only	19	1.00	1.00		1.00	1.00	1.00	0.37	0.00
Programmable Thermostat - Electric								0.34	0.21
Programmable Thermostat - Oil								0.35	0.00
Programmable Thermostat - Gas								0.35	0.00
Programmable Thermostat - Other								0.35	0.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Programmable Thermostat - AC Only	3.00%	4.00%	50.00%	43.00%
Programmable Thermostat - Electric	25.35%	29.86%	23.07%	21.72%
Programmable Thermostat - Oil	6.59%	3.85%	47.32%	42.24%
Programmable Thermostat - Gas	6.59%	3.85%	47.32%	42.24%
Programmable Thermostat - Other	6.59%	3.85%	47.32%	42.24%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Programmable Thermostat	0	0	45.13	0.00	0.00	0.00	0.01	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Programmable Thermostat	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $150 / measure

Incentive: $150 / measure

Replacement Freezer

Sector: Income Eligible **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Appliances **Measure Type:** Freezers **Measure Sub Type:** Freezer

Program: Income Eligible Single Family

Measure Description

This measure covers the replacement of an existing inefficient freezer with a new energy efficient model.

Baseline Description

The baseline efficiency case for both the replaced and baseline new freezer is represented by the existing freezer. It is assumed that low-income customers would replace their freezers with a used inefficient unit.

BCR Measures

BCR Measure Name	Unique Identifier
Replacement Freezer	2024 Electric Income Eligible Single Family Replacement Freezer

Savings Principle

The high efficiency case is a new high efficiency freezer.

Savings Method

Calculated using deemed inputs

Unit

Installed high-efficiency freezer.

Savings Equation

Gross kWh = Qty × (kWh_base - kWh_ee)

Gross kW = Qty × (kWh_base - kWh_ee) / Hours

Where:

Qty = Total number of units.

kW_base = Deemed average demand per baseline unit.

kW_ee = Deemed average demand per high-efficiency unit.

Hours = Deemed average annualoperating hours.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Replacement Freezer	333.0	0.0500	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Replacement Freezer	12	1.00	1.00		1.00	1.00	1.00	0.91	0.68

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Replacement Freezer	28.67%	33.56%	17.07%	20.69%

Measure Life Source: EPA Research (2014), Energy Star Commercial Equipment Calculator, Freezer Calcs, https://www.energystar.gov/sites/default/files/asset/document/commercial_kitchen_equipment_calculator.xlsx. Assume 2/3rd of measure life for recycling - MA Common assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Replacement Freezer	0	0	1.42	0.00	0.00	26.97	0.01	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

One-time $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Replacement Freezer	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $615 / measure

Incentive: $615 / measure

Replacement Refrigerator

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Appliances | **Measure Type:** Refrigerators | **Measure Sub Type:** Refrigerator

Program: Income Eligible Single Family

Measure Description

This measure covers the replacement of an existing inefficient refrigerator with a new ENERGY STAR® rated refrigerator.

Baseline Description

The baseline efficiency case is the existing refrigerator. It is assumed that low-income customers would otherwise replace their refrigerators with a used inefficient unit.

BCR Measures

BCR Measure Name	Unique Identifier
Replacement Refrigerator	2024 Electric Income Eligible Single Family Replacement Refrigerator

Savings Principle

The high efficiency case is an ENERGY STAR® rated refrigerator that meets the ENERGY STAR® criteria for full-sized refrigerators (7.75 cubic feet), using at least 20% less energy than models meeting the minimum Federal government standard.

Savings Method

Calculated using deemed inputs

Unit

Installed high-efficiency refrigerator.

Savings Equation

Gross kWh = Qty × (kWh_base - kWh_ee)

Gross kW = Qty × (kWh_base - kWh_ee) / Hours

Where:

Qty = Total number of units.

kW_base = Deemed average demand per baseline unit.

kW_ee = Deemed average demand per high-efficiency unit.

Hours = Deemed average annualoperating hours.

Hours: 8760

Hours Note: The average annual operating hours are 8760 hours/year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Replacement Refrigerator	467.0	0.0800	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Replacement Refrigerator	15	1.00	1.00		1.00	1.00	1.00	0.79	0.65

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Replacement Refrigerator	29.00%	31.95%	18.18%	20.87%

Measure Life Source: DOE (2021). Technical Support Document: Refrigerators, Refrigerator-freezers, and Freezers. EERE-2017-BT-STD-0014-0030. https://www.regulations.gov/document/EERE-2017-BT-STD-0003-0020

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Replacement Refrigerator	0	0	1.42	0.00	0.00	26.97	0.01	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

One-time $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Replacement Refrigerator	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $1260 / measure

Incentive: $1260 / measure

Smart Strips

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Plug Load | **Measure Type:** Smart Strips | **Measure Sub Type:** Smart Strip

Program: Income Eligible Single Family

Measure Description

The basic measures switches off plug load using current sensors and switching devices which turn off plug load when electrical current drops below threshold low levels. The advanced measure shuts devices off after it no longer senses activity from their infrared controls.

Baseline Description

The baseline efficiency case is the absence power strip and leaving peripheral devices plugged in or using a power surge protector and leaving peripheral devices on.

BCR Measures

BCR Measure Name	Unique Identifier
Smart Strips	2024 Electric Income Eligible Single Family Smart Strips

Savings Principle

The high efficiency case is the use of a smart strip or advanced smart strip.

Savings Method

Calculated using deemed inputs

Unit

Rebated smart strip.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: 8760

Hours Note: Since the power strip is assumed to be plugged in all year, the savings are based on 8,760 operational hours per year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Smart Strips	105.0	0.0200	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Smart Strips	5	0.81	1.00		0.92	0.92	0.92	0.58	0.86

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Smart Strips	32.24%	34.78%	15.36%	17.62%

Measure Life Note: Massachusetts Common Assumption

ISR Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

RRsp Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

RRwp Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Smart Strips	0	0	0.00	0.00	0.00	0.00	0.01	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Smart Strips	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $20 / measure

Incentive: $20 / measure

Weatherization

Sector: Income Eligible

Fuel: Electric

Program Type: Prescriptive

Measure Category: Building Shell

Measure Type: Insulation & Air sealing

Measure Sub Type: Weatherization

Program: Income Eligible Single Family

Measure Description

Installation of weatherization measures such as air sealing and insulation in homes heated with electricity, oil, or propane. Non-heating electric savings are achieved from reduced fan run time for heating and cooling systems.

Baseline Description

The baseline efficiency case is any existing home shell measures.

BCR Measures

BCR Measure Name	Unique Identifier
Weatherization, Electric	2024 Electric Income Eligible Single Family Weatherization, Electric
Weatherization, Del Fuel	2024 Electric Income Eligible Single Family Weatherization, Del Fuel
Weatherization, Other	2024 Electric Income Eligible Single Family Weatherization, Other

Savings Principle

The high efficiency case can be a combination of increased insulation, air sealing, duct sealing, and other improvements to the home shell.

Savings Method

Deemed

Unit

Completed weatherization project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Weatherization, Electric	1231.0	0.9500	1231.00				
Weatherization, Del Fuel	95.0	0.0730	95.00	0.00	0.00	0.00	0.00
Weatherization, Other	93.0	0.0730	93.00				

Electric kWh Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Oil MMBtu Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Propane MMBtu Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Weatherization	20	1.00	1.00		1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Weatherization	25.35%	29.86%	23.07%	21.72%

Measure Life Source: Guidehouse (2018). ComEd Effective Useful Life Research Report. https://www.icc.illinois.gov/docket/P2017-0312/documents/287811/files/501915.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Weatherization	0	0	565.74	0.00	0.00	0.00	0.01	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Weatherization	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $5500 / home

Incentive: $5500 / home

WiFi Thermostat

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Thermostat

Program: Income Eligible Single Family

Measure Description

Installation of wifi thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.

Baseline Description

The baseline efficiency case is an HVAC system with either a manual or a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Wi-Fi Thermostat - AC Only Wi-Fi Thermostat - Oil Wi-Fi Thermostat - Other	2024 Electric Income Eligible Single Family Wi-Fi Thermostat - AC Only 2024 Electric Income Eligible Single Family Wi-Fi Thermostat - Oil 2024 Electric Income Eligible Single Family Wi-Fi Thermostat - Other

Savings Principle

The high efficiency case is an HVAC system providing space heating with a wifi thermostat installed.

Savings Method

Deemed

Unit

Installed programmable thermostat.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Wi-Fi Thermostat - AC Only	64.4	0.0900				0.00	0.00
Wi-Fi Thermostat - Oil	18.0	0.0300	0.00	0.00	0.00	2.78	0.00
Wi-Fi Thermostat - Other	18.0	0.0300				0.00	2.79

Electric kWh Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Electric kWh Note: The total cooling savings of 64 kWh were adjusted to reflect the percent of homes that have cooling which based on the MA Residential Baseline study is 28 percent.

Electric kW Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
WiFi Thermostat	11	1.00	1.00		1.00	1.00	1.00	0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
WiFi Thermostat	7.00%	4.00%	47.00%	42.00%

Measure Life Source: Southern California Edison (2017). Residential Smart Thermostat Workpaper (Work Paper SCE17HC054, Revision #0). https://www.peakload.org/assets/SCE17HC054.0_Residential_Sma.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
WiFi Thermostat	0	0	45.13	0.00	0.00	0.00	0.01	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
WiFi Thermostat	0.00	0.00	0.00	1.00

TRC: $275 / unit

Incentive: $275 / unit

Window

Sector: Income Eligible

Fuel: Electric

Program Type: Prescriptive

Measure Category: Building Shell

Measure Type: Windows

Measure Sub Type: Windows, electric resistance

Program: Income Eligible Single Family

Measure Description

Early replacement of a single pane window either with or without a storm with a triple pane window.

Baseline Description

The baseline efficiency case is a single pane window with or without a storm.

BCR Measures

BCR Measure Name	Unique Identifier
Window -Electric Resistance	2024 Electric Income Eligible Single Family Window - Electric Resistance
Window -Heat Pump	2024 Electric Income Eligible Single Family Window -Heat Pump
Window -Oil	2024 Electric Income Eligible Single Family Window -Oil
Window -Propane	2024 Electric Income Eligible Single Family Window - Propane

Savings Principle

The high efficiency case is an Energy Star qualified triple pane window.

Savings Method

Deemed

Unit

Replacement of window with single pane either with or without a storm with a triple pane window.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Window -Electric Resistance	254.0	0.1300	0.00	0.00	0.00	0.00	0.00
Window -Heat Pump	127.0	0.0900					0.00
Window -Oil	7.0	0.0100				0.00	0.00
Window -Propane	7.0	0.0100				1.27	1.27

Electric kWh Note: Massachusetts Common Assumption

Electric kW Note: Massachusetts Common Assumption

Gas Heat MMBtu Note: Massachusetts Common Assumption

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Window -Electric Resistance	25	1.00	1.00		1.00	1.00	1.00	0.33	0.43
Window -Heat Pump								0.37	0.22
Window -Oil								0.37	0.00
Window -Propane								0.37	0.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Window -Electric Resistance	45.00%	44.00%	6.00%	5.00%
Window -Heat Pump	25.25%	29.29%	24.24%	21.21%
Window -Oil	3.96%	3.96%	49.50%	42.57%
Window -Propane	3.96%	3.96%	49.50%	42.57%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRsp Note: Massachusetts Common Assumption

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Window	0	0	6.81	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Window	0.00	0.00	0.00	1.00

NTG Note: Massachusetts Common Assumption

TRC: $0 / measure

Incentive: $0 / measure

Window AC Replacements

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Cooling | **Measure Sub Type:** Window AC

Program: Income Eligible Single Family

Measure Description

Replacement of existing inefficient room air conditioners with more efficient models. This is only offered as a measure when an AC timer would not reduce usage during the peak period.

Baseline Description

The baseline efficiency case is the existing air conditioning unit.

BCR Measures

BCR Measure Name	Unique Identifier
Window AC Replacements	2024 Electric Income Eligible Single Family Window AC Replacements

Savings Principle

The high efficiency case is the high efficiency room air conditioning unit.

Savings Method

Deemed

Unit

Replacement of existing window AC with high-efficiency window AC.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Hours Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Hours Note: Calculated for Multifamily applications and not applicable for single family.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Window AC Replacements	71.0	0.1100	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Window AC Replacements	12	1.00	1.00			1.00	1.00	0.33	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Window AC Replacements	2.88%	2.15%	47.53%	47.43%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Window AC Replacements	0	0	50.17	0.00	0.00	0.00	0.01	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Window AC Replacements	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $480 / measure

Incentive: $480 / measure

Aerator

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Water Heating | **Measure Type:** Flow Control | **Measure Sub Type:** Faucet Aerator

Program: Income Eligible Multifamily

Measure Description

Installation of a faucet aerator with a flow rate of 1.5 GPM or less on an existing faucet with high flow in a commercial setting with service water heated by electricity.

Baseline Description

The baseline efficiency case is 2.2 GPM or greater faucet.

BCR Measures

BCR Measure Name	Unique Identifier
Aerator - Electric	2024 Electric Income Eligible Multifamily Aerator - Electric
Aerator - Oil	2024 Electric Income Eligible Multifamily Aerator - Oil
Aerator - Other	2024 Electric Income Eligible Multifamily Aerator - Other

Savings Principle

The high efficiency case is a faucet with 1.5 GPM or less aerator installed.

Savings Method

Deemed

Unit

Installed faucet aerator.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Aerator - Electric	38.0	0.0091				0.00	0.00
Aerator - Oil	0.0	0.0	0.00	0.00	0.00	0.20	0.00
Aerator - Other	0.0	0.0				0.00	0.20

Electric kWh Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Electric kW Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Oil MMBtu Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Propane MMBtu Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Aerator	7	0.90	1.00		1.00	1.00	1.00	0.31	0.81

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Aerator	41.52%	31.39%	15.22%	11.88%

Measure Life Note: Massachusetts Common Assumption

ISR Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

RRsp Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

RRwp Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Aerator	359	0	0.59	0.00	0.00	0.00	0.01	0.00

Water/Sewer Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Annual $ Source: NMR (2018, 2019). TXC 29 Market-Rate Rental Property NEI Study (Phase 1). TXC50 - LIMF Market Rate MF NEI - Phase I.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Aerator	0.00	0.00	0.00	1.00

TRC: $5 / LI MF Bundled costs (see Participant listing)

Air Sealing

Sector: Income Eligible

Fuel: Electric

Program Type: Custom

Measure Category: Building Shell

Measure Type: Air Sealing

Measure Sub Type: Air Sealing/Infiltration

Program: Income Eligible Multifamily

Measure Description

Thermal shell air leaks are sealed through strategic use and location of air-tight materials.

Baseline Description

The baseline efficiency case is the existing building before the air sealing measure is implemented. The baseline building is characterized by the existing CFM50 measurement (CFM50PRE) for single family homes, or the existing air changes per hour (ACHPRE)

BCR Measures

BCR Measure Name	Unique Identifier
Air Sealing - Elec	2024 Electric Income Eligible Multifamily Air Sealing - Elec
Air Sealing - Elec w/AC	2024 Electric Income Eligible Multifamily Air Sealing - Elec w/AC
Air Sealing - Oil	2024 Electric Income Eligible Multifamily Air Sealing - Oil
Air Sealing - Other	2024 Electric Income Eligible Multifamily Air Sealing - Other

Savings Principle

The high efficiency case is the existing building after the air sealing measure is implemented. The high efficiency building is characterized by the new CFM50 measurement for single family homes (CFM50POST), or the new air changes per hour (ACHPOST) for multi-family facilities, which is measured after the air sealing measure is implemented.

Savings Method

Calculated using site-specific inputs

Unit

Completed air sealing project.

Savings Equation

Gross kWh = Stories × SQFT × (CFM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM

Gross kW = Gross kWh × kW/kWh

Where:

Stories = Total stories in the multi-family building

SQFT = Area of building in square feet

CFM/SQFT_pre = Estimate of pre-retrofit air leakagein CFM/SQFT based on number of stories in the building and air-tightness ratings of the existing roof and floor

CFM/SQFT_post = Estimate of post-retrofit air leakage in CFM/SQFT based on number of stories in the building and air-tightness ratings of theimproved roof and floor

deltakWh/CFM = Average annual kWh reduction per CFM

Gross kWh = Stories × SQFT × (CFM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM

kW/kWh = Average kW reduction per kWh reduction

Hours: 4644

Hours Source: NOAA Weather data: An average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Air Sealing - Elec	Calc	Calc	0.00	0.00	0.00	0.00	0.00
Air Sealing - Elec w/AC						0.00	0.00
Air Sealing - Oil						0.00	0.00
Air Sealing - Other						Calc	Calc

Electric kWh Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Electric kW Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Air Sealing - Elec	20	1.00	1.00		1.00	1.00	1.00	0.33	0.22
Air Sealing - Elec w/AC								0.33	0.22
Air Sealing - Oil								0.35	0.00
Air Sealing - Other								0.35	0.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Air Sealing - Elec	25.42%	30.57%	22.44%	21.58%
Air Sealing - Elec w/AC	25.42%	30.57%	22.44%	21.58%
Air Sealing - Oil	6.59%	3.85%	47.32%	42.24%
Air Sealing - Other	6.60%	3.85%	47.32%	42.24%

Measure Life Source: Guidehouse (2018). ComEd Effective Useful Life Research Report. https://www.icc.illinois.gov/docket/P2017-0312/documents/287811/files/501915.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Air Sealing	0	0	373.85	0.00	0.00	0.00	0.01	0.00

Annual $ Source: NMR Group, Inc (2021). Low-Income Multifamily Health- and Safety-Related NEIs Study (TXC 50) Preliminary Findings Report. https://ma-eeac.org/wp-content/uploads/TXC50-Low-Income-Multifamily-Health-and-Safety-NEI-Preliminary-Findings-Report_15OCT2018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Air Sealing	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $70 / LI MF Bundled costs (see Participant listing)

Incentive: $70 / LI MF Bundled costs (see Participant listing)

Boiler Reset Control

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Boiler Control

Program: Income Eligible Multifamily

Measure Description

Boiler reset controls are devices that improve the efficiency of an existing boiler system by modulating the hot water temperature set point. Reset controls automatically control boiler water temperature based on outdoor temperature using a software program; load controls sense the thermal demand of the heating system and resets the water temperature based on the demand.

Baseline Description

The baseline efficiency case is a boiler without reset controls

BCR Measures

BCR Measure Name	Unique Identifier
Boiler Reset Control - Oil	2024 Electric Income Eligible Multifamily Boiler Reset Control - Oil
Boiler Reset Control - Other	2024 Electric Income Eligible Multifamily Boiler Reset Control - Other

Savings Principle

The efficient case is a boiler with reset or load controls, which reset the supply water temperature based on outdoor temperatures and/or building load.

Savings Method

Unit

Installation of boiler reset control on existing boiler

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Boiler Reset Control - Oil			0.00	0.00	0.00	35.50	0.00
Boiler Reset Control - Other						0.00	35.50

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Boiler Reset Control	15	1.00	1.00		1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Boiler Reset Control	0.00%	0.00%	0.00%	0.00%

Measure Life Source: ACEEE (2006). Emerging Technologies Report: Advanced Boiler Controls. Prepared for ACEEE.https://www.aceee.org/files/pdf/2006_BoilerControls.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Boiler Reset Control	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Boiler Reset Control	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

CFL Fixture

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Lighting | **Measure Type:** CFL | **Measure Sub Type:**

Program: Income Eligible Multifamily

Measure Description

The installation of ENERGY STAR® compact fluorescent (CFL) indoor fixtures. Compact fluorescent fixtures offer comparable luminosity to incandescent fixtures at significantly

less wattage and significantly longer lifetimes. Hardwired fluorescent fixturesoffer comparable luminosity to incandescent fixtures at significantly lower wattage and offer significantly longer lifespan.

Baseline Description

The baseline efficiency case is a blend of incandescent, compact fluorescent, and halogen lamps. For home audit applications, the baseline is the existing fixture.

BCR Measures

BCR Measure Name	Unique Identifier
CFL Fixture - Common Int	2024 Electric Income Eligible Multifamily CFL Fixture - Common Int
CFL Fixture - Dwelling Int	2024 Electric Income Eligible Multifamily CFL Fixture - Dwelling Int
CFL Fixture - Dwelling Ext	2024 Electric Income Eligible Multifamily CFL Fixture - Dwelling Ext

Savings Principle

The high efficiency case is an ENERGY STAR® qualified compact fluorescent light fixture wired for exclusive use with pin-based CFLs.

Savings Method

Calculated using site-specific inputs

Unit

Rebated lamp or fixture.

Savings Equation

Gross kWh = [(QTY_pre × Watts_pre × Hours_base) - (QTY_ee × Watts_ee × Hours_ee)]/1000 × 52

Gross kW = [(QTY_pre × Watts_pre) - (QTY_ee × Watts_ee)]/1000

Where:

QTY_pre = Quantity of pre-retrofit fixtures/bulbs

QTY_ee = Quantity of efficient fixtures/bulbs installed

Watts_pre = Rated watts of pre-retrofit fixtures/bulbs

Watts_ee = Rated watts of efficient fixtures/bulbs installed

Hours_pre = Weekly hours of operation for pre-retrofit case lighting fixtures/bulbs

Hours_ee = Weekly hours of operation for efficient lighting fixtures/bulbs

1000 = Watts per kW

52 = Weeks per year

Hours: N/A

Hours Note: Multifamily common area hours are site specific

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CFL Fixture - Common Int							
CFL Fixture - Dwelling Int	Calc	Calc	0.00	0.00	0.00	0.00	0.00
CFL Fixture - Dwelling Ext							

Electric kWh Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Electric kW Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
CFL Fixture - Common Int								0.17	0.16
CFL Fixture - Dwelling Int	1	1.00	1.00		1.00	1.00	1.00	0.13	0.16
CFL Fixture - Dwelling Ext								0.13	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
CFL Fixture - Common Int	43.00%	24.00%	21.00%	12.00%
CFL Fixture - Dwelling Int	43.00%	24.00%	21.00%	12.00%
CFL Fixture - Dwelling Ext	17.54%	47.37%	17.54%	17.54%

Measure Life Note: Based on MA EUL assumptions

ISR Source: Navigant (2018). Multi-Family Program Impact and Net-to-Gross Evaluation (RES 44). https://ma-eeac.org/wp-content/uploads/RES-44_Multi-family-Program-Impact-Evaluation_FINAL_SO-Rates-Updated.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
CFL Fixture	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
CFL Fixture	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

CFLs

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Lighting | **Measure Type:** Interior | **Measure Sub Type:** CFL Screw Base

Program: Income Eligible Multifamily

Measure Description

The installation of compact fluorescent bulbs.

Baseline Description

The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided by market research or for EISA exempt bulbs and bulbs installed through a home energy audit, the base line is a 65 Watt incandescent.

BCR Measures

BCR Measure Name	Unique Identifier
CFLs	2024 Electric Income Eligible Multifamily CFLs

Savings Principle

The high efficiency case is an ENERGY STAR® rated CFL spiral bulb.

Savings Method

Deemed

Unit

Rebated lamp or fixture.

Savings Equation

Gross kWh = Qty × deltakW × Hours

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

DeltakW = Deemed average kW reduction per unit.

Hours = Deemed average annual operating hours.

Hours: 1022

Hours Source: Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.

Hours Note: The average annual operating hours are 1,022 hours/year for rebated lights and calculated by vendor for home audit applications.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CFLs	44.8	0.0450	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three-Year Planning Version. Prepared for the Massachusetts PAs.

Electric kW Source: NMR Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three-Year Planning Version. Prepared for the Massachusetts PAs.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
CFLs	5	0.99	1.00		1.00	1.00	1.00	0.17	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
CFLs	36.00%	36.00%	13.00%	15.00%

Measure Life Source: MA PAs (2019). Lighting Worksheet PY2019-2021 - Updated for RI

ISR Source: Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR® Homes: 2005 Baseline Study: Part II: Homeowner Survey Analysis Incorporating Inspection Data Final Report.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: All PAs use 100% savings persistence factors.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT. The Cadmus Group, Inc. (2012).

CFwp Source: Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT. The Cadmus Group, Inc. (2012).

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
CFLs	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
CFLs	0.00	0.00	0.00	1.00

TRC: $0 / bulb

Incentive: $0 / bulb

Common Int LED Bulbs

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Lighting | **Measure Type:** Interior | **Measure Sub Type:** Common LED

Program: Income Eligible Multifamily

Measure Description

The installation of ENERGY STAR® LED indoor bulbs.

Baseline Description

The baseline efficiency case is the existing installed bulb.

BCR Measures

BCR Measure Name	Unique Identifier
Common Int LED Bulbs	2024 Electric Income Eligible Multifamily Common Int LED Bulbs

Savings Principle

The high efficiency case is bulbs that use fewer watts.

Savings Method

Deemed

Unit

Installed bulb

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Common Int LED Bulbs	179.0	0.0448	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Electric kW Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Common Int LED Bulbs	1	1.00	1.00		0.86	1.00	1.00	0.80	0.61

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Common Int LED Bulbs	30.27%	17.38%	34.27%	18.08%

Measure Life Note: Based on MA EUL assumptions

ISR Source: Navigant (2018). Multi-Family Program Impact and Net-to-Gross Evaluation (RES 44). https://ma-eeac.org/wp-content/uploads/RES-44_Multi-family-Program-Impact-Evaluation_FINAL_SO-Rates-Updated.pdf

SPF Note: Savings persistence is 100% since measure life is 1 year.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Common Int LED Bulbs	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

One-time $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Common Int LED Bulbs	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

Common Occupancy Sensor

Sector: Income Eligible

Fuel: Electric

Program Type: Custom

Measure Category: Lighting

Measure Type: Interior

Measure Sub Type: Common Occ Sensor

Program: Income Eligible Multifamily

Measure Description

The installation of sensors that reduce the lighting hours of use.

Baseline Description

The baseline efficiency case is a blend of incandescent, compact fluorescent, and halogen lamps. For home audit applications, the baseline is the existing fixture.

BCR Measures

BCR Measure Name	Unique Identifier
Common Occupancy Sensor	2024 Electric Income Eligible Multifamily Common Occupancy Sensor

Savings Principle

The high efficiency case is an ENERGY STAR® qualified compact fluorescent light fixture wired for exclusive use with pin-based CFLs.

Savings Method

Calculated using site-specific inputs

Unit

Rebated lamp or fixture.

Savings Equation

Gross kWh = [(QTY_pre × Watts_pre × Hours_base) - (QTY_ee × Watts_ee × Hours_ee)]/1000 × 52

Gross kW = [(QTY_pre × Watts_pre) - (QTY_ee × Watts_ee)]/1000

Where:

QTY_pre = Quantity of pre-retrofit fixtures/bulbs

QTY_ee = Quantity of efficient fixtures/bulbs installed

Watts_pre = Rated watts of pre-retrofit fixtures/bulbs

Watts_ee = Rated watts of efficient fixtures/bulbs installed

Hours_pre = Weekly hours of operation for pre-retrofit case lighting fixtures/bulbs

Hours_ee = Weekly hours of operation for efficient lighting fixtures/bulbs

1000 = Watts per kW

52 = Weeks per year

Hours: N/A

Hours Note: Multifamily common area hours are site specific

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Common Occupancy Sensor	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Electric kW Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Common Occupancy Sensor	10	1.00	1.00		1.00	1.00	1.00	0.17	0.16

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Common Occupancy Sensor	36.00%	36.00%	13.00%	15.00%

Measure Life Source: MA Residential Lighting Worksheet 2017, including reference to Market Adoption Model

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

CFwp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Common Occupancy Sensor	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Common Occupancy Sensor	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

Custom

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Custom | **Measure Type:** Multi-family | **Measure Sub Type:** Low Income

Program: Income Eligible Multifamily

Measure Description

Vendors install a variety of measures at multifamily facilities. Measures include

Baseline Description

For retrofit projects, the baseline efficiency case is the same as the existing, or pre-retrofit, case for the

BCR Measures

BCR Measure Name	Unique Identifier
Custom	2024 Electric Income Eligible Multifamily Custom

Savings Principle

The high efficiency scenario is specific to the facility and may include one or more energy efficiency

Savings Method

Calc

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom	Calc	Calc	Calc	Calc	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom	multi	1.00	1.00	1.00	1.00	1.00	1.00	0.77	0.64

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom	39.30%	27.40%	19.60%	13.70%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom	0.00	0.00	0.00	1.00

TRC: $300000 / LI MF Bundled costs (see Participant listing)

Incentive: $300000 / LI MF Bundled costs (see Participant listing)

CUSTOM CHP

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Custom | **Measure Type:** CHP | **Measure Sub Type:** CHP

Program: Income Eligible Multifamily

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
CUSTOM CHP	2024 Electric Income Eligible Multifamily CUSTOM CHP

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CUSTOM CHP	Calc	Calc	0.00	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
CUSTOM CHP	multi	1.00	1.00		1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
CUSTOM CHP	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
CUSTOM CHP	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
CUSTOM CHP	0.00	0.00	0.00	1.00

TRC: $540000 / LI MF Bundled costs (see Participant listing)

Incentive: $540000 / LI MF Bundled costs (see Participant listing)

CUSTOM CIRCULATOR

Sector: Income Eligible

Fuel: Electric

Program Type: Custom

Measure Category: Water Heating

Measure Type: Water Heater

Measure Sub Type: Demand Circulator

Program: Income Eligible Multifamily

Measure Description

Installation of a demand controller on a re-circulation loop.

Baseline Description

Full time operation of re-circ pump.

BCR Measures

BCR Measure Name	Unique Identifier
CUSTOM CIRCULATOR	2024 Electric Income Eligible Multifamily CUSTOM CIRCULATOR

Savings Principle

The re-circulation pump is controlled by a demand signal or timer to reduce operating hours when no hot water usage occurs.

Savings Method

Calc

Unit

Installed recirculation controller

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CUSTOM CIRCULATOR	Calc		Calc	0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
CUSTOM CIRCULATOR	multi	1.00	1.00	0.99	0.99				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
CUSTOM CIRCULATOR	0.00%	70.21%	29.79%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
CUSTOM CIRCULATOR	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
CUSTOM CIRCULATOR	0.00	0.00	0.00	1.00

TRC: $8000 / LI MF Bundled costs (see Participant listing)

Incentive: $8000 / LI MF Bundled costs (see Participant listing)

Dehumidifier

Sector: Income Eligible **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Appliances **Measure Type:** Dehumidifiers **Measure Sub Type:** Dehumidifier

Program: Income Eligible Multifamily

Measure Description

The Installation of high efficiency dehumidifiers and the turn-in of existing inefficient dehumidifiers.

Baseline Description

The baseline efficiency case is the existing dehumidifier. It is assumed that low-income customers would otherwise replace their dehumidifiers with a used inefficient unit.

BCR Measures

BCR Measure Name	Unique Identifier
Dehumidifier	2024 Electric Income Eligible Multifamily Dehumidifier

Savings Principle

The high efficiency case is an ENERGY STAR® replacement unit with an efficiency of 1.47 L/kWh. The high efficiency case is an ENERGY STAR® replacement unit with an efficiency of 1.47 L/kWh.

Savings Method

Calc

Unit

Per dehumidifier

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Dehumidifier	489.4	0.1100	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Dehumidifier	17	1.00	1.00		1.00	1.00	1.00	0.85	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Dehumidifier	2.00%	3.00%	59.00%	36.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Dehumidifier	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Dehumidifier	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $0 / measure

Incentive: $0 / measure

DHW

Sector: Income Eligible **Fuel:** Electric **Program Type:** Custom

Measure Category: Water Heating **Measure Type:** Water Heater **Measure Sub Type:** Water Heater

Program: Income Eligible Multifamily

Measure Description

Installation of high efficiency water heating equipment to replace the existing inefficient water heater.

Baseline Description

The baseline efficiency case is a stand-alone tank water heater.

BCR Measures

BCR Measure Name	Unique Identifier
DHW	2024 Electric Income Eligible Multifamily DHW

Savings Principle

The high efficiency case is a stand-alone storage water heater with an energy factor >= 0.66

Savings Method

Calc

Unit

Installed water heating system.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
DHW	Calc	Calc	0.00	0.00	0.00	Calc	Calc

Electric kWh Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Electric kW Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
DHW	multi	1.00	1.00		1.00	1.00	1.00	0.31	0.81

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
DHW	41.52%	31.39%	15.22%	11.88%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

CFwp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
DHW	1786	0	1.21	0.00	0.00	0.00	0.01	0.00

Annual $ Source: NMR (2018, 2019). TXC 29 Market-Rate Rental Property NEI Study (Phase 1). TXC50 - LIMF Market Rate MF NEI - Phase I.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
DHW	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

EISA Exempt Lighting

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Lighting | **Measure Type:** EISA Exempt | **Measure Sub Type:**

Program: Income Eligible Multifamily

Measure Description

The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.

Baseline Description

The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided by market research or for EISA exempt bulbs and bulbs installed through an home energy audit, the base line is a 65 Watt incandescent.

BCR Measures

BCR Measure Name	Unique Identifier
EISA Exempt Lighting - Common Int	2024 Electric Income Eligible Multifamily EISA Exempt Lighting - Common Int
EISA Exempt Lighting - Common Ext	2024 Electric Income Eligible Multifamily EISA Exempt Lighting - Common Ext
EISA Exempt Lighting - Dwelling Int	2024 Electric Income Eligible Multifamily EISA Exempt Lighting - Dwelling Int
EISA Exempt Lighting - Dwelling Ext	2024 Electric Income Eligible Multifamily EISA Exempt Lighting - Dwelling Ext

Savings Principle

The high efficiency case is and ENERGY STAR® qualified LED fixture.

Savings Method

Calculated using site-specific inputs

Unit

Rebated lamp or fixture.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Hours Source: NMR Group,Inc. (2014). Northeast Residential Lighting Hours-of-Use Study. https://neep.org/sites/default/files/resources/Northeast-Residential-Lighting-Hours-of-Use-Study-Final-Report1.pdf

Hours Note: Multifamily common area hours are site specific. Multifamily dwelling unit hours defined by room type from NMR HOU study.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
EISA Exempt Lighting - Common Int	185.9	0.0465	0.00	0.00	0.00	0.00	0.00
EISA Exempt Lighting - Common Ext	185.9	0.0465					
EISA Exempt Lighting - Dwelling Int	15.0	0.0038					
EISA Exempt Lighting - Dwelling Ext	15.0	0.0038					

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
EISA Exempt Lighting	1	1.00	1.00		1.00	1.00	1.00	0.55	0.85

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
EISA Exempt Lighting	35.11%	30.72%	19.04%	15.12%

Measure Life Note: Based on MA EUL assumptions

ISR Source: Navigant (2018). Multi-Family Program Impact and Net-to-Gross Evaluation (RES 44). https://ma-eeac.org/wp-content/uploads/RES-44_Multi-family-Program-Impact-Evaluation_FINAL_SO-Rates-Updated.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
EISA Exempt Lighting	0	0	17.62	0.03	0.00	10.98	0.01	0.00

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
EISA Exempt Lighting	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

EW LI Fixtures

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Lighting | **Measure Type:** CFL Fixture | **Measure Sub Type:**

Program: Income Eligible Multifamily

Measure Description

The installation of ENERGY STAR® compact fluorescent (CFL) indoor fixtures. The installation of hardwired ENERGY STAR® fluorescent outdoor fixtures with pin-based bulbs. Compact fluorescent fixtures offer comparable luminosity to incandescent fixtures atsignificantly less wattage and significantly longer lifetimes. Hardwired fluorescent fixtures offer comparable luminosity to incandescent fixtures at significantly lower wattage and offer significantly longer lifespan.

Baseline Description

The baseline efficiency case is a blend of incandescent, compact fluorescent, and halogen lamps. For home audit applications, the baseline is the existing fixture.

BCR Measures

BCR Measure Name	Unique Identifier
Lighting Fixtures - Indoor	2024 Electric Income Eligible Multifamily Lighting Fixtures - Indoor
Lighting Fixtures - Outdoor	2024 Electric Income Eligible Multifamily Lighting Fixtures - Outdoor

Savings Principle

The high efficiency case is an ENERGY STAR® qualified compact fluorescent light fixture wired for exclusive use with pin-based CFLs.

Savings Method

Calculated using deemed inputs

Unit

Rebated lamp or fixture.

Savings Equation

Gross kWh = Qty × deltakW × Hours

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

DeltakW = Deemed average kW reduction per unit.

Hours = Deemed average annual operating hours.

Hours: N/A

Hours Source: Nexus Market Research and RLW Analytics (2004). Impact Evaluation of the Massachusetts, Rhode Island, and Vermont 2003 Residential Lighting Programs.

Hours Note: The average annual operating hours are 912.5 hours/year or calculated for home audit applications**.**

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Lighting Fixtures - Indoor Lighting Fixtures - Outdoor	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Electric kW Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
EW LI Fixtures	1	1.00	1.00		1.00	1.00	1.00	0.55	0.85

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
EW LI Fixtures	35.11%	30.72%	19.04%	15.12%

Measure Life Note: Based on MA EUL assumptions

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rates are 100% since savings estimates are based on evaluation results.

CFsp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

CFwp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
EW LI Fixtures	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
EW LI Fixtures	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

Fixtures

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Lighting | **Measure Type:** Interior | **Measure Sub Type:** LED Fixture

Program: Income Eligible Multifamily

Measure Description

The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.

Baseline Description

The baseline efficiency case is a combination of an incandescent bulb and halogen bulb

BCR Measures

BCR Measure Name	Unique Identifier
Fixtures	2024 Electric Income Eligible Multifamily Fixtures

Savings Principle

The high efficiency case is and ENERGY STAR® qualified LED fixture.

Savings Method

Deemed

Unit

Rebated lamp or fixture.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Fixtures	34.0	0.0090	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Electric kW Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Fixtures	1	0.95	1.00		1.00	1.00	1.00	0.17	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Fixtures	36.00%	36.00%	13.00%	15.00%

Measure Life Note: Based on MA EUL assumptions

ISR Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

ISR Note: For mailed-in LEDs, ISR is assumed at 83% based on MA VHEA Study (MA20R26-B-VHEA)

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Fixtures	0	0	0.00	0.00	0.00	0.00	0.00	0.00

One-time $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Fixtures	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

Heat Pumps

Sector: Income Eligible **Fuel:** Electric **Program Type:** Custom

Measure Category: HVAC **Measure Type:** Heat Pumps **Measure Sub Type:** Heat Pump

Program: Income Eligible Multifamily

Measure Description

Installation of a heat pump displacing electric, oil, or propane heat.

Baseline Description

The baseline efficiency case is the existing site conditions

BCR Measures

BCR Measure Name	Unique Identifier
Heat Pumps	2024 Electric Income Eligible Multifamily Heat Pumps

Savings Principle

The high efficiency case will vary by site

Savings Method

Calc

Unit

Installation of heat pump

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heat Pumps	Calc		0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heat Pumps	20	1.00	1.00		1.00	1.00	1.00	0.01	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heat Pumps	42.00%	41.00%	9.00%	8.00%

Measure Life Source: Michaels Energy (2022). X2001A: Connecticut Measure Life/EUL Update Study-Residential Measures. https://energizect.com/sites/default/files/2022-07/CT%20X2001A%20EUL%20Res%20Measure%20Report%20FINAL060522.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heat Pumps	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heat Pumps	0.00	0.00	0.00	1.00

TRC: $300000 / LI MF Bundled costs (see Participant listing)

Incentive: $300000 / LI MF Bundled costs (see Participant listing)

Heat Pumps - Oil

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Heat Pumps | **Measure Sub Type:** Heat Pump

Program: Income Eligible Multifamily

Measure Description

Full displacement of an existing inefficient propane or oil furnace with a high efficiency central ducted heat pump.

Baseline Description

The baseline is an existing inefficient furnace at 77.7% AFUE for a properly functioning unit and 83% AFUE when the customer would have installed a new furnace without program intervention.

BCR Measures

BCR Measure Name	Unique Identifier
Heat Pumps - Oil	2024 Electric Income Eligible Multifamily Heat Pumps - Oil

Savings Principle

The high efficiency case is a new 4.7 ton 16 SEER/9.5 HSPF ducted central heat pump.

Savings Method

Custom

Unit

Installation of a high efficiency central ducted heat pump

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heat Pumps - Oil	Calc	Calc	0.00	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heat Pumps - Oil	multi	1.00	1.00		1.00	1.00	1.00	-0.27	0.62

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heat Pumps - Oil	36.40%	48.20%	8.00%	7.40%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFwp Note: Consistent with MA TRM

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heat Pumps - Oil	0	0	847.67	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heat Pumps - Oil	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

HVAC, Custom

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Custom | **Measure Type:** HVAC | **Measure Sub Type:**

Program: Income Eligible Multifamily

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
HVAC, Custom	2024 Electric Income Eligible Multifamily HVAC, Custom

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
HVAC, Custom	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
HVAC, Custom	multi	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
HVAC, Custom	43.06%	56.94%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
HVAC, Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
HVAC, Custom	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

Insulation

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Building Shell | **Measure Type:** Insulation | **Measure Sub Type:**

Program: Income Eligible Multifamily

Measure Description

Shell insulation upgrades applied in existing facilities including improved insulation in attics, basements and sidewalls.

Baseline Description

The baseline efficiency case is any existing home shell measures.

BCR Measures

BCR Measure Name	Unique Identifier
Insulation - Elec with AC	2024 Electric Income Eligible Multifamily Insulation - Elec with AC
Insulation - Oil	2024 Electric Income Eligible Multifamily Insulation - Oil
Insulation - Other	2024 Electric Income Eligible Multifamily Insulation - Other

Savings Principle

The high efficiency case includes increased weatherization insulation levels.

Savings Method

Calculated using site-specific inputs

Unit

Completed insulation project.

Savings Equation

Gross kWh = SQFT × deltakWh/SQFT × (1/R_pre - 1/R_post)

Gross kW = Gross kWh × kW/kWh

Where:

SQFT = Square feet of insulation installed

deltakWh/SQFT = Average annual kWh reduction per SQFT of insulation

R_pre = R-Value of the existing insulation

R_post =R-Value of the new installed insulation

Gross kWh = Stories × SQFT × (CFM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM

kW/kWh = Average annual kW reduction per kWh reduction

Hours: 4644

Hours Source: NOAA Weather data: An average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Insulation - Elec with AC	Calc	Calc	0.00	0.00	0.00	0.00	0.00
Insulation - Oil						Calc	0.00
Insulation - Other							Calc

Electric kWh Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Electric kW Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Insulation	25	1.00	1.00		1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Insulation	6.60%	3.85%	47.32%	42.24%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Insulation	0	0	373.85	0.00	0.00	0.00	0.01	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Insulation	0.00	0.00	0.00	1.00

TRC: $230 / LI MF Bundled costs (see Participant listing)

Incentive: $230 / LI MF Bundled costs (see Participant listing)

LED Bulb

Sector: Income Eligible **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Lighting **Measure Type:** LED **Measure Sub Type:** LED Bulbs

Program: Income Eligible Multifamily

Measure Description

The installation of ENERGY STAR® LED bulbs.

Baseline Description

The baseline efficiency case is the existing installed bulb.

BCR Measures

BCR Measure Name	Unique Identifier
LED Bulbs	2024 Electric Income Eligible Multifamily LED Bulbs

Savings Principle

The high efficiency case is bulbs that use fewer watts.

Savings Method

Deemed

Unit

Installed bulb

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
LED Bulbs	33.3		0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
LED Bulb	1	1.00	1.00		1.00	1.00	1.00	0.55	0.85

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
LED Bulb	35.11%	30.72%	19.04%	15.12%

Measure Life Note: Based on MA EUL assumptions

ISR Source: Navigant (2018). Multi-Family Program Impact and Net-to-Gross Evaluation (RES 44). https://ma-eeac.org/wp-content/uploads/RES-44_Multi-family-Program-Impact-Evaluation_FINAL_SO-Rates-Updated.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
LED Bulb	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
LED Bulb	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

LED Fixture

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Lighting | **Measure Type:** LED Fixture | **Measure Sub Type:**

Program: Income Eligible Multifamily

Measure Description

The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.

Baseline Description

The baseline efficiency case is blend of incandescents, CFLs and other bulbs types, as provided by market research or for a home energy audit, the base line is a 65 Watt incandescent.

BCR Measures

BCR Measure Name	Unique Identifier
LED Fixture - Common Ext	2024 Electric Income Eligible Multifamily LED Fixture - Common Ext
LED Fixture - Common Int	2024 Electric Income Eligible Multifamily LED Fixture - Common Int
LED Fixture - Linear, Common Int	2024 Electric Income Eligible Multifamily LED Fixture - Linear, Common Int
LED Fixture - Dwelling Int	2024 Electric Income Eligible Multifamily LED Fixture - Dwelling Int
LED Fixture - Dwelling Ext	2024 Electric Income Eligible Multifamily LED Fixture - Dwelling Ext

Savings Principle

The high efficiency case is and ENERGY STAR® qualified LED fixture.

Savings Method

Calculated using site-specific inputs

Unit

Rebated lamp or fixture.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Hours Source: NMR Group,Inc. (2014). Northeast Residential Lighting Hours-of-Use Study. https://neep.org/sites/default/files/resources/Northeast-Residential-Lighting-Hours-of-Use-Study-Final-Report1.pdf

Hours Note: Multifamily common area hours are site specific. Multifamily dwelling unit hours defined by room type from NMR HOU study.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
LED Fixture - Common Ext	503.0	0.1258					
LED Fixture - Common Int	206.0	0.0515					
LED Fixture - Linear, Common Int	206.0	0.0515	0.00	0.00	0.00	0.00	0.00
LED Fixture - Dwelling Int	34.0	0.0850					
LED Fixture - Dwelling Ext	34.0	0.0850					

Electric kWh Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
LED Fixture	1	1.00	1.00		1.00	1.00	1.00	0.55	0.85

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
LED Fixture	35.11%	30.72%	19.04%	15.12%

Measure Life Note: Based on MA EUL assumptions

ISR Source: Navigant (2018). Multi-Family Program Impact and Net-to-Gross Evaluation (RES 44). https://ma-eeac.org/wp-content/uploads/RES-44_Multi-family-Program-Impact-Evaluation_FINAL_SO-Rates-Updated.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
LED Fixture	0	0	17.62	0.03	0.00	11.48	0.01	0.00

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

One-time $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
LED Fixture	0.00	0.00	0.00	1.00

TRC: Exterior - $330; Interior - $200

Incentive: Exterior - $330; Interior - $200

Participant (NEB)

Sector: Income Eligible **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Participant **Measure Type:** NEI **Measure Sub Type:** Low Income

Program: Income Eligible Multifamily

Measure Description

This row identifies a participant for tracking and cost purposes.

Baseline Description

N/A

BCR Measures

BCR Measure Name	Unique Identifier
Participant (NEB)	2024 Electric Income Eligible Multifamily Participant (NEB)

Savings Principle

N/A

Savings Method

N/A

Unit

N/A

Savings Equation

N/A

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Participant (NEB)			0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Participant (NEB)	5	1.00	1.00		1.00	1.00	1.00	0.77	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Participant (NEB)	34.00%	33.00%	16.00%	17.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Participant (NEB)	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Participant (NEB)	0.00	0.00	0.00	1.00

TRC: $840 / participant

Incentive: $840 / participant

Pipe Wrap DHW

Sector: Income Eligible **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Water Heating **Measure Type:** Insulation **Measure Sub Type:** Pipe Insulation

Program: Income Eligible Multifamily

Measure Description

Installation of insulation to reduce water heating energy.

Baseline Description

The baseline case is uninsulated heated water pipes.

BCR Measures

BCR Measure Name	Unique Identifier
Pipe Wrap DHW	2024 Electric Income Eligible Multifamily Pipe Wrap DHW
Pipe Wrap DHW - Elec	2024 Electric Income Eligible Multifamily Pipe Wrap DHW - Elec
Pipe Wrap DHW - Oil	2024 Electric Income Eligible Multifamily Pipe Wrap DHW - Oil
Pipe Wrap DHW Other	2024 Electric Income Eligible Multifamily Pipe Wrap DHW Other

Savings Principle

The high efficiency case is the installation of high-efficiency domestic hot water equipment such as low-flow showerheads and faucet aerators.

Savings Method

Deemed

Unit

Linear Foot

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Pipe Wrap DHW	24.9	0.0060	0.00	0.00	0.00		0.00
Pipe Wrap DHW - Elec	24.9	0.0060				0.00	0.00
Pipe Wrap DHW - Oil	0.0	0.0				0.15	0.00
Pipe Wrap DHW Other	0.0	0.0					0.15

Electric kWh Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Electric kW Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Oil MMBtu Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Propane MMBtu Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Pipe Wrap DHW	15	0.90	1.00		1.00	1.00	1.00	0.31	0.81

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Pipe Wrap DHW	41.52%	31.39%	15.22%	11.88%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

Measure Life Note: Massachusetts Common Assumption

ISR Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

RRsp Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

RRwp Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Pipe Wrap DHW	0	0	6.70	0.00	0.00	0.00	0.01	0.00

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Pipe Wrap DHW	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

Programmable Thermostat

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Thermostat

Program: Income Eligible Multifamily

Measure Description

Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.

Baseline Description

The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Programmable Thermostat - Elec with AC	2024 Electric Income Eligible Multifamily Programmable Thermostat - Elec with AC
Programmable Thermostat - Oil	2024 Electric Income Eligible Multifamily Programmable Thermostat - Oil

Savings Principle

The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.

Savings Method

Deemed

Unit

Installed thermostat

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Programmable Thermostat - Elec with AC	278.0	0.2085	0.00	0.00	0.00	0.00	0.00
Programmable Thermostat - Oil	29.0	0.0218				1.60	

Oil MMBtu Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Programmable Thermostat	19	0.95	1.00		1.00	1.00	1.00	0.33	0.22

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Programmable Thermostat	25.42%	30.57%	22.44%	21.58%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

RRsp Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

RRwp Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Programmable Thermostat	0	0	16.24	0.00	0.00	0.00	0.01	0.00

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Programmable Thermostat	0.00	0.00	0.00	1.00

TRC: $125 / LI MF Bundled costs (see Participant listing)

Incentive: $125 / LI MF Bundled costs (see Participant listing)

Reflector Lighting

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Lighting | **Measure Type:** Reflector | **Measure Sub Type:**

Program: Income Eligible Multifamily

Measure Description

The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.

Baseline Description

The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided by market research or for EISA exempt bulbs and bulbs installed through an home energy audit, the base line is a 65 Watt incandescent.

BCR Measures

BCR Measure Name	Unique Identifier
Reflector Lighting - Common Ext	2024 Electric Income Eligible Multifamily Reflector Lighting - Common Ext
Reflector Lighting - Common Int	2024 Electric Income Eligible Multifamily Reflector Lighting - Common Int
Reflector Lighting - Dwelling Ext	2024 Electric Income Eligible Multifamily Reflector Lighting - Dwelling Ext
Reflector Lighting - Dwelling Int	2024 Electric Income Eligible Multifamily Reflector Lighting - Dwelling Int

Savings Principle

The high efficiency case is and ENERGY STAR® qualified LED fixture.

Savings Method

Calculated using site-specific inputs

Unit

Rebated lamp or fixture.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Hours Source: NMR Group,Inc. (2014). Northeast Residential Lighting Hours-of-Use Study. https://neep.org/sites/default/files/resources/Northeast-Residential-Lighting-Hours-of-Use-Study-Final-Report1.pdf

Hours Note: Multifamily common area hours are site specific. Multifamily dwelling unit hours defined by room type from NMR HOU study.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Reflector Lighting - Common Ext	210.0	0.0525	0.00	0.00	0.00	0.00	0.00
Reflector Lighting - Common Int	140.0	0.0350					
Reflector Lighting - Dwelling Ext	19.0	0.0048					
Reflector Lighting - Dwelling Int	19.0	0.0048					

Electric kWh Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Reflector Lighting	1	1.00	1.00		1.00	1.00	1.00	0.55	0.85

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Reflector Lighting	35.11%	30.72%	19.04%	15.12%

Measure Life Note: Based on MA EUL assumptions

ISR Source: Navigant (2018). Multi-Family Program Impact and Net-to-Gross Evaluation (RES 44). https://ma-eeac.org/wp-content/uploads/RES-44_Multi-family-Program-Impact-Evaluation_FINAL_SO-Rates-Updated.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Reflector Lighting	0	0	17.62	0.03	0.00	10.98	0.01	0.00

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

One-time $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Reflector Lighting	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

Refrigerator

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Appliances | **Measure Type:** Refrigerators | **Measure Sub Type:** Refrigerator

Program: Income Eligible Multifamily

Measure Description

This measure covers the replacement of an existing inefficient refrigerator with a new ENERGY STAR® rated refrigerator. ENERGY STAR® qualified refrigerators use at least 20% less energy than non-qualified models.

Baseline Description

The baseline efficiency case is the existing refrigerator. It is assumed that low-income customers would otherwise replace their refrigerators with a used inefficient unit.

BCR Measures

BCR Measure Name	Unique Identifier
Refrigerator	2024 Electric Income Eligible Multifamily Refrigerator

Savings Principle

The high efficiency case is an ENERGY STAR® rated refrigerator that meets the ENERGY STAR® criteria for full-sized refrigerators (7.75 cubic feet), using at least 20% less energy than models meeting the minimum Federal government standard.

Savings Method

Calculated using deemed inputs

Unit

Installed high-efficiency refrigerator.

Savings Equation

delta kWh = ((kWhpre-kWhes) x (RUL/EUL)) + (((kWhstd+kWhused)/2 - kWhes) x ((EUL-RUL)/EUL)) x Focc

Where:

kWhpre = Annual kWh consumption of existing equipment. Value is based on metering or AHAM database. The default value is 874 kWh.

kWhES = Annual kWhconsumption of new ENERGY STAR qualified refrigerator or freezer. This is from the nameplate on the new unit. The default value is 358 kWh.

STD Average annual consumption of equipment meeting federal standard: Calculated by dividing the kWhES by 0.9 (i.e., the Energy Star units are assumed to be 10% more efficient than the kWhstd units). The default value is

398 kWh.

kWhused Average annual consumption of used equipment. Default value is 475 kWh.34

RUL = Remaining Useful life assumed to be 6 years

EUL = Estimated useful life for a new refrigerator is 12 years35

Focc = Occupant adjustment factor used to adjust the energy savings according to the number of occupants in the dwelling unit. See table below. Default is 2.3 occupants per tenant unit

ΔkWh = 330, using the default assumptions

Hours: 8760

Hours Note: The average annual operating hours are 8760 hours/year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Refrigerator	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Electric kW Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Refrigerator	12	1.00	1.00		1.00	1.00	1.00	0.79	0.65

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Refrigerator	29.00%	31.95%	18.18%	20.87%

Measure Life Source: Environmental Protection Agency (2018). Savings Calculator for Energy Star Qualified Appliances.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rates are 100% since savings estimates are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Refrigerator	0	0	0.00	0.00	0.00	0.00	0.01	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Refrigerator	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

Showerhead

Sector: Income Eligible

Fuel: Electric

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Showerhead

Program: Income Eligible Multifamily

Measure Description

Installation of a low flow showerhead with a flow rate of 1.5 GPM or less.

Baseline Description

The baseline efficiency case is a showerhead with a flow of 2.5 gpm. For home audit applications, the baseline is the existing showerhead.

BCR Measures

BCR Measure Name	Unique Identifier
Showerhead - Elec	2024 Electric Income Eligible Multifamily Showerhead - Elec
Showerhead - Oil	2024 Electric Income Eligible Multifamily Showerhead - Oil
Showerhead - Other	2024 Electric Income Eligible Multifamily Showerhead - Other

Savings Principle

The high efficiency is a low-flow showerhead with a flow of 1.5 gpm or less.

Savings Method

Deemed

Unit

Installed showerhead.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Showerhead - Elec	246.0	0.0590				0.00	0.00
Showerhead - Oil	0.0	0.0	0.00	0.00	0.00	1.40	0.00
Showerhead - Other	0.0	0.0				0.00	1.40

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Showerhead	15	0.90	1.00		1.00	1.00	1.00	0.31	0.81

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Showerhead, Elec	41.52%	31.39%	15.22%	11.88%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

Measure Life Note: National Grid assumption based on regional PA working groups.

ISR Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

RRsp Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

RRwp Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Showerhead	1786	1786	0.59	0.00	0.00	0.00	0.01	0.00

Water/Sewer Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Showerhead	0.00	0.00	0.00	1.00

TRC: $25 / LI MF Bundled costs (see Participant listing)

Incentive: $25 / LI MF Bundled costs (see Participant listing)

Smart Strips

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Plug Load | **Measure Type:** Smart Strips | **Measure Sub Type:** Smart Strip

Program: Income Eligible Multifamily

Measure Description

The basic measures switches off plug load using current sensors and switching devices which turn off plug load when electrical current drops below threshold low levels. The advanced measure shuts devices off after it no longer senses activity from their infrared controls.

Baseline Description

The baseline efficiency case is the absence power strip and leaving peripheral devices plugged in or using a power surge protector and leaving peripheral devices on

BCR Measures

BCR Measure Name	Unique Identifier
Smart Strips	2024 Electric Income Eligible Multifamily Smart Strips

Savings Principle

The high efficiency case is the use of a smart strip or advanced smart strip.

Savings Method

Deemed

Unit

Rebated smart strip.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: 8760

Hours Note: Since the power strip is assumed to be plugged in all year, the savings are based on 8,760 operational hours per year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Smart Strips	105.0	0.0189	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Smart Strips	5	0.84	1.00		0.92	0.92	0.92	0.58	0.86

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Smart Strips	32.24%	34.78%	15.36%	17.62%

Measure Life Note: Massachusetts Common Assumption

ISR Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

RRsp Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

RRwp Source: NMR (2018). RLPNC 17-3: Advanced Power Strip Metering Study. https://ma-eeac.org/wp-content/uploads/RLPNC_173_APSMeteringReport_Revised_18March2019.pdf

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Smart Strips	0	0	0.00	0.00	0.00	0.00	0.01	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Smart Strips	0.00	0.00	0.00	1.00

TRC: $23 / LI MF Bundled costs (see Participant listing)

Incentive: $23 / LI MF Bundled costs (see Participant listing)

Thermostatic Shut-off Valve

Sector: Income Eligible

Fuel: Electric

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Showerhead

Program: Income Eligible Multifamily

Measure Description

A showerhead with a control that limits flow once water is heated.

Baseline Description

The baseline efficiency case is a showerhead with a flow of 2.5 gpm. For home audit applications, the baseline is the existing showerhead.

BCR Measures

BCR Measure Name	Unique Identifier
Thermostatic Shut-off Valve	2024 Electric Income Eligible Multifamily Thermostatic Shut-off Valve

Savings Principle

The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.

Savings Method

Calc

Unit

Installed showerhead

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Thermostatic Shut-off Valve	69.0	0.0100	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: National Grid (2014). Review of ShowerStart evolve.

Electric kW Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Thermostatic Shut-off Valve	15	1.00	1.00		1.00	1.00	1.00	0.31	0.81

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Thermostatic Shut-off Valve	41.52%	31.39%	15.22%	11.88%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

Measure Life Note: National Grid assumption based on regional PA working groups.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

CFwp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Thermostatic Shut-off Valve	558	0	0.59	0.00	0.00	0.00	0.01	0.00

Water/Sewer Source: National Grid (2014). Review of ShowerStart evolve.

One-time $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Thermostatic Shut-off Valve	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

TSV Showerhead

Sector: Income Eligible

Fuel: Electric

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Showerhead

Program: Income Eligible Multifamily

Measure Description

A showerhead with a control that limits flow once water is heated.

Baseline Description

The baseline efficiency case is a showerhead with a flow of 2.5 gpm. For home audit applications, the baseline is the existing showerhead.

BCR Measures

BCR Measure Name	Unique Identifier
TSV Showerhead - Elec	2024 Electric Income Eligible Multifamily TSV Showerhead - Elec
TSV Showerhead - Oil	2024 Electric Income Eligible Multifamily TSV Showerhead - Oil
TSV Showerhead - Other	2024 Electric Income Eligible Multifamily TSV Showerhead - Other

Savings Principle

The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.

Savings Method

Deemed

Unit

Installed showerhead.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
TSV Showerhead - Elec	315.0	0.0756				0.00	0.00
TSV Showerhead - Oil	0.0	0.0	0.00	0.00	0.00	1.60	0.00
TSV Showerhead - Other	0.0	0.0				0.00	1.60

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
TSV Showerhead	15	0.90	1.00		1.00	1.00	1.00	0.31	0.81

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
TSV Showerhead - Elec	41.52%	31.39%	15.22%	11.88%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

RRsp Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

RRwp Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
TSV Showerhead	2130	0	0.59	0.00	0.00	0.00	0.01	0.00

Water/Sewer Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
TSV Showerhead	0.00	0.00	0.00	1.00

TRC: $40 / LI MF Bundled costs (see Participant listing)

Incentive: $40 / LI MF Bundled costs (see Participant listing)

Vending Miser

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Vending Miser | **Measure Type:** Vending Miser | **Measure Sub Type:** Vending Miser

Program: Income Eligible Multifamily

Measure Description

Controls significantly reduce the energy consumption of refrigerated beverage vending machine lighting and refrigeration systems by powering down these systems during periods of inactivity while maintaining a refrigerated product. This measure applies torefrigerated beverage vending machines and glass front refrigerated coolers. This measure does not apply to ENERGY STAR® qualified vending machines, as they already have built-in controls.

Baseline Description

The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, or glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

BCR Measures

BCR Measure Name	Unique Identifier
Vending Miser	2024 Electric Income Eligible Multifamily Vending Miser

Savings Principle

The high efficiency case is a standard efficiency refrigerated beverage vending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

Savings Method

Deemed

Unit

Installed vending miser.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: 8760

Hours Note: It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Vending Miser	1612.0		0.00	0.00	0.00	0.00	0.00

Electric kWh Source: USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Vending Miser	5	1.00	1.00		1.00	1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Vending Miser	32.00%	35.00%	16.00%	17.00%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

RRsp Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

RRwp Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Vending Miser	0	0	0.00	0.00	0.00	0.00	0.01	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Vending Miser	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

VFD

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Motors/Drives | **Measure Type:** Variable Speed Drive | **Measure Sub Type:** Motors/Drives

Program: Income Eligible Multifamily

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
VFD	2024 Electric Income Eligible Multifamily VFD

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calc

Unit

Installed VFD

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
VFD	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
VFD	multi	1.00	1.00		0.99	1.00	1.00	0.37	0.69

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
VFD	23.70%	27.20%	23.80%	25.30%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

RRsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

RRwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
VFD	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
VFD	0.00	0.00	0.00	1.00

TRC: $28000 / kWh

Incentive: $28000 / kWh

WiFi Thermostat

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Thermostat

Program: Income Eligible Multifamily

Measure Description

Installation of a wifi thermostat which gives the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.

Baseline Description

The baseline efficiency case is an HVAC system providing space heating without a WiFi thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
WiFi Thermostat	2024 Electric Income Eligible Multifamily WiFi Thermostat

Savings Principle

The high efficiency case is an HVAC system providing space heating with a WiFi thermostat installed.

Savings Method

Deemed

Unit

Installed thermostat

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Gross MMBtu_Oil = Qty × deltaMMBtu_Oil

Gross MMBtu_Propane = Qty× deltaMMBtu_Propane

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

deltaMMBtu_Oil = Average annual oil reduction per unit

deltaMMBtu_Propane = Average annual propane reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
WiFi Thermostat	64.0	0.1550	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
WiFi Thermostat	11	1.00	1.00		1.00			0.33	0.22

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
WiFi Thermostat	25.42%	30.56%	22.44%	21.58%

Measure Life Source: Southern California Edison (2017). Residential Smart Thermostat Workpaper (Work Paper SCE17HC054, Revision #0). https://www.peakload.org/assets/SCE17HC054.0_Residential_Sma.pdf

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
WiFi Thermostat	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
WiFi Thermostat	0.00	0.00	0.00	1.00

TRC: $0 / audit with multiple installed measures

Incentive: $0 / audit with multiple installed measures

Window

Sector: Income Eligible

Fuel: Electric

Program Type: Prescriptive

Measure Category: Building Shell

Measure Type: Windows

Measure Sub Type: Windows, electric resistance

Program: Income Eligible Multifamily

Measure Description

Early replacement of a single pane window either with or without a storm with a triple pane window.

Baseline Description

The baseline efficiency case is a single pane window with or without a storm.

BCR Measures

BCR Measure Name	Unique Identifier
Window -Electric Resistance	2024 Electric Income Eligible Multifamily Window -Electric Resistance
Window -Heat Pump	2024 Electric Income Eligible Multifamily Window -Heat Pump
Window -Oil	2024 Electric Income Eligible Multifamily Window -Oil
Window -Propane	2024 Electric Income Eligible Multifamily Window -Propane

Savings Principle

The high efficiency case is an Energy Star qualified triple pane window.

Savings Method

Deemed

Unit

Replacement of window with single pane either with or without a storm with a triple pane window.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Window -Electric Resistance	254.0	0.1300	0.00	0.00	0.00	0.00	0.00
Window -Heat Pump	127.0	0.0900				0.00	0.00
Window -Oil	7.0	0.0100				1.27	0.00
Window -Propane	7.0	0.0100				0.00	1.27

Electric kWh Note: Massachusetts Common Assumption

Electric kW Note: Massachusetts Common Assumption

Gas Heat MMBtu Note: Massachusetts Common Assumption

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Window -Electric Resistance	25	1.00	1.00		1.00	1.00	1.00	0.33	0.43
Window -Heat Pump								0.37	0.22
Window -Oil								0.37	0.00
Window -Propane								0.37	0.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Window -Electric Resistance	45.00%	44.00%	6.00%	5.00%
Window -Heat Pump	25.25%	29.29%	24.24%	21.21%
Window -Oil	3.96%	3.96%	49.50%	42.57%
Window -Propane	3.96%	3.96%	49.50%	42.57%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRsp Note: Massachusetts Common Assumption

RRwp Note: Massachusetts Common Assumption

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Window	0	0	6.81	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Window	0.00	0.00	0.00	1.00

NTG Note: Massachusetts Common Assumption

TRC: $0 / measure

Incentive: $0 / measure

Water Heating, Custom

Sector: Income Eligible | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Water Heating | **Measure Type:** Water Heater | **Measure Sub Type:** Water Heater

Program: Income Eligible Multifamily

Measure Description

Installation of high efficiency water heating equipment to replace the existing inefficient water heater.

Baseline Description

The baseline efficiency case is a stand-alone tank water heater.

BCR Measures

BCR Measure Name	Unique Identifier
Water Heating, Custom	2024 Electric Income Eligible Multifamily Water Heating, Custom

Savings Principle

The high efficiency case is a stand-alone storage water heater with an energy factor >= 0.66

Savings Method

Calc

Unit

Installed water heating system.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Water Heating, Custom	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Electric kWh Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Electric kW Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Water Heating, Custom	13	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Water Heating, Custom	0.00%	0.00%	0.00%	0.00%

Measure Life Source: DOE (2008). ENERGY STAR® Residential Water Heaters: Final Criteria Analysis. Prepared for the DOE; Page 10.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

CFsp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

CFwp Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Water Heating, Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2018, 2019). TXC 29 Market-Rate Rental Property NEI Study (Phase 1). TXC50 - LIMF Market Rate MF NEI - Phase I.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Water Heating, Custom	0.00	0.00	0.00	1.00

Boiler

Sector: Income Eligible | **Fuel:** Gas | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Heating System | **Measure Sub Type:** Boiler

Program: Income Eligible Single Family

Measure Description

The installation of high efficiency boiler.

Baseline Description

The baseline is an existing inefficient boiler.

BCR Measures

BCR Measure Name	Unique Identifier
Boiler	2024 Gas Income Eligible Single Family Boiler

Savings Principle

The high efficiency case is a high efficiency boiler.

Savings Method

Deemed

Unit

Installed Boiler.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Boiler	16.0		16.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Gas Heat MMBtu Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Boiler	23	1.00	1.00	1.00		1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Boiler	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Environmental Protection Agency (2009). Life Cycle Cost Estimate for ENERGY STAR Qualified Boiler.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Boiler	0	0	315.01	0.00	0.19	0.00	0.00	0.92

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

One-time $ Source: Additional Non-Energy Impacts for Low Income Programs (2012)

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Boiler	0.00	0.00	0.00	1.00

TRC: $6127 / measure

Incentive: $6127 / measure

Furnace

Sector: Income Eligible **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Heating System **Measure Sub Type:** Furnace

Program: Income Eligible Single Family

Measure Description

The installation of high efficiency furnace.

Baseline Description

The baseline is an existing inefficient furnace.

BCR Measures

BCR Measure Name	Unique Identifier
Furnace	2024 Gas Income Eligible Single Family Furnace

Savings Principle

The high efficiency case is a high efficiency furnace.

Savings Method

Deemed

Unit

Installed Furnace.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Furnace	16.0		16.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Gas Heat MMBtu Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Furnace	17	1.00	1.00	1.00		1.00	1.00		0.43

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Furnace	45.00%	55.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Furnace	0	0	315.01	0.00	0.19	0.00	0.00	0.92

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

One-time $ Source: Additional Non-Energy Impacts for Low Income Programs (2012)

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Furnace	0.00	0.00	0.00	1.00

TRC: $6127 / measure

Incentive: $6127 / measure

Participants

Sector: Income Eligible **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Participant **Measure Type:** Participant **Measure Sub Type:** Participant

Program: Income Eligible Single Family

Measure Description

This row identifies a participant for tracking and cost purposes.

Baseline Description

N/A

BCR Measures

BCR Measure Name	Unique Identifier
Participants	2024 Gas Income Eligible Single Family Participants

Savings Principle

N/A

Savings Method

N/A

Unit

N/A

Savings Equation

N/A

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Participants			0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Participants	5	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Participants	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Participants	0	0	9.48	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Participants	0.00	0.00	0.00	1.00

TRC: $0 / measure

Incentive: $0 / measure

Programmable Thermostat, Gas

Sector: Income Eligible | **Fuel:** Gas | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Thermostat

Program: Income Eligible Single Family

Measure Description

Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.

Baseline Description

The baseline efficiency case is an HVAC system without a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Programmable Thermostat, Gas	2024 Gas Income Eligible Single Family Programmable Thermostat, Gas

Savings Principle

The high efficiency case is an HVAC system that has a programmable thermostat installed.

Savings Method

Deemed

Unit

Installation of programmable thermostat

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Programmable Thermostat, Gas	27.0	0.0400	27.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Gas Heat MMBtu Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Programmable Thermostat, Gas	19	1.00	1.00	1.00	1.00	1.00	1.00	0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Programmable Thermostat, Gas	6.59%	3.85%	47.32%	42.24%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Guidehouse (2020). Massachusetts Residential Baseline Study. https://ma-eeac.org/wp-content/uploads/RES-1-Residential-Baseline-Study-Ph4-Comprehensive-Report-2020-04-02.pdf

CFwp Source: Guidehouse (2020). Massachusetts Residential Baseline Study. https://ma-eeac.org/wp-content/uploads/RES-1-Residential-Baseline-Study-Ph4-Comprehensive-Report-2020-04-02.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Programmable Thermostat, Gas	0	0	45.13	0.00	0.19	0.00	0.00	0.92

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

One-time $ Source: Additional Non-Energy Impacts for Low Income Programs (2012)

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Programmable Thermostat, Gas	0.00	0.00	0.00	1.00

TRC: $85 / measure

Incentive: $85 / measure

Triple Pane Windows

Sector: Income Eligible | **Fuel:** Gas | **Program Type:** Prescriptive

Measure Category: Building Shell | **Measure Type:** Windows | **Measure Sub Type:** Windows, triple pane

Program: Income Eligible Single Family

Measure Description

Early replacement of a single pane window either with or without a storm with a triple pane window.

Baseline Description

The baseline efficiency case is a single pane window with or without a storm.

BCR Measures

BCR Measure Name	Unique Identifier
Triple Pane Windows	2024 Gas Income Eligible Single Family Triple Pane Windows

Savings Principle

The high efficiency case is an Energy Star qualified triple pane window.

Savings Method

Deemed

Unit

Replacement of window with single pane either with or without a storm with a triple pane window.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Triple Pane Windows	7.0	0.0100	7.00	0.00	0.00	0.00	0.00

Electric kWh Note: Massachusetts Common Assumption

Electric kW Note: Massachusetts Common Assumption

Gas Heat MMBtu Note: Massachusetts Common Assumption

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Triple Pane Windows	25	1.00	1.00	1.00	1.00	1.00	1.00	0.37	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Triple Pane Windows	3.96%	3.96%	49.50%	42.57%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRsp Note: Massachusetts Common Assumption

RRwp Note: Massachusetts Common Assumption

CFsp Source: Guidehouse (2020). Massachusetts Residential Baseline Study. https://ma-eeac.org/wp-content/uploads/RES-1-Residential-Baseline-Study-Ph4-Comprehensive-Report-2020-04-02.pdf

CFwp Source: Guidehouse (2020). Massachusetts Residential Baseline Study. https://ma-eeac.org/wp-content/uploads/RES-1-Residential-Baseline-Study-Ph4-Comprehensive-Report-2020-04-02.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Triple Pane Windows	0	0	6.81	0.00	0.00	0.00	0.00	0.00

One-time $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Triple Pane Windows	0.00	0.00	0.00	1.00

NTG Note: Massachusetts Common Assumption

TRC: $0 / measure

Incentive: $0 / measure

Weatherization

Sector: Income Eligible | **Fuel:** Gas | **Program Type:** Prescriptive

Measure Category: Building Shell | **Measure Type:** Insulation & Air sealing | **Measure Sub Type:** Weatherization

Program: Income Eligible Single Family

Measure Description

Installation of weatherization measures such as air sealing and insulation in gas heated homes. Electric savings are achieved from reduced run time of the HVAC system fan(s).

Baseline Description

The baseline efficiency case is the existing home shell.

BCR Measures

BCR Measure Name	Unique Identifier
Weatherization	2024 Gas Income Eligible Single Family Weatherization

Savings Principle

The high efficiency case can be a combination of increased insulation, air sealing, duct sealing, and other improvements to the home shell.

Savings Method

Deemed

Unit

Household with weatherization measures installed

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Weatherization	93.0	0.0700	93.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Gas Heat MMBtu Source: Cadeo (2018). Rhode Island Income Eligible Services Single Family Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/04/ng-ri-ies-impact-evaluation-report_final_30aug2018.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Weatherization	20	1.00	1.00	1.00	1.00	1.00	1.00	0.34	0.21

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Weatherization	25.35%	29.86%	23.07%	21.72%

Measure Life Source: Guidehouse (2018). ComEd Effective Useful Life Research Report. https://www.icc.illinois.gov/docket/P2017-0312/documents/287811/files/501915.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Weatherization	0	0	565.74	0.00	0.19	0.00	0.00	0.92

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

One-time $ Source: Additional Non-Energy Impacts for Low Income Programs (2012)

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Weatherization	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $6127 / job

Incentive: $6127 / job

Wi-Fi Thermostat, Gas

Sector: Income Eligible | **Fuel:** Gas | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** WiFi T-stat

Program: Income Eligible Single Family

Measure Description

A communicating thermostat which allows remote set point adjustment and control via remote application. System requires an outdoor air temperature algorithm in the control logic to operate heating and cooling systems Primary Energy Impact: Natural Gas

Baseline Description

The baseline efficiency case is an HVAC system without a wifi thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Wi-Fi Thermostat, Gas	2024 Gas Income Eligible Single Family Wi-Fi Thermostat, Gas

Savings Principle

The high efficiency case is an HVAC system that has a wifi thermostat installed.

Savings Method

Deemed

Unit

Installation of WiFi programmable thermostat

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Wi-Fi Thermostat, Gas	20.0	0.0300	20.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo/Illume (2020). 2017-2018 Impact Evaluation of EnergyWise Single Family Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Electric kW Source: Navigant Consulting (2018). Baseline Loadshape Study

Gas Heat MMBtu Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Wi-Fi Thermostat, Gas	11	1.00	1.00	1.00	1.00	1.00	1.00	0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Wi-Fi Thermostat, Gas	6.59%	3.85%	47.32%	42.24%

Measure Life Source: Southern California Edison (2017). Residential Smart Thermostat Workpaper (Work Paper SCE17HC054, Revision #0). https://www.peakload.org/assets/SCE17HC054.0_Residential_Sma.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Guidehouse (2020). Massachusetts Residential Baseline Study. https://ma-eeac.org/wp-content/uploads/RES-1-Residential-Baseline-Study-Ph4-Comprehensive-Report-2020-04-02.pdf

CFwp Source: Guidehouse (2020). Massachusetts Residential Baseline Study. https://ma-eeac.org/wp-content/uploads/RES-1-Residential-Baseline-Study-Ph4-Comprehensive-Report-2020-04-02.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Wi-Fi Thermostat, Gas	0	0	45.13	0.00	0.19	0.00	0.00	0.92

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

One-time $ Source: Additional Non-Energy Impacts for Low Income Programs (2012)

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Wi-Fi Thermostat, Gas	0.00	0.00	0.00	1.00

TRC: $265 / participant

Incentive: $265 / participant

Air Sealing

Sector: Income Eligible

Fuel: Gas

Program Type: Custom

Measure Category: Building Shell

Measure Type: Air Sealing

Measure Sub Type: Air Sealing/Infiltration

Program: Income Eligible Multifamily

Measure Description

Thermal shell air leaks are sealed through strategic use and location of air-tight materials.

Baseline Description

The baseline efficiency case is the existing building before the air sealing measure is implemented. The baseline building is characterized by the existing CFM50 measurement (CFM50PRE) for single family homes, or the existing air changes per hour (ACHPRE)

BCR Measures

BCR Measure Name	Unique Identifier
Air Sealing	2024 Gas Income Eligible Multifamily Air Sealing

Savings Principle

The high efficiency case is the existing building after the air sealing measure is implemented. The high efficiency building is characterized by the new CFM50 measurement for single family homes (CFM50POST), or the new air changes per hour (ACHPOST) for multi-family facilities, which is measured after the air sealing measure is implemented.

Savings Method

Calculated using site-specific inputs

Unit

Completed air sealing project.

Savings Equation

Gross MMBtu Gas = (CFM50_pre - CFM50_post) / LBL × HDD × (Hours per Day) × (Minutes per Hour) × (Btu/ft3-°F) × CorrectionFactor / SeasonalEff / (Btu per MMBtu)

Where:

CFM50_pre = CFM50 measurement before air sealing

CFM50_post = CFM50 measurement after air sealing (cu.ft./min)

LBL = LBL factor - This factor is determined as the product of the N-factor and a Height Correction Factor according to BPI Protocol

4644 HDD = Heating degree days (deg. F-day); This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data. http://www.ncdc.noaa.gov

24 Hours per Day = Conversion factor

60 Minutes per Hour = Conversion factor

0.018 Btu/ft3-°F = Heat capacity of 1 cubic foot of air at 70 °F

1 CorrectionFactor = Correction factor determined by auditor (e.g. for seasonal homes): Default

0.7 SeasonalEff = Heating system seasonal efficiency factor determined by auditor for homes heated with natural gas: Default

1,000,000 Btuper MMBtu = Conversion factor

Hours: 4644

Hours Source: NOAA Weather data: An average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.

Hours Note: Heating hours are characterized by the heating degree days for the facility, 4644.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Air Sealing				0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Air Sealing	multi	1.00	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Air Sealing	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Air Sealing	0	0	0.00	0.00	0.19	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

One-time $ Source: Additional Non-Energy Impacts for Low Income Programs (2012)

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Air Sealing	0.00	0.00	0.00	1.00

TRC: $785 / LI MF Bundled costs (see Participant listing)

Incentive: $785 / LI MF Bundled costs (see Participant listing)

CONTROLS_LI

Sector: Income Eligible | **Fuel:** Gas | **Program Type:** Custom

Measure Category: Custom | **Measure Type:** HVAC | **Measure Sub Type:** Controls

Program: Income Eligible Multifamily

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
CONTROLS_LI	2024 Gas Income Eligible Multifamily CONTROLS_LI

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CONTROLS_LI	Calc		0.00	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
CONTROLS_LI	multi	1.00	1.00	1.00		1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
CONTROLS_LI	0.00%	0.00%	0.00%	0.00%

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
CONTROLS_LI	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
CONTROLS_LI	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

Custom

Sector: Income Eligible **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Custom **Measure Sub Type:** Custom

Program: Income Eligible Multifamily

Measure Description

Vendors install a variety of measures at multifamily facilities. Measures include

Baseline Description

For retrofit projects, the baseline efficiency case is the same as the existing, or pre-retrofit, case for the

BCR Measures

BCR Measure Name	Unique Identifier
Custom	2024 Gas Income Eligible Multifamily Custom

Savings Principle

The high efficiency scenario is specific to the facility and may include one or more energy efficiency

Savings Method

Calc

Unit

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom		Calc	0.00	0.00	Calc	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom	multi	1.00	1.00	0.99	0.99				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom	0	0	0.00	0.00	0.19	0.00	0.00	0.00

One-time $ Source: Additional Non-Energy Impacts for Low Income Programs (2012)

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom	0.00	0.00	0.00	1.00

TRC: $15900 / LI MF Bundled costs (see Participant listing)

Incentive: $15900 / LI MF Bundled costs (see Participant listing)

Demand Circulator

Sector: Income Eligible

Fuel: Gas

Program Type: Custom

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Demand Circulator

Program: Income Eligible Multifamily

Measure Description

Installation of a demand controller on a re-circulation loop.

Baseline Description

Full time operation of re-circ pump.

BCR Measures

BCR Measure Name	Unique Identifier
Demand Circulator	2024 Gas Income Eligible Multifamily Demand Circulator

Savings Principle

The re-circulation pump is controlled by a demand signal or timer to reduce operating hours when no hot water usage occurs.

Savings Method

Calc

Unit

Installed recirc controller

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Demand Circulator				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Demand Circulator	multi	1.00	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Demand Circulator	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Demand Circulator	0	0	0.00	0.00	0.19	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

One-time $ Source: Additional Non-Energy Impacts for Low Income Programs (2012)

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Demand Circulator	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

Duct Insulation_LI

Sector: Income Eligible **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Envelope **Measure Type:** Ducting **Measure Sub Type:** Duct Insulation

Program: Income Eligible Multifamily

Measure Description

For existing ductwork in non-conditioned spaces, insulate ductwork.

Baseline Description

The baseline efficiency case is existing, un-insulated ductwork in unconditioned spaces (e.g. attic or basement).

BCR Measures

BCR Measure Name	Unique Identifier
Duct Insulation_LI	2024 Gas Income Eligible Multifamily Duct Insulation_LI

Savings Principle

The high efficiency condition is insulated ductwork in unconditioned spaces.

Savings Method

Deemed

Unit

Completed duct insulation job.

Savings Equation

MMBTUannual = (((1/Rexist)-(1/Rnew)) x HDD x 24 x Area) / (1,000,000) X Nheat

kWhannual = MMBtuannaul x 293.1

kW = kWhannual x kW/kWhNheating

Where:

Rexist = Existing effective R-value (R-ExistingInsulation + R-Assembly), ft2-°F/Btuh

Rnew = New total effective R-value (R-ProposedMeasure + R-ExistingInsulation + R-Assembly), ft2-°F/Btuh

Area = Square footage of insulated area

ηheat = Efficiency of the heating system (AFUE or COP)

293.1 = Conversion constant (1MMBtu = 293.1 kWh)

24 = Conversion for hours per day

HDD = Heating Degree Days; dependent on location, see table below

1,000,000 = Conversion from Btu to MMBtu

kW/kWh heating = Average annual kW reduction per kWh reduction: 0.00050 kW/kWh

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Duct Insulation_LI				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Duct Insulation_LI	25	1.00	1.00	1.00		1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Duct Insulation_LI	0.00%	0.00%	0.00%	0.00%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Duct Insulation_LI	0	0	0.00	0.00	0.00	0.00	0.00	0.00

One-time $ Source: Additional Non-Energy Impacts for Low Income Programs (2012)

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Duct Insulation_LI	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

Duct Sealing

Sector: Income Eligible | **Fuel:** Gas | **Program Type:** Custom

Measure Category: HVAC | **Measure Type:** Ducting | **Measure Sub Type:** Duct Sealing

Program: Income Eligible Multifamily

Measure Description

Ducts are sealed by reconnecting disconnected duct joints and sealing gaps or seams with mastic and fiber-mesh tape as appropriate

Baseline Description

The baseline efficiency case is the existing facility or equipment prior to the implementation of duct sealing.

BCR Measures

BCR Measure Name	Unique Identifier
Duct Sealing	2024 Gas Income Eligible Multifamily Duct Sealing

Savings Principle

The baseline efficiency case is the existing facility or equipment after the implementation of duct sealing.

Savings Method

Calc

Unit

Savings Equation

MMBtu = Annualheatingconsumption x %SAVE x (1/1000000)

Where:

AnnualHeatingConsumption = The total annual heating consumption for the facility (Btu)

%SAVE = Average reduction in energy consumption.

1/1,000,000 = Conversion from Btu to MMBtu

Savings Factors for Multifamily Duct Sealing

Measure Type %SAVE158

Savings Factors for Multifamily Duct Sealing

Surface Area < 50 SQFT 7%

Surface Area > 50 SQFT and < 200 SQFT 3%

Surface Area > 200 SQFT 1%

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Duct Sealing			0.00	0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Duct Sealing	multi	1.00	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Duct Sealing	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Duct Sealing	0	0	0.00	0.00	0.19	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

One-time $ Source: Additional Non-Energy Impacts for Low Income Programs (2012)

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Duct Sealing	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

Faucet aerator

Sector: Income Eligible **Fuel:** Gas **Program Type:** Custom

Measure Category: Water Heating **Measure Type:** Flow Control **Measure Sub Type:** Faucet Aerator

Program: Income Eligible Multifamily

Measure Description

Installation of a faucet aerator with a flow rate of 1.5 GPM or less on an existing faucet with high flow.

Baseline Description

The baseline efficiency case is an existing faucet with a high flow.

BCR Measures

BCR Measure Name	Unique Identifier
Faucet aerator	2024 Gas Income Eligible Multifamily Faucet aerator

Savings Principle

The high efficiency is a low-flow faucet aerator.

Savings Method

Deemed

Unit

Installed faucet aerator.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Faucet aerator			0.00	0.00	0.00	0.00	0.00

Gas DHW MMBtu Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Faucet aerator	multi	0.90	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Faucet aerator	0.00%	0.00%	0.00%	0.00%

ISR Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Faucet aerator	359	0	0.00	0.00	0.19	0.00	0.00	0.00

Water/Sewer Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

One-time $ Source: Additional Non-Energy Impacts for Low Income Programs (2012)

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Faucet aerator	0.00	0.00	0.00	1.00

TRC: $5 / LI MF Bundled costs (see Participant listing)

Incentive: $5 / LI MF Bundled costs (see Participant listing)

HEATING _Custom_LI

Sector: Income Eligible **Fuel:** Gas **Program Type:** Custom

Measure Category: HVAC **Measure Type:** Heating System **Measure Sub Type:** Heating

Program: Income Eligible Multifamily

Measure Description

Installation of high efficiency heating equipment to replace existing inefficient furnace, hydronic boiler or steam boiler.

Baseline Description

The baseline efficiency case is the existing inefficient heating system.

BCR Measures

BCR Measure Name	Unique Identifier
HEATING _Custom_LI	2024 Gas Income Eligible Multifamily HEATING _Custom_LI

Savings Principle

The high efficiency case is characterized by the rated efficiency (AFUEEE) of the new high efficiency furnace or boiler.

Savings Method

Calc

Unit

Installed heating system.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
HEATING _Custom_LI	Calc		Calc	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
HEATING _Custom_LI	multi	1.00	1.00	1.00		1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
HEATING _Custom_LI	0.00%	0.00%	0.00%	0.00%

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
HEATING _Custom_LI	0	0	0.00	0.00	0.19	0.00	0.00	0.92

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

One-time $ Source: Additional Non-Energy Impacts for Low Income Programs (2012)

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
HEATING _Custom_LI	0.00	0.00	0.00	1.00

TRC: $135000 / LI MF Bundled costs (see Participant listing)

Incentive: $135000 / LI MF Bundled costs (see Participant listing)

Heating System Retrofit

Sector: Income Eligible

Fuel: Gas

Program Type: Custom

Measure Category: HVAC

Measure Type: Heating System

Measure Sub Type: Retrofit Heating System

Program: Income Eligible Multifamily

Measure Description

Installation of high efficiency heating equipment to replace the existing inefficient furnace, hydronic boiler or steam boiler.

Baseline Description

The baseline efficiency is determined based on the type of heating equipment installed. For boilers it is 75% AFUE and for furnaces it is 78% AFUE..

BCR Measures

BCR Measure Name	Unique Identifier
Heating System Retrofit, Boiler Heating System Retrofit, Commercial Boiler Heating System Retrofit, Furnace	2024 Gas Income Eligible Multifamily Heating System Retrofit, Boiler 2024 Gas Income Eligible Multifamily Heating System Retrofit, Commercial Boiler 2024 Gas Income Eligible Multifamily Heating System Retrofit, Furnace

Savings Principle

The high efficiency case is characterized by the rated efficiency (AFUEEE) of the new high efficiency furnace or boiler.

Savings Method

Calc

Unit

Heating system

Savings Equation

Delta MMBtu = (Btu/hr) x ((1/AFUEbase)-(1/AFUEee)) X EFLHheat x (1/1000000)

Where:

Btu/hr = Nominal heating capacity of the installed equipment (Btu/hr)

AFUEBASE = Average fuel utilization efficiency of the existing equipment (%)

AFUEEE = Average fuel utilization efficiency of the efficient equipment (%)

EFLHHeat = Equivalent full load heating hours for the facility (Hr)

1/1,000,000 = Conversion from Btu to MMBtu

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heating System Retrofit, Boiler Heating System Retrofit, Commercial Boiler Heating System Retrofit, Furnace				0.00	0.00	0.00	0.00

Gas DHW MMBtu Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heating System Retrofit	multi	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heating System Retrofit	0.00%	0.00%	0.00%	0.00%

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heating System Retrofit	0	0	810.01	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heating System Retrofit	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

HEATPUMP_LI

Sector: Income Eligible **Fuel:** Gas **Program Type:** Custom

Measure Category: HVAC **Measure Type:** Heat Pumps **Measure Sub Type:** Heat Pump

Program: Income Eligible Multifamily

Measure Description

Installation of a heat pump to displace electric, oil, or propane heat.

Baseline Description

The baseline efficiency case is existing site conditions.

BCR Measures

BCR Measure Name	Unique Identifier
HEATPUMP_LI	2024 Gas Income Eligible Multifamily HEATPUMP_LI

Savings Principle

The high efficiency case varies depending on the equipment installed.

Savings Method

Calc

Unit

Installed heat pump.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
HEATPUMP_LI	Calc		Calc	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
HEATPUMP_LI	multi	1.00	1.00	1.00		1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
HEATPUMP_LI	36.40%	48.20%	8.00%	7.40%

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
HEATPUMP_LI	0	0	810.01	0.00	0.19	0.00	0.00	0.92

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

One-time $ Source: Additional Non-Energy Impacts for Low Income Programs (2012)

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
HEATPUMP_LI	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

Hot Water - Custom

Sector: Income Eligible

Fuel: Gas

Program Type: Custom

Measure Category: Water Heating

Measure Type: Water Heater

Measure Sub Type: Efficient Water Heater

Program: Income Eligible Multifamily

Measure Description

Installation of high efficiency water heating equipment to replace the existing inefficient water heater.

Baseline Description

The baseline efficiency case is a stand-alone tank water heater with an energy factor of 0.575.

BCR Measures

BCR Measure Name	Unique Identifier
Hot Water - Custom	2024 Gas Income Eligible Multifamily Hot Water - Custom

Savings Principle

The high efficiency case includes the new efficient water heater with an Energy Factor > 0.60.

Savings Method

Calc

Unit

Installed water heating system.

Savings Equation

Delta MMBtu = Units x (18 MMBTu/Units) x ((1/EFbase) - (1/EFee)

Unit = Total number of dwelling units utilizing the water heater

18 MMBtu/Unit = Average annual water heating energy demand per dwelling unit401

EFBASE = Energy Factor for the baseline waterheater

EFEE = Energy Factor for the new efficient water heater

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Hot Water - Custom	Calc		Calc	0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Hot Water - Custom	multi	1.00	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Hot Water - Custom	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Hot Water - Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Hot Water - Custom	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

Low Flow Showerhead

Sector: Income Eligible

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Showerhead

Program: Income Eligible Multifamily

Measure Description

The installation of a low flow showerhead with a flow rate of 1.5 GPM or less. The installation of TSV is a control that limits flow once water is heated.

Baseline Description

The baseline efficiency case is a showerhead with a flow of 2.5 gpm. For home audit applications, the baseline is the existing showerhead. For the case of the adapter, a low flow showerhead with flow of 1.5 gpm or less.

BCR Measures

BCR Measure Name	Unique Identifier
Low Flow Showerhead - Showerhead	2024 Gas Income Eligible Multifamily Low Flow Showerhead - Showerhead
Low Flow Showerhead - Showerhead w/ TSV	2024 Gas Income Eligible Multifamily Low Flow Showerhead - Showerhead w/ TSV

Savings Principle

The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.

Savings Method

Deemed

Unit

Installed low-flow showerhead

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Low Flow Showerhead - Showerhead Low Flow Showerhead - Showerhead w/ TSV				0.00	0.00	0.00	0.00

Gas DHW MMBtu Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Low Flow Showerhead	15	0.90	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Low Flow Showerhead	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Low Flow Showerhead	0	0	0.00	0.00	0.19	0.00	0.00	0.92

Water/Sewer Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Low Flow Showerhead	0.00	0.00	0.00	1.00

TRC: $25 / LI MF Bundled costs (see Participant listing)

Incentive: $25 / LI MF Bundled costs (see Participant listing)

Participant

Sector: Income Eligible **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Participant **Measure Type:** Participant **Measure Sub Type:** Participant

Program: Income Eligible Multifamily

Measure Description

This row identifies a participant for tracking and cost purposes.

Baseline Description

BCR Measures

BCR Measure Name	Unique Identifier
Participant	2024 Gas Income Eligible Multifamily Participant

Savings Principle

Savings Method

Unit

Savings Equation

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Participant				0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Participant	1	1.00	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Participant	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Participant	0	0	9.48	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Participant	0.00	0.00	0.00	1.00

TRC: $0 / participant

Incentive: $0 / participant

Pipe Wrap (Water Heating)

Sector: Income Eligible **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Water Heating **Measure Type:** Insulation **Measure Sub Type:** Pipe Insulation

Program: Income Eligible Multifamily

Measure Description

Installation of DHW pipe wraps

Baseline Description

The baseline efficiency case is the existing hot water equipment.

BCR Measures

BCR Measure Name	Unique Identifier
Pipe Wrap (Water Heating)	2024 Gas Income Eligible Multifamily Pipe Wrap (Water Heating)

Savings Principle

The high efficiency case includes pipe wrap.

Savings Method

Deemed

Unit

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Pipe Wrap (Water Heating)			0.00	0.15	0.00	0.00	0.00

Gas DHW MMBtu Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Gas DHW MMBtu Note: 3 feet per piece

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Pipe Wrap (Water Heating)	15	0.90	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Pipe Wrap (Water Heating)	0.00%	0.00%	0.00%	0.00%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Pipe Wrap (Water Heating)	0	0	6.70	0.00	0.19	0.00	0.00	0.92

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

One-time $ Source: Additional Non-Energy Impacts for Low Income Programs (2012)

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Pipe Wrap (Water Heating)	0.00	0.00	0.00	1.00

TRC: $3 / LI MF Bundled costs (see Participant listing)

Incentive: $3 / LI MF Bundled costs (see Participant listing)

Programmable thermostat

Sector: Income Eligible | **Fuel:** Gas | **Program Type:** Custom

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Thermostat

Program: Income Eligible Multifamily

Measure Description

Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.

Baseline Description

For the installation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the installation of a wi-fi programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Programmable thermostat	2024 Gas Income Eligible Multifamily Programmable thermostat

Savings Principle

The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed.

Savings Method

Deemed

Unit

Installation of programmable thermostat

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Programmable thermostat	29.0	0.0461	29.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Electric kW Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Gas Heat MMBtu Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Programmable thermostat	19	0.95	1.00	1.00	1.00			0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Programmable thermostat	6.59%	3.85%	47.32%	42.24%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Programmable thermostat	0	0	0.00	0.00	0.19	0.00	0.00	0.92

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

One-time $ Source: Additional Non-Energy Impacts for Low Income Programs (2012)

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Programmable thermostat	0.00	0.00	0.00	1.00

TRC: $125 / LI MF Bundled costs (see Participant listing)

Incentive: $125 / LI MF Bundled costs (see Participant listing)

Insulation

Sector: Income Eligible | **Fuel:** Gas | **Program Type:** Custom

Measure Category: Building Shell | **Measure Type:** Insulation | **Measure Sub Type:** Shell

Program: Income Eligible Multifamily

Measure Description

Insulation upgrades are applied in existing multifamily facilities.

Baseline Description

The baseline efficiency case is characterized by the total R-value of the existing attic, basement or sidewall (Rexisit). This is calculated as the R-value of the existing insulation, estimated by the program contractor, plus the R-value of the ceiling, floor, or wall (for all projects: RCEILING = 3.36; RFLOOR = 6.16; RWALL = 6.65)

BCR Measures

BCR Measure Name	Unique Identifier
Insulation	2024 Gas Income Eligible Multifamily Insulation

Savings Principle

The high efficiency case is characterized by the total R-value of the attic after the installation of additional attic, basement or sidewall insulation. This is calculated as the sum of the existing R-value (RBASE) plus the R-value of the added insulation(RADD).

Savings Method

Calculated using site-specific inputs

Unit

Completed insulation project.

Savings Equation

MMBTUannual = (((1/Rexist)-(1/Rnew)) x HDD x 24 x Area) / (1,000,000) X Nheat

kWhannual = MMBtuannaul x 293.1

kW = kWhannual x kW/kWhNheating

Where:

Rexist = Existing effective R-value (R-ExistingInsulation + R-Assembly), ft2-°F/Btuh

Rnew = New total effective R-value (R-ProposedMeasure + R-ExistingInsulation + R-Assembly), ft2-°F/Btuh

Area = Square footage of insulated area

ηheat = Efficiency of the heating system (AFUE or COP)

293.1 = Conversion constant (1MMBtu = 293.1 kWh)

24 = Conversion for hours per day

HDD = Heating Degree Days; dependent on location, see table below

1,000,000 = Conversion from Btu to MMBtu

kW/kWh heating = Average annual kW reduction per kWh reduction: 0.00050 kW/kWh

Hours: 4644

Hours Source: NOAA Weather data: An average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.

Hours Note: Heating hours are characterized by the heating degree days for the facility, 4644.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Insulation			0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Insulation	25	1.00	1.00	1.00	1.00			0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Insulation	6.59%	3.85%	47.32%	42.24%

Measure Life Source: The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Insulation	0	0	373.85	0.00	0.19	0.00	0.00	0.92

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

One-time $ Source: Additional Non-Energy Impacts for Low Income Programs (2012)

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Insulation	0.00	0.00	0.00	1.00

TRC: $325 / LI MF Bundled costs (see Participant listing)

Incentive: $325 / LI MF Bundled costs (see Participant listing)

Triple Pane Windows

Sector: Income Eligible | **Fuel:** Gas | **Program Type:** Prescriptive

Measure Category: Building Shell | **Measure Type:** Windows | **Measure Sub Type:** Windows, triple pane

Program: Income Eligible Multifamily

Measure Description

Early replacement of a single pane window either with or without a storm with a triple pane window.

Baseline Description

The baseline efficiency case is a single pane window with or without a storm.

BCR Measures

BCR Measure Name	Unique Identifier
Triple Pane Windows	2024 Gas Income Eligible Multifamily Triple Pane Windows

Savings Principle

The high efficiency case is an Energy Star qualified triple pane window.

Savings Method

Deemed

Unit

Replacement of window with single pane either with or without a storm with a triple pane window.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Triple Pane Windows	7.0	0.0100	7.00	0.00	0.00	0.00	0.00

Electric kWh Note: Massachusetts Common Assumption

Electric kW Note: Massachusetts Common Assumption

Gas Heat MMBtu Note: Massachusetts Common Assumption

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Triple Pane Windows	25	1.00	1.00	1.00	1.00	1.00	1.00	0.37	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Triple Pane Windows	3.96%	3.96%	49.50%	42.57%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRsp Note: Massachusetts Common Assumption

RRwp Note: Massachusetts Common Assumption

CFsp Source: Guidehouse (2020). Massachusetts Residential Baseline Study. https://ma-eeac.org/wp-content/uploads/RES-1-Residential-Baseline-Study-Ph4-Comprehensive-Report-2020-04-02.pdf

CFwp Source: Guidehouse (2020). Massachusetts Residential Baseline Study. https://ma-eeac.org/wp-content/uploads/RES-1-Residential-Baseline-Study-Ph4-Comprehensive-Report-2020-04-02.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Triple Pane Windows	0	0	6.81	0.00	0.00	0.00	0.00	0.00

One-time $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Triple Pane Windows	0.00	0.00	0.00	1.00

NTG Note: Massachusetts Common Assumption

TRC: $0 / measure

Incentive: $0 / measure

VFD_LI

Sector: Income Eligible | **Fuel:** Gas | **Program Type:** Custom

Measure Category: Motors/Drives | **Measure Type:** Variable Speed Drive | **Measure Sub Type:** Motors/Drives

Program: Income Eligible Multifamily

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
VFD_LI	2024 Gas Income Eligible Multifamily VFD_LI

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calc

Unit

Installed VFD

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
VFD_LI	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
VFD_LI	multi	1.00	1.00	0.99					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
VFD_LI	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2022). Impact Evaluations of PY2020 Custom Gas Installations in Rhode Island. http://rieermc.ri.gov/wp-content/uploads/2023/01/rhode-island-energy-py2020-custom-gas-program-report_final.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
VFD_LI	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
VFD_LI	0.00	0.00	0.00	1.00

TRC: $0 / Gross therm

Incentive: $0 / Gross therm

Wi-Fi Thermostat (controls gas heat only)

Sector: Income Eligible | **Fuel:** Gas | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** Controls | **Measure Sub Type:** Thermostat

Program: Income Eligible Multifamily

Measure Description

A communicating thermostat which allows remote set point adjustment and control via remote application. System requires an outdoor air temperature algorithm in the control logic to operate heating and cooling systems Primary Energy Impact: Natural Gas

Baseline Description

The baseline efficiency case is an HVAC system with either a manual or a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Wi-Fi Thermostat (controls gas heat only)	2024 Gas Income Eligible Multifamily Wi-Fi Thermostat (controls gas heat only)

Savings Principle

The high efficiency case is an HVAC system that has a Wi-Fi thermostat installed.

Savings Method

Deemed

Unit

Installation of WiFi programmable thermostat

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Wi-Fi Thermostat (controls gas heat only)	31.0	0.0493	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Electric kW Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Gas Heat MMBtu Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Wi-Fi Thermostat (controls gas heat only)	11	0.95	1.00	1.00	1.00			0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Wi-Fi Thermostat (controls gas heat only)	6.59%	3.85%	47.32%	42.24%

Measure Life Source: Southern California Edison (2017). Residential Smart Thermostat Workpaper (Work Paper SCE17HC054, Revision #0). https://www.peakload.org/assets/SCE17HC054.0_Residential_Sma.pdf

ISR Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Wi-Fi Thermostat (controls gas heat only)	0	0	13.53	0.00	0.19	0.00	0.00	0.92

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

One-time $ Source: Additional Non-Energy Impacts for Low Income Programs (2012)

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Wi-Fi Thermostat (controls gas heat only)	0.00	0.00	0.00	1.00

TRC: $0 / LI MF Bundled costs (see Participant listing)

Incentive: $0 / LI MF Bundled costs (see Participant listing)

Advanced Building

Sector: C&I

Fuel: Electric

Program Type: Custom

Measure Category: Custom

Measure Type: Advanced Building

Measure Sub Type: Advanced Building

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Advanced Building	2024 Electric Large C&I New Construction Advanced Building

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Advanced Building	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Advanced Building	multi	1.00	1.00	0.47	0.47	0.49	0.25	0.49	0.07

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Advanced Building	31.29%	35.38%	15.64%	17.69%

Measure Life Note: Assume 1/3 of measure life

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2019). Rhode Island Commercial and Industrial Impact Evaluation of 2013-2015 Custom CDA Installations. http://rieermc.ri.gov/wp-content/uploads/2019/05/ri_cda_programreport_final.pdf

RRsp Source: DNV GL (2019). Rhode Island Commercial and Industrial Impact Evaluation of 2013-2015 Custom CDA Installations. http://rieermc.ri.gov/wp-content/uploads/2019/05/ri_cda_programreport_final.pdf

RRwp Source: DNV GL (2019). Rhode Island Commercial and Industrial Impact Evaluation of 2013-2015 Custom CDA Installations. http://rieermc.ri.gov/wp-content/uploads/2019/05/ri_cda_programreport_final.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Advanced Building	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Advanced Building	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.69 / kWh

Incentive: $0.45 / kWh

Air Cooled AC

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** AC **Measure Sub Type:** Air cooled

Program: Large C&I New Construction

Measure Description

This measure applies to the installation of high-efficiency single package or split system air source, water source, ground source (closed loop) and groundwater source (open loop) heat pump systems for space conditioning applications.

Baseline Description

Appendix A details the specific efficiency requirements by equipment type.

BCR Measures

BCR Measure Name	Unique Identifier
Air Cooled AC - 5.4-11.25 T	2024 Electric Large C&I New Construction Air Cooled AC - 5.4-11.25 T
Air Cooled AC - 11.25-20 T	2024 Electric Large C&I New Construction Air Cooled AC - 11.25-20 T
Air Cooled AC - 20-63 T	2024 Electric Large C&I New Construction Air Cooled AC - 20-63 T
Air Cooled AC - over 63 T	2024 Electric Large C&I New Construction Air Cooled AC - over 63 T

Savings Principle

The high efficiency case assumes the HVAC equipment exceeds the requirements of the current version of International Energy Conservation Code (IECC) as mandated by Rhode Island State Building Code.

Savings Method

Calculated using site-specific inputs

Unit

Installed unitary AC system for space cooling.

Savings Equation

Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) × Hours_C

Gross kW = Tons × (kBtu/hr per ton) × (1/EER_base - 1/EER_ee)

Where:

Tons = Rated cooling capacity of the installed equipment: site-specific.

12 kBtu/hr per ton = Conversion factor

SEER_base = Seasonal Energy Efficiency Ratio of the baseline equipment: code

SEER_ee = Seasonal energy efficiency ratio of the high-efficiency unit: site-specific.

Hours_C = Equivalent full load cooling hours

EER_ee = Energy Efficiency Ratio of the new efficient equipment: site-specific. For equipment < 5.4 tons, assume the following conversion: EER≈SEER/1.1

EER_base = Energy Efficiency Ratio of baseline equipment: code. Since IECC 2012 does not provide EER requirements for equipment < 5.4 tons, assume the following conversion: EER ≈ SEER/1.1

Hours: N/A

Hours Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Hours Note: If site-specific data is unavailable, the average cooling EFLHs are taken as 855 hours while the average heating EFLHs are taken as 1137 hours.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Air Cooled AC - 5.4-11.25 T Air Cooled AC - 11.25-20 T Air Cooled AC - 20-63 T Air Cooled AC - over 63 T	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Air Cooled AC	15	1.00	1.00		1.00	1.00	1.00	0.40	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Air Cooled AC	8.60%	4.60%	52.70%	34.10%

Measure Life Source: California Public Utilities Commission (2014). Energy Division, DEER EUL Table Update.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

RRsp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

RRwp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

CFsp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

CFwp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Air Cooled AC	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Air Cooled AC	0.47	0.00	0.00	0.53

NTG Source: DNV GL, NMR, Tetra Tech (2018). Massachusetts Commercial and Industrial Upstream HVAC/Heat Pump and Hot Water NTG and Market Effects Indicator Study. https://ma-eeac.org/wp-content/uploads/TXC_35_Report_5Sep2018_FINAL.pdf

TRC: $0.30 / kWh

Incentive: $0.25 / kWh

AirCChiller

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** AC **Measure Sub Type:** Chiller

Program: Large C&I New Construction

Measure Description

This measure promotes the installation of efficient air-cooled water chilling packages for comfort cooling applications. Eligible chillers include air-cooled chillers for single chiller systems or for the lead chiller only in multi-chiller systems.

Baseline Description

The baseline efficiency case for new installations assumes compliance with the current version of International Energy Conservation Code (IECC) as mandated by Rhode Island State Building Code. Appendix A, Table 9 details the specific efficiency requirements by equipment type.

BCR Measures

BCR Measure Name	Unique Identifier
AirCChiller - IPLV	2024 Electric Large C&I New Construction AirCChiller - IPLV
AirCChiller - Peak	2024 Electric Large C&I New Construction AirCChiller - Peak
AirCChiller - 150to300T	2024 Electric Large C&I New Construction AirCChiller - 150to300T
AirCChiller - to150T	2024 Electric Large C&I New Construction AirCChiller - to150T

Savings Principle

The high efficiency case assumes the HVAC equipment exceeds the requirements of the current version of International Energy Conservation Code (IECC) as mandated by Rhode Island State Building Code.

Savings Method

Calculated using site-specific inputs

Unit

Installed high-efficiency chiller for space cooling.

Savings Equation

Gross kWh = Tons × 12 × (1/EER_base - 1/EER_ee) × Hours_C

Gross kW = Tons × 12 × (1/EER_base - 1/EER_ee) × LF

Where:

Tons = Rated cooling capacity of the installed equipment: site-specific.

EER_base = Energy Efficiency Ratio of baseline equipment: code

Reference Table 9

EER_ee = Energy Efficiency Ratio of the efficient equipment: site-specific.

Hours_C = Equivalent full load cooling hours

Reference Table 10

LF = Load Factor

12 = Conversion factor: 12 kBtu/hr per ton.

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis; in the absence of site specific information, 1,328 hours can be used as a default.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
AirCChiller - IPLV AirCChiller - Peak AirCChiller - 150to300T AirCChiller - to150T	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Algorithm inputs are based on engineering estimates of cooling hours and 2012 International Code Council (2012).

Electric kW Note: Algorithm inputs are based on engineering estimates of cooling hours and 2012 International Code Council (2012).

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
AirCChiller	23	1.00	1.00		1.07	1.00	1.00	0.42	0.08

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
AirCChiller	11.30%	10.80%	39.40%	38.50%

Measure Life Source: Guidehouse (2018). ComEd Effective Useful Life Research Report.
https://www.icc.illinois.gov/docket/P2017-0312/documents/287811/files/501915.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA (2016). Impact Evaluation of 2012 National Grid-Rhode Island Prescriptive Chiller Program.
http://rieermc.ri.gov/wp-content/uploads/2017/08/20160722_py2012_ri_prescriptive_chiller_report_final.pdf

RRsp Note: RRsp & RRwp are set to 1.00 because evaluation results set coincidence factor.

RRwp Note: RRsp & RRwp are set to 1.00 because evaluation results set coincidence factor.

CFsp Source: KEMA (2016). Impact Evaluation of 2012 National Grid-Rhode Island Prescriptive Chiller Program.
http://rieermc.ri.gov/wp-content/uploads/2017/08/20160722_py2012_ri_prescriptive_chiller_report_final.pdf

CFwp Source: KEMA (2016). Impact Evaluation of 2012 National Grid-Rhode Island Prescriptive Chiller Program.
http://rieermc.ri.gov/wp-content/uploads/2017/08/20160722_py2012_ri_prescriptive_chiller_report_final.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
AirCChiller	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
AirCChiller	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.40 / kWh

Incentive: $0.26 / kWh

AirHP

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Heat Pump **Measure Sub Type:** Air Source

Program: Large C&I New Construction

Measure Description

This measure applies to the installation of high-efficiency single package or split system air source, water source, ground source (closed loop) and groundwater source (open loop) heat pump systems for space conditioning applications.

Baseline Description

The baseline efficiency case for new installations assumes compliance with the current version of International Energy Conservation Code (IECC) as mandated by Rhode Island State Building Code. Appendix A details the specific efficiency requirements by equipment type.

BCR Measures

BCR Measure Name	Unique Identifier
AirHP - Pkg to5.4T	2024 Electric Large C&I New Construction AirHP - Pkg to5.4T
AirHP - 5.4-11.25T	2024 Electric Large C&I New Construction AirHP - 5.4-11.25T
AirHP - 11.25-20T	2024 Electric Large C&I New Construction AirHP - 11.25-20T
AirHP - over20T	2024 Electric Large C&I New Construction AirHP - over20T

Savings Principle

The high efficiency case assumes the HVAC equipment exceeds the requirements of the current version of International Energy Conservation Code (IECC) as mandated by Rhode Island State Building Code.

Savings Method

Calculated using site-specific inputs

Unit

Installed heat pump system for space cooling and heating.

Savings Equation

Gross kWh = Tons × (kBtu/hr per ton) × [(1/SEER_base - 1/SEER_ee) × Hours_C + CR × (1/HSPF_base - 1/HSPF_ee) × Hours_H]

Gross kW = Tons × (kBtu/hr per ton) × (1/EER_base - 1/EER_ee)

Where:

Tons = Rated cooling capacity of the installed equipment: site-specific.

12 kBtu/hr per ton = Conversion factor

SEER_base = Seasonal Energy Efficiency Ratio of the baseline equipment: code

SEER_ee = Seasonal energy efficiency ratio of the high-efficiency unit: site-specific.

Hours_C = Equivalent full load cooling hours

HSPF_base = Heating Seasonal Performance Factor for baseline equipment: code

HSPF_ee = Heating Seasonal Performance Factor for new efficient equipment: site-specific.

Hours_H = Equivalent full load heating hours

CR = Capacity Ratio converts rated coolingcapacity to heating capacity. For equipment with cooling capacity ≤ 5.4 tons, assume CR=1. For equipment > 5.4 tons, assume CR=1.15; Optimal Energy, Inc. (2008). Memo:Non-Electric enefits Analysis Update. Prepared for Dave Weber, NSTAR.

EER_base = EnergyEfficiency Ratio of baseline equipment.

EER_ee = Energy Efficiency Ratio of the new efficient equipment: site-specific. For equipment < 5.4 tons, assume the following conversion: EER≈SEER/1.1

Hours: N/A

Hours Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Hours Note: If site-specific data is unavailable, the average cooling EFLHs are taken as 855 hours while the average heating EFLHs are taken as 1137 hours.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
AirHP - Pkg to5.4T AirHP - 5.4-11.25T AirHP - 11.25-20T AirHP - over20T	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Algorithm inputs are based on engineering estimates of cooling hours and 2012 International Code Council (2012).

Electric kW Note: Algorithm Inputs based on UI and CL&P Program Savings Documentation for 2011 Program Year, Section 2.2.2 C&I LO Cooling - Unitary AC & Heat Pumps

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
AirHP	12	1.00	1.00		1.05	1.00	1.00	0.40	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
AirHP	8.60%	4.60%	52.70%	34.10%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.

RRsp Source: The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.

RRwp Source: The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.

CFsp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

CFwp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
AirHP	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
AirHP	0.45	0.00	0.00	0.55

NTG Source: DNV (2021). MA C&I Upstream HVAC & Gas Water Heating NTG Study (MA20X08-B-CIHVACNTG). https://ma-eeac.org/wp-content/uploads/MA20X08-B-CIHVACNTG_Final_Report_Clean_9.10.pdf

TRC: <=5.4T - $0.62/kWh; 5.4-11.25T - $0.23/kWh; 11.25T-20T - $0.19/kWh

Incentive: <=5.4T - $0.4/kWh; 5.4-11.25T - $0.15/kWh; 11.25T-20T - $0.13/kWh

Boiler, Draft Fan

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I New Construction

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Boiler, Draft Fan	2024 Electric Large C&I New Construction Boiler, Draft Fan

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Boiler, Draft Fan	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Boiler, Draft Fan	15	1.00	1.00		0.94	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Boiler, Draft Fan	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

RRsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

RRwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Boiler, Draft Fan	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Boiler, Draft Fan	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.48 / kWh

Incentive: $0.31 / kWh

Boiler, Feedwater Pump

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I New Construction

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Boiler, Feedwater Pump	2024 Electric Large C&I New Construction Boiler, Feedwater Pump

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Boiler, Feedwater Pump	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Boiler, Feedwater Pump	15	1.00	1.00		0.94	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Boiler, Feedwater Pump	23.70%	27.20%	23.80%	25.30%

Measure Life Source: California Public Utilities Commission (CPUC), Energy Division (2008). EUL_Summary_10-1-08.xls.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

RRsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

RRwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Boiler, Feedwater Pump	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Boiler, Feedwater Pump	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.48 / kWh

Incentive: $0.31 / kWh

Building Exhaust Fan

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I New Construction

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Building Exhaust Fan	2024 Electric Large C&I New Construction Building Exhaust Fan

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Building Exhaust Fan	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Building Exhaust Fan	15	1.00	1.00		0.94	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Building Exhaust Fan	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

RRsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

RRwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Building Exhaust Fan	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Building Exhaust Fan	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.48 / kWh

Incentive: $0.31 / kWh

Building Shell

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** BLD SHELL **Measure Sub Type:** BLD SHELL

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Building Shell	2024 Electric Large C&I New Construction Building Shell

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Building Shell	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Building Shell	5,10,15,20, 25	1.00	1.00	0.89	0.89	0.74	1.05	0.71	0.86

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Building Shell	0.00%	0.00%	50.00%	50.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Building Shell	Calc	Calc	0.00	0.04	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Building Shell	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.77 / kWh

Incentive: $0.5 / kWh

Chiller

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** CHILLER **Measure Sub Type:** CHILLER

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Chiller	2024 Electric Large C&I New Construction Chiller

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Chiller	Calc	Calc	0.00	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Chiller	multi	1.00	1.00		0.89	0.74	1.05	0.69	0.54

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Chiller	45.82%	20.85%	22.90%	10.43%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Chiller	Calc	Calc	0.00	0.02	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Chiller	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.81 / kWh

Incentive: $0.53 / kWh

Chiller, Water Pump

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I New Construction

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Chiller, Water Pump	2024 Electric Large C&I New Construction Chiller, Water Pump

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Chiller, Water Pump	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Chiller, Water Pump	15	1.00	1.00		0.94	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Chiller, Water Pump	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

RRsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

RRwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Chiller, Water Pump	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Chiller, Water Pump	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.48 / kWh

Incentive: $0.31 / kWh

CHP

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** CHP **Measure Sub Type:** CHP

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
CHP	2024 Electric Large C&I New Construction CHP

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CHP	Calc	Calc	0.00	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
CHP	15,20,25	1.00	1.00		1.00	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
CHP	0.00%	0.00%	50.00%	50.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
CHP	Calc	Calc	0.00	-0.01	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
CHP	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

CODES AND STANDARDS

Sector: C&I

Fuel: Electric

Program Type: Custom

Measure Category: Codes and Standards

Measure Type: Codes and Standards

Measure Sub Type: Codes and Standards

Program: Large C&I New Construction

Measure Description

Energy efficiency code trainings and advocacy work to improve energy efficiency of buildings and equipment within Rhode Island.

Baseline Description

Un-influenced adoption curve of federal minimum codes and standards.

BCR Measures

BCR Measure Name	Unique Identifier
CODES AND STANDARDS	2024 Electric Large C&I New Construction CODES AND STANDARDS

Savings Principle

Accelerated adoption of advancing energy codes and equipment standards.

Savings Method

Calculated based on attribution study

Unit

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CODES AND STANDARDS	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR (2017). Rhode Island Code Compliance Enhancement Initiative Attribution and Savings Study. http://rieermc.ri.gov/wp-content/uploads/2018/03/ri-ccei-attribution-and-savings-final-report-12-12-17-clean.pdf

Gas Heat MMBtu Source: NMR (2017). Rhode Island Code Compliance Enhancement Initiative Attribution and Savings Study. http://rieermc.ri.gov/wp-content/uploads/2018/03/ri-ccei-attribution-and-savings-final-report-12-12-17-clean.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
CODES AND STANDARDS	20	1.00	1.00		1.00	0.91	0.76		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
CODES AND STANDARDS	37.11%	29.56%	18.55%	14.78%

Measure Life Note: Massachusetts Common Assumption

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
CODES AND STANDARDS	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
CODES AND STANDARDS	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $0 / kWh

Incentive: $0 / kWh

Commercial Electric Combination Oven

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Food Service **Measure Type:** Cooking Equipment **Measure Sub Type:** Oven

Program: Large C&I New Construction

Measure Description

Installation of a qualified ENERGY STAR® commercial oven. ENERGY STAR® commercial ovens save energy during preheat, cooking and idle times due to improved cooking efficiency, and preheat and idle energy rates.

Baseline Description

The weighted baseline efficiency case for a combination oven is a commercial combination oven with a cooking energy efficiency of 74% with a production capacity of 100 pounds per hour for oven mode and 53% steam cooking energy efficiency, with a production capacity of 150 pounds per hour for steam mode. Idle energy is assumed to be 2.47 kW for oven mode and 5.0 kW for steam mode.

BCR Measures

BCR Measure Name	Unique Identifier
Commercial Electric Combination Oven	2024 Electric Large C&I New Construction Commercial Electric Combination Oven

Savings Principle

The high efficiency case for a combination oven is a commercial combination oven with a cooking energy efficiency of 78% with a production capacity of 119 pounds per hour for oven mode, and 63% cooking energy efficiency with a production capacity of 177 pounds per hour for steam mode, and idle energy rate of 1.3 kW for convection mode and 1.5 kW for steam mode.

Savings Method

Deemed

Unit

Installed high-efficiency commercial electric oven.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Commercial Electric Combination Oven	8870.0	2.0300	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: DNV (2023). Kitchen Equipment ISP Study.

Electric kW Source: DNV (2023). Kitchen Equipment ISP Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Commercial Electric Combination Oven	12	1.00	1.00		1.00	1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Commercial Electric Combination Oven	32.00%	35.00%	16.00%	17.00%

Measure Life Source: FTSC Research (2009), Energy Star Commercial Kitchen Calculator, Oven Calcs, https://www.energystar.gov/sites/default/files/asset/document/commercial_kitchen_equipment_calculator.xlsx

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

RRsp Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

RRwp Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFsp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Commercial Electric Combination Oven	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Commercial Electric Combination Oven	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.28 / kWh

Incentive: $0.18 / kWh

Commercial Electric Convection Oven

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Food Service **Measure Type:** Cooking Equipment **Measure Sub Type:** Oven

Program: Large C&I New Construction

Measure Description

Installation of a qualified ENERGY STAR® commercial oven. ENERGY STAR® commercial ovens save energy during preheat, cooking and idle times due to improved cooking efficiency, and preheat and idle energy rates.

Baseline Description

The weighted baseline efficiency case is a convection oven with a cooking energy efficiency of 70%, production capacity of 90 pounds per hour, and idle energy rate of 1.66 kW.

BCR Measures

BCR Measure Name	Unique Identifier
Commercial Electric Convection Oven	2024 Electric Large C&I New Construction Commercial Electric Convection Oven

Savings Principle

The high efficiency case is a convection oven with a cooking energy efficiency of 76%, production capacity of 90 pounds per hour, and idle energy rate of 1.3 kW.

Savings Method

Deemed

Unit

Installed high-efficiency commercial electric oven.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Commercial Electric Convection Oven	1796.0	0.4100	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: DNV (2023). Kitchen Equipment ISP Study.

Electric kW Source: DNV (2023). Kitchen Equipment ISP Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Commercial Electric Convection Oven	12	1.00	1.00		1.00	1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Commercial Electric Convection Oven	32.00%	35.00%	16.00%	17.00%

Measure Life Source: CEEL (2016). Ultra-Low Temperature Freezers: Opening the Door to Energy Savings in Laboratories.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

RRsp Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

RRwp Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFsp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Commercial Electric Convection Oven	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Commercial Electric Convection Oven	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.36 / kWh

Incentive: $0.23 / kWh

Commercial Electric Fryer - Large

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Food Service **Measure Type:** Cooking Equipment **Measure Sub Type:** Fryer

Program: Large C&I New Construction

Measure Description

Installation of a qualified ENERGY STAR® commercial fryer, which saves energy during preheating, cooking, and idling.

Baseline Description

The weighted baseline efficiency case is a deep-fat fryer with a cooking efficiency of 79%, a shortening capacity of up to 100 pounds, and an idle energy rate of 1.11 kW.

BCR Measures

BCR Measure Name	Unique Identifier
Commercial Electric Fryer - Large	2024 Electric Large C&I New Construction Commercial Electric Fryer - Large

Savings Principle

The high efficiency case is a deep-fat fryer with a cooking energy efficiency of 86%, a shortening capacity of over 70 pounds, and an idle energy rate of 0.75 kW.

Savings Method

Deemed

Unit

Installed high-efficiency electric fryer.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: 3756

Hours Note: Fryers are assumed to operate 313 days per year, or 6 days per week, based on a MA common assumption.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Commercial Electric Fryer - Large	2438.0	0.4600	0.00	0.00	0.00	0.00	0.00

Electric kW Source: DNV (2023). Kitchen Equipment ISP Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Commercial Electric Fryer - Large	12	1.00	1.00		1.00	1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Commercial Electric Fryer - Large	32.00%	35.00%	16.00%	17.00%

Measure Life Source: Environmental Protection Agency (2009). Life Cycle Cost Estimate for ENERGY STAR Qualified Gas Fryer.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: All PAs use 100% savings persistence factors.

RRe Note: Realization rate is assumed to be 100%

RRsp Note: Realization rate is assumed to be 100%

RRwp Note: Realization rate is assumed to be 100%

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFsp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Commercial Electric Fryer - Large	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Commercial Electric Fryer - Large	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.15 / kWh

Incentive: $0.10 / kWh

Commercial Electric Fryer - Standard

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Food Service **Measure Type:** Cooking Equipment **Measure Sub Type:** Fryer

Program: Large C&I New Construction

Measure Description

Installation of a qualified ENERGY STAR® commercial fryer, which saves energy during preheating, cooking, and idling.

Baseline Description

The weighted baseline efficiency case is a deep-fat fryer with a cooking efficiency of 79%, a shortening capacity of up to 65 pounds, and an idle energy rate of 1.02 kW.

BCR Measures

BCR Measure Name	Unique Identifier
Commercial Electric Fryer - Standard	2024 Electric Large C&I New Construction Commercial Electric Fryer - Standard

Savings Principle

The high efficiency case is a deep-fat fryer with a cooking energy efficiency of 86%, a shortening capacity of up to 70 pounds, and an idle energy rate of 0.75 kW.

Savings Method

Deemed

Unit

Installed high-efficiency electric fryer.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: 3756

Hours Note: Fryers are assumed to operate 313 days per year, or 6 days per week, based on a MA common assumption.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Commercial Electric Fryer - Standard	2017.0	0.4600	0.00	0.00	0.00	0.00	0.00

Electric kW Source: DNV (2023). Kitchen Equipment ISP Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Commercial Electric Fryer - Standard	12	1.00	1.00		1.00	1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Commercial Electric Fryer - Standard	32.00%	35.00%	16.00%	17.00%

Measure Life Source: Environmental Protection Agency (2009). Life Cycle Cost Estimate for ENERGY STAR Qualified Gas Fryer.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: All PAs use 100% savings persistence factors.

RRe Note: Realization rate is assumed to be 100%

RRsp Note: Realization rate is assumed to be 100%

RRwp Note: Realization rate is assumed to be 100%

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFsp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Commercial Electric Fryer - Standard	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Commercial Electric Fryer - Standard	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.14 / kWh

Incentive: $0.10 / kWh

Commercial Electric Griddle

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Food Service **Measure Type:** Cooking Equipment **Measure Sub Type:** Griddle

Program: Large C&I New Construction

Measure Description

Installation of a qualified ENERGY STAR® griddle. ENERGY STAR® griddles save energy during preheat, cooking and idle times due to improved cooking efficiency, and preheat and idle energy rates.

Baseline Description

The baseline efficiency case is a typically sized, 6 sq. ft. commercial griddle with a cooking energy efficiency of 65%, production capacity of 35 pounds per hour, and idle energy rate of 400 W/sq. ft.

BCR Measures

BCR Measure Name	Unique Identifier
Commercial Electric Griddle	2024 Electric Large C&I New Construction Commercial Electric Griddle

Savings Principle

The high efficiency case is a typically sized, 6 sq. ft. commercial griddle with a cooking energy efficiency of 75%, production capacity of 49.2 pounds per hour, and idle energy rate of 293 W/sq. ft.

Savings Method

Deemed

Unit

Installed high-efficiency commercial electric griddle.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: 3756

Hours Source: Technical Assessment of Commercial Ovens <http://www.fishnick.com/equipment/techassessment/7_ovens.pdf>, pg.23

Hours Note: Griddles are assumed to operate 313 days per year. Combination ovens are assumed to operate 12 hours a day, or 3756 hours per year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Commercial Electric Griddle	3965.0	0.9000	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Electric kW Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Commercial Electric Griddle	12	1.00	1.00		1.00	1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Commercial Electric Griddle	32.00%	35.00%	16.00%	17.00%

Measure Life Source: Food Service Technology Center (2011). Electric Griddle Life-Cycle Cost Calculator. Accessed on 10/12/2011.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

RRsp Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

RRwp Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFsp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Commercial Electric Griddle	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Commercial Electric Griddle	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.48 / kWh

Incentive: $0.31 / kWh

Commercial electric steamer

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Food Service **Measure Type:** Cooking Equipment **Measure Sub Type:** Steamer

Program: Large C&I New Construction

Measure Description

Installation of a qualified ENERGY STAR® commercial steam cooker. ENERGY STAR® steam cookers save energy during cooling and idle times due to improved cooking efficiency and idle energy rates.

Baseline Description

The Baseline Efficiency case is an electric steam cooker with a cooking efficiency of 50%, pan production capacity of 70.0 pounds per hour, preheat energy of 1.5 kWh, and idle energy rate of 0.4-0.8 kW

BCR Measures

BCR Measure Name	Unique Identifier
Commercial electric steamer	2024 Electric Large C&I New Construction Commercial electric steamer

Savings Principle

The High Efficiency case is an ENERGY STAR® electric steam cooker with a cooking energy efficiency of 68%, pan production capacity of 88.0 pounds per hour, preheat energy of 1.5 kWh, and an idle energy rate of 0.26 kW.

Savings Method

Deemed

Unit

Installed high-efficiency commercial electric steamer.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Commercial electric steamer	3082.0	1.0700	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: DNV (2023). Kitchen Equipment ISP Study.

Electric kW Source: DNV (2023). Kitchen Equipment ISP Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Commercial electric steamer	12	1.00	1.00		1.00	1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Commercial electric steamer	32.00%	35.00%	16.00%	17.00%

Measure Life Source: Environmental Protection Agency (2011). Savings Calculator for ENERGY Star Qualified Commercial Kitchen Equipment: Steam Cooker Calcs. Accessed on 10/12/2011.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

RRsp Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

RRwp Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFsp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Commercial electric steamer	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Commercial electric steamer	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.12 / kWh

Incentive: $0.08 / kWh

Commercial Refrigeration

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Refrigeration **Measure Sub Type:** REFRG COMM

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Commercial Refrigeration	2024 Electric Large C&I New Construction Commercial Refrigeration

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Commercial Refrigeration	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Commercial Refrigeration	multi	1.00	1.00	0.89	0.89	0.74	1.05	0.92	0.84

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Commercial Refrigeration	22.60%	27.30%	23.30%	26.80%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Commercial Refrigeration	Calc	Calc	0.00	0.01	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Commercial Refrigeration	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.71 / kWh

Incentive: $0.46 / kWh

Comprehensive Design

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** COMP DESIGN **Measure Sub Type:** COMP DESIGN

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Comprehensive Design	2024 Electric Large C&I New Construction Comprehensive Design

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Comprehensive Design	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Comprehensive Design	multi	1.00	1.00	0.47	0.47	0.49	0.25	0.49	0.07

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Comprehensive Design	31.29%	35.38%	15.64%	17.69%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2019). Rhode Island Commercial and Industrial Impact Evaluation of 2013-2015 Custom CDA Installations. http://rieermc.ri.gov/wp-content/uploads/2019/05/ri_cda_programreport_final.pdf

RRsp Source: DNV GL (2019). Rhode Island Commercial and Industrial Impact Evaluation of 2013-2015 Custom CDA Installations. http://rieermc.ri.gov/wp-content/uploads/2019/05/ri_cda_programreport_final.pdf

RRwp Source: DNV GL (2019). Rhode Island Commercial and Industrial Impact Evaluation of 2013-2015 Custom CDA Installations. http://rieermc.ri.gov/wp-content/uploads/2019/05/ri_cda_programreport_final.pdf

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Comprehensive Design	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Comprehensive Design	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.68 / kWh

Incentive: $0.44 / kWh

Compressed Air

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** COMP AIR **Measure Sub Type:** COMP AIR

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Compressed Air	2024 Electric Large C&I New Construction Compressed Air

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Compressed Air	Calc	Calc	0.00	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Compressed Air	15	1.00	1.00		0.89	0.74	1.05	1.00	0.84

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Compressed Air	41.75%	24.92%	20.87%	12.46%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Compressed Air	Calc	Calc	0.00	0.03	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Compressed Air	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.60 / kWh

Incentive: $0.39 / kWh

Compressed Air Nozzle

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Compressed Air **Measure Type:** CAIR Nozzle **Measure Sub Type:** CAIR Nozzle

Program: Large C&I New Construction

Measure Description

The installation of an efficient CAIR nozzle.

Baseline Description

The baseline efficiency case is the installation of a standard CAIR nozzle.

BCR Measures

BCR Measure Name	Unique Identifier
Compressed Air Nozzle	2024 Electric Large C&I New Construction Compressed Air Nozzle

Savings Principle

The high efficiency case is the installation of an efficient CAIR nozzle.

Savings Method

Calculated using site-specific inputs

Unit

Installed CAIR nozzle.

Savings Equation

Gross kWh = CFM_pipe × deltaCFM/CFM_pipe × deltakW/CFM × Hours

Gross kW = CFM_pipe × deltaCFM/CFM_pipe × deltakW/CFM

Where:

CFM_pipe = CFM capacity of piping: site-specific

0.049 deltaCFM/CFM_pipe = Average CFM saved per CFM of piping capacity

0.24386 deltakW/CFM = Average demand savings per CFM; Based on regional analysis assuming a typical timed drain settings discharge scenario.

Hours = Annual operating hours of the zero loss condensate drain: site-specific

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Compressed Air Nozzle	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Compressed Air Nozzle	15	1.00	1.00		1.44	1.00	1.00	1.00	0.82

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Compressed Air Nozzle	24.54%	25.82%	24.53%	25.10%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

RRsp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

RRwp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

CFsp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

CFwp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Compressed Air Nozzle	0	0	0.00	0.04	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Compressed Air Nozzle	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.43 / kWh

Incentive: $0.28 / kWh

Conveyor Broiler

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Food Service **Measure Type:** Broiler **Measure Sub Type:** Conveyor Broiler

Program: Large C&I New Construction

Measure Description

Installation of a energy efficient underfired broiler to replace a conventional automatic constant input rate conveyor broiler. This measure has both electric and gas savings.

Baseline Description

Baseline broiler must be an automatic conveyor broiler capable of maintaining a temperature above 600 F with a tested idle rate greater than 60 kBtu/h for size 22-28" wide, greater than 70 kBtu/h for >28" wide, and greater than 40 kBtu/h for <22" wide.

BCR Measures

BCR Measure Name	Unique Identifier
Conveyor Broiler - 22-28" wide	2024 Electric Large C&I New Construction Conveyor Broiler - 22-28" wide
Conveyor Broiler - >28" wide	2024 Electric Large C&I New Construction Conveyor Broiler - >28" wide
Conveyor Broiler - <22" wide	2024 Electric Large C&I New Construction Conveyor Broiler - <22" wide

Savings Principle

The high efficiency case for a conveyor broiler must have a catalyst and an input rate less than 80 kBtu/h or a dual stage or modulating gas valve with a capability of throttling the input rate below 80 kBtu/h. Baseline broiler must be replaced by a broiler similar in size or smaller. Must be installed under a Type II Hood.

Savings Method

Deemed

Unit

Per Conveyor Broiler

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Conveyor Broiler - 22-28" wide	6403.0	0.2800					
Conveyor Broiler - >28" wide	23849.0	0.2800	0.00	0.00	0.00	0.00	0.00
Conveyor Broiler - <22" wide	7144.0	0.2800					

Electric kWh Source: SoCalGas. (2019). Commercial Conveyor Broilers workpaper WPSCGNRCC171226A11. http://deeresources.net/workpapers

Electric kW Source: SoCalGas. (2019). Commercial Conveyor Broilers workpaper WPSCGNRCC171226A11. http://deeresources.net/workpapers

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Conveyor Broiler	12	1.00	1.00		1.00			0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Conveyor Broiler	32.00%	35.00%	16.00%	17.00%

Measure Life Source: Robert Mowris & Associates (2005). Ninth Year Retention Study of the 1995 Southern California Gas Company Commercial New Construction Program. https://www.caetrm.com/media/reference-documents/Ninth_Year_Retention_Study_No_718A_for_1995_SCG_CNC_Program.pdf

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rates are 100% since savings estimates are based on evaluation results.

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFsp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Conveyor Broiler	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Conveyor Broiler	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $1.51/ kWh

Incentive: $0.98 / kWh

Cooling Tower Fan

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I New Construction

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Cooling Tower Fan	2024 Electric Large C&I New Construction Cooling Tower Fan

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Cooling Tower Fan	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Cooling Tower Fan	15	1.00	1.00		0.94	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Cooling Tower Fan	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

RRsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

RRwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Cooling Tower Fan	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Cooling Tower Fan	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.48 / kWh

Incentive: $0.31 / kWh

Custom HVAC

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** HVAC **Measure Sub Type:** HVAC

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Custom HVAC	2024 Electric Large C&I New Construction Custom HVAC

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom HVAC	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom HVAC	multi	1.00	1.00	0.89	0.89	0.74	1.05	0.69	0.54

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom HVAC	45.82%	20.85%	22.90%	10.43%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom HVAC	Calc	Calc	0.00	0.02	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom HVAC	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.81 / kWh

Incentive: $0.53 / kWh

Deck Oven

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Food Service **Measure Type:** Cooking Equipment **Measure Sub Type:** Oven

Program: Large C&I New Construction

Measure Description

Installation of a high efficiency commercial electric deck oven.

Baseline Description

The baseline efficiency case is a commercial electric deck oven with a cooking energy efficiency of 40% and a 1.8 kW idle energy rate.

BCR Measures

BCR Measure Name	Unique Identifier
Deck Oven	2024 Electric Large C&I New Construction Deck Oven

Savings Principle

The high efficiency case is an electric commercial deck oven with cooking energy efficiency of at least 60% and has an idle of 1.3 kW or less.

Savings Method

Deemed

Unit

Installed high-efficiency commercial electric deck oven.

Savings Equation

Gross kWh = Qty × (kW_base - kW_ee) × Hours

Gross kW = Qty × (kW_base - kW_ee)

Where:

Qty = Total number of units.

kW_base = Deemed average demand per baseline unit.

kW_ee = Deemed average demand per high-efficiency unit.

Hours = Deemed average annual operating hours.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Deck Oven	7519.0	1.5450	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: American Society for Testing and Materials (ASTM). 2010. ASTM F1965-99, Standard Test Method for the Performance of Deck Ovens. West Conshohocken (PA): ASTM International.

Electric kW Source: American Society for Testing and Materials (ASTM). 2010. ASTM F1965-99, Standard Test Method for the Performance of Deck Ovens. West Conshohocken (PA): ASTM International.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Deck Oven	12	1.00	1.00	1.00		1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Deck Oven	32.00%	35.00%	16.00%	17.00%

Measure Life Source: CEEL (2016). Ultra-Low Temperature Freezers: Opening the Door to Energy Savings in Laboratories.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

RRsp Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

RRwp Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFsp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Deck Oven	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Deck Oven	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.46 / kWh

Incentive: $0.30 / kWh

DHW ECM Pump

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** DHW **Measure Sub Type:** Pump

Program: Large C&I New Construction

Measure Description

The installation of a high efficiency DHW circulator pump with an ECM.

Baseline Description

The baseline system is a pump without an EC motor. The baseline system may have no control, a timer, aquastat, or be on demand. The baseline system is assumed to run a weighted average of these four control types.

BCR Measures

BCR Measure Name	Unique Identifier
DHW ECM Pump - <= 1/8 HP	2024 Electric Large C&I New Construction DHW ECM Pump - <= 1/8 HP
DHW ECM Pump - <=1/20 HP	2024 Electric Large C&I New Construction DHW ECM Pump - <=1/20 HP
DHW ECM Pump - 1/20 to 1/8 HP	2024 Electric Large C&I New Construction DHW ECM Pump - 1/20 to 1/8 HP
DHW ECM Pump - 1/8 to 1/6 HP	2024 Electric Large C&I New Construction DHW ECM Pump - 1/8 to 1/6 HP
DHW ECM Pump - 1/6 to 3/4 HP	2024 Electric Large C&I New Construction DHW ECM Pump - 1/6 to 3/4 HP
DHW ECM Pump - 3/4 to 3 HP	2024 Electric Large C&I New Construction DHW ECM Pump - 3/4 to 3 HP

Savings Principle

The high efficiency case is a DHW circulator pump with an ECM.

Savings Method

Deemed

Unit

Per Pump

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
DHW ECM Pump - <= 1/8 HP	462.0	0.0338	0.00	0.00	0.00	0.00	0.00
DHW ECM Pump - <=1/20 HP	462.0	0.0338					
DHW ECM Pump - 1/20 to 1/8 HP	462.0	0.0338					
DHW ECM Pump - 1/8 to 1/6 HP	639.0	0.0557					
DHW ECM Pump - 1/6 to 3/4 HP	1507.0	0.1323					
DHW ECM Pump - 3/4 to 3 HP	3013.0	0.2340					

Electric kWh Source: The Cadmus Group. (2017). Circulator Pump Technical Memo.

Electric kW Source: The Cadmus Group. (2017). Circulator Pump Technical Memo.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
DHW ECM Pump	20	1.00	1.00		1.00			1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
DHW ECM Pump	37.50%	37.50%	12.50%	12.50%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
DHW ECM Pump	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
DHW ECM Pump	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.60 / kWh

Incentive: $0.39 / kWh

Dishwasher - High Temperature Door Type

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Food Service

Measure Type: Dishwasher

Measure Sub Type: High Temp, Door Type

Program: Large C&I New Construction

Measure Description

Installation of a qualified ENERGY STAR® high temperature commercial dishwasher in a building with gas domestic hot water. High temperature dishwashers use a

booster heater to raise the rinse water temperature to 1800 F – hot enough to sterilize dishes and assist in drying. Electric savings are achieved through savings to the electric booster.

Baseline Description

The weighted baseline efficiency case is a commercial dishwasher with 0.7 kW idle energy rate and 0.92 gal/rack water consumption.

BCR Measures

BCR Measure Name	Unique Identifier
Dishwasher - High Temperature Door Type	2024 Electric Large C&I New Construction Dishwasher - High Temperature Door Type

Savings Principle

The high efficiency case is a commercial dishwasher with 0.55 kW idle energy rate and 0.89 gal/rack water consumption or lower following ENERGY STAR efficiency requirements.

Savings Method

Deemed

Unit

Installed Dishwasher

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: 5634

Hours Note: Dishwashers are assumed to operate 313 days per year. The average dishwasher is assumed to operate 18 hours per day, or 5,634 hours per year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Dishwasher - High Temperature Door Type	1558.0	0.2400	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: DNV (2023). Kitchen Equipment ISP Study.

Electric kW Source: DNV (2023). Kitchen Equipment ISP Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Dishwasher - High Temperature Door Type	15	1.00	1.00	1.00	1.00			0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Dishwasher - High Temperature Door Type	32.00%	35.00%	16.00%	17.00%

Measure Life Source: Savings Calculator for ENERGY STAR® Certified Commercial Kitchen Equipment: Dishwasher Calcs. <http://www.energystar.gov/buildings/sites/default/uploads/files/commercial_kitchen_equipment_calculator.xlsx >

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rates are 100% since savings estimates are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Dishwasher - High Temperature Door Type	35000	35000	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Dishwasher - High Temperature Door Type	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.34 / kWh

Incentive: $0.22 / kWh

Dishwasher - High Temperature Multi Tank Conveyor

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Food Service

Measure Type: Dishwasher

Measure Sub Type: High Temp, Door Type

Program: Large C&I New Construction

Measure Description

Installation of a qualified ENERGY STAR® high temperature commercial dishwasher in a building with gas domestic hot water. High temperature dishwashers use a

booster heater to raise the rinse water temperature to 1800 F – hot enough to sterilize dishes and assist in drying. Electric savings are achieved through savings to the electric booster.

Baseline Description

The weighted baseline efficiency case is a commercial dishwasher with 2.31 kW idle energy rate and 0.64 gal/rack water consumption.

BCR Measures

BCR Measure Name	Unique Identifier
Dishwasher - High Temperature Multi Tank Conveyor	2024 Electric Large C&I New Construction Dishwasher - High Temperature Multi Tank Conveyor

Savings Principle

The high efficiency case is a commercial dishwasher with 1.85 kW idle energy rate and 0.54 gal/rack water consumption or lower following ENERGY STAR efficiency requirements.

Savings Method

Deemed

Unit

Installed Dishwasher

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: 5634

Hours Note: Dishwashers are assumed to operate 313 days per year. The average dishwasher is assumed to operate 18 hours per day, or 5,634 hours per year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Dishwasher - High Temperature Multi Tank Conveyor	8587.0	1.3100	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: DNV (2023). Kitchen Equipment ISP Study.

Electric kW Source: DNV (2023). Kitchen Equipment ISP Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Dishwasher - High Temperature Multi Tank Conveyor	20	1.00	1.00	1.00	1.00			0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Dishwasher - High Temperature Multi Tank Conveyor	32.00%	35.00%	16.00%	17.00%

Measure Life Source: Savings Calculator for ENERGY STAR® Certified Commercial Kitchen Equipment: Dishwasher Calcs. <http://www.energystar.gov/buildings/sites/default/uploads/files/commercial_kitchen_equipment_calculator.xlsx >

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rates are 100% since savings estimates are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Dishwasher - High Temperature Multi Tank Conveyor	80754	80754	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Dishwasher - High Temperature Multi Tank Conveyor	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.15 / kWh

Incentive: $0.10 / kWh

Dishwasher - High Temperature Pots and Pans

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Food Service

Measure Type: Dishwasher

Measure Sub Type: High Temp, Door Type

Program: Large C&I New Construction

Measure Description

Installation of a qualified ENERGY STAR® high temperature commercial dishwasher in a building with gas domestic hot water. High temperature dishwashers use a

booster heater to raise the rinse water temperature to 1800 F – hot enough to sterilize dishes and assist in drying. Electric savings are achieved through savings to the electric booster.

Baseline Description

The weighted baseline efficiency case is a commercial dishwasher with 2.07 kW idle energy rate and 0.56 gal/rack water consumption.

BCR Measures

BCR Measure Name	Unique Identifier
Dishwasher - High Temperature Pots and Pans	2024 Electric Large C&I New Construction Dishwasher - High Temperature Pots and Pans

Savings Principle

The high efficiency case is a commercial dishwasher with 0.9 kW idle energy rate and 0.58 gal/rack water consumption or lower following ENERGY STAR efficiency requirements.

Savings Method

Deemed

Unit

Installed Dishwasher

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: 5634

Hours Note: Dishwashers are assumed to operate 313 days per year. The average dishwasher is assumed to operate 18 hours per day, or 5,634 hours per year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Dishwasher - High Temperature Pots and Pans	1159.0	0.1800	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: DNV (2023). Kitchen Equipment ISP Study.

Electric kW Source: DNV (2023). Kitchen Equipment ISP Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Dishwasher - High Temperature Pots and Pans	10	1.00	1.00	1.00	1.00			0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Dishwasher - High Temperature Pots and Pans	32.00%	35.00%	16.00%	17.00%

Measure Life Source: Savings Calculator for ENERGY STAR® Certified Commercial Kitchen Equipment: Dishwasher Calcs. <http://www.energystar.gov/buildings/sites/default/uploads/files/commercial_kitchen_equipment_calculator.xlsx >

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rates are 100% since savings estimates are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Dishwasher - High Temperature Pots and Pans	10517	10517	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Dishwasher - High Temperature Pots and Pans	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $1.38 / kWh

Incentive: $0.90 / kWh

Dishwasher - High Temperature Single Tank Conveyor

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Food Service

Measure Type: Dishwasher

Measure Sub Type: High Temp, Single Tank

Program: Large C&I New Construction

Measure Description

Installation of a qualified ENERGY STAR® high temperature commercial dishwasher in a building with gas domestic hot water. High temperature dishwashers use a

booster heater to raise the rinse water temperature to 1800 F – hot enough to sterilize dishes and assist in drying. Electric savings are achieved through savings to the electric booster.

Baseline Description

The weighted baseline efficiency case is a commercial dishwasher with 1.57 kW idle energy rate and 0.77 gal/rack water consumption.

BCR Measures

BCR Measure Name	Unique Identifier
Dishwasher - High Temperature Single Tank Conveyor	2024 Electric Large C&I New Construction Dishwasher - High Temperature Single Tank Conveyor

Savings Principle

The high efficiency case is a commercial dishwasher with 1.20 kW idle energy rate and 0.70 gal/rack water consumption or lower following ENERGY STAR efficiency requirements.

Savings Method

Deemed

Unit

Installed Dishwasher

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: 5634

Hours Note: Dishwashers are assumed to operate 313 days per year. The average dishwasher is assumed to operate 18 hours per day, or 5,634 hours per year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Dishwasher - High Temperature Single Tank Conveyor	4937.0	0.7500	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: DNV (2023). Kitchen Equipment ISP Study.

Electric kW Source: DNV (2023). Kitchen Equipment ISP Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Dishwasher - High Temperature Single Tank Conveyor	20	1.00	1.00	1.00	1.00			0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Dishwasher - High Temperature Single Tank Conveyor	32.00%	35.00%	16.00%	17.00%

Measure Life Source: Savings Calculator for ENERGY STAR® Certified Commercial Kitchen Equipment: Dishwasher Calcs. <http://www.energystar.gov/buildings/sites/default/uploads/files/commercial_kitchen_equipment_calculator.xlsx >

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rates are 100% since savings estimates are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Dishwasher - High Temperature Single Tank Conveyor	21300	21300	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Dishwasher - High Temperature Single Tank Conveyor	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.55 / kWh

Incentive: $0.36 / kWh

Dishwasher - High Temperature Under Counter

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Food Service

Measure Type: Dishwasher

Measure Sub Type: High Temp, Under Counter

Program: Large C&I New Construction

Measure Description

Installation of a qualified ENERGY STAR® high temperature commercial dishwasher in a building with gas domestic hot water. High temperature dishwashers use a

booster heater to raise the rinse water temperature to 1800 F – hot enough to sterilize dishes and assist in drying. Electric savings are achieved through savings to the electric booster.

Baseline Description

The weighted baseline efficiency case is a commercial dishwasher with 0.54 kW idle energy rate and 0.88 gal/rack water consumption.

BCR Measures

BCR Measure Name	Unique Identifier
Dishwasher - High Temperature Under Counter	2024 Electric Large C&I New Construction Dishwasher - High Temperature Under Counter

Savings Principle

The high efficiency case is a commercial dishwasher with 0.30 kW idle energy rate and 0.86 gal/rack water consumption or lower following ENERGY STAR efficiency requirements.

Savings Method

Deemed

Unit

Installed Dishwasher

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: 5634

Hours Note: Dishwashers are assumed to operate 313 days per year. The average dishwasher is assumed to operate 18 hours per day, or 5,634 hours per year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Dishwasher - High Temperature Under Counter	1528.0	0.2300	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: DNV (2023). Kitchen Equipment ISP Study.

Electric kW Source: DNV (2023). Kitchen Equipment ISP Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Dishwasher - High Temperature Under Counter	10	1.00	1.00	1.00	1.00			0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Dishwasher - High Temperature Under Counter	32.00%	35.00%	16.00%	17.00%

Measure Life Source: Savings Calculator for ENERGY STAR® Certified Commercial Kitchen Equipment: Dishwasher Calcs. <http://www.energystar.gov/buildings/sites/default/uploads/files/commercial_kitchen_equipment_calculator.xlsx >

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rates are 100% since savings estimates are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Dishwasher - High Temperature Under Counter	5400	5400	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Dishwasher - High Temperature Under Counter	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.45 / kWh

Incentive: $0.29 / kWh

Dishwasher - Low Temperature Door Type

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Food Service

Measure Type: Dishwasher

Measure Sub Type: Low Temp, Door Type

Program: Large C&I New Construction

Measure Description

Installation of a qualified ENERGY STAR® low temperature commercial dishwasher in a facility with electric hot water heating. Low temperature dishwashers use the hot water supplied by the kitchen's existing water heater and use a chemical sanitizing agentin the final rinse cycle and sometimes a drying agent.

Baseline Description

The weighted baseline efficiency case is a commercial dishwasher with 0.60 kW idle energy rate and 1.23 gal/rack water consumption.

BCR Measures

BCR Measure Name	Unique Identifier
Dishwasher - Low Temperature Door Type	2024 Electric Large C&I New Construction Dishwasher - Low Temperature Door Type

Savings Principle

The high efficiency case is a commercial dishwasher with 0.30 kW idle energy rate and 0.79 gal/rack water consumption or lower following ENERGY STAR efficiency requirements.

Savings Method

Deemed

Unit

Installed Dishwasher

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: 5634

Hours Note: Dishwashers are assumed to operate 313 days per year. The average dishwasher is assumed to operate 18 hours per day, or 5,634 hours per year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Dishwasher - Low Temperature Door Type	2082.0	0.3200	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: DNV (2023). Kitchen Equipment ISP Study.

Electric kW Source: DNV (2023). Kitchen Equipment ISP Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Dishwasher - Low Temperature Door Type	15	1.00	1.00	1.00	1.00			0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Dishwasher - Low Temperature Door Type	32.00%	35.00%	16.00%	17.00%

Measure Life Source: Savings Calculator for ENERGY STAR® Certified Commercial Kitchen Equipment: Dishwasher Calcs. <http://www.energystar.gov/buildings/sites/default/uploads/files/commercial_kitchen_equipment_calculator.xlsx >

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rates are 100% since savings estimates are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Dishwasher - Low Temperature Door Type	80600	80600	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Dishwasher - Low Temperature Door Type	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Dishwasher - Low Temperature Multi Tank Conveyor

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Food Service

Measure Type: Dishwasher

Measure Sub Type: Low Temp, Single tank

Program: Large C&I New Construction

Measure Description

Installation of a qualified ENERGY STAR® low temperature commercial dishwasher in a facility with electric hot water heating. Low temperature dishwashers use the hot water supplied by the kitchen's existing water heater and use a chemical sanitizing agentin the final rinse cycle and sometimes a drying agent.

Baseline Description

The weighted baseline efficiency case is a commercial dishwasher with 2.00 kW idle energy rate and 0.62 gal/rack water consumption.

BCR Measures

BCR Measure Name	Unique Identifier
Dishwasher - Low Temperature Multi Tank Conveyor	2024 Electric Large C&I New Construction Dishwasher - Low Temperature Multi Tank Conveyor

Savings Principle

The high efficiency case is a commercial dishwasher with 1.00 kW idle energy rate and 0.54 gal/rack water consumption or lower following ENERGY STAR efficiency requirements.

Savings Method

Deemed

Unit

Installed Dishwasher

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: 5634

Hours Note: Dishwashers are assumed to operate 313 days per year. The average dishwasher is assumed to operate 18 hours per day, or 5,634 hours per year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Dishwasher - Low Temperature Multi Tank Conveyor	8485.0	1.2900	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: DNV (2023). Kitchen Equipment ISP Study.

Electric kW Source: DNV (2023). Kitchen Equipment ISP Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Dishwasher - Low Temperature Multi Tank Conveyor	20	1.00	1.00	1.00	1.00			0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Dishwasher - Low Temperature Multi Tank Conveyor	32.00%	35.00%	16.00%	17.00%

Measure Life Source: Savings Calculator for ENERGY STAR® Certified Commercial Kitchen Equipment: Dishwasher Calcs. <http://www.energystar.gov/buildings/sites/default/uploads/files/commercial_kitchen_equipment_calculator.xlsx >

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rates are 100% since savings estimates are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Dishwasher - Low Temperature Multi Tank Conveyor	93900	93900	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Dishwasher - Low Temperature Multi Tank Conveyor	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Dishwasher - Low Temperature Single Tank Conveyor

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Food Service

Measure Type: Dishwasher

Measure Sub Type: Low Temp, Single tank

Program: Large C&I New Construction

Measure Description

Installation of a qualified ENERGY STAR® low temperature commercial dishwasher in a facility with electric hot water heating. Low temperature dishwashers use the hot water supplied by the kitchen's existing water heater and use a chemical sanitizing agentin the final rinse cycle and sometimes a drying agent.

Baseline Description

The weighted baseline efficiency case is a commercial dishwasher with 1.52 kW idle energy rate and 0.86 gal/rack water consumption.

BCR Measures

BCR Measure Name	Unique Identifier
Dishwasher - Low Temperature Single Tank Conveyor	2024 Electric Large C&I New Construction Dishwasher - Low Temperature Single Tank Conveyor

Savings Principle

The high efficiency case is a commercial dishwasher with 0.84 kW idle energy rate and 0.79 gal/rack water consumption or lower following ENERGY STAR efficiency requirements.

Savings Method

Deemed

Unit

Installed Dishwasher

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: 5634

Hours Note: Dishwashers are assumed to operate 313 days per year. The average dishwasher is assumed to operate 18 hours per day, or 5,634 hours per year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Dishwasher - Low Temperature Single Tank Conveyor	5709.0	0.8700	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: DNV (2023). Kitchen Equipment ISP Study.

Electric kW Source: DNV (2023). Kitchen Equipment ISP Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Dishwasher - Low Temperature Single Tank Conveyor	20	1.00	1.00	1.00	1.00			0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Dishwasher - Low Temperature Single Tank Conveyor	32.00%	35.00%	16.00%	17.00%

Measure Life Source: Savings Calculator for ENERGY STAR® Certified Commercial Kitchen Equipment: Dishwasher Calcs. <http://www.energystar.gov/buildings/sites/default/uploads/files/commercial_kitchen_equipment_calculator.xlsx >

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rates are 100% since savings estimates are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Dishwasher - Low Temperature Single Tank Conveyor	65100	65100	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Dishwasher - Low Temperature Single Tank Conveyor	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.02 / kWh

Incentive: $0.01 / kWh

Dishwasher - Low Temperature Under Counter

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Food Service

Measure Type: Dishwasher

Measure Sub Type: Low Temp, Under Counter

Program: Large C&I New Construction

Measure Description

Installation of a qualified ENERGY STAR® low temperature commercial dishwasher in a facility with electric hot water heating. Low temperature dishwashers use the hot water supplied by the kitchen's existing water heater and use a chemical sanitizing agentin the final rinse cycle and sometimes a drying agent.

Baseline Description

The weighted baseline efficiency case is a commercial dishwasher with 0.50 kW idle energy rate and 1.24 gal/rack water consumption.

BCR Measures

BCR Measure Name	Unique Identifier
Dishwasher - Low Temperature Under Counter	2024 Electric Large C&I New Construction Dishwasher - Low Temperature Under Counter

Savings Principle

The high efficiency case is a commercial dishwasher with 0.25 kW idle energy rate and 1.19 gal/rack water consumption or lower following ENERGY STAR efficiency requirements.

Savings Method

Deemed

Unit

Installed Dishwasher

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: 5634

Hours Note: Dishwashers are assumed to operate 313 days per year. The average dishwasher is assumed to operate 18 hours per day, or 5,634 hours per year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Dishwasher - Low Temperature Under Counter	1650.0	0.2500	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: DNV (2023). Kitchen Equipment ISP Study.

Electric kW Source: DNV (2023). Kitchen Equipment ISP Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Dishwasher - Low Temperature Under Counter	10	1.00	1.00	1.00	1.00			0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Dishwasher - Low Temperature Under Counter	32.00%	35.00%	16.00%	17.00%

Measure Life Source: Savings Calculator for ENERGY STAR® Certified Commercial Kitchen Equipment: Dishwasher Calcs. <http://www.energystar.gov/buildings/sites/default/uploads/files/commercial_kitchen_equipment_calculator.xlsx >

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rates are 100% since savings estimates are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Dishwasher - Low Temperature Under Counter	12700	12700	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Dishwasher - Low Temperature Under Counter	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.23 / kWh

Incentive: $0.15 / kWh

Dual enthalpy economizer controls

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** Economizer

Program: Large C&I New Construction

Measure Description

The measure is to upgrade the outside-air dry-bulb economizer to a dual enthalpy economizer. The system will continuously monitor the enthalpy of both the outside air and return air. The system will control the system dampers adjust the outside quantity based on the two readings.

Baseline Description

The baseline efficiency case for this measure assumes the relevant HVAC equipment is operating with a fixed dry-bulb economizer.

BCR Measures

BCR Measure Name	Unique Identifier
Dual enthalpy economizer controls	2024 Electric Large C&I New Construction Dual enthalpy economizer controls

Savings Principle

The high efficiency case is the installation of an outside air economizer utilizing two enthalpy sensors, one for outdoor air and one for return air.

Savings Method

Deemed

Unit

Total tons of controlled cooling capacity.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Dual enthalpy economizer controls	289.0	0.2890	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Patel, Dinesh (2001). Energy Analysis: Dual Enthalpy Control. Prepared for NSTAR.

Electric kW Source: Patel, Dinesh (2001). Energy Analysis: Dual Enthalpy Control. Prepared for NSTAR.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Dual enthalpy economizer controls	10	1.00	1.00		1.00	1.00	1.00	0.40	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Dual enthalpy economizer controls	26.40%	16.60%	34.90%	22.10%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRsp Source: The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.

RRwp Source: The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.

CFsp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

CFwp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Dual enthalpy economizer controls	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Dual enthalpy economizer controls	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.14 / kWh

Incentive: $0.09 / kWh

ECM fan motor for HVAC

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Motors **Measure Sub Type:** ECM Motor

Program: Large C&I New Construction

Measure Description

This measure is offered through the Cool Choice program and promotes the installation of electronically commutated motors (ECMs) on fan powered terminal boxes, fan coils, and HVAC supply fans on small unitary equipment.

Baseline Description

The baseline efficiency case for this measure assumes the VAV box fans are powered by a single speed fractional horsepower permanent split capacitor (PSC) induction motor.

BCR Measures

BCR Measure Name	Unique Identifier
ECM fan motor for HVAC	2024 Electric Large C&I New Construction ECM fan motor for HVAC

Savings Principle

The high efficiency case must have a motor installed on new, qualifying HVAC equipment.

Savings Method

Calculated using site-specific inputs

Unit

Installed ECM fan motor.

Savings Equation

Gross kWh = DesignCFM × BoxSizeFactor × %Flow_Annual × Hours

Gross Summer kW = DesignCFM × BoxSizeFactor × %Flow_Summer × Hours

Gross Winter kW = DesignCFM × BoxSizeFactor × %Flow_Winter × Hours

Where:

DesignCFM = Capacity of the VAV box in cubic feet perminute: site-specific.

BoxSizeFactor = Savings factor in Watts/CFM

%Flow_Annual = Average % of design flow over all operating hours

%Flow_Summer = Average % of design flow during summer peak period

%Flow_Winter = Average % of design flow during winter peak period

Hours = Estimated annual operating hours for VAV box fans: site-specific.

DesignCFM = Capacity of the VAV box in cubic feet per minute: site-specific.

Hours = Estimated annual operating hours for VAV box fans: site-specific.

Hours: N/A

Hours Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Hours Note: The average cooling EFLHs are taken as 855 hours while the average heating EFLHs are taken as 1137 hours.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
ECM fan motor for HVAC	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
ECM fan motor for HVAC	20	1.00	1.00		1.00	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
ECM fan motor for HVAC	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRsp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRwp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

CFwp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
ECM fan motor for HVAC	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
ECM fan motor for HVAC	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

ECM Pump

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** HVAC **Measure Sub Type:** Pump

Program: Large C&I New Construction

Measure Description

The installation of a high efficiency circulator pump with an ECM.

Baseline Description

The baseline system is a pump without an EC motor. The baseline system may have no control, a timer, aquastat, or be on demand. The baseline system is assumed to run a weighted average of these four control types.

BCR Measures

BCR Measure Name	Unique Identifier
	2024 Electric Large C&I New Construction ECM Pump - <= 1/8 HP
ECM Pump - <= 1/8 HP	2024 Electric Large C&I New Construction ECM Pump - <=1/20 HP
ECM Pump - <=1/20 HP	2024 Electric Large C&I New Construction ECM Pump - 1/20 to 1/8 HP
ECM Pump - 1/20 to 1/8 HP	2024 Electric Large C&I New Construction ECM Pump - 1/6 to 3/4 HP
ECM Pump - 1/6 to 3/4 HP	

Savings Principle

The high efficiency case is a circulator pump with an ECM.

Savings Method

Deemed

Unit

Per Pump

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
ECM Pump - <= 1/8 HP	221.0	0.0338	0.00	0.00	0.00	0.00	0.00
ECM Pump - <=1/20 HP	221.0	0.0338					
ECM Pump - 1/20 to 1/8 HP	221.0	0.0338					
ECM Pump - 1/6 to 3/4 HP	719.0	0.1323					

Electric kWh Source: The Cadmus Group. (2017). Circulator Pump Technical Memo.

Electric kW Source: The Cadmus Group. (2017). Circulator Pump Technical Memo.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
ECM Pump	20	1.00	1.00		1.00	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
ECM Pump	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
ECM Pump	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
ECM Pump	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.47 / kWh

Incentive: $0.30 / kWh

Electric HW Spray Valve

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Food Service **Measure Type:** Spray Valve **Measure Sub Type:**

Program: Large C&I New Construction

Measure Description

The installation of an electric hot water spray valve

Baseline Description

The baseline efficiency case is a standard efficiency electric hot water spray valve.

BCR Measures

BCR Measure Name	Unique Identifier
Electric HW Spray Valve	2024 Electric Large C&I New Construction Electric HW Spray Valve

Savings Principle

Savings Method

Deemed

Unit

Installed pre-rinse spray valve.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Electric HW Spray Valve	4648.0	0.7900	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Electric HW Spray Valve	5	1.00	1.00	1.00		1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Electric HW Spray Valve	32.00%	35.00%	16.00%	17.00%

Measure Life Source: SBW Consulting. 2007. Impact and Process Evaluation Final Report for California Urban Water Conservation Council 2004-05 Pre-Rinse Spray Valve Installation Program (Phase 2). https://p2infohouse.org/ref/50/49026.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRsp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRwp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFsp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Electric HW Spray Valve	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Electric HW Spray Valve	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.89/ kWh

Incentive: $0.58 / kWh

EMS

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** EMS **Measure Sub Type:** EMS

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
EMS	2024 Electric Large C&I New Construction EMS

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
EMS	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
EMS	10,15	1.00	1.00	0.89	0.89	0.74	1.05	0.69	0.54

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
EMS	45.82%	20.85%	22.90%	10.43%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
EMS	Calc	Calc	0.00	0.04	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
EMS	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.81 / kWh

Incentive: $0.53 / kWh

Evap AC, over 20 T

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** AC **Measure Sub Type:**

Program: Large C&I New Construction

Measure Description

This measure applies to the installation of high-efficiency single package or split system air source, water source, ground source (closed loop) and groundwater source (open loop) heat pump systems for space conditioning applications.

Baseline Description

The baseline efficiency case for new installations assumes compliance with the current version of International Energy Conservation Code (IECC) as mandated by Rhode Island State Building Code. Appendix A details the specific efficiency requirements by equipment type.

BCR Measures

BCR Measure Name	Unique Identifier
Evap AC, over 20 T	2024 Electric Large C&I New Construction Evap AC, over 20 T

Savings Principle

The high efficiency case assumes the HVAC equipment exceeds the requirements of the current version of International Energy Conservation Code (IECC) as mandated by Rhode Island State Building Code.

Savings Method

Calculated using site-specific inputs

Unit

Installed unitary AC system for space cooling.

Savings Equation

Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) × Hours_C

Gross kW = Tons × (kBtu/hr per ton) × (1/EER_base - 1/EER_ee)

Where:

Tons = Rated cooling capacity of the installed equipment: site-specific.

12 kBtu/hr per ton = Conversion factor

SEER_base = Seasonal Energy Efficiency Ratio of the baseline equipment: code

SEER_ee = Seasonal energy efficiency ratio of the high-efficiency unit: site-specific.

Hours_C = Equivalent full load cooling hours

EER_ee = Energy Efficiency Ratio of the new efficient equipment: site-specific. For equipment < 5.4 tons, assume the following conversion: EER≈SEER/1.1

EER_base = Energy Efficiency Ratio of baseline equipment: code. Since IECC 2012 does not provide EER requirements for equipment < 5.4 tons, assume the following conversion: EER ≈ SEER/1.1

Hours: N/A

Hours Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Hours Note: If site-specific data is unavailable, the average cooling EFLHs are taken as 855 hours while the average heating EFLHs are taken as 1137 hours.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Evap AC, over 20 T	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Evap AC, over 20 T	15	1.00	1.00		1.00	1.00	1.00	0.40	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Evap AC, over 20 T	8.60%	4.60%	52.70%	34.10%

Measure Life Source: California Public Utilities Commission (2014). Energy Division, DEER EUL Table Update.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

RRsp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

RRwp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

CFsp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

CFwp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Evap AC, over 20 T	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Evap AC, over 20 T	0.45	0.00	0.00	0.55

NTG Source: DNV (2021). MA C&I Upstream HVAC & Gas Water Heating NTG Study (MA20X08-B-CIHVACNTG). https://ma-eeac.org/wp-content/uploads/MA20X08-B-CIHVACNTG_Final_Report_Clean_9.10.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Food Service

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** FOOD **Measure Sub Type:** FOOD

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Food Service	2024 Electric Large C&I New Construction Food Service

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Food Service	Calc	Calc	0.00	Calc	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Food Service	10,15	1.00	1.00		0.89	0.74	1.05	0.71	0.86

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Food Service	0.00%	0.00%	50.00%	50.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Food Service	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Food Service	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.60 / kWh

Incentive: $0.39 / kWh

Freezer Glass Door

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Food Service **Measure Type:** Freezer **Measure Sub Type:** Door

Program: Large C&I New Construction

Measure Description

Installation of an Energy Star rated freezer with a glass door.

Baseline Description

The baseline efficiency case is a freezer with standard energy consumption.

BCR Measures

BCR Measure Name	Unique Identifier
Freezer Glass Door - <15 ft3	2024 Electric Large C&I New Construction Freezer Glass Door - <15 ft3
Freezer Glass Door - 15 to 29.9 ft3	2024 Electric Large C&I New Construction Freezer Glass Door - 15 to 29.9 ft3
Freezer Glass Door - 30 to 49.9 ft3	2024 Electric Large C&I New Construction Freezer Glass Door - 30 to 49.9 ft3
Freezer Glass Door - >50 ft3	2024 Electric Large C&I New Construction Freezer Glass Door - >50 ft3

Savings Principle

The high efficiency case is an Energy Star rated freezer.

Savings Method

Deemed

Unit

Per freezer

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Freezer Glass Door - <15 ft3	427.0	0.0500	0.00	0.00	0.00	0.00	0.00
Freezer Glass Door - 15 to 29.9 ft3	681.0	0.0800					
Freezer Glass Door - 30 to 49.9 ft3	1062.0	0.1200					
Freezer Glass Door - >50 ft3	1466.0	0.1700					

Electric kWh Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Electric kW Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Freezer Glass Door	12	1.00	1.00		1.00	1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Freezer Glass Door	32.00%	35.00%	16.00%	17.00%

Measure Life Source: EPA Research (2014), Energy Star Commercial Equipment Calculator, Freezer Calcs, https://www.energystar.gov/sites/default/files/asset/document/commercial_kitchen_equipment_calculator.xlsx. Assume 2/3rd of measure life for recycling - MA Common assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Freezer Glass Door	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Freezer Glass Door	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: <15 ft3 - $0.81/kWh; 15-29.9 ft3 - $0.73 ft3; 30-49.9 ft3 - $0.29/kWh; >50 ft3 - $0.31/kWh

Incentive: <15 ft3 - $0.53/kWh; 15-29.9 ft3 - $0.48 ft3; 30-49.9 ft3 - $0.19/kWh; >50 ft3 - $0.20/kWh

Freezer Solid Door

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Food Service **Measure Type:** Freezer **Measure Sub Type:** Door

Program: Large C&I New Construction

Measure Description

Installation of an Energy Star rated freezer with a solid door.

Baseline Description

The baseline efficiency case is a freezer with standard energy consumption.

BCR Measures

BCR Measure Name	Unique Identifier
Freezer Solid Door - <15 ft3	2024 Electric Large C&I New Construction Freezer Solid Door - <15 ft3
Freezer Solid Door - 15 to 29.9 ft3	2024 Electric Large C&I New Construction Freezer Solid Door - 15 to 29.9 ft3
Freezer Solid Door - 30 to 49.9 ft3	2024 Electric Large C&I New Construction Freezer Solid Door - 30 to 49.9 ft3
Freezer Solid Door - >50 ft3	2024 Electric Large C&I New Construction Freezer Solid Door - >50 ft3

Savings Principle

The high efficiency case is an Energy Star rated freezer.

Savings Method

Deemed

Unit

Per freezer

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Freezer Solid Door - <15 ft3	427.0	0.0200	0.00	0.00	0.00	0.00	0.00
Freezer Solid Door - 15 to 29.9 ft3	681.0	0.0600					
Freezer Solid Door - 30 to 49.9 ft3	1062.0	0.0600					
Freezer Solid Door - >50 ft3	1486.0	0.0700					

Electric kWh Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Electric kW Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Freezer Solid Door	12	1.00	1.00		1.00	1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Freezer Solid Door	32.00%	35.00%	16.00%	17.00%

Measure Life Source: EPA Research (2014), Energy Star Commercial Equipment Calculator, Freezer Calcs, https://www.energystar.gov/sites/default/files/asset/document/commercial_kitchen_equipment_calculator.xlsx. Assume 2/3rd of measure life for recycling - MA Common assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Freezer Solid Door	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Freezer Solid Door	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: <15 ft3 - $1.63/kWh; 15-29.9 ft3 - $1.03 ft3; 30-49.9 ft3 - $0.57/kWh; >50 ft3 - $0.78/kWh

Incentive: <15 ft3 - $1.06/kWh; 15-29.9 ft3 - $0.69 ft3; 30-49.9 ft3 - $0.37/kWh; >50 ft3 - $0.51/kWh

Freezer, Ultra Low Temperature

Sector: C&I | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Refrigeration | **Measure Type:** Freezers | **Measure Sub Type:** Ultra Low Temperature

Program: Large C&I New Construction

Measure Description

The installation of an ENERGY STAR qualified ultra-low temperature (-80 °C) freezer.

Baseline Description

The base case is defined as a standard efficiency ULT Freezer (-80 °C) with a standard efficiency dual cascade refrigeration system.

BCR Measures

BCR Measure Name	Unique Identifier
Freezer, Ultra Low Temperature	2024 Electric Large C&I New Construction Freezer, Ultra Low Temperature

Savings Principle

The high efficiency case is ENERGY STAR qualified under the Ultra Low Temperature Freezer Specification.

Savings Method

Unit

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Hours Note: The average annual operating hours are 8760 hours/year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Freezer, Ultra Low Temperature	5737.0	0.5400	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Eversource Energy ULT Freezer Base Case Investigation, prepared by DMI, October 7, 2017

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Freezer, Ultra Low Temperature	10	1.00	1.00		1.00	1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Freezer, Ultra Low Temperature	32.00%	35.00%	16.00%	17.00%

Measure Life Source: DNV GL (2018) ERS Portfolio Model Methods and Assumptions - Electric and Natural Gas Memo.

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Note: National Grid assumption based on regional PA working groups.

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFsp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Freezer, Ultra Low Temperature	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Freezer, Ultra Low Temperature	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.62 / kWh

Incentive: $0.400 / kWh

Fuel Cell

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Other **Measure Type:** **Measure Sub Type:**

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Fuel Cell	2024 Electric Large C&I New Construction Fuel Cell

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Fuel Cell	Calc	Calc	Calc	Calc	Calc	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Fuel Cell	6,10,15	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Fuel Cell	0.00%	0.00%	50.00%	50.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization Rate is assumed 100%.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Fuel Cell	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Fuel Cell	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Fuel Switch

Sector: C&I | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Custom | **Measure Type:** Fuel Switch | **Measure Sub Type:**

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Fuel Switch - DHW	2024 Electric Large C&I New Construction Fuel Switch - DHW
Fuel Switch - HVAC	2024 Electric Large C&I New Construction Fuel Switch - HVAC

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Fuel Switch - DHW	Calc	Calc	Calc	Calc	0.00	Calc	0.00
Fuel Switch - HVAC	Calc	Calc	Calc			Calc	

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Fuel Switch	5,10,15	1.00	1.00		0.89	0.67	1.05	0.71	0.86

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Fuel Switch	0.00%	0.00%	50.00%	50.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Fuel Switch	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Fuel Switch	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Ground Source Heat Pump

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Heat Pumps **Measure Sub Type:** Ground Source

Program: Large C&I New Construction

Measure Description

This measure applies to the installation of high-efficiency single package or split system air source, water source, ground source (closed loop) and groundwater source (open loop) heat pump systems for space conditioning applications.

Baseline Description

Appendix A details the specific efficiency requirements by equipment type.

BCR Measures

BCR Measure Name	Unique Identifier
Ground Source Heat Pump - closed loop to 11.25 tons	2024 Electric Large C&I New Construction Ground Source Heat Pump - closed loop to 11.25 tons
Groundwater Source Heat Pump - Open Loop to 11.25 tons	2024 Electric Large C&I New Construction Groundwater Source Heat Pump - Open Loop to 11.25 tons

Savings Principle

The high efficiency case assumes a high-efficiency air cooled, water source, ground water source, or ground source heat pump system that exceeds the energy efficiency requirements of the International Energy Conservation Code (IECC) 2015.

Savings Method

Calculated using site-specific inputs

Unit

Installed heat pump system for space cooling / heating.

Savings Equation

Gross kWh = Tons × (kBtu/hr per ton) × [(1/SEER_base - 1/SEER_ee) × Hours_C + CR × (1/HSPF_base - 1/HSPF_ee) × Hours_H]

Gross kW = Tons × (kBtu/hr per ton) × (1/EER_base - 1/EER_ee)

Where:

Tons = Rated cooling capacity of the installed equipment: site-specific.

12 kBtu/hr per ton = Conversion factor

SEER_base = Seasonal Energy Efficiency Ratio of the baseline equipment: code

SEER_ee = Seasonal energy efficiency ratio of the high-efficiency unit: site-specific.

Hours_C = Equivalent full load cooling hours

HSPF_base = Heating Seasonal Performance Factor for baseline equipment: code

HSPF_ee = Heating Seasonal Performance Factor for new efficient equipment: site-specific.

Hours_H = Equivalent full load heating hours

CR = Capacity Ratio converts rated coolingcapacity to heating capacity. For equipment with cooling capacity ≤ 5.4 tons, assume CR=1. For equipment > 5.4 tons, assume CR=1.15; Optimal Energy, Inc. (2008). Memo:Non-Electric enefits Analysis Update. Prepared for Dave Weber, NSTAR.

EER_base = EnergyEfficiency Ratio of baseline equipment.

EER_ee = Energy Efficiency Ratio of the new efficient equipment: site-specific. For equipment < 5.4 tons, assume the following conversion: EER≈SEER/1.1

Hours: N/A

Hours Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Hours Note: If site-specific data is unavailable, the average cooling EFLHs are taken as 855 hours while the average heating EFLHs are taken as 1137 hours.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Ground Source Heat Pump - closed loop to 11.25 tons Groundwater Source Heat Pump - Open Loop to 11.25 tons	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Ground Source Heat Pump	25	1.00	1.00		1.05	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Ground Source Heat Pump	37.50%	37.50%	12.50%	12.50%

Measure Life Source: DNV GL (20121). Ground Source Heat Pump eTRM Measure Review (MA20C15-B-GSHP). https://ma-eeac.org/wp-content/uploads/MA20C15-B-GSHP_GroundSourceHeatPump_final.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.

RRsp Source: The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.

RRwp Source: The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.

CFsp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

CFwp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Ground Source Heat Pump	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Ground Source Heat Pump	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Hand Wrapper

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Food Service **Measure Type:** Refrigeration **Measure Sub Type:**

Program: Large C&I New Construction

Measure Description

A commercial on-demand hand-wrap machine that replaces a conventional or always-on hand-wrap machine

Baseline Description

The baseline is a Commercial Electric Hand-wrap Machine always on.

BCR Measures

BCR Measure Name	Unique Identifier
Hand Wrapper	2024 Electric Large C&I New Construction Hand Wrapper

Savings Principle

On-demand Hand-wrap Machine with Mechanical or Optical Control System

Savings Method

Deemed

Unit

Installed hand-wrap machine

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Hand Wrapper	1565.0	0.1810	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Electric kW Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Hand Wrapper	10	1.00	1.00		1.00	1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Hand Wrapper	32.00%	35.00%	16.00%	17.00%

Measure Life Source: University of California, Office of the President, Purchasing Services (2018). Useful Life Index, G8605: Cutters, Slicers, Saws, Choppers, Graters, Grinders, Universal Mach, Food Prep. https://www.caetrm.com/media/reference-documents/UC_EUL_for_Hand_Wrap_Food_Prep_2018.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because savings are based on researched assumptions.

RRsp Note: Realization rate is assumed 100% because savings are based on researched assumptions.

RRwp Note: Realization rate is assumed 100% because savings are based on researched assumptions.

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFsp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Hand Wrapper	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Hand Wrapper	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.11 / kWh

Incentive: $0.07 / kWh

Heating Hot Water Pump

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I New Construction

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Heating Hot Water Pump	2024 Electric Large C&I New Construction Heating Hot Water Pump

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heating Hot Water Pump	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heating Hot Water Pump	15	1.00	1.00		0.94	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heating Hot Water Pump	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

RRsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

RRwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heating Hot Water Pump	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heating Hot Water Pump	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.48 / kWh

Incentive: $0.31 / kWh

High Efficiency Condensing Units

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Refrigeration **Measure Type:** Condensing Unit **Measure Sub Type:** Refrigeration

Program: Large C&I New Construction

Measure Description

The installation of a High Efficiency Condensing Unit (HECU) with a floating heat pressure control and scroll compressor. Savings are broken out per component of the HECU.

Baseline Description

The baseline efficiency case for the HECU measure is a condensing unit with a standard compressor efficiency rating, no floating head pressure controls, and single speed compressor fan motors.

BCR Measures

BCR Measure Name	Unique Identifier
High Efficiency Condensing Units - Floating Head Pressure Control	2024 Electric Large C&I New Construction High Efficiency Condensing Units - Floating Head Pressure Control
High Efficiency Condensing Units - Scroll Compressor	2024 Electric Large C&I New Construction High Efficiency Condensing Units - Scroll Compressor

Savings Principle

The high efficiency case for the HECU measure must have scroll compressor technology, incorporate floating head pressure controls, and have the ability to modulate compressor fan speed.

Savings Method

Deemed

Unit

Per HECU

Savings Equation

Hours: N/A

Hours Note: Refer to Appendix A Table 14

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
High Efficiency Condensing Units - Floating Head Pressure Control High Efficiency Condensing Units - Scroll Compressor	Deemed	Deemed	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Refer to Appendix A Table 14

Electric kW Note: Refer to Appendix A Table 14

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
High Efficiency Condensing Units	13	1.00	1.00		1.00			0.77	0.69

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
High Efficiency Condensing Units	33.00%	32.60%	17.00%	17.40%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Note: Based on VT

CFwp Note: Based on VT

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
High Efficiency Condensing Units	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
High Efficiency Condensing Units	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.45 / kWh

Incentive: $0.29 / kWh

High Performance Contact Conveyor Toaster

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Food Service

Measure Type: Toaster

Measure Sub Type: High Performance

Program: Large C&I New Construction

Measure Description

The Installation of a high performance contact conveyor toaster.

Baseline Description

The baseline is >3.75 W/bun from the 2022 CA eTRM.

BCR Measures

BCR Measure Name	Unique Identifier
High Performance Contact Conveyor Toaster	2024 Electric Large C&I New Construction High Performance Contact Conveyor Toaster

Savings Principle

The efficient equipment must be <= 3.75 W/bun.

Savings Method

Deemed

Unit

Installed high performance contact conveyor toaster.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
High Performance Contact Conveyor Toaster	2340.0	0.3610	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: CA eTRM

Electric kW Source: CA eTRM

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
High Performance Contact Conveyor Toaster	12	1.00	1.00		1.00	1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
High Performance Contact Conveyor Toaster	67.00%	0.00%	33.00%	0.00%

Measure Life Source: CEEL (2016). Ultra-Low Temperature Freezers: Opening the Door to Energy Savings in Laboratories.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because savings are based on researched assumptions.

RRsp Note: Realization rate is assumed 100% because savings are based on researched assumptions.

RRwp Note: Realization rate is assumed 100% because savings are based on researched assumptions.

CFsp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

CFwp Note: Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
High Performance Contact Conveyor Toaster	0	0	0.00	0.01	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
High Performance Contact Conveyor Toaster	0.25	0.00	0.09	0.84

NTG Source: NMR (2021). C&I Prescriptive and Custom NTG Omnibus Study (MA20X07-B-CIOMNINTG). https://ma-eeac.org/wp-content/uploads/MA20X07-B-CIOMNINTG_CI-PrescrCustom-NTG-Report_Final_2021.09.13.pdf

TRC: $1.08 / kWh

Incentive: $0.7 / kWh

Hot Food Holding Cabinet

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Food Service **Measure Type:** Hot Food Cabinet **Measure Sub Type:**

Program: Large C&I New Construction

Measure Description

The installation of a commercial hot food holding cabinet.

Baseline Description

The baseline efficiency for a HRHC are the following: Full size is less than or equal to 0.65 kW idle rate, 3/4 size is less than or equal to 0.51 kW idle rate, and 1/2 size is less than or equal to 0.31 kW idle rate.

BCR Measures

BCR Measure Name	Unique Identifier
Hot Food Holding Cabinet - 3/4	2024 Electric Large C&I New Construction Hot Food Holding Cabinet - 3/4
Hot Food Holding Cabinet - Full	2024 Electric Large C&I New Construction Hot Food Holding Cabinet - Full
Hot Food Holding Cabinet - 1/2	2024 Electric Large C&I New Construction Hot Food Holding Cabinet - 1/2

Savings Principle

A HFHC that incorporates better insulation, reducing heat loss, and may also offer additional energy saving devices such as magnetic door gaskets, auto-door closures, or dutch doors. 1/2 size idle energy rate is 172 W. 3/4 size idle energy rate is 258 W.

Savings Method

Deemed

Unit

Per hot food cabinet

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: 4695

Hours Note: Hot food holding cabinets assumed to operate 313 days per year617 for 15 hours a day, or 4,695 hours per year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Hot Food Holding Cabinet - 3/4	498.0	0.1500					
Hot Food Holding Cabinet - Full	498.0	0.1500	0.00	0.00	0.00	0.00	0.00
Hot Food Holding Cabinet - 1/2	498.0	0.1500					

Electric kWh Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Electric kW Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Hot Food Holding Cabinet	12	1.00	1.00		1.00			0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Hot Food Holding Cabinet	32.00%	35.00%	16.00%	17.00%

Measure Life Source: Robert Mowris & Associates (2005). Ninth Year Retention Study of the 1995 Southern California Gas Company Commercial New Construction Program. https://www.caetrm.com/media/reference-documents/Ninth_Year_Retention_Study_No_718A_for_1995_SCG_CNC_Program.pdf

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rates are 100% since savings estimates are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Hot Food Holding Cabinet	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Hot Food Holding Cabinet	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: 3/4 - $1.13/kWh; full - $0.54/kWh; 1/2 - $0.91/kWh

Incentive: 3/4 - $0.73/kWh; full - $0.35/kWh; 1/2 - $0.59/kWh

HVAC Fan

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** HVAC **Measure Sub Type:** Fan

Program: Large C&I New Construction

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
HVAC Fan - Return	2024 Electric Large C&I New Construction HVAC Fan - Return
HVAC Fan - Supply	2024 Electric Large C&I New Construction HVAC Fan - Supply

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
HVAC Fan - Return HVAC Fan - Supply	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
HVAC Fan	15	1.00	1.00		0.94	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
HVAC Fan	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

RRsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

RRwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
HVAC Fan	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
HVAC Fan	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.48 / kWh

Incentive: $0.31 / kWh

Ice Machine

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Food Service **Measure Type:** Ice Machine **Measure Sub Type:**

Program: Large C&I New Construction

Measure Description

Installation of a qualified ENERGY STAR® commercial ice machine.

Baseline Description

The baseline efficiency case is a non-ENERGY STAR® commercial ice machine.

BCR Measures

BCR Measure Name	Unique Identifier
Ice Machine - Ice Making Head	2024 Electric Large C&I New Construction Ice Machine - Ice Making Head
Ice Machine - Cont. Remote	2024 Electric Large C&I New Construction Ice Machine - Cont. Remote
Ice Machine - Ice Self Contained	2024 Electric Large C&I New Construction Ice Machine - Ice Self Contained
Ice Machine - Remote/Split	2024 Electric Large C&I New Construction Ice Machine - Remote/Split

Savings Principle

The high efficiency case is a commercial ice machine meeting the ENERGY STAR® Specifications V3.0 Efficiency Requirements.

Savings Method

Deemed

Unit

Per ice machine

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: 5634

Hours Note: Ice making machines are assumed to operate 365 days per year. The average ice making machine is assumed to operate 18 hours per day, or 5,634 hours per year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Ice Machine - Ice Making Head	1574.0	0.3000	0.00	0.00	0.00	0.00	0.00
Ice Machine - Cont. Remote	3235.0	0.3000					
Ice Machine - Ice Self Contained	680.0	0.3000					
Ice Machine - Remote/Split	1322.0	0.3000					

Electric kWh Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Electric kW Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Ice Machine	8	1.00	1.00		1.00			0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Ice Machine	32.00%	35.00%	16.00%	17.00%

Measure Life Source: Savings Calculator for ENERGY STAR® Certified Commercial Kitchen Equipment: Ice Machine Calcs. <http://www.energystar.gov/buildings/sites/default/uploads/files/commercial_kitchen_equipment_calculator.xlsx >

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rates are 100% since savings estimates are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Ice Machine	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Ice Machine	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: Ice Making Head - $0.38/kWh; Cont. Remote - $0.13/kWh; Ice Self Contained - $0.43/kWh; Remote/Split - $0.10/kWh

Incentive: Ice Making Head - $0.25kWh; Cont. Remote - $0.09/kWh; Ice Self Contained - $0.28/kWh; Remote/Split - $0.06/kWh

LEDS

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** LEDS **Measure Sub Type:** LEDS

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
LEDS	2024 Electric Large C&I New Construction LEDS

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
LEDS	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
LEDS	multi	1.00	1.00	0.95	0.95	0.94	0.75	1.11	0.79

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
LEDS	40.66%	26.01%	20.33%	13.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

RRsp Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

RRwp Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
LEDS	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
LEDS	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.53 / kWh

Incentive: $0.35 / kWh

Lighting Controls

Sector: C&I | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Lighting | **Measure Type:** Controls | **Measure Sub Type:** Controls

Program: Large C&I New Construction

Measure Description

This measure promotes the installation of lighting controls in lost-opportunity applications. Promoted technologies include occupancy sensors, daylight dimming controls, and integrated controls.

Baseline Description

The baseline efficiency case assumes code-compliant controls.

BCR Measures

BCR Measure Name	Unique Identifier
Lighting Controls - Dimming Lighting Controls - Integrated Lighting Controls - Sensor Lighting Controls - Exterior Lighting Controls - Street Light Exterior	2024 Electric Large C&I New Construction Lighting Controls - Dimming 2024 Electric Large C&I New Construction Lighting Controls - Integrated 2024 Electric Large C&I New Construction Lighting Controls - Sensor 2024 Electric Large C&I New Construction Lighting Controls - Exterior 2024 Electric Large C&I New Construction Lighting Controls - Street Light Exterior

Savings Principle

The high efficiency case involves lighting fixtures connected to controls that reduce the baseline hours of operation.

Savings Method

Calc

Unit

Installed lighting controls project.

Savings Equation

Gross kWh = SUM[QTY_i × Watts_i × (Hours_base_i - Hours_ee_i)] / (Watts per kW)

Gross kW = SUM(QTY_i × Watts_i) / (Watts per kW)

Where:

QTY_i = Quantity in controlled fixtures in location i

Watts_i = Connected wattage of controlled fixtures in location i

Hours_base_i = Total annual hours that the connected lighting in location i operated without controls (for retrofit installations) or would have operated with code-compliance controls (for new construction installations).

Hours_ee_i = Total annual hours that the connected lighting in location i operates with the lighting controls implemented.

1,000 Watts per kW = Conversion factor

deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved.

deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Lighting Controls - Dimming Lighting Controls - Integrated Lighting Controls - Sensor Lighting Controls - Exterior Lighting Controls - Street Light Exterior	Calc	Calc	Calc	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Lighting Controls	See Table 13 in Appendix A	1.00	1.00	0.95	0.95	1.00	1.00	0.59	0.54

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Lighting Controls	30.27%	17.38%	34.27%	18.08%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Lighting Controls	0	0	0.00	0.07	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Lighting Controls	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.34 / kWh

Incentive: $0.22 / kWh

Lighting Systems, Custom

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Lighting **Measure Type:** Interior **Measure Sub Type:** Efficient Lighting

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Lighting Systems, Custom	2024 Electric Large C&I New Construction Lighting Systems, Custom

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Lighting Systems, Custom	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Lighting Systems, Custom	multi	1.00	1.00	0.95	0.95	0.94	0.75	1.11	0.79

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Lighting Systems, Custom	40.66%	26.01%	20.33%	13.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

RRsp Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

RRwp Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Lighting Systems, Custom	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Lighting Systems, Custom	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.53 / kWh

Incentive: $0.35 / kWh

Lighting Controls, Custom

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Lighting **Measure Type:** Custom **Measure Sub Type:** Lighting

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Lighting Controls, Custom	2024 Electric Large C&I New Construction Lighting Controls, Custom

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) × Hours

Gross kW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW)

Where:

QTY_base_i = Quantity of baseline fixtures in location i

Watts_base_i = Connected wattage of baseline fixtures in location i

QTY_ee_j = Quantity of efficient fixtures in location j

Watts_ee_j = Connected wattage of efficient fixtures in location j

1,000 Watts per kW = Conversion factor

Hours = Lighting annual hours of operation: site-specific.

deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved.

deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Lighting Controls, Custom	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Lighting Controls, Custom	multi	1.00	1.00	0.95	0.95	1.00	1.00	1.11	0.79

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Lighting Controls, Custom	40.66%	26.01%	20.33%	13.00%

Measure Life Note: Consistent with MA TRM

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Lighting Controls, Custom	0	0	0.00	0.09	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Lighting Controls, Custom	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.53 / kWh

Incentive: $0.35 / kWh

LoadComp

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Compressed Air

Measure Type: High Efficiency Air Compressors

Measure Sub Type:

Program: Large C&I New Construction

Measure Description

The installation of oil flooded, rotary screw compressors with Load/No Load capacity control scheme to improve compression efficiencies at partial loads, including a properly sized air receiver.

Baseline Description

The baseline efficiency case is a typical modulating compressor with blow down valve.

BCR Measures

BCR Measure Name	Unique Identifier
LOADCOMP-25HP	2024 Electric Large C&I New Construction LOADCOMP-25HP
LOADCOMP-75HP	2024 Electric Large C&I New Construction LOADCOMP-75HP

Savings Principle

The high efficiency case is an oil-flooded, rotary screw compressor with Load/No Load capacity control with a properly sized air receiver.

Savings Method

Calculated using site-specific inputs

Unit

Total horsepower (hp) of installed air compressor capacity.

Savings Equation

Gross kWh = HP_compressor × deltakW/HP × Hours

Gross kW = HP_compressor × deltakW/HP

Where:

HP_compressor = Nominal rated horsepower of high efficiency air compressor: site-specific

Hours = Annual operating hours of the air compressor: site-specific

deltakW/HP = Air compressor kW reduction per HP

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
LOADCOMP-25HP LOADCOMP-75HP	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Algorithm Input kwh/horsepower based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations

Electric kW Note: Algorithm Input kwh/horsepower based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
LoadComp	15	1.00	1.00		1.44	1.00	1.00	1.00	0.82

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
LoadComp	24.54%	25.82%	24.53%	25.10%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRsp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

RRwp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
LoadComp	0	0	0.00	0.04	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
LoadComp	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.43 / kWh

Incentive: $0.28 / kWh

Low pressure drop filter

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Compressed Air

Measure Type: Low Pressure Drop Filters

Measure Sub Type: Low Pressure Drop Filter

Program: Large C&I New Construction

Measure Description

Filters remove solids and aerosols from compressed air systems. Low pressure drop filters have longer lives and lower pressure drops than traditional coalescing filters resulting in higher efficiencies.

Baseline Description

The baseline efficiency case is a standard coalescing filter with initial drop of between 1 and 2 pounds per sq inch (psi) with an end of life drop of 10 psi.

BCR Measures

BCR Measure Name	Unique Identifier
Low pressure drop filter	2024 Electric Large C&I New Construction Low pressure drop filter

Savings Principle

The high efficiency case is a low pressure drop filter with initial drop not exceeding 1 psi when new and 3 psi at element change. Filters must be deep-bed, “mist eliminator” style and installed on a single operating compressor rated 15 – 75 HP.

Savings Method

Calculated using site-specific inputs

Unit

Installed filter.

Savings Equation

Gross kWh = Qty × HP_compressor × (kW per HP) × %SAVE × Hours

Gross kW = Qty × HP_compressor × (kW per HP) × %SAVE

Where:

Qty = Number of filters installed: site-specific

HP_compressor = Average compressor load: site-specific

kW per HP = Conversion factor

%SAVE = Percent change in pressure drop: site-specific

Hours = Annual operating hours of the lower pressure drop filter: site-specific

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Low pressure drop filter	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Low pressure drop filter	5	1.00	1.00		1.44	1.00	1.00	1.00	0.82

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Low pressure drop filter	24.54%	25.82%	24.53%	25.10%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

Measure Life Note: Assumes 1/3 of the savings of compressed air

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

RRsp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

RRwp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

CFsp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

CFwp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Low pressure drop filter	0	0	0.00	0.04	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Low pressure drop filter	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.43 / kWh

Incentive: $0.28 / kWh

Make Up Air Fan

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I New Construction

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Make Up Air Fan	2024 Electric Large C&I New Construction Make Up Air Fan

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Make Up Air Fan	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Make Up Air Fan	15	1.00	1.00		0.94	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Make Up Air Fan	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

RRsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

RRwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Make Up Air Fan	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Make Up Air Fan	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.48 / kWh

Incentive: $0.31 / kWh

MFHR

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Whole Home **Measure Type:** Custom **Measure Sub Type:** Adaptive Reuse

Program: Large C&I New Construction

Measure Description

To capture lost opportunities, encourage the construction of energy-efficient homes, and drive the market to one in which new homes are moving towards net-zero energy.

Baseline Description

The User Defined Reference Home was revised in 2023 as a result of a baseline study.

BCR Measures

BCR Measure Name	Unique Identifier
MFHR - Cooling	2024 Electric Large C&I New Construction MFHR - Cooling
MFHR - DHW	2024 Electric Large C&I New Construction MFHR - DHW
MFHR - Heating	2024 Electric Large C&I New Construction MFHR - Heating
MFHR - Lighting	2024 Electric Large C&I New Construction MFHR - Lighting

Savings Principle

The high efficiency case is represented by the specific energy characteristics of each “as-built” home completed through the program.

Savings Method

Calculated using site-specific inputs

Unit

Completed ESH heating, cooling, DHW, or lighting project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
MFHR - Cooling MFHR - DHW MFHR - Heating MFHR - Lighting	Calc	Calc	Calc	Calc	Calc	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
MFHR - Cooling	multi	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
MFHR - DHW								0.58	1.00
MFHR - Heating								0.00	1.00
MFHR - Lighting								0.17	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
MFHR - Cooling	25.70%	25.70%	25.27%	23.32%
MFHR - DHW	39.31%	39.31%	11.78%	9.60%
MFHR - Heating	48.08%	48.08%	1.60%	2.25%
MFHR - Lighting	39.04%	39.04%	10.24%	11.68%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRsp Note: Realization rate is assumed 100% because energy savings are custom calculated.

RRwp Note: Realization rate is assumed 100% because energy savings are custom calculated.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
MFHR	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
MFHR	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.60 / kWh

Incentive: $0.39 / kWh

Motor

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** MOTOR **Measure Sub Type:** MOTOR

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Motor	2024 Electric Large C&I New Construction Motor

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Motor	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Motor	multi	1.00	1.00	0.89	0.89	0.74	1.05	0.92	0.61

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Motor	23.70%	27.20%	23.80%	25.30%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Motor	Calc	Calc	0.00	0.02	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Motor	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.34 / kWh

Incentive: $0.22 / kWh

ODP Motor

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Motor **Measure Sub Type:** ODP

Program: Large C&I New Construction

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
ODP-1200F	2024 Electric Large C&I New Construction ODP-1200F
ODP-1200N	2024 Electric Large C&I New Construction ODP-1200N
ODP-1200S	2024 Electric Large C&I New Construction ODP-1200S
ODP-1800F	2024 Electric Large C&I New Construction ODP-1800F
ODP-1800N	2024 Electric Large C&I New Construction ODP-1800N
ODP-1800S	2024 Electric Large C&I New Construction ODP-1800S
ODP-3600F	2024 Electric Large C&I New Construction ODP-3600F
ODP-3600N	2024 Electric Large C&I New Construction ODP-3600N
ODP-3600S	2024 Electric Large C&I New Construction ODP-3600S

Savings Principle

Savings Method

Unit

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
ODP-1200F							
ODP-1200N							
ODP-1200S							
ODP-1800F							
ODP-1800N	Calc	Calc	0.00	0.00	0.00	0.00	0.00
ODP-1800S							
ODP-3600F							
ODP-3600N							
ODP-3600S							

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
ODP Motor	15	1.00	1.00		0.94	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
ODP Motor	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

RRsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

RRwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
ODP Motor	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
ODP Motor	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.45 / kWh

Incentive: $0.29 / kWh

Other

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** OTHER **Measure Sub Type:** Other

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Other	2024 Electric Large C&I New Construction Other

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Other	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Other	multi	1.00	1.00	0.89	0.89	0.74	1.05	0.85	0.91

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Other	42.63%	24.04%	21.31%	12.02%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Other	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Other	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.60 / kWh

Incentive: $0.39 / kWh

Packaged Terminal Air Conditioner

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** PTAC **Measure Sub Type:** PTAC

Program: Large C&I New Construction

Measure Description

This measure applies to the installation of high-efficiency single package or split system air source, water source, ground source (closed loop) and groundwater source (open loop) heat pump systems for space conditioning applications.

Baseline Description

Appendix A details the specific efficiency requirements by equipment type.

BCR Measures

BCR Measure Name	Unique Identifier
Packaged Terminal Air Conditioner	2024 Electric Large C&I New Construction Packaged Terminal Air Conditioner

Savings Principle

The high efficiency case assumes the HVAC equipment exceeds the requirements of the current version of International Energy Conservation Code (IECC) as mandated by Rhode Island State Building Code.

Savings Method

Calculated using site-specific inputs

Unit

Installed unitary AC system for space cooling.

Savings Equation

Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) × Hours_C

Gross kW = Tons × (kBtu/hr per ton) × (1/EER_base - 1/EER_ee)

Where:

Tons = Rated cooling capacity of the installed equipment: site-specific.

12 kBtu/hr per ton = Conversion factor

SEER_base = Seasonal Energy Efficiency Ratio of the baseline equipment: code

SEER_ee = Seasonal energy efficiency ratio of the high-efficiency unit: site-specific.

Hours_C = Equivalent full load cooling hours

EER_ee = Energy Efficiency Ratio of the new efficient equipment: site-specific. For equipment < 5.4 tons, assume the following conversion: EER≈SEER/1.1

EER_base = Energy Efficiency Ratio of baseline equipment: code. Since IECC 2012 does not provide EER requirements for equipment < 5.4 tons, assume the following conversion: EER ≈ SEER/1.1

Hours: N/A

Hours Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Hours Note: If site-specific data is unavailable, the average cooling EFLHs are taken as 855 hours while the average heating EFLHs are taken as 1137 hours.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Packaged Terminal Air Conditioner	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Packaged Terminal Air Conditioner	15	1.00	1.00		1.00	1.00	1.00	0.40	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Packaged Terminal Air Conditioner	8.60%	4.60%	52.70%	34.10%

Measure Life Source: California Public Utilities Commission (2014). Energy Division, DEER EUL Table Update.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

RRsp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

RRwp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

CFsp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

CFwp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Packaged Terminal Air Conditioner	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Packaged Terminal Air Conditioner	0.45	0.00	0.00	0.55

NTG Source: DNV (2021). MA C&I Upstream HVAC & Gas Water Heating NTG Study (MA20X08-B-CIHVACNTG). https://ma-eeac.org/wp-content/uploads/MA20X08-B-CIHVACNTG_Final_Report_Clean_9.10.pdf

TRC: $0.30 / kWh

Incentive: $0.25 / kWh

Packaged Terminal Heat Pumps (PTHP)

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: HVAC

Measure Type: Heat Pumps

Measure Sub Type: Heat Pump, Packaged Terminal

Program: Large C&I New Construction

Measure Description

Installation of a high efficiency PTHP from a code level PTHP.

Baseline Description

The baseline is a code level PTHP.

BCR Measures

BCR Measure Name	Unique Identifier
Packaged Terminal Heat Pumps (PTHP)	2024 Electric Large C&I New Construction Packaged Terminal Heat Pumps (PTHP)

Savings Principle

The high efficiency case is a high efficiency PTHP

Savings Method

Deemed

Unit

Per PTHP

Savings Equation

Gross kWh = Qty × (kW_base - kW_ee) × Hours

Gross kW = Qty × (kW_base - kW_ee)

Where:

Qty = Total number of units.

kW_base = Deemed average demand per baseline unit.

kW_ee = Deemed average demand per high-efficiency unit.

Hours = Deemed average annual operating hours.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Packaged Terminal Heat Pumps (PTHP)	1.0		0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Based on energy modeling of PNNL prototype buildings of small hotel, large hotel, and multifamily mid-rise

Electric kW Note: The peak demand occurs in the winter at low ambient temps when supplemental elec resistance heat is operational. As a result, there is no max kW demand reduction going from PTAC to high efficiency PTHP (existing buildings) or code level PTHP to high effic

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Packaged Terminal Heat Pumps (PTHP)	8	1.00	1.00		1.00	1.00	1.00	0.01	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Packaged Terminal Heat Pumps (PTHP)	19.06%	16.76%	36.33%	27.84%

Measure Life Source: Guidehouse (2018). ComEd Effective Useful Life Research Report. https://www.icc.illinois.gov/docket/P2017-0312/documents/287811/files/501915.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization Rate is assumed 100%.

RRwp Note: Realization Rate is assumed 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Packaged Terminal Heat Pumps (PTHP)	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Packaged Terminal Heat Pumps (PTHP)	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $3.08 / kWh

Incentive: $0 / kWh

PEI H2O Pump, Continuous

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Pump **Measure Sub Type:** PEI H2O Pump

Program: Large C&I New Construction

Measure Description

The installation of a clean water pump with a constant speed.

Baseline Description

The baseline efficiency case for this measure is a PEI rating of 0.94 for a pump sized 1 <= hp <= 50 and a PEI rating of 0.95 for a pump sized 50 <= hp <= 250.

BCR Measures

BCR Measure Name	Unique Identifier
PEI H2O PUMP - AG, C	2024 Electric Large C&I New Construction PEI H2O PUMP - AG, C
PEI H2O PUMP - COMM, C	2024 Electric Large C&I New Construction PEI H2O PUMP - COMM, C
PEI H2O PUMP - INDUS, C	2024 Electric Large C&I New Construction PEI H2O PUMP - INDUS, C
PEI H2O PUMP - MUNI, C	2024 Electric Large C&I New Construction PEI H2O PUMP - MUNI, C

Savings Principle

The high efficiency case for this measure is a PEI rating of 0.92 for a pump sized 1 <= hp <= 15, PEI rating of 0.88 and 0.90 for a pump sized 15 <= hp <= 50 and a PEI rating of 0.89, 0.91 and 0.93 for a pump sized 50 <= hp <= 250.

Savings Method

Calculated using site-specific inputs

Unit

Installed clean water pump

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Hours Source: Pacific Gas and Electric Company (PG&E). 2022. "SWWP004-02 Pump Database and PEI Analysis_5-12-22.xlsx.

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
PEI H2O PUMP - AG, C	354.3	0.0800	0.00	0.00	0.00	0.00	0.00
PEI H2O PUMP - COMM, C	532.0	0.0800					
PEI H2O PUMP - INDUS, C	917.9	0.0800					
PEI H2O PUMP - MUNI, C	320.1	0.0800					

Electric kWh Source: NEEA (2019). Extended Motor Product Savings Validation Research on Clean Water Pumps and Circulators. https://www.neea.org/img/documents/XMP-Savings-Validation-Research-on-Clean-Water-Pumps-and-Circulators.pdf

Electric kW Source: NEEA (2019). Extended Motor Product Savings Validation Research on Clean Water Pumps and Circulators. https://www.neea.org/img/documents/XMP-Savings-Validation-Research-on-Clean-Water-Pumps-and-Circulators.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
PEI H2O Pump, Continuous	15	1.00	1.00		1.01	1.09	1.57	0.82	0.05

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
PEI H2O Pump, Continuous	15.88%	18.23%	33.58%	32.31%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
PEI H2O Pump, Continuous	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
PEI H2O Pump, Continuous	0.46	0.00	0.00	0.54

NTG Source: DNV GL, NMR, Tetra Tech (2018). Massachusetts Commercial and Industrial Upstream HVAC/Heat Pump and Hot Water NTG and Market Effects Indicator Study. https://ma-eeac.org/wp-content/uploads/TXC_35_Report_5Sep2018_FINAL.pdf

TRC: $0.18 / kWh

Incentive: $0.12 / kWh

PEI H2O Pump, Variable

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Pump **Measure Sub Type:** PEI H2O Pump

Program: Large C&I New Construction

Measure Description

The installation of a clean water pump with a variable speed.

Baseline Description

The baseline efficiency case for this measure is a PEI rating of 0.47 for a pump sized 1 <= hp <= 15 and a PEI rating of 0.49 for a pump sized 15 <= hp <=250

BCR Measures

BCR Measure Name	Unique Identifier
	2024 Electric Large C&I New Construction PEI H2O PUMP - AG, V
PEI H2O PUMP - AG, V	2024 Electric Large C&I New Construction PEI H2O PUMP - COMM, V
PEI H2O PUMP - COMM, V	2024 Electric Large C&I New Construction PEI H2O PUMP - INDUS, V
PEI H2O PUMP - INDUS, V	2024 Electric Large C&I New Construction PEI H2O PUMP - MUNI, V
PEI H2O PUMP - MUNI, V	

Savings Principle

The high efficiency case for this measure is a PEI rating of 0.43, 0.45, and 0.47 for a pump sized 15 <= hp <= 50 and a PEI rating of 0.45 and 0.47 for a pump sized 50 <= hp <= 250.

Savings Method

Calculated using site-specific inputs

Unit

Installed clean water pump

Savings Equation

Annual Electric Energy Savings

$\Delta kWh = hp \times 0.746 \times (1 - OF) \times (PEIbaseline - PEIee) \times LSAF \times hrs$

Summer Peak Coincident Demand Savings

$\Delta kW = hp \times 0.746 \times RLF \times (PEIbaseline - PEIee) \times CF$

Annual Fossil Fuel Energy Savings

$\Delta MMBtu = N/A$

where:

ΔkWh = Annual electricity energy savings

ΔkW = Peak coincident demand electric savings

ΔMMBtu = Annual fossil fuel energy savings

hp = Pump motor horsepower

OF = Oversize Factor

baseline = Characteristic of baseline condition

ee = Characteristic of energy efficient condition

PEI = Pump Energy Index

LSAF = Load Shape Adjustment Factor

hrs = Annual hours of operation

RLF = Rated load factor

CF = Coincidence factor

0.746 = Conversion factor (kW/hp), 746 watts equals one horsepower

Hours: N/A

Hours Source: Pacific Gas and Electric Company (PG&E). 2022. "SWWP004-02 Pump Database and PEI Analysis_5-12-22.xlsx.

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
PEI H2O PUMP - AG, V PEI H2O PUMP - COMM, V PEI H2O PUMP - INDUS, V PEI H2O PUMP - MUNI, V	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
PEI H2O Pump, Variable	15	1.00	1.00		1.01	1.09	1.57	0.82	0.05

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
PEI H2O Pump, Variable	15.88%	18.23%	33.58%	32.31%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
PEI H2O Pump, Variable	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
PEI H2O Pump, Variable	0.46	0.00	0.00	0.54

NTG Source: DNV GL, NMR, Tetra Tech (2018). Massachusetts Commercial and Industrial Upstream HVAC/Heat Pump and Hot Water NTG and Market Effects Indicator Study. https://ma-eeac.org/wp-content/uploads/TXC_35_Report_5Sep2018_FINAL.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Performance Lighting, Custom

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** LGHT-PERF **Measure Sub Type:** LGHT-PERF

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Performance Lighting, Custom	2024 Electric Large C&I New Construction Performance Lighting, Custom

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Performance Lighting, Custom	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Performance Lighting, Custom	multi	1.00	1.00		0.95	0.94	0.75	1.11	0.79

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Performance Lighting, Custom	40.66%	26.01%	20.33%	13.00%

Measure Life Source: DNV (2022). RI C&I Lighting Market Characterization and Adjusted Measure Life Study. http://rieermc.ri.gov/wp-content/uploads/2022/11/rhode-island_ci-lighting-market-characterization-and-adjusted-measure-life-report_final.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

RRsp Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

RRwp Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Performance Lighting, Custom	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Performance Lighting, Custom	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.53 / kWh

Incentive: $0.35 / kWh

Performance Lighting

Sector: C&I | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Lighting | **Measure Type:** Prescriptive Lighting | **Measure Sub Type:** Performance Lighting

Program: Large C&I New Construction

Measure Description

The installation of lighting systems that achieve lighting power densities below those required by RI building code.

Baseline Description

The Baseline Efficiency assumes compliance with lighting power density requirements as mandated by Rhode Island State Building Code, which currently reflects IECC 2012. IECC 2012 offers two compliance paths, the Building Area Method and Space-by-Space Method.

BCR Measures

BCR Measure Name	Unique Identifier
Performance Lighting - Tier 1 Exterior	2024 Electric Large C&I New Construction Performance Lighting - Tier 1 Exterior
Performance Lighting - Tier 1 Interior	2024 Electric Large C&I New Construction Performance Lighting - Tier 1 Interior
Performance Lighting Tier 2 & 3 Exterior	2024 Electric Large C&I New Construction Performance Lighting Tier 2 & 3 Exterior
Performance Lighting Tier 2 & 3 Interior	2024 Electric Large C&I New Construction Performance Lighting Tier 2 & 3 Interior

Savings Principle

The high efficiency scenario assumes lighting systems that achieve lighting power densities below those required by RI State Building Code. Actual site lighting power densities should be determined on a case-by-case basis. Please refer to the current yearapplication form for minimum percentage better than code efficiency requirements.

Savings Method

Calc

Unit

Installed lighting performance project.

Savings Equation

Gross kWh = [SUM(LPD_base_i × Area_i × Hours_i) - SUM(QTY_ee_j × Watts_ee_j × Hours_j)] / (Watts per kW)

Gross kW = [SUM(LPD_base_i × Area_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW)

Where:

Area_i = Floor area of location i (SQFT)

Hours_base_i = Total annual operating hours for baseline lighting equipment in location i

QTY_ee_j = Quantity of efficient fixtures in location j

Watts_ee_j = Connected wattage of efficient fixtures in location j

Hours_j = Lighting annual hours of operation: site-specific.

1,000 Watts per kW = Conversion factor

deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved.

deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Performance Lighting - Tier 1 Exterior	Calc	Calc	Calc	0.00	0.00	Calc	0.00
Performance Lighting - Tier 1 Interior	Calc	Calc	Calc			Calc	
Performance Lighting Tier 2 & 3 Exterior	Calc	Calc	Calc			Calc	
Performance Lighting Tier 2 & 3 Interior	Calc	Calc	Calc			Calc	

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Performance Lighting	15	1.00	1.00	0.95	0.95	1.00	1.00	0.59	0.54

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Performance Lighting	30.27%	17.38%	34.27%	18.08%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Performance Lighting	0	0	0.00	0.02	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Performance Lighting	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.34 / kWh

Incentive: $0.34 / kWh

Prescriptive Lighting

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Lighting **Measure Type:** Prescriptive Lighting **Measure Sub Type:** Lighting

Program: Large C&I New Construction

Measure Description

This measure promotes the installation of lighting fixtures in lost opportunity applications.

Baseline Description

The baseline efficiency case is determined using assumed baseline wattages for each of the installed fixtures unless baseline assumptions have been evaluated.

BCR Measures

BCR Measure Name	Unique Identifier
Prescriptive Lighting - EXT-24/7	2024 Electric Large C&I New Construction Prescriptive Lighting - EXT-24/7
Prescriptive Lighting - EXT-DUSKDAWN	2024 Electric Large C&I New Construction Prescriptive Lighting - EXT-DUSKDAWN
Prescriptive Lighting - Compact	2024 Electric Large C&I New Construction Prescriptive Lighting - Compact
Prescriptive Lighting - Custom	2024 Electric Large C&I New Construction Prescriptive Lighting - Custom
Prescriptive Lighting - Fluorescent	2024 Electric Large C&I New Construction Prescriptive Lighting - Fluorescent
Prescriptive Lighting - LED Case Ref	2024 Electric Large C&I New Construction Prescriptive Lighting - LED Case Ref
Prescriptive Lighting - LED General	2024 Electric Large C&I New Construction Prescriptive Lighting - LED General
Prescriptive Lighting - LED Sign	2024 Electric Large C&I New Construction Prescriptive Lighting - LED Sign

Savings Principle

The high efficiency case is project-specific and is determined using actual fixture counts for the project and the wattage tables in Appendix A.

Savings Method

Calculated using site-specific inputs

Unit

Installed high-efficiency lighting project.

Savings Equation

Gross kWh = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) × Hours

Gross kW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW)

Where:

QTY_base_i = Quantity of baseline fixtures in location i

Watts_base_i = Connected wattage of baseline fixtures in location i

QTY_ee_j = Quantity of efficient fixtures in location j

Watts_ee_j = Connected wattage of efficient fixtures in location j

1,000 Watts per kW = Conversion factor

Hours = Lighting annual hours of operation: site-specific.

deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved.

deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Prescriptive Lighting - EXT-24/7 Prescriptive Lighting - EXT-DUSKDAWN Prescriptive Lighting - Compact Prescriptive Lighting - Custom Prescriptive Lighting - Fluorescent Prescriptive Lighting - LED Case Ref Prescriptive Lighting - LED General Prescriptive Lighting - LED Sign	Calc	Calc	Calc	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Prescriptive Lighting	15	1.00	1.00	0.95	0.95	1.00	1.00	0.59	0.54

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Prescriptive Lighting	30.27%	17.38%	34.27%	18.08%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Prescriptive Lighting	0	0	0.00	0.02	0.00	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Prescriptive Lighting	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.34 / kWh

Incentive: $0.22 / kWh

Process

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** PROCESS **Measure Sub Type:** PROCESS

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Process	2024 Electric Large C&I New Construction Process

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Process	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Process	5,10,15,20	1.00	1.00	0.89	0.89	0.74	1.05	0.68	0.62

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Process	45.55%	21.12%	22.77%	10.56%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Process	Calc	Calc	0.00	0.09	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Process	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.52 / kWh

Incentive: $0.34 / kWh

Process Cooling

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** PROC-COOLING **Measure Sub Type:** PROC-COOLING

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Process Cooling	2024 Electric Large C&I New Construction Process Cooling

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Process Cooling	Calc	Calc	0.00	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Process Cooling	multi	1.00	1.00		0.89	0.74	1.05	0.68	0.62

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Process Cooling	45.55%	21.12%	22.77%	10.56%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Process Cooling	Calc	Calc	0.00	0.09	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Process Cooling	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.50 / kWh

Incentive: $0.32 / kWh

Process Exhaust Fan

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I New Construction

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Process Exhaust Fan	2024 Electric Large C&I New Construction Process Exhaust Fan

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Process Exhaust Fan	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Process Exhaust Fan	15	1.00	1.00		0.94	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Process Exhaust Fan	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

RRsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

RRwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Process Exhaust Fan	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Process Exhaust Fan	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.48 / kWh

Incentive: $0.31 / kWh

Process, Cool Pump

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I New Construction

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Process, Cool Pump	2024 Electric Large C&I New Construction Process, Cool Pump

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Process, Cool Pump	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Process, Cool Pump	15	1.00	1.00		0.94	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Process, Cool Pump	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

RRsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

RRwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Process, Cool Pump	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Process, Cool Pump	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.48 / kWh

Incentive: $0.31 / kWh

Refrigerated Air Dryer

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Compressed Air

Measure Type: Refrigerated Air Dryers

Measure Sub Type: Refrigerated Air Dryer

Program: Large C&I New Construction

Measure Description

The installation of cycling or variable frequency drive (VFD)-equipped refrigerated compressed air dryer. An efficient refrigerated dryer cycles on and off or uses a variable speed drive as required by the demand for compressed air instead of running continuously. Only properly sized refrigerated air dryers used in a single-compressor system are eligible.

Baseline Description

The baseline efficiency case is a non-cycling refrigerated air dryer.

BCR Measures

BCR Measure Name	Unique Identifier
Refrigerated Air Dryer - CAT<100	2024 Electric Large C&I New Construction Refrigerated Air Dryer - CAT<100
Refrigerated Air Dryer - CAT>400	2024 Electric Large C&I New Construction Refrigerated Air Dryer - CAT>400
Refrigerated Air Dryer - CAT-200	2024 Electric Large C&I New Construction Refrigerated Air Dryer - CAT-200
Refrigerated Air Dryer - CAT-300	2024 Electric Large C&I New Construction Refrigerated Air Dryer - CAT-300
Refrigerated Air Dryer - CAT-400	2024 Electric Large C&I New Construction Refrigerated Air Dryer - CAT-400

Savings Principle

The high efficiency case is a cycling refrigerated dryer or a refrigerated dryer equipped with a VFD.

Savings Method

Calculated using site-specific inputs

Unit

kW saved per CFM of installed air dryer capacity.

Savings Equation

Gross kWh = CFM_dryer × deltakW/CFM × Hours

Gross kW = CFM_dryer × deltakW/CFM

Where:

CFM_dryer = Full flow rated capacity of the refrigerated air dryer in cubic feet per minute (CFM), typically obtained from equipment's Compressed Air Gas Institute Datasheet: site-specific

deltakW/CFM = Refrigerated air dryer kW reduction per dryer full flow rated CFM

Hours = Annual operating hours of the refrigerated air dryer: site-specific

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis; RR adjusts for evaluation results.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Refrigerated Air Dryer - CAT<100 Refrigerated Air Dryer - CAT>400 Refrigerated Air Dryer - CAT-200 Refrigerated Air Dryer - CAT-300 Refrigerated Air Dryer - CAT-400	Calc	0.0056	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Algorithm Input kwh/CFM based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations

Electric kW Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

Electric kW Note: kW/(rated CFM)

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Refrigerated Air Dryer	13	1.00	1.00		1.44	1.00	1.00	1.00	0.82

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Refrigerated Air Dryer	24.54%	25.82%	24.53%	25.10%

Measure Life Source: Guidehouse (2018). ComEd Effective Useful Life Research Report. https://www.icc.illinois.gov/docket/P2017-0312/documents/287811/files/501915.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

RRsp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

RRwp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

CFsp Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

CFwp Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Refrigerated Air Dryer	0	0	0.00	0.04	0.00	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Refrigerated Air Dryer	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.43 / kWh

Incentive: $0.28 / kWh

Refrigerated Chef Base

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Food Service

Measure Type: Refrigeration

Measure Sub Type: Refrigerated Chef Base

Program: Large C&I New Construction

Measure Description

The measure case is defined as a refrigerated chef base that uses energy less than or equal to the maximum daily energy consumption.

Baseline Description

The baseline efficiency are refrigerated chef bases with the following daily energy use intensity per exterior length: 35-54"- 0.6000 kWh/day/ft3, 55-73" - 0.5400 kWh/day/ft3, 75-89" - 0.4751 kWh/day/ft3, and 90-120" - 0.4700 kWh/day/ft3.

BCR Measures

BCR Measure Name	Unique Identifier
Refrigerated Chef Base - 35" to 54"	2024 Electric Large C&I New Construction Refrigerated Chef Base - 35" to 54"
Refrigerated Chef Base - 55" to 73"	2024 Electric Large C&I New Construction Refrigerated Chef Base - 55" to 73"
Refrigerated Chef Base - 74" to 89"	2024 Electric Large C&I New Construction Refrigerated Chef Base - 74" to 89"
Refrigerated Chef Base - 90" to 120"	2024 Electric Large C&I New Construction Refrigerated Chef Base - 90" to 120"

Savings Principle

The high efficiency case are refrigerated chef bases with the following daily energy use intensity based on the exterior length: 35-54"- 0.1800 kWh/day/ft3, 55-73" - 0.1600 kWh/day/ft3, 75-89" - 0.1400 kWh/day/ft3, and 90-120" - 0.1400 kWh/day/ft3.

Savings Method

Deemed based on algorithm

Unit

Daily Energy Use (kWh/day/ft3)

Savings Equation

Chef Base Daily Energy Use kWh/day/ft3 * 365 (# 0f days) = Annual Energy Consumption (kWh)/ft3

(Annual Energy Consumption Standard - Annual Energy Consumption Efficient) x Refrigerated Volume = kWh/yr

(Peak demand Intensity kW/ft3 Standard - Efficient) xRefrigerated Volume = Peak Demand Savings kW

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Refrigerated Chef Base - 35" to 54"	1052.0	0.1152	0.00	0.00	0.00	0.00	0.00
Refrigerated Chef Base - 55" to 73"	1637.0	0.1770					
Refrigerated Chef Base - 74" to 89"	1985.0	0.2142					
Refrigerated Chef Base - 90" to 120"	2673.0	0.2885					

Electric kWh Source: Emerging Products (2016). Chef Bases for Foodservice Applications. https://www.caetrm.com/media/reference-documents/ET15SCE1010_Chef_Bases_Report_final2.pdf

Electric kW Source: Emerging Products (2016). Chef Bases for Foodservice Applications. https://www.caetrm.com/media/reference-documents/ET15SCE1010_Chef_Bases_Report_final2.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Refrigerated Chef Base	12	1.00	1.00		1.00	1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Refrigerated Chef Base	32.00%	35.00%	16.00%	17.00%

Measure Life Source: California Public Utilities Commission (2014). Energy Division, DEER EUL Table Update.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Refrigerated Chef Base	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Refrigerated Chef Base	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: 35"-54" - $0.81/kWh; 74"-89" - $0.43/kWh

Incentive: 35"-54" - $0.52/kWh; 74"-89" - $0.28/kWh

Refrigerator Glass Door

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Refrigeration **Measure Type:** Door **Measure Sub Type:** Glass

Program: Large C&I New Construction

Measure Description

Installation of an Energy Star rated refrigerator with a glass door.

Baseline Description

The baseline efficiency case is a refrigerator with standard energy consumption.

BCR Measures

BCR Measure Name	Unique Identifier
Refrigerator Glass Door - <15 ft3	2024 Electric Large C&I New Construction Refrigerator Glass Door - <15 ft3
Refrigerator Glass Door - 15 to 29.9 ft3	2024 Electric Large C&I New Construction Refrigerator Glass Door - 15 to 29.9 ft3
Refrigerator Glass Door - 30 to 49.9 ft3	2024 Electric Large C&I New Construction Refrigerator Glass Door - 30 to 49.9 ft3
Refrigerator Glass Door - >50 ft3	2024 Electric Large C&I New Construction Refrigerator Glass Door - >50 ft3

Savings Principle

The high efficiency case is an Energy Star rated refrigerator.

Savings Method

Deemed

Unit

Per refrigerator

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Refrigerator Glass Door - <15 ft3	245.0	0.0300	0.00	0.00	0.00	0.00	0.00
Refrigerator Glass Door - 15 to 29.9 ft3	307.0	0.0400					
Refrigerator Glass Door - 30 to 49.9 ft3	540.0	0.0600					
Refrigerator Glass Door - >50 ft3	610.0	0.0700					

Electric kWh Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Electric kW Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Refrigerator Glass Door	12	1.00	1.00		1.00	1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Refrigerator Glass Door	32.00%	35.00%	16.00%	17.00%

Measure Life Source: California Public Utilities Commission (2014). Energy Division, DEER EUL Table Update.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Refrigerator Glass Door	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Refrigerator Glass Door	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: <15ft3 - $1.41/kWh; 15-29.9ft3 - $0.88/kWh; 30-49.9ft3 - $0.64/kWh; >50ft3 - $0.95/kWh

Incentive: <15ft3 - $0.92/kWh; 15-29.9ft3 - $0.57/kWh; 30-49.9ft3 - $0.42/kWh; >50ft3 - $0.61/kWh

Refrigerator Solid Door

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Refrigeration **Measure Type:** Door **Measure Sub Type:** Solid

Program: Large C&I New Construction

Measure Description

Installation of an Energy Star rated refrigerator with a solid door.

Baseline Description

The baseline efficiency case is a refrigerator with standard energy consumption.

BCR Measures

BCR Measure Name	Unique Identifier
Refrigerator Solid Door - <15 ft3	2024 Electric Large C&I New Construction Refrigerator Solid Door - <15 ft3
Refrigerator Solid Door - 15 to 29.9 ft3	2024 Electric Large C&I New Construction Refrigerator Solid Door - 15 to 29.9 ft3
Refrigerator Solid Door - 30 to 49.9 ft3	2024 Electric Large C&I New Construction Refrigerator Solid Door - 30 to 49.9 ft3
Refrigerator Solid Door - >50 ft3	2024 Electric Large C&I New Construction Refrigerator Solid Door - >50 ft3

Savings Principle

The high efficiency case is an Energy Star rated refrigerator.

Savings Method

Deemed

Unit

Per refrigerator

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Refrigerator Solid Door - <15 ft3	170.0	0.0200	0.00	0.00	0.00	0.00	0.00
Refrigerator Solid Door - 15 to 29.9 ft3	255.0	0.0300					
Refrigerator Solid Door - 30 to 49.9 ft3	245.0	0.0400					
Refrigerator Solid Door - >50 ft3	376.0	0.0500					

Electric kWh Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Electric kW Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Refrigerator Solid Door	12	1.00	1.00		1.00	1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Refrigerator Solid Door	32.00%	35.00%	16.00%	17.00%

Measure Life Source: California Public Utilities Commission (2014). Energy Division, DEER EUL Table Update.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Refrigerator Solid Door	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Refrigerator Solid Door	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: <15ft3 - $2.04/kWh; 15-29.9ft3 - $1.06/kWh; 30-49.9ft3 - $2.04/kWh; >50ft3 - $1.54/kWh

Incentive: <15ft3 - $1.32/kWh; 15-29.9ft3 - $0.69/kWh; 30-49.9ft3 - $1.33/kWh; >50ft3 - $1.00/kWh

Room Air Cleaner

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Room Air Cleaners **Measure Sub Type:**

Program: Large C&I New Construction

Measure Description

The installation of an ENERGY STAR® qualified room air cleaner for a classroom, small office, or small retail space.

Baseline Description

The baseline efficiency case is a unit with 2.0 CADR/Wattdust.

BCR Measures

BCR Measure Name	Unique Identifier
Room Air Cleaner - K-12	2024 Electric Large C&I New Construction Room Air Cleaner - K-12
Room Air Cleaner - Office	2024 Electric Large C&I New Construction Room Air Cleaner - Office
Room Air Cleaner - Retail	2024 Electric Large C&I New Construction Room Air Cleaner - Retail

Savings Principle

The current EnergyStar specification requires a minimum of 2.0 CADR/Wattdust. However, the ENERGY STAR average CADR/Watt (Dust) of models available in their US market database (approximately 170 models) is approximately 3.5 CADR/Wattdust. Therefore it isassumed that the high efficiency unit has a 3.0 CADR/Wattdust

Savings Method

Deemed

Unit

Installed ENERGY STAR® room air cleaner

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakWh / Hours

Where:

Qty = Total number of units.

deltakWh = Deemed average annual kWh reduction per unit.

Hours = Deemed average annual operating hours.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Room Air Cleaner - K-12	214.1	0.0750					
Room Air Cleaner - Office	316.4	0.0750	0.00	0.00	0.00	0.00	0.00
Room Air Cleaner - Retail	373.0	0.0750					

Electric kWh Source: Environmental Protection Agency (2018). Savings Calculator for Energy Star Qualified Appliances.

Electric kW Source: Environmental Protection Agency (2018). Savings Calculator for Energy Star Qualified Appliances.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Room Air Cleaner	3	0.97	1.00		1.00	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Room Air Cleaner	22.83%	27.02%	24.93%	25.22%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Source: Guidehouse. (2021). MA Residential Coordinated Delivery Virtual Home Energy Assessment Study (MA20R26-B-VHEA). https://ma-eeac.org/wp-content/uploads/MA20R26-B-VHEA_Report_FINAL_12MAR2021.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Note: National Grid assumption based on regional PA working groups.

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Room Air Cleaner	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Room Air Cleaner	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.41 / kWh

Incentive: $0.26 / kWh

Sensors

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** Sensors

Program: Large C&I New Construction

Measure Description

The measure is to the installation of occupancy sensors to control HVAC units.

Baseline Description

The baseline efficiency case assumes the equipment has no occupancy based controls.

BCR Measures

BCR Measure Name	Unique Identifier
Sensors	2024 Electric Large C&I New Construction Sensors

Savings Principle

The high efficiency case is the installation of controls that include occupancy sensors.

Savings Method

Deemed

Unit

Installed hotel occupancy sensor.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Sensors	438.0	0.0900	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: National Grid and NSTAR (2010). Energy Analysis: Hotel Guest Occupancy Sensors.

Electric kW Source: National Grid and NSTAR (2010). Energy Analysis: Hotel Guest Occupancy Sensors.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Sensors	10	1.00	1.00		1.08	1.00	1.00	0.42	0.08

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Sensors	11.30%	10.80%	39.40%	38.50%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRsp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRwp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

CFsp Source: KEMA (2016). Impact Evaluation of 2012 National Grid-Rhode Island Prescriptive Chiller Program. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160722_py2012_ri_prescriptive_chiller_report_final.pdf

CFwp Source: KEMA (2016). Impact Evaluation of 2012 National Grid-Rhode Island Prescriptive Chiller Program. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160722_py2012_ri_prescriptive_chiller_report_final.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Sensors	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Sensors	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.40 / kWh

Incentive: $0.26 / kWh

Split system AC to 5.4 tons

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** AC **Measure Sub Type:** Split

Program: Large C&I New Construction

Measure Description

This measure applies to the installation of high-efficiency single package or split system air source, water source, ground source (closed loop) and groundwater source (open loop) heat pump systems for space conditioning applications.

Baseline Description

Appendix A details the specific efficiency requirements by equipment type.

BCR Measures

BCR Measure Name	Unique Identifier
Split system AC to 5.4 tons	2024 Electric Large C&I New Construction Split system AC to 5.4 tons

Savings Principle

The high efficiency case assumes the HVAC equipment exceeds the requirements of the current version of International Energy Conservation Code (IECC) as mandated by Rhode Island State Building Code.

Savings Method

Calculated using site-specific inputs

Unit

Installed unitary AC system for space cooling.

Savings Equation

Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) × Hours_C

Gross kW = Tons × (kBtu/hr per ton) × (1/EER_base - 1/EER_ee)

Where:

Tons = Rated cooling capacity of the installed equipment: site-specific.

12 kBtu/hr per ton = Conversion factor

SEER_base = Seasonal Energy Efficiency Ratio of the baseline equipment: code

SEER_ee = Seasonal energy efficiency ratio of the high-efficiency unit: site-specific.

Hours_C = Equivalent full load cooling hours

EER_ee = Energy Efficiency Ratio of the new efficient equipment: site-specific. For equipment < 5.4 tons, assume the following conversion: EER≈SEER/1.1

EER_base = Energy Efficiency Ratio of baseline equipment: code. Since IECC 2012 does not provide EER requirements for equipment < 5.4 tons, assume the following conversion: EER ≈ SEER/1.1

Hours: N/A

Hours Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Hours Note: If site-specific data is unavailable, the average cooling EFLHs are taken as 855 hours while the average heating EFLHs are taken as 1137 hours.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Split system AC to 5.4 tons	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Split system AC to 5.4 tons	15	1.00	1.00		1.00	1.00	1.00	0.40	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Split system AC to 5.4 tons	8.60%	4.60%	52.70%	34.10%

Measure Life Source: California Public Utilities Commission (2014). Energy Division, DEER EUL Table Update.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

RRsp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

RRwp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

CFsp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

CFwp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Split system AC to 5.4 tons	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Split system AC to 5.4 tons	0.47	0.00	0.00	0.53

NTG Source: DNV GL, NMR, Tetra Tech (2018). Massachusetts Commercial and Industrial Upstream HVAC/Heat Pump and Hot Water NTG and Market Effects Indicator Study. https://ma-eeac.org/wp-content/uploads/TXC_35_Report_5Sep2018_FINAL.pdf

TRC: $0.30 / kWh

Incentive: $0.25 / kWh

TEFC Motor

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I New Construction

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
TEFC-1200F	2024 Electric Large C&I New Construction TEFC-1200F
TEFC-1200N	2024 Electric Large C&I New Construction TEFC-1200N
TEFC-1200S	2024 Electric Large C&I New Construction TEFC-1200S
TEFC-1800F	2024 Electric Large C&I New Construction TEFC-1800F
TEFC-1800N	2024 Electric Large C&I New Construction TEFC-1800N
TEFC-1800S	2024 Electric Large C&I New Construction TEFC-1800S
TEFC-3600F	2024 Electric Large C&I New Construction TEFC-3600F
TEFC-3600N	2024 Electric Large C&I New Construction TEFC-3600N
TEFC-3600S	2024 Electric Large C&I New Construction TEFC-3600S

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
TEFC-1200F TEFC-1200N TEFC-1200S TEFC-1800F TEFC-1800N TEFC-1800S TEFC-3600F TEFC-3600N TEFC-3600S	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
TEFC Motor	15	1.00	1.00		0.94	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
TEFC Motor	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

RRsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

RRwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
TEFC Motor	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
TEFC Motor	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.45 / kWh

Incentive: $0.29 / kWh

Transformers

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** TRNS **Measure Sub Type:** TRNS

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Transformers	2024 Electric Large C&I New Construction Transformers

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Transformers	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Transformers	20,25	1.00	1.00	0.89	0.89	0.74	1.05	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Transformers	0.00%	0.00%	50.00%	50.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Transformers	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Transformers	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.62 / kWh

Incentive: $0.4 / kWh

Upstream Lighting

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Lighting **Measure Type:** Prescriptive **Measure Sub Type:** Upstream

Program: Large C&I New Construction

Measure Description

The installation of efficient lighting discounted at the distribution level.

Baseline Description

The baseline case is a mix of fluorescent and halogen fixtures for LEDs and low efficiency fluorescents for high efficiency fluorescents.

BCR Measures

BCR Measure Name	Unique Identifier
UPSTR Lighting- LED	2024 Electric Large C&I New Construction UPSTR Lighting-LED
UPSTR Lighting - General	2024 Electric Large C&I New Construction UPSTR Lighting - General
UPSTR Lighting - Stairwell LED	2024 Electric Large C&I New Construction UPSTR Lighting - Stairwell LED
UPSTR Lighting - Linear LED	2024 Electric Large C&I New Construction UPSTR Lighting - Linear LED

Savings Principle

The high efficiency case is high efficiency LED. Please refer to Table 6 in Appendix A for wattage details.

Savings Method

Deemed

Unit

Installed high-efficiency lighting project.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Hours Note: The annual hours of operation are application specific and can be seen in Table 6: Upstream Lighting.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
UPSTR Lighting- LED UPSTR Lighting - General UPSTR Lighting - Stairwell LED UPSTR Lighting - Linear LED	Table 6	Table 6	6.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Upstream Lighting	15	1.00	1.00	0.95	0.95	1.00	1.00	0.59	0.54

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Upstream Lighting	30.27%	17.38%	34.27%	18.08%

Measure Life Source: DNV (2022). RI C&I Lighting Market Characterization and Adjusted Measure Life Study. http://rieermc.ri.gov/wp-content/uploads/2022/11/rhode-island_ci-lighting-market-characterization-and-adjusted-measure-life-report_final.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Upstream Lighting	0	0	0.00	0.02	0.00	0.00	0.00	0.00

Annual $ Source: Tetra Tech (2012). Final Report – Commercial and Industrial Non-Energy Impacts Study. https://www.puc.nh.gov/EESE%20Board/Meetings/2017/021017EERSWorkshop1/Commercial%20and%20Industrial%20Non-Energy%20Impacts%20Study.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Upstream Lighting	0.28	0.02	0.02	0.76

TRC: $0 / kWh

Incentive: $0 / kWh

VARICOMP, 75HP

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Compressed Air

Measure Type: Compressor

Measure Sub Type: Variable compressor up to 75 HP

Program: Large C&I New Construction

Measure Description

The installation of oil flooded, rotary screw compressors with Variable Displacement capacity control schemes to improve compression efficiencies at partial loads, including a properly sized air receiver.

Baseline Description

The baseline efficiency case is a typical load / unload compressor.

BCR Measures

BCR Measure Name	Unique Identifier
VARICOMP, 75HP	2024 Electric Large C&I New Construction VARICOMP, 75HP

Savings Principle

The high efficiency case is an oil-flooded, rotary screw compressor with Variable Displacement capacity control with a properly sized air receiver.

Savings Method

Calculated using site-specific inputs

Unit

kW saved per horsepower (hp) of installed air compressor capacity.

Savings Equation

Gross kWh = HP_compressor × deltakW/HP × Hours

Gross kW = HP_compressor × deltakW/HP

Where:

HP_compressor = Nominal rated horsepower of high efficiency air compressor: site-specific

Hours = Annual operating hours of the air compressor: site-specific

deltakW/HP = Air compressor kW reduction per HP

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis; RR adjusts for evaluation results.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
VARICOMP, 75HP	Calc	0.1900	0.00	0.00	0.00	0.00	0.00

Electric kW Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

Electric kW Note: kW/HP

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
VARICOMP, 75HP	15	1.00	1.00		1.44	1.00	1.00	1.00	0.82

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
VARICOMP, 75HP	24.54%	25.82%	24.53%	25.10%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

RRsp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

RRwp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
VARICOMP, 75HP	0	0	0.00	0.04	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
VARICOMP, 75HP	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.48 / kWh

Incentive: $0.31 / kWh

Vending Miser - Glass Front Refrigerated Coolers

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Vending Miser **Measure Type:** Vending Miser **Measure Sub Type:** Vending Miser

Program: Large C&I New Construction

Measure Description

Standard efficiency glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity

Baseline Description

The baseline efficiency case is a standard efficiency glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

BCR Measures

BCR Measure Name	Unique Identifier
Vending Miser - Glass Front Refrigerated Coolers	2024 Electric Large C&I New Construction Vending Miser - Glass Front Refrigerated Coolers

Savings Principle

The high efficiency case is a standard efficiency glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

Savings Method

Deemed

Unit

Installed vending miser.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: 8760

Hours Note: It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Vending Miser - Glass Front Refrigerated Coolers	1208.0	0.1380	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.

Electric kW Source: USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Vending Miser - Glass Front Refrigerated Coolers	5	1.00	1.00		1.00	1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Vending Miser - Glass Front Refrigerated Coolers	23.00%	27.00%	23.00%	27.00%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2020). Impact Evaluation of PY 2017 Small Business Initiative Non-lighting Measures (MA19C03-E-SBIMPCT). https://ma-eeac.org/wp-content/uploads/Final-Report-MA19C03-E-SBIMPCT-03202020.pdf

RRsp Source: DNV GL (2020). Impact Evaluation of PY 2017 Small Business Initiative Non-lighting Measures (MA19C03-E-SBIMPCT). https://ma-eeac.org/wp-content/uploads/Final-Report-MA19C03-E-SBIMPCT-03202020.pdf

RRwp Source: DNV GL (2020). Impact Evaluation of PY 2017 Small Business Initiative Non-lighting Measures (MA19C03-E-SBIMPCT). https://ma-eeac.org/wp-content/uploads/Final-Report-MA19C03-E-SBIMPCT-03202020.pdf

CFsp Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Vending Miser - Glass Front Refrigerated Coolers	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Vending Miser - Glass Front Refrigerated Coolers	0.18	0.00	0.05	0.87

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $1.08 / kWh

Incentive: $0.7 / kWh

Vending Miser - Non-Refrigerated Snack Vending Machines UPSTR

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Vending Miser **Measure Type:** Vending Miser **Measure Sub Type:** Vending Miser

Program: Large C&I New Construction

Measure Description

Standard efficiency non-refrigerated snack vending machine with a control system capable of powering down lighting and refrigeration systems during periods of inactivity

Baseline Description

The baseline efficiency case is a standard efficiency nonrefrigerated snack vending machine without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

BCR Measures

BCR Measure Name	Unique Identifier
Vending Miser - Non-Refrigerated Snack Vending Machines UPSTR	2024 Electric Large C&I New Construction Vending Miser - Non-Refrigerated Snack Vending Machines UPSTR

Savings Principle

The high efficiency case is a standard efficiency nonrefrigerated snack vending machine without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

Savings Method

Deemed

Unit

Installed vending miser.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Vending Miser - Non-Refrigerated Snack Vending Machines UPSTR	343.0	0.0390	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.

Electric kW Source: USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Vending Miser - Non-Refrigerated Snack Vending Machines UPSTR	5	1.00	1.00		1.00	1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Vending Miser - Non-Refrigerated Snack Vending Machines UPSTR	23.00%	27.00%	23.00%	27.00%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2020). Impact Evaluation of PY 2017 Small Business Initiative Non-lighting Measures (MA19C03-E-SBIMPCT). https://ma-eeac.org/wp-content/uploads/Final-Report-MA19C03-E-SBIMPCT-03202020.pdf

RRsp Source: DNV GL (2020). Impact Evaluation of PY 2017 Small Business Initiative Non-lighting Measures (MA19C03-E-SBIMPCT). https://ma-eeac.org/wp-content/uploads/Final-Report-MA19C03-E-SBIMPCT-03202020.pdf

RRwp Source: DNV GL (2020). Impact Evaluation of PY 2017 Small Business Initiative Non-lighting Measures (MA19C03-E-SBIMPCT). https://ma-eeac.org/wp-content/uploads/Final-Report-MA19C03-E-SBIMPCT-03202020.pdf

CFsp Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Vending Miser - Non-Refrigerated Snack Vending Machines UPSTR	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Vending Miser - Non-Refrigerated Snack Vending Machines UPSTR	0.18	0.00	0.05	0.87

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $1.08 / kWh

Incentive: $0.7 / kWh

Vending Miser - Refrigerated Beverage Vending Machines UPSTR

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Vending Miser **Measure Type:** Vending Miser **Measure Sub Type:** Vending Miser

Program: Large C&I New Construction

Measure Description

Standard efficiency refrigerated beverage vending machine with a control system capable of powering down lighting and refrigeration systems during periods of inactivity

Baseline Description

The baseline efficiency case is a standard efficiency refrigerated beverage vending machine without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

BCR Measures

BCR Measure Name	Unique Identifier
Vending Miser - Refrigerated Beverage Vending Machines UPSTR	2024 Electric Large C&I New Construction Vending Miser - Refrigerated Beverage Vending Machines UPSTR

Savings Principle

The high efficiency case is a standard efficiency refrigerated beverage vending machine with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

Savings Method

Deemed

Unit

Installed vending miser.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: 8760

Hours Note: It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Vending Miser - Refrigerated Beverage Vending Machines UPSTR	1612.0	0.1840	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.

Electric kW Source: USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Vending Miser - Refrigerated Beverage Vending Machines UPSTR	5	1.00	1.00		1.00	1.00	1.00	0.90	0.90

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Vending Miser - Refrigerated Beverage Vending Machines UPSTR	23.00%	27.00%	23.00%	27.00%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2020). Impact Evaluation of PY 2017 Small Business Initiative Non-lighting Measures (MA19C03-E-SBIMPCT). https://ma-eeac.org/wp-content/uploads/Final-Report-MA19C03-E-SBIMPCT-03202020.pdf

RRsp Source: DNV GL (2020). Impact Evaluation of PY 2017 Small Business Initiative Non-lighting Measures (MA19C03-E-SBIMPCT). https://ma-eeac.org/wp-content/uploads/Final-Report-MA19C03-E-SBIMPCT-03202020.pdf

RRwp Source: DNV GL (2020). Impact Evaluation of PY 2017 Small Business Initiative Non-lighting Measures (MA19C03-E-SBIMPCT). https://ma-eeac.org/wp-content/uploads/Final-Report-MA19C03-E-SBIMPCT-03202020.pdf

CFsp Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Vending Miser - Refrigerated Beverage Vending Machines UPSTR	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Vending Miser - Refrigerated Beverage Vending Machines UPSTR	0.18	0.00	0.05	0.87

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $1.08 / kWh

Incentive: $0.7 / kWh

VFD Secondary

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I New Construction

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
VFD Secondary	2024 Electric Large C&I New Construction VFD Secondary

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
VFD Secondary	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
VFD Secondary	15	1.00	1.00		0.94	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
VFD Secondary	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

RRsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

RRwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
VFD Secondary	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
VFD Secondary	0.28	0.02	0.02	0.76

TRC: $0.48 / kWh

Incentive: $0.31 / kWh

VRF AC

Sector: C&I | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Motors/Drives | **Measure Type:** VRF | **Measure Sub Type:** AC

Program: Large C&I New Construction

Measure Description

This measure applies to the installation of high-efficiency single package or split system air source, water source, ground source (closed loop) and groundwater source (open loop) heat pump systems for space conditioning applications.

Baseline Description

The baseline efficiency case for new installations assumes compliance with the current version of International Energy Conservation Code (IECC) as mandated by Rhode Island State Building Code. Appendix A details the specific efficiency requirements by equipment type.

BCR Measures

BCR Measure Name	Unique Identifier
VRF AC - 11.25T-20T	2024 Electric Large C&I New Construction VRF AC - 11.25T-20T
VRF AC - 5.4T-11.25T	2024 Electric Large C&I New Construction VRF AC - 5.4T-11.25T
VRF AC - over 20T	2024 Electric Large C&I New Construction VRF AC - over 20T
VRF AC - to 5.4T	2024 Electric Large C&I New Construction VRF AC - to 5.4T

Savings Principle

The high efficiency case assumes the HVAC equipment exceeds the requirements of the current version of International Energy Conservation Code (IECC) as mandated by Rhode Island State Building Code.

Savings Method

Calculated using site-specific inputs

Unit

Installed unitary AC system for space cooling.

Savings Equation

Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) × Hours_C

Gross kW = Tons × (kBtu/hr per ton) × (1/EER_base - 1/EER_ee)

Where:

Tons = Rated cooling capacity of the installed equipment: site-specific.

12 kBtu/hr per ton = Conversion factor

SEER_base = Seasonal Energy Efficiency Ratio of the baseline equipment: code

SEER_ee = Seasonal energy efficiency ratio of the high-efficiency unit: site-specific.

Hours_C = Equivalent full load cooling hours

EER_ee = Energy Efficiency Ratio of the new efficient equipment: site-specific. For equipment < 5.4 tons, assume the following conversion: EER≈SEER/1.1

EER_base = Energy Efficiency Ratio of baseline equipment: code. Since IECC 2012 does not provide EER requirements for equipment < 5.4 tons, assume the following conversion: EER ≈ SEER/1.1

Hours: N/A

Hours Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Hours Note: If site-specific data is unavailable, the average cooling EFLHs are taken as 855 hours while the average heating EFLHs are taken as 1137 hours.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
VRF AC - 11.25T-20T VRF AC - 5.4T-11.25T VRF AC - over 20T VRF AC - to 5.4T	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
VRF AC	15	1.00	1.00		1.05	1.00	1.00	0.40	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
VRF AC	8.60%	4.60%	52.70%	34.10%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.

RRsp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

RRwp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

CFsp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

CFwp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
VRF AC	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
VRF AC	0.70	0.00	0.00	0.30

NTG Source: DNV (2021). MA C&I Upstream HVAC & Gas Water Heating NTG Study (MA20X08-B-CIHVACNTG). https://ma-eeac.org/wp-content/uploads/MA20X08-B-CIHVACNTG_Final_Report_Clean_9.10.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

VRF HP

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** VRF **Measure Sub Type:** HP

Program: Large C&I New Construction

Measure Description

This measure applies to the installation of high-efficiency single package or split system air source, water source, ground source (closed loop) and groundwater source (open loop) heat pump systems for space conditioning applications.

Baseline Description

The baseline efficiency case for new installations assumes compliance with the current version of International Energy Conservation Code (IECC) as mandated by Rhode Island State Building Code. Appendix A details the specific efficiency requirements by equipment type.

BCR Measures

BCR Measure Name	Unique Identifier
VRF HP - 11.25T-20T	2024 Electric Large C&I New Construction VRF HP - 11.25T-20T
VRF HP - 5.4T-11.25T	2024 Electric Large C&I New Construction VRF HP - 5.4T-11.25T
VRF HP - over 20T	2024 Electric Large C&I New Construction VRF HP - over 20T
VRF HP - to 5.4T	2024 Electric Large C&I New Construction VRF HP - to 5.4T

Savings Principle

The high efficiency case assumes the HVAC equipment exceeds the requirements of the current version of International Energy Conservation Code (IECC) as mandated by Rhode Island State Building Code.

Savings Method

Calculated using site-specific inputs

Unit

Installed heat pump system for space cooling and heating.

Savings Equation

Gross kWh = Tons × (kBtu/hr per ton) × [(1/SEER_base - 1/SEER_ee) × Hours_C + CR × (1/HSPF_base - 1/HSPF_ee) × Hours_H]

Gross kW = Tons × (kBtu/hr per ton) × (1/EER_base - 1/EER_ee)

Where:

Tons = Rated cooling capacity of the installed equipment: site-specific.

12 kBtu/hr per ton = Conversion factor

SEER_base = Seasonal Energy Efficiency Ratio of the baseline equipment: code

SEER_ee = Seasonal energy efficiency ratio of the high-efficiency unit: site-specific.

Hours_C = Equivalent full load cooling hours

HSPF_base = Heating Seasonal Performance Factor for baseline equipment: code

HSPF_ee = Heating Seasonal Performance Factor for new efficient equipment: site-specific.

Hours_H = Equivalent full load heating hours

CR = Capacity Ratio converts rated coolingcapacity to heating capacity. For equipment with cooling capacity ≤ 5.4 tons, assume CR=1. For equipment > 5.4 tons, assume CR=1.15; Optimal Energy, Inc. (2008). Memo:Non-Electric enefits Analysis Update. Prepared for Dave Weber, NSTAR.

EER_base = EnergyEfficiency Ratio of baseline equipment.

EER_ee = Energy Efficiency Ratio of the new efficient equipment: site-specific. For equipment < 5.4 tons, assume the following conversion: EER≈SEER/1.1

Hours: N/A

Hours Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Hours Note: If site-specific data is unavailable, the average cooling EFLHs are taken as 855 hours while the average heating EFLHs are taken as 1137 hours.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
VRF HP - 11.25T-20T VRF HP - 5.4T-11.25T VRF HP - over 20T VRF HP - to 5.4T	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Algorithm inputs are based on engineering estimates of cooling hours and 2012 International Code Council (2012).

Electric kW Note: Algorithm Inputs based on UI and CL&P Program Savings Documentation for 2011 Program Year, Section 2.2.2 C&I LO Cooling - Unitary AC & Heat Pumps

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
VRF HP	17	1.00	1.00		1.05	1.00	1.00	0.40	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
VRF HP	8.60%	4.60%	52.70%	34.10%

Measure Life Source: DNV GL (2018). Expected Useful Life (EUL) Estimation for Air-Conditioning Equipment from Current Age Distribution Memo (Project 73 Track D). https://ma-eeac.org/wp-content/uploads/Final-memo-on-P73-Track-D-EUL-estimation-results-to-date-v2.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.

RRsp Source: The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.

RRwp Source: The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.

CFsp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

CFwp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
VRF HP	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
VRF HP	0.70	0.00	0.00	0.30

NTG Source: DNV (2021). MA C&I Upstream HVAC & Gas Water Heating NTG Study (MA20X08-B-CIHVACNTG). https://ma-eeac.org/wp-content/uploads/MA20X08-B-CIHVACNTG_Final_Report_Clean_9.10.pdf

TRC: 5.4T-11.25T - $0.41/kWh;11.25T-20T - $0.48/kWh; >20T - $0.35/kWh

Incentive: 5.4T-11.25T - $0.31/kWh;11.25T-20T - $0.27/kWh; >20T - $0.23/kWh

VSD

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** VSD **Measure Sub Type:**

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
VSD-Non HVAC	2024 Electric Large C&I New Construction VSD-Non HVAC

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
VSD-Non HVAC	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
VSD	multi	1.00	1.00	0.89	0.89	0.74	1.05	0.92	0.61

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
VSD	23.70%	27.20%	23.80%	25.30%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
VSD	Calc	Calc	0.00	0.02	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
VSD	0.70	0.00	0.00	0.30

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.34 / kWh

Incentive: $0.22 / kWh

VSD Compressor (15<=HP<=75)

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Compressed Air

Measure Type: Compressor

Measure Sub Type: Variable Speed Drive Compressor

Program: Large C&I New Construction

Measure Description

The installation of oil flooded, rotary screw compressors with Variable Speed Drive capacity control schemes to improve compression efficiencies at partial loads, including a properly sized air receiver.

Baseline Description

The baseline efficiency case is a typical load / unload compressor.

BCR Measures

BCR Measure Name	Unique Identifier
VSD Compressor (15<=HP<=75)	2024 Electric Large C&I New Construction VSD Compressor (15<=HP<=75)

Savings Principle

The high efficiency case is an oil-flooded, rotary screw compressor with Variable Speed Drive capacity control with a properly sized air receiver.

Savings Method

Calculated using site-specific inputs

Unit

kW saved per horsepower (hp) of installed air compressor capacity.

Savings Equation

Gross kWh = HP_compressor × deltakW/HP × Hours

Gross kW = HP_compressor × deltakW/HP

Where:

HP_compressor = Nominal rated horsepower of high efficiency air compressor: site-specific

Hours = Annual operating hours of the air compressor: site-specific

deltakW/HP = Air compressor kW reduction per HP

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis; RR adjusts for evaluation results.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
VSD Compressor (15<=HP<=75)	Calc	0.1900	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Algorithm Input kwh/horsepower based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations

Electric kW Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

Electric kW Note: kW/HP

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
VSD Compressor (15<=HP<=75)	13	1.00	1.00		1.44	1.00	1.00	1.00	0.82

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
VSD Compressor (15<=HP<=75)	24.54%	25.82%	24.53%	25.10%

Measure Life Source: DOE (2016). Technical Support Document: Air Compressors. EERE-2013-BT-STD-0040-0082. https://www.regulations.gov/document/EERE-2013-BT-STD-0040-0082

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

RRsp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

RRwp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

CFsp Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

CFwp Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
VSD Compressor (15<=HP<=75)	0	0	0.00	0.04	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
VSD Compressor (15<=HP<=75)	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.34 / kWh

Incentive: $0.22 / kWh

Water Source Heat Pump

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Heat Pumps **Measure Sub Type:** Ground Source

Program: Large C&I New Construction

Measure Description

This measure applies to the installation of high-efficiency single package or split system air source, water source, ground source (closed loop) and groundwater source (open loop) heat pump systems for space conditioning applications.

Baseline Description

Appendix A details the specific efficiency requirements by equipment type.

BCR Measures

BCR Measure Name	Unique Identifier
Water Source Heat Pump	2024 Electric Large C&I New Construction Water Source Heat Pump

Savings Principle

The high efficiency case assumes a high-efficiency air cooled, water source, ground water source, or ground source heat pump system that exceeds the energy efficiency requirements of the International Energy Conservation Code (IECC) 2015.

Savings Method

Calculated using site-specific inputs

Unit

Installed heat pump system for space cooling / heating.

Savings Equation

Gross kWh = Tons × (kBtu/hr per ton) × [(1/SEER_base - 1/SEER_ee) × Hours_C + CR × (1/HSPF_base - 1/HSPF_ee) × Hours_H]

Gross kW = Tons × (kBtu/hr per ton) × (1/EER_base - 1/EER_ee)

Where:

Tons = Rated cooling capacity of the installed equipment: site-specific.

12 kBtu/hr per ton = Conversion factor

SEER_base = Seasonal Energy Efficiency Ratio of the baseline equipment: code

SEER_ee = Seasonal energy efficiency ratio of the high-efficiency unit: site-specific.

Hours_C = Equivalent full load cooling hours

HSPF_base = Heating Seasonal Performance Factor for baseline equipment: code

HSPF_ee = Heating Seasonal Performance Factor for new efficient equipment: site-specific.

Hours_H = Equivalent full load heating hours

CR = Capacity Ratio converts rated coolingcapacity to heating capacity. For equipment with cooling capacity ≤ 5.4 tons, assume CR=1. For equipment > 5.4 tons, assume CR=1.15; Optimal Energy, Inc. (2008). Memo:Non-Electric enefits Analysis Update. Prepared for Dave Weber, NSTAR.

EER_base = EnergyEfficiency Ratio of baseline equipment.

EER_ee = Energy Efficiency Ratio of the new efficient equipment: site-specific. For equipment < 5.4 tons, assume the following conversion: EER≈SEER/1.1

Hours: N/A

Hours Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Hours Note: If site-specific data is unavailable, the average cooling EFLHs are taken as 855 hours while the average heating EFLHs are taken as 1137 hours.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Water Source Heat Pump	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Water Source Heat Pump	12	1.00	1.00		1.05	1.00	1.00	1.00	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Water Source Heat Pump	1.46%	1.46%	48.54%	48.54%

Measure Life Source: DNV GL (2018). Expected Useful Life (EUL) Estimation for Air-Conditioning Equipment from Current Age Distribution Memo (Project 73 Track D). https://ma-eeac.org/wp-content/uploads/Final-memo-on-P73-Track-D-EUL-estimation-results-to-date-v2.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.

RRsp Source: The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.

RRwp Source: The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.

CFsp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

CFwp Source: KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Water Source Heat Pump	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Water Source Heat Pump	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.69 / kWh

Incentive: $0.45 / kWh

WCChill

Sector: C&I | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: HVAC | **Measure Type:** WCChill | **Measure Sub Type:**

Program: Large C&I New Construction

Measure Description

This measure promotes the installation of efficient water-cooled chilling packages for comfort cooling applications. Eligible chillers include water-cooled chillers for single chiller systems or for the lead chiller only in multi-chiller systems.

Baseline Description

The baseline efficiency case for new installations assumes compliance with the current version of International Energy Conservation Code (IECC) as mandated by Rhode Island State Building Code. Appendix A, Table 9 details the specific efficiency requirements by equipment type.

BCR Measures

BCR Measure Name	Unique Identifier
	2024 Electric Large C&I New Construction WCChill - over300T_IPLV_CEN
	2024 Electric Large C&I New Construction WCChill - over300T_IPLV_SCR
	2024 Electric Large C&I New Construction WCChill - over300T_PkkW_CEN
	2024 Electric Large C&I New Construction WCChill - over300T_PkkW_SCR
WCChill - over300T_IPLV_CEN	2024 Electric Large C&I New Construction WCChill - to150T_IPLV_CEN
WCChill - over300T_IPLV_SCR	2024 Electric Large C&I New Construction WCChill - to150T_IPLV_SCR
WCChill - over300T_PkkW_CEN	2024 Electric Large C&I New Construction WCChill - to150T_PkkW_CEN
WCChill - over300T_PkkW_SCR	2024 Electric Large C&I New Construction WCChill - to150T_PkkW_SCR
WCChill - to150T_IPLV_CEN	2024 Electric Large C&I New Construction WCChill - 150-300T_IPLV
WCChill - to150T_IPLV_SCR	2024 Electric Large C&I New Construction WCChill - 150-300T_IPLV_CEN
WCChill - to150T_PkkW_CEN	2024 Electric Large C&I New Construction WCChill - 150-300T_IPLV_SCR
WCChill - to150T_PkkW_SCR	2024 Electric Large C&I New Construction WCChill - 150-300T_PkKW
WCChill - 150-300T_IPLV	2024 Electric Large C&I New Construction WCChill - 150-300T_PkKW_CEN
WCChill - 150-300T_IPLV_CEN	2024 Electric Large C&I New Construction WCChill - 150-300T_PkKW_SCR
WCChill - 150-300T_IPLV_SCR	2024 Electric Large C&I New Construction WCChill - 300-1000T_IPLV
WCChill - 150-300T_PkKW	2024 Electric Large C&I New Construction WCChill - 300-1000T_PkKW
WCChill - 150-300T_PkKW_CEN	2024 Electric Large C&I New Construction WCChill - 30-70T
WCChill - 150-300T_PkKW_SCR	2024 Electric Large C&I New Construction WCChill - 70-150T
WCChill - 300-1000T_IPLV	
WCChill - 300-1000T_PkKW	
WCChill - 30-70T	
WCChill - 70-150T	

Savings Principle

The high efficiency case assumes the HVAC equipment exceeds the requirements of the current version of International Energy Conservation Code (IECC) as mandated by Rhode Island State Building Code.

Savings Method

Calculated using site-specific inputs

Unit

Installed high-efficiency chiller for space cooling.

Savings Equation

Gross kWh = Tons × (kW/ton_base - kW/ton_ee) × Hours_C

Gross kW = Tons × (kW/ton_base - kW/ton_ee) × LF

Where:

Tons = Rated cooling capacity of the installed equipment: site-specific.

kW/ton_base = Rated efficiency of baseline equipment: code

kW/ton_ee =Energy efficiency rating of the efficient equipment: site-specific.

Hours_C = Equivalent full load cooling hours

LF = Load Factor

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis; in the absence of site specific information, 1,328 hours can be used as a default.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
WCChill - over300T_IPLV_CEN WCChill - over300T_IPLV_SCR WCChill - over300T_PkkW_CEN WCChill - over300T_PkkW_SCR WCChill - to150T_IPLV_CEN WCChill - to150T_IPLV_SCR WCChill - to150T_PkkW_CEN WCChill - to150T_PkkW_SCR WCChill - 150-300T_IPLV WCChill - 150-300T_IPLV_CEN WCChill - 150-300T_IPLV_SCR WCChill - 150-300T_PkKW WCChill - 150-300T_PkKW_CEN WCChill - 150-300T_PkKW_SCR WCChill - 300-1000T_IPLV WCChill - 300-1000T_PkKW WCChill - 30-70T WCChill - 70-150T	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Algorithm inputs are based on engineering estimates of cooling hours and 2012 International Code Council (2012).

Electric kW Note: Algorithm inputs are based on engineering estimates of cooling hours and 2012 International Code Council (2012).

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
WCChill	23	1.00	1.00		1.08	1.00	1.00	0.42	0.08

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
WCChill	11.30%	10.80%	39.40%	38.50%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group.
https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRsp Note: RRsp & RRwp are set to 1.00 because evaluation results set coincidence factor.

RRwp Note: RRsp & RRwp are set to 1.00 because evaluation results set coincidence factor.

CFsp Source: KEMA (2016). Impact Evaluation of 2012 National Grid-Rhode Island Prescriptive Chiller Program. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160722_py2012_ri_prescriptive_chiller_report_final.pdf

CFwp Source: KEMA (2016). Impact Evaluation of 2012 National Grid-Rhode Island Prescriptive Chiller Program. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160722_py2012_ri_prescriptive_chiller_report_final.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
WCChill	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
WCChill	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.462 / kWh

Incentive: $0.3 / kWh

Zero loss condensate drain

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Compressed Air

Measure Type: Zero Loss Condensate Drains

Measure Sub Type: Zero Loss Condensate Drain

Program: Large C&I New Construction

Measure Description

Drains remove water from a compressed air system. Zero loss condensate drains remove water from a compressed air system without venting any air, resulting in less air demand and consequently greater efficiency.

Baseline Description

The baseline efficiency case is the installation of a standard condensate drain on a compressor system.

BCR Measures

BCR Measure Name	Unique Identifier
Zero loss condensate drain	2024 Electric Large C&I New Construction Zero loss condensate drain

Savings Principle

The high efficiency case is the installation of a zero loss condensate drain on a single operating compressor rated <= 75 HP.

Savings Method

Calculated using site-specific inputs

Unit

Installed drain.

Savings Equation

Gross kWh = CFM_pipe × deltaCFM/CFM_pipe × deltakW/CFM × Hours

Gross kW = CFM_pipe × deltaCFM/CFM_pipe × deltakW/CFM

Where:

CFM_pipe = CFM capacity of piping: site-specific

0.049 deltaCFM/CFM_pipe = Average CFM saved per CFM of piping capacity

0.24386 deltakW/CFM = Average demand savings per CFM; Based on regional analysis assuming a typical timed drain settings discharge scenario.

Hours = Annual operating hours of the zero loss condensate drain: site-specific

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Zero loss condensate drain	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Zero loss condensate drain	15	1.00	1.00		1.44	1.00	1.00	1.00	0.82

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Zero loss condensate drain	24.54%	25.82%	24.53%	25.10%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

RRsp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

RRwp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

CFsp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

CFwp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Zero loss condensate drain	0	0	0.00	0.04	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Zero loss condensate drain	0.28	0.02	0.02	0.76

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.43 / kWh

Incentive: $0.28 / kWh

HVAC Fan

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** HVAC **Measure Sub Type:** Fan

Program: Large C&I Retrofit

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
HVAC Fan - Return	2024 Electric Large C&I Retrofit HVAC Fan - Return
HVAC Fan - Supply	2024 Electric Large C&I Retrofit HVAC Fan - Supply

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
HVAC Fan - Return HVAC Fan - Supply	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
HVAC Fan	15	1.00	1.00		0.94	0.99	0.99	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
HVAC Fan	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
HVAC Fan	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
HVAC Fan	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.42 / kWh

Incentive: $0.42 / kWh

Boiler, Draft Fan

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I Retrofit

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Boiler, Draft Fan	2024 Electric Large C&I Retrofit Boiler, Draft Fan

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Boiler, Draft Fan	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Boiler, Draft Fan	15	1.00	1.00		0.94	0.99	0.99	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Boiler, Draft Fan	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Boiler, Draft Fan	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Boiler, Draft Fan	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.42 / kWh

Incentive: $0.42 / kWh

Boiler, Feedwater Pump

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I Retrofit

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Boiler, Feedwater Pump	2024 Electric Large C&I Retrofit Boiler, Feedwater Pump

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Boiler, Feedwater Pump	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Boiler, Feedwater Pump	15	1.00	1.00		0.94	0.99	0.99	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Boiler, Feedwater Pump	23.70%	27.20%	23.80%	25.30%

Measure Life Source: California Public Utilities Commission (CPUC), Energy Division (2008). EUL_Summary_10-1-08.xls.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Boiler, Feedwater Pump	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Boiler, Feedwater Pump	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.42 / kWh

Incentive: $0.42 / kWh

Building Exhaust Fan

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I Retrofit

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Building Exhaust Fan	2024 Electric Large C&I Retrofit Building Exhaust Fan

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Building Exhaust Fan	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Building Exhaust Fan	15	1.00	1.00		0.94	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Building Exhaust Fan	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

RRsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

RRwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Building Exhaust Fan	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Building Exhaust Fan	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.42 / kWh

Incentive: $0.42 / kWh

Building operator certification

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Whole Building **Measure Type:** BOC Training **Measure Sub Type:** Certification

Program: Large C&I Retrofit

Measure Description

The Building Operator Certification (BOC) class improves operators' ability to optimize / minimize gas and electricity use in buildings.

Baseline Description

The base case is a building operator without specific training on efficient use of gas and electricity in buildings.

BCR Measures

BCR Measure Name	Unique Identifier
Building operator certification	2024 Electric Large C&I Retrofit Building operator certification

Savings Principle

The high efficiency case is a building operator attending a class on improving the efficiency of gas and electricity use in buildings.

Savings Method

Deemed

Unit

kWh/SF/BOC completion

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Building operator certification	0.2		0.18	0.00	0.00	0.00	0.00

Electric kWh Source: Navigant Consulting (2015). Comprehensive Review of Non-Residential Training and Education Programs, with a Focus on Building Operator Certification. Prepared for the Massachusetts PAs and EEAC

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Building operator certification	5	1.00	1.00		1.00			0.40	0.89

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Building operator certification	34.82%	34.82%	12.96%	17.41%

Measure Life Source: Navigant Consulting (2015). Comprehensive Review of Non-Residential Training and Education Programs, with a Focus on Building Operator Certification. Prepared for the Massachusetts PAs and EEAC

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Building operator certification	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Building operator certification	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Building Shell

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Whole Building **Measure Sub Type:**

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Building Shell	2024 Electric Large C&I Retrofit Building Shell

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Building Shell	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Building Shell	5,10,15,20, 25	1.00	1.00	0.89	0.89	0.74	1.05	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Building Shell	0.00%	0.00%	50.00%	50.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Building Shell	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Building Shell	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $1.04 / kWh

Incentive: $0.8 / kWh

Chiller, Water Pump

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I Retrofit

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Chiller, Water Pump	2024 Electric Large C&I Retrofit Chiller, Water Pump

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Chiller, Water Pump	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Chiller, Water Pump	15	1.00	1.00		0.94	1.00	0.99	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Chiller, Water Pump	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

RRsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

RRwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Chiller, Water Pump	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Chiller, Water Pump	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.42 / kWh

Incentive: $0.42 / kWh

Commercial Refrigeration

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Refrigeration **Measure Sub Type:**

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Commercial Refrigeration	2024 Electric Large C&I Retrofit Commercial Refrigeration

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Commercial Refrigeration	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Commercial Refrigeration	multi	1.00	1.00	0.89	0.89	0.74	1.05	0.48	0.73

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Commercial Refrigeration	22.60%	27.30%	23.30%	26.80%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Commercial Refrigeration	Calc	Calc	0.00	0.05	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Commercial Refrigeration	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.78 / kWh

Incentive: $0.44 / kWh

Comprehensive Retrofit (CR)

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Whole Building **Measure Sub Type:** Whole Building

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Comprehensive Retrofit (CR)	2024 Electric Large C&I Retrofit Comprehensive Retrofit (CR)

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Comprehensive Retrofit (CR)	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Comprehensive Retrofit (CR)	multi	1.00	1.00	0.89	0.89	0.74	1.05	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Comprehensive Retrofit (CR)	0.00%	0.00%	50.00%	50.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Comprehensive Retrofit (CR)	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Comprehensive Retrofit (CR)	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Compressed Air Nozzle

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Compressed Air **Measure Type:** CAIR Nozzle **Measure Sub Type:** CAIR Nozzle

Program: Large C&I Retrofit

Measure Description

The installation of an efficient CAIR nozzle.

Baseline Description

The baseline efficiency case is the installation of a standard CAIR nozzle.

BCR Measures

BCR Measure Name	Unique Identifier
Compressed Air Nozzle	2024 Electric Large C&I Retrofit Compressed Air Nozzle

Savings Principle

The high efficiency case is the installation of an efficient CAIR nozzle.

Savings Method

Calculated using site-specific inputs

Unit

Installed CAIR nozzle.

Savings Equation

Gross kWh = CFM_pipe × deltaCFM/CFM_pipe × deltakW/CFM × Hours

Gross kW = CFM_pipe × deltaCFM/CFM_pipe × deltakW/CFM

Where:

CFM_pipe = CFM capacity of piping: site-specific

0.049 deltaCFM/CFM_pipe = Average CFM saved per CFM of piping capacity

0.24386 deltakW/CFM = Average demand savings per CFM; Based on regional analysis assuming a typical timed drain settings discharge scenario.

Hours = Annual operating hours of the zero loss condensate drain: site-specific

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Compressed Air Nozzle	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Compressed Air Nozzle	13	1.00	1.00		1.00	1.00	1.00	1.00	0.82

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Compressed Air Nozzle	34.24%	28.94%	18.41%	18.41%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

RRsp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

RRwp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Compressed Air Nozzle	0	0	0.00	0.06	0.00	0.00	0.00	0.00

Annual $ Source: Tetra Tech (2012). Final Report – Commercial and Industrial Non-Energy Impacts Study. https://www.puc.nh.gov/EESE%20Board/Meetings/2017/021017EERSWorkshop1/Commercial%20and%20Industrial%20Non-Energy%20Impacts%20Study.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Compressed Air Nozzle	0.15	0.00	0.00	0.86

TRC: $0 / kWh

Incentive: $0 / kWh

Cooling Town Fan

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I Retrofit

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Cooling Town Fan	2024 Electric Large C&I Retrofit Cooling Town Fan

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Cooling Town Fan	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Cooling Town Fan	15	1.00	1.00		0.94	0.99	0.99	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Cooling Town Fan	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

RRwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Cooling Town Fan	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Cooling Town Fan	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.42 / kWh

Incentive: $0.42 / kWh

Custom CHP

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** CHP **Measure Sub Type:** CHP

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Custom CHP	2024 Electric Large C&I Retrofit Custom CHP

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom CHP	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom CHP	5,10,15,20, 25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom CHP	31.00%	36.00%	15.00%	18.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRsp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom CHP	0	0	0.00	-0.01	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-ClOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-ClOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom CHP	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Custom Compressed Air

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Compressed Air **Measure Sub Type:** Compressed Air

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Custom Compressed Air	2024 Electric Large C&I Retrofit Custom Compressed Air

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom Compressed Air	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom Compressed Air	multi	1.00	1.00	0.89	0.89	0.74	1.05	0.99	1.04

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom Compressed Air	31.97%	34.70%	15.98%	17.35%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom Compressed Air	0	0	0.00	0.06	0.00	0.00	0.00	0.00

Annual $ Source: Tetra Tech (2012). Final Report – Commercial and Industrial Non-Energy Impacts Study. https://www.puc.nh.gov/EESE%20Board/Meetings/2017/021017EERSWorkshop1/Commercial%20and%20Industrial%20Non-Energy%20Impacts%20Study.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom Compressed Air	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.1 / kWh

Incentive: $0.09 / kWh

Custom HVAC

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** HVAC **Measure Sub Type:** HVAC

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Custom HVAC	2024 Electric Large C&I Retrofit Custom HVAC

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom HVAC	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom HVAC	multi	1.00	1.00	0.89	0.89	0.74	1.05	0.95	0.38

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom HVAC	32.36%	34.31%	16.18%	17.15%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom HVAC	0	0	0.00	0.04	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom HVAC	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.9 / kWh

Incentive: $0.6 / kWh

Custom Lighting

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Lighting **Measure Type:** Custom **Measure Sub Type:** Lighting

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Custom Lighting	2024 Electric Large C&I Retrofit Custom Lighting

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) × Hours

Gross kW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW)

Where:

QTY_base_i = Quantity of baseline fixtures in location i

Watts_base_i = Connected wattage of baseline fixtures in location i

QTY_ee_j = Quantity of efficient fixtures in location j

Watts_ee_j = Connected wattage of efficient fixtures in location j

1,000 Watts per kW = Conversion factor

Hours = Lighting annual hours of operation: site-specific.

deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved.

deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom Lighting	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom Lighting	multi	1.00	1.00	0.93	0.93	0.99	0.99	0.59	0.54

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom Lighting	30.27%	17.38%	34.27%	18.08%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom Lighting	0	0	0.00	0.03	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom Lighting	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Custom Motor

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Motor **Measure Sub Type:** Motor

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Custom Motor	2024 Electric Large C&I Retrofit Custom Motor

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom Motor	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom Motor	multi	1.00	1.00	0.89	0.89	0.74	1.05	0.69	0.37

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom Motor	23.70%	27.20%	23.80%	25.30%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom Motor	0	0	0.00	0.02	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom Motor	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.42 / kWh

Incentive: $0.4 / kWh

Custom Other

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Other **Measure Sub Type:** Other

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Custom Other	2024 Electric Large C&I Retrofit Custom Other

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom Other	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom Other	multi	1.00	1.00	0.89	0.89	0.74	1.05	0.72	0.56

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom Other	35.25%	31.42%	17.62%	15.71%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom Other	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: Tetra Tech (2012). Final Report – Commercial and Industrial Non-Energy Impacts Study. https://www.puc.nh.gov/EESE%20Board/Meetings/2017/021017EERSWorkshop1/Commercial%20and%20Industrial%20Non-Energy%20Impacts%20Study.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom Other	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $1.04 / kWh

Incentive: $0.19 / kWh

Custom process

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Process **Measure Sub Type:** Process

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Custom process	2024 Electric Large C&I Retrofit Custom process

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom process	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom process	multi	1.00	1.00	0.89	0.89	0.74	1.05	0.68	0.70

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom process	32.82%	33.85%	16.41%	16.92%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom process	0	0	0.00	0.10	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom process	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.34 / kWh

Incentive: $0.22 / kWh

Custom: SEM

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** SEM **Measure Sub Type:** SEM

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Custom: SEM	2024 Electric Large C&I Retrofit Custom: SEM

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom: SEM	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom: SEM	multi	1.00	1.00	1.00	1.00	1.00	1.00	0.87	0.51

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom: SEM	32.40%	34.27%	16.20%	17.13%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom: SEM	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom: SEM	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Dual Enthalpy Economizer Control (DEEC)

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: HVAC

Measure Type: Controls

Measure Sub Type: Dual Enthalpy Economizer Control

Program: Large C&I Retrofit

Measure Description

The measure is to upgrade the outside-air dry-bulb economizer to a dual enthalpy economizer. The system will continuously monitor the enthalpy of both the outside air and return air. The system will control the system dampers adjust the outside quantity based on the two readings.

Baseline Description

The baseline efficiency case for this measure assumes the relevant HVAC equipment is operating with a fixed dry-bulb economizer.

BCR Measures

BCR Measure Name	Unique Identifier
Dual Enthalpy Economizer Control (DEEC)	2024 Electric Large C&I Retrofit Dual Enthalpy Economizer Control (DEEC)

Savings Principle

The high efficiency case is the installation of an outside air economizer utilizing two enthalpy sensors, one for outdoor air and one for return air.

Savings Method

Deemed

Unit

Total tons of controlled cooling capacity.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Dual Enthalpy Economizer Control (DEEC)	289.0	0.2890	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Patel, Dinesh (2001). Energy Analysis: Dual Enthalpy Control. Prepared for NSTAR.

Electric kW Source: Patel, Dinesh (2001). Energy Analysis: Dual Enthalpy Control. Prepared for NSTAR.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Dual Enthalpy Economizer Control (DEEC)	10	1.00	1.00		1.04	1.03	1.03	0.94	0.97

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Dual Enthalpy Economizer Control (DEEC)	26.40%	16.60%	34.90%	22.10%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

CFwp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Dual Enthalpy Economizer Control (DEEC)	0	0	0.00	0.11	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Dual Enthalpy Economizer Control (DEEC)	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Energy Management System

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** EMS

Program: Large C&I Retrofit

Measure Description

The measure is the installation of a new building energy management system (EMS) or the expansion of an existing energy management system for control of non-lighting electric and gas end-uses in an existing building on existing equipment.

Baseline Description

The baseline case is the existing equipment and systems without the implemented controls.

BCR Measures

BCR Measure Name	Unique Identifier
EMS 5k-40ksqft	2024 Electric Large C&I Retrofit EMS 5k-40ksqft
EMS 40k-80ksqft	2024 Electric Large C&I Retrofit EMS 40k-80ksqft
EMS 80k-200ksqft	2024 Electric Large C&I Retrofit EMS 80k-200ksqft

Savings Principle

The high efficiency case is the installation of a new EMS or the expansion of an existing EMS to control additional non-lighting electric and/or gas equipment. The EMS must be installed in an existing building on existing equipment.

Savings Method

Custom

Unit

Upgrade to existing energy management system.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = Gross kWh × deltaMMBtu_Gas/kWh

Gross MMBtu Oil = Gross kWh × deltaMMBtu_Oil/kWh

Where:

deltaMMBtu_Gas/kWh = Deemed average natural gas impact per gross electric energy impact

deltaMMBtu_Oil/kWh = Deemed average heating oil impact per gross electric energy impact

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
EMS 5k-40ksqft EMS 40k-80ksqft EMS 80k-200ksqft	Calc	0.0900	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: National Grid and NSTAR (2010). Energy Analysis: Hotel Guest Occupancy Sensors.

Electric kW Source: National Grid and NSTAR (2010). Energy Analysis: Hotel Guest Occupancy Sensors.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Energy Management System	10	1.00	1.00		1.04	1.03	1.03	0.94	0.97

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Energy Management System	26.40%	16.60%	34.90%	22.10%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Energy Management System	0	0	0.00	0.12	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Energy Management System	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $1.08 / kWh

Energy management system, custom

Sector: C&I

Fuel: Electric

Program Type: Custom

Measure Category: Custom

Measure Type: Controls

Measure Sub Type: Energy Management System

Program: Large C&I Retrofit

Measure Description

The measure is the installation of a new building energy management system (EMS) or the expansion of an existing energy management system for control of non-lighting electric and gas end-uses in an existing building on existing equipment.

Baseline Description

The baseline case is the existing equipment and systems without the implemented controls.

BCR Measures

BCR Measure Name	Unique Identifier
Energy management system, custom	2024 Electric Large C&I Retrofit Energy management system, custom

Savings Principle

The high efficiency case is the installation of a new EMS or the expansion of an existing EMS to control additional non-lighting electric and/or gas equipment. The EMS must be installed in an existing building on existing equipment.

Savings Method

Calculated using site-specific inputs

Unit

Upgrade to existing energy management system.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Energy management system, custom	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Energy management system, custom	5,10,15	1.00	1.00	0.89	0.89	0.74	1.05	0.95	0.38

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Energy management system, custom	32.36%	34.31%	16.18%	17.15%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Energy management system, custom	0	0	0.00	0.04	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Energy management system, custom	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.54 / kWh

Incentive: $0.4 / kWh

Food Service

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Food Service **Measure Sub Type:** Food Service

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Food Service	2024 Electric Large C&I Retrofit Food Service

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Food Service	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Food Service	multi	1.00	1.00	0.89	0.89	0.74	1.05	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Food Service	0.00%	0.00%	50.00%	50.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Food Service	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Food Service	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $1.04 / kWh

Incentive: $0.35 / kWh

Fuel Cell

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Other **Measure Type:** **Measure Sub Type:** Motors/Drives

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Fuel Cell	2024 Electric Large C&I Retrofit Fuel Cell

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Fuel Cell	Calc	Calc	Calc	Calc	Calc	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Fuel Cell	multi	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Fuel Cell	0.00%	0.00%	50.00%	50.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization Rate is assumed 100%.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Fuel Cell	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Fuel Cell	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.1 / kWh

Incentive: $0.1 / kWh

Fuel Switch

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Fuel Switch **Measure Sub Type:**

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Fuel Switch - DHW	2024 Electric Large C&I Retrofit Fuel Switch - DHW
Fuel Switch - HVAC	2024 Electric Large C&I Retrofit Fuel Switch - HVAC

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Fuel Switch - DHW	Calc	Calc	Calc	0.00	0.00	Calc	Calc
Fuel Switch - HVAC	Calc	Calc	Calc			Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Fuel Switch	5,10,15	1.00	1.00		0.89	0.74	1.05	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Fuel Switch	0.00%	0.00%	50.00%	50.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Fuel Switch	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Fuel Switch	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Glass front refrigerated coolers

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Refrigeration **Measure Type:** Controls **Measure Sub Type:** Vending Miser

Program: Large C&I Retrofit

Measure Description

Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintaina cool product that meets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated snack vending machines, and glass front refrigerated coolers. This measure should not be applied to ENERGY STAR® qualified vending machines, as they already have built-in controls.

Baseline Description

The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

BCR Measures

BCR Measure Name	Unique Identifier
Glass front refrigerated coolers	2024 Electric Large C&I Retrofit Glass front refrigerated coolers

Savings Principle

The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

Savings Method

Deemed

Unit

Installed vending miser.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: 8760

Hours Note: It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Glass front refrigerated coolers	1208.0	0.1380	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.

Electric kW Source: USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Glass front refrigerated coolers	5	1.00	1.00		1.04	1.00	1.00	0.94	0.97

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Glass front refrigerated coolers	26.40%	16.60%	34.90%	22.10%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRsp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRwp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

CFsp Note: Coincidence Factors are set to zero since demand savings typically occur during off-peak hours

CFwp Note: Coincidence Factors are set to zero since demand savings typically occur during off-peak hours

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Glass front refrigerated coolers	0	0	0.00	0.11	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Glass front refrigerated coolers	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Heating Hot Water Pump

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I Retrofit

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Heating Hot Water Pump	2024 Electric Large C&I Retrofit Heating Hot Water Pump

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heating Hot Water Pump	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heating Hot Water Pump	13	1.00	1.00		0.94	0.99	0.99	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heating Hot Water Pump	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

RRwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heating Hot Water Pump	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heating Hot Water Pump	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.42 / kWh

Incentive: $0.42 / kWh

Sensors

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: HVAC

Measure Type: Controls

Measure Sub Type: Occupancy Sensor

Program: Large C&I Retrofit

Measure Description

The measure is to the installation of hotel occupancy sensors (HOS) to control packaged terminal AC units (PTACs) with electric heat, heat pump units and/or fan coil units in hotels that operate all 12 months of the year.

Baseline Description

The baseline efficiency case assumes the equipment has no occupancy based controls.

BCR Measures

BCR Measure Name	Unique Identifier
Sensors	2024 Electric Large C&I Retrofit Sensors

Savings Principle

The high efficiency case is the installation of controls that include (a) occupancy sensors, (b) window/door switches for rooms that have operable window or patio doors, and (c) set back to 65 degrees Fahrenheit in the heating mode and set forward to 78 Fin the cooling mode when occupancy detector is in the unoccupied mode. Sensors controlled by a front desk system are not eligible.

Savings Method

Deemed

Unit

Installed hotel occupancy sensor.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Sensors	438.0	0.0900	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: National Grid and NSTAR (2010). Energy Analysis: Hotel Guest Occupancy Sensors.

Electric kW Source: National Grid and NSTAR (2010). Energy Analysis: Hotel Guest Occupancy Sensors.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Sensors	10	1.00	1.00		1.04	1.00	1.00	0.94	0.97

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Sensors	26.40%	16.60%	34.90%	22.10%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRsp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRwp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

CFwp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Sensors	0	0	0.00	0.11	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Sensors	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

LEDS

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** LEDS **Measure Sub Type:** LEDS

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
LEDS	2024 Electric Large C&I Retrofit LEDS

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
LEDS	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
LEDS	6	1.00	1.00	0.95	0.95	0.94	0.75	0.93	0.80

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
LEDS	38.40%	28.22%	19.26%	14.11%

Measure Life Source: DNV (2022). RI C&I Lighting Market Characterization and Adjusted Measure Life Study. http://rieermc.ri.gov/wp-content/uploads/2022/11/rhode-island_ci-lighting-market-characterization-and-adjusted-measure-life-report_final.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

RRsp Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

RRwp Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
LEDS	0	0	0.00	0.06	0.00	0.00	0.00	0.00

Annual $ Source: Tetra Tech (2012). Final Report – Commercial and Industrial Non-Energy Impacts Study. https://www.puc.nh.gov/EESE%20Board/Meetings/2017/021017EERSWorkshop1/Commercial%20and%20Industrial%20Non-Energy%20Impacts%20Study.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
LEDS	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.83 / kWh

Incentive: $0.34 / kWh

Lighting Controls

Sector: C&I | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Lighting | **Measure Type:** Controls | **Measure Sub Type:** Controls

Program: Large C&I Retrofit

Measure Description

This measure promotes the installation of lighting controls in retrofit applications. Promoted technologies include occupancy sensors, daylight dimming controls, and integrated controls.

Baseline Description

The baseline efficiency case assumes no controls.

BCR Measures

BCR Measure Name	Unique Identifier
Lighting Controls - Dimming	2024 Electric Large C&I Retrofit Lighting Controls - Dimming
Lighting Controls - Integrated	2024 Electric Large C&I Retrofit Lighting Controls - Integrated
Lighting Controls - Sensor	2024 Electric Large C&I Retrofit Lighting Controls - Sensor
Lighting Controls - Exterior	2024 Electric Large C&I Retrofit Lighting Controls - Exterior
Lighting Controls - Street Light Exterior	2024 Electric Large C&I Retrofit Lighting Controls - Street Light Exterior

Savings Principle

The high efficiency case involves lighting fixtures connected to controls that reduce the pre-retrofit hours of operation.

Savings Method

Calc

Unit

Installed lighting controls project.

Savings Equation

Gross kWh = SUM[QTY_i × Watts_i × (Hours_base_i - Hours_ee_i)] / (Watts per kW)

Gross kW = SUM(QTY_i × Watts_i) / (Watts per kW)

Where:

QTY_i = Quantity in controlled fixtures in location i

Watts_i = Connected wattage of controlled fixtures in location i

Hours_base_i = Total annual hours that the connected lighting in location i operated without controls (for retrofit installations) or would have operated with code-compliance controls (for new construction installations).

Hours_ee_i = Total annual hours that the connected lighting in location i operates with the lighting controls implemented.

1,000 Watts per kW = Conversion factor

deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved.

deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Lighting Controls - Dimming Lighting Controls - Integrated Lighting Controls - Sensor Lighting Controls - Exterior Lighting Controls - Street Light Exterior	Calc	Calc	Calc	0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: DNV GL (2018).Impact Evaluation of PY2015 RI C&I Upstream Lighting Initiative. http://rieermc.ri.gov/wp-content/uploads/2019/04/impact_eval_of_ri_upstream_lighting_finalreport.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Lighting Controls	See Table 12 in Appendix A	1.00	1.00	0.93	0.93	0.99	0.99	0.59	0.54

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Lighting Controls	30.27%	17.38%	34.27%	18.08%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Lighting Controls	0	0	0.00	0.09	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Lighting Controls	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.83 / kWh

Lighting Controls, Custom

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Lighting Controls **Measure Sub Type:** Lighting Controls

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Lighting Controls, Custom	2024 Electric Large C&I Retrofit Lighting Controls, Custom

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Lighting Controls, Custom	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Lighting Controls, Custom	multi	1.00	1.00	0.95	0.95	0.94	0.75	0.93	0.80

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Lighting Controls, Custom	38.40%	28.22%	19.26%	14.11%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

RRsp Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

RRwp Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Lighting Controls, Custom	0	0	0.00	0.10	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Lighting Controls, Custom	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.83 / kWh

Incentive: $0.57 / kWh

Lighting Systems, Custom

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Lighting **Measure Type:** Interior **Measure Sub Type:** Efficient Lighting

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Lighting Systems, Custom	2024 Electric Large C&I Retrofit Lighting Systems, Custom

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Lighting Systems, Custom	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Lighting Systems, Custom	multi	1.00	1.00	0.95	0.95	0.94	0.75	0.93	0.80

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Lighting Systems, Custom	38.40%	28.22%	19.26%	14.11%

Measure Life Note: Consistent with MA TRM

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

RRsp Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

RRwp Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Lighting Systems, Custom	0	0	0.00	0.06	0.00	0.00	0.00	0.00

Annual $ Source: Tetra Tech (2012). Final Report – Commercial and Industrial Non-Energy Impacts Study. https://www.puc.nh.gov/EESE%20Board/Meetings/2017/021017EERSWorkshop1/Commercial%20and%20Industrial%20Non-Energy%20Impacts%20Study.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Lighting Systems, Custom	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.83 / kWh

Incentive: $0.34 / kWh

Load Comp, 75HP

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Compressed Air

Measure Type: Compressor

Measure Sub Type: Load / no-load compressor up to 75 HP

Program: Large C&I Retrofit

Measure Description

The installation of oil flooded, rotary screw compressors with Load/No Load capacity control scheme to improve compression efficiencies at partial loads, including a properly sized air receiver.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Load Comp, 75HP	2024 Electric Large C&I Retrofit Load Comp, 75HP

Savings Principle

The high efficiency case is an oil-flooded, rotary screw compressor with Load/No Load capacity control with a properly sized air receiver.

Savings Method

Calculated using site-specific inputs

Unit

Total horsepower (hp) of installed air compressor capacity.

Savings Equation

Gross kWh = HP_compressor × deltakW/HP × Hours

Gross kW = HP_compressor × deltakW/HP

Where:

HP_compressor = Nominal rated horsepower of high efficiency air compressor: site-specific

Hours = Annual operating hours of the air compressor: site-specific

deltakW/HP = Air compressor kW reduction per HP

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Load Comp, 75HP	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Algorithm Input kwh/horsepower based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations

Electric kW Note: Algorithm Input kwh/horsepower based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Load Comp, 75HP	13	1.00	1.00		1.00	1.00	1.00	1.00	0.82

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Load Comp, 75HP	34.24%	28.94%	18.41%	18.41%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

RRsp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

RRwp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Load Comp, 75HP	0	0	0.00	0.06	0.00	0.00	0.00	0.00

Annual $ Source: Tetra Tech (2012). Final Report – Commercial and Industrial Non-Energy Impacts Study. https://www.puc.nh.gov/EESE%20Board/Meetings/2017/021017EERSWorkshop1/Commercial%20and%20Industrial%20Non-Energy%20Impacts%20Study.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Load Comp, 75HP	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Low pressure drop filter

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Compressed Air

Measure Type: Filter

Measure Sub Type: Low pressure drop filter

Program: Large C&I Retrofit

Measure Description

Filters remove solids and aerosols from compressed air systems. Low pressure drop filters have longer lives and lower pressure drops than traditional coalescing filters resulting in higher efficiencies.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Low pressure drop filter	2024 Electric Large C&I Retrofit Low pressure drop filter

Savings Principle

The high efficiency case is a low pressure drop filter with initial drop not exceeding 1 psi when new and 3 psi at element change. Filters must be deep-bed, “mist eliminator” style and installed on a single operating compressor rated 15 – 75 HP.

Savings Method

Calculated using site-specific inputs

Unit

Installed filter.

Savings Equation

Gross kWh = Qty × HP_compressor × (kW per HP) × %SAVE × Hours

Gross kW = Qty × HP_compressor × (kW per HP) × %SAVE

Where:

Qty = Number of filters installed: site-specific

HP_compressor = Average compressor load: site-specific

kW per HP = Conversion factor

%SAVE = Percent change in pressure drop: site-specific

Hours = Annual operating hours of the lower pressure drop filter: site-specific

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Low pressure drop filter	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Algorithm Input kwh/horsepower based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations

Electric kW Note: Algorithm Input kwh/horsepower based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Low pressure drop filter	5	1.00	1.00		1.00	1.00	1.00	1.00	0.82

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Low pressure drop filter	34.24%	28.94%	18.41%	18.41%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

Measure Life Note: Assumes 1/3 of the savings of compressed air

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

RRsp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

RRwp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

CFsp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

CFwp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Low pressure drop filter	0	0	0.00	0.06	0.00	0.00	0.00	0.00

Annual $ Source: Tetra Tech (2012). Final Report – Commercial and Industrial Non-Energy Impacts Study. https://www.puc.nh.gov/EESE%20Board/Meetings/2017/021017EERSWorkshop1/Commercial%20and%20Industrial%20Non-Energy%20Impacts%20Study.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Low pressure drop filter	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Make Up Air Fan

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I Retrofit

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Make Up Air Fan	2024 Electric Large C&I Retrofit Make Up Air Fan

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Make Up Air Fan	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Make Up Air Fan	15	1.00	1.00		0.94	0.99	0.99	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Make Up Air Fan	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Make Up Air Fan	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Make Up Air Fan	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.42 / kWh

Incentive: $0.42 / kWh

Motor VFD

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** VFD **Measure Sub Type:** Motor

Program: Large C&I Retrofit

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
MTVFD-BLDG EXHST FAN	2024 Electric Large C&I Retrofit MTVFD-BLDG EXHST FAN
MTVFD-BOIL DRAFT FAN	2024 Electric Large C&I Retrofit MTVFD-BOIL DRAFT FAN
MTVFD-BOIL FWTR PUMP	2024 Electric Large C&I Retrofit MTVFD-BOIL FWTR PUMP
MTVFD-CHIL WATER PMP	2024 Electric Large C&I Retrofit MTVFD-CHIL WATER PMP
MTVFD-CT FAN	2024 Electric Large C&I Retrofit MTVFD-CT FAN
MTVFD-HEAT HW PUMP	2024 Electric Large C&I Retrofit MTVFD-HEAT HW PUMP
MTVFD-HVAC RET FAN	2024 Electric Large C&I Retrofit MTVFD-HVAC RET FAN
MTVFD-HVAC SUP FAN	2024 Electric Large C&I Retrofit MTVFD-HVAC SUP FAN
MTVFD-MK UP AIR FAN	2024 Electric Large C&I Retrofit MTVFD-MK UP AIR FAN
MTVFD-PROC COOL PUMP	2024 Electric Large C&I Retrofit MTVFD-PROC COOL PUMP
MTVFD-WATER/WST PUMP	2024 Electric Large C&I Retrofit MTVFD-WATER/WST PUMP
MTVFD-WSHP PUMP	2024 Electric Large C&I Retrofit MTVFD-WSHP PUMP

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
MTVFD-BLDG EXHST FAN MTVFD-BOIL DRAFT FAN MTVFD-BOIL FWTR PUMP MTVFD-CHIL WATER PMP MTVFD-CT FAN MTVFD-HEAT HW PUMP MTVFD-HVAC RET FAN MTVFD-HVAC SUP FAN MTVFD-MK UP AIR FAN MTVFD-PROC COOL PUMP MTVFD-WATER/WST PUMP MTVFD-WSHP PUMP	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Motor VFD	15	1.00	1.00		0.94	0.99	0.99	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Motor VFD	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Motor VFD	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Motor VFD	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.42 / kWh

Incentive: $0.42 / kWh

Motor VFD Secondary

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I Retrofit

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Motor VFD Secondary	2024 Electric Large C&I Retrofit Motor VFD Secondary

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Motor VFD Secondary	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Motor VFD Secondary	15	1.00	1.00		0.94	0.99	0.99	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Motor VFD Secondary	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Motor VFD Secondary	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Motor VFD Secondary	0.15	0.00	0.00	0.86

TRC: $0.42 / kWh

Incentive: $0.42 / kWh

Non-refrigerated snack vending machine

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Refrigeration **Measure Type:** Controls **Measure Sub Type:** Vending Miser

Program: Large C&I Retrofit

Measure Description

Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintaina cool product that meets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated snack vending machines, and glass front refrigerated coolers. This measure should not be applied to ENERGY STAR® qualified vending machines, as they already have built-in controls.

Baseline Description

The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

BCR Measures

BCR Measure Name	Unique Identifier
Non-refrigerated snack vending machine	2024 Electric Large C&I Retrofit Non-refrigerated snack vending machine

Savings Principle

The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

Savings Method

Deemed

Unit

Installed vending miser.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: 8760

Hours Note: It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Non-refrigerated snack vending machine	343.0	0.0390	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.

Electric kW Source: USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Non-refrigerated snack vending machine	5	1.00	1.00		1.04	1.00	1.00	0.94	0.97

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Non-refrigerated snack vending machine	26.40%	16.60%	34.90%	22.10%

Measure Life Source: DNV GL (2018) ERS Portfolio Model Methods and Assumptions - Electric and Natural Gas Memo.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRsp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRwp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

CFsp Note: Coincidence Factors are set to zero since demand savings typically occur during off-peak hours

CFwp Note: Coincidence Factors are set to zero since demand savings typically occur during off-peak hours

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Non-refrigerated snack vending machine	0	0	0.00	0.11	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Non-refrigerated snack vending machine	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.9 / kWh

Incentive: $0.5 / kWh

O & M

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** O & M **Measure Sub Type:** O & M

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
O & M	2024 Electric Large C&I Retrofit O & M

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
O & M	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
O & M	2,5	1.00	1.00	0.89	0.89	0.74	1.05	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
O & M	0.00%	0.00%	50.00%	50.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
O & M	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
O & M	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.34 / kWh

Incentive: $0.18 / kWh

Packaged Terminal Heat Pumps (PTHP)

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: HVAC

Measure Type: Heat Pumps

Measure Sub Type: Heat Pump, Packaged Terminal

Program: Large C&I Retrofit

Measure Description

Installation of a high efficiency PTHP to replace an existing PTAC.

Baseline Description

The baseline is an existing PTAC.

BCR Measures

BCR Measure Name	Unique Identifier
Packaged Terminal Heat Pumps (PTHP)	2024 Electric Large C&I Retrofit Packaged Terminal Heat Pumps (PTHP)

Savings Principle

The high efficiency case is a high efficiency PTHP

Savings Method

Deemed

Unit

Per PTHP

Savings Equation

Gross kWh = Qty × deltakW × Hours

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

DeltakW = Deemed average kW reduction per unit.

Hours = Deemed average annual operating hours.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Packaged Terminal Heat Pumps (PTHP)	1.0		0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Based on energy modeling of PNNL prototype buildings of small hotel, large hotel, and multifamily mid-rise

Electric kW Note: The peak demand occurs in the winter at low ambient temps when supplemental elec resistance heat is operational. As a result, there is no max kW demand reduction going from PTAC to high efficiency PTHP (existing buildings) or code level PTHP to high effic

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Packaged Terminal Heat Pumps (PTHP)	8	1.00	1.00		1.00	1.00	1.00	0.06	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Packaged Terminal Heat Pumps (PTHP)	31.64%	33.38%	19.83%	15.18%

Measure Life Source: Guidehouse (2018). ComEd Effective Useful Life Research Report. https://www.icc.illinois.gov/docket/P2017-0312/documents/287811/files/501915.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization Rate is assumed 100%.

RRwp Note: Realization Rate is assumed 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Packaged Terminal Heat Pumps (PTHP)	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Packaged Terminal Heat Pumps (PTHP)	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.39 / kWh

Incentive: $0.15 / kWh

Pay for Performance (P4P)

Sector: C&I

Fuel: Electric

Program Type: Custom

Measure Category: Miscellaneous Prescriptive

Measure Type: Pay 4 Performance

Measure Sub Type: 1 year

Program: Large C&I Retrofit

Measure Description

The implementation of optimization measures to reduce energy consumption, using M&V to verify savings on a per-project basis.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
P4P -1 Year	2024 Electric Large C&I Retrofit P4P -1 Year
P4P - 2 Year	2024 Electric Large C&I Retrofit P4P - 2 Year
P4P - 3 Year	2024 Electric Large C&I Retrofit P4P - 3 Year
P4P - 4 Year	2024 Electric Large C&I Retrofit P4P - 4 Year
P4P - 5 Year	2024 Electric Large C&I Retrofit P4P - 5 Year

Savings Principle

Implemented optimization measures.

Savings Method

Calculated using site-specific inputs

Unit

Completed P4P project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
P4P -1 Year							
P4P - 2 Year							
P4P - 3 Year	Calc		0.00	0.00	0.00	0.00	0.00
P4P - 4 Year							
P4P - 5 Year							

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Pay for Performance (P4P)	1,2,3,4,5	1.00	1.00		1.00			1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Pay for Performance (P4P)	33.33%	33.33%	16.67%	16.67%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Pay for Performance (P4P)	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Pay for Performance (P4P)	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Performance Lighting

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Lighting

Measure Type: Prescriptive Lighting

Measure Sub Type: Performance Lighting

Program: Large C&I Retrofit

Measure Description

The installation of lighting systems that achieve lighting power densities below those required by RI building code.

Baseline Description

The Baseline Efficiency assumes compliance with lighting power density requirements as mandated by Rhode Island State Building Code, which currently reflects IECC 2012. IECC 2012 offers two compliance paths, the Building Area Method and Space-by-Space Method.

BCR Measures

BCR Measure Name	Unique Identifier
Performance Lighting - Tier 1 Exterior	2024 Electric Large C&I Retrofit Performance Lighting - Tier 1 Exterior
Performance Lighting - Tier 1 Interior	2024 Electric Large C&I Retrofit Performance Lighting - Tier 1 Interior
Performance Lighting Tier 2 & 3 Exterior	2024 Electric Large C&I Retrofit Performance Lighting Tier 2 & 3 Exterior
Performance Lighting Tier 2 & 3 Interior	2024 Electric Large C&I Retrofit Performance Lighting Tier 2 & 3 Interior

Savings Principle

The high efficiency scenario assumes lighting systems that achieve lighting power densities below those required by RI State Building Code. Actual site lighting power densities should be determined on a case-by-case basis. Please refer to the current yearapplication form for minimum percentage better than code efficiency requirements.

Savings Method

Unit

Per Lighting Performance Project

Savings Equation

Gross kWh = [SUM(LPD_base_i × Area_i × Hours_i) - SUM(QTY_ee_j × Watts_ee_j × Hours_j)] / (Watts per kW)

Gross kW = [SUM(LPD_base_i × Area_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW)

Where:

Area_i = Floor area of location i (SQFT)

Hours_base_i = Total annual operating hours for baseline lighting equipment in location i

QTY_ee_j = Quantity of efficient fixtures in location j

Watts_ee_j = Connected wattage of efficient fixtures in location j

Hours_j = Lighting annual hours of operation: site-specific.

1,000 Watts per kW = Conversion factor

deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved.

deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Performance Lighting - Tier 1 Exterior	Calc	Calc	Calc	0.00	0.00	Calc	0.00
Performance Lighting - Tier 1 Interior	Calc	Calc	Calc			Calc	
Performance Lighting Tier 2 & 3 Exterior	Calc	Calc	Calc			Calc	
Performance Lighting Tier 2 & 3 Interior	Calc	Calc	Calc			Calc	

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Performance Lighting	See Table 12 in Appendix A	1.00	1.00	0.93	0.93	0.99	0.99	0.59	0.54

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Performance Lighting	30.27%	17.38%	34.27%	18.08%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Performance Lighting	0	0	0.00	0.03	0.00	0.00	0.00	0.00

Annual $ Source: Tetra Tech (2012). Final Report – Commercial and Industrial Non-Energy Impacts Study. https://www.puc.nh.gov/EESE%20Board/Meetings/2017/021017EERSWorkshop1/Commercial%20and%20Industrial%20Non-Energy%20Impacts%20Study.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Performance Lighting	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Prescriptive Lighting

Sector: C&I | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Lighting | **Measure Type:** Prescriptive Lighting | **Measure Sub Type:**

Program: Large C&I Retrofit

Measure Description

This measure promotes the installation of lighting fixtures in retrofit applications.

Baseline Description

The baseline efficiency case is project-specific and is determined using actual fixture counts from the existing space.

BCR Measures

BCR Measure Name	Unique Identifier
Prescriptive Lighting - 24/7	2024 Electric Large C&I Retrofit Prescriptive Lighting - 24/7
Prescriptive Lighting - DuskDawn	2024 Electric Large C&I Retrofit Prescriptive Lighting - DuskDawn
Prescriptive Lighting - Compact	2024 Electric Large C&I Retrofit Prescriptive Lighting - Compact
Prescriptive Lighting - Linear LED - Downstream	2024 Electric Large C&I Retrofit Prescriptive Lighting - Linear LED - Downstream
Prescriptive Lighting - Fluorescent	2024 Electric Large C&I Retrofit Prescriptive Lighting - Fluorescent
Prescriptive Lighting - LED Case Ref	2024 Electric Large C&I Retrofit Prescriptive Lighting - LED Case Ref
Prescriptive Lighting - LED - Downstream	2024 Electric Large C&I Retrofit Prescriptive Lighting - LED - Downstream
Prescriptive Lighting - LED General	2024 Electric Large C&I Retrofit Prescriptive Lighting - LED General
Prescriptive Lighting - LED Replacement	2024 Electric Large C&I Retrofit Prescriptive Lighting - LED Replacement
Prescriptive Lighting - LED Sign	2024 Electric Large C&I Retrofit Prescriptive Lighting - LED Sign

Savings Principle

The high efficiency case is project-specific and is determined using actual fixture counts for the project and the wattage tables in Appendix A.

Savings Method

Unit

Installed high-efficiency lighting project.

Savings Equation

Gross kWh = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) × Hours

Gross kW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW)

Where:

QTY_base_i = Quantity of baseline fixtures in location i

Watts_base_i = Connected wattage of baseline fixtures in location i

QTY_ee_j = Quantity of efficient fixtures in location j

Watts_ee_j = Connected wattage of efficient fixtures in location j

1,000 Watts per kW = Conversion factor

Hours = Lighting annual hours of operation: site-specific.

deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved.

deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Prescriptive Lighting - 24/7 Prescriptive Lighting - DuskDawn Prescriptive Lighting - Compact Prescriptive Lighting - Linear LED - Downstream Prescriptive Lighting - Fluorescent Prescriptive Lighting - LED Case Ref Prescriptive Lighting - LED - Downstream Prescriptive Lighting - LED General Prescriptive Lighting - LED Replacement Prescriptive Lighting - LED Sign	Calc	Calc	Calc	0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: DNV GL (2018).Impact Evaluation of PY2015 RI C&I Upstream Lighting Initiative. http://rieermc.ri.gov/wp-content/uploads/2019/04/impact_eval_of_ri_upstream_lighting_finalreport.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Prescriptive Lighting	See Table 12 in Appendix A	1.00	1.00	0.93	0.93	0.99	0.99	0.59	0.54

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Prescriptive Lighting	30.27%	17.38%	34.27%	18.08%

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Prescriptive Lighting	0	0	0.00	0.03	0.00	0.00	0.00	0.00

Annual $ Source: Tetra Tech (2012). Final Report – Commercial and Industrial Non-Energy Impacts Study. https://www.puc.nh.gov/EESE%20Board/Meetings/2017/021017EERSWorkshop1/Commercial%20and%20Industrial%20Non-Energy%20Impacts%20Study.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Prescriptive Lighting	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.83 / kWh

Incentive: $0.34 / kWh

Process Cooling

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Process Cooling **Measure Sub Type:** Process Cooling

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Process Cooling	2024 Electric Large C&I Retrofit Process Cooling

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Process Cooling	Calc	Calc	0.00	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Process Cooling	multi	1.00	1.00		0.89	0.74	1.05	0.68	0.70

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Process Cooling	32.82%	33.85%	16.41%	16.92%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Process Cooling	0	0	0.00	0.10	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Process Cooling	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.34 / kWh

Incentive: $0.25 / kWh

Process, Cool Pump

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Pump

Program: Large C&I Retrofit

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Process, Cool Pump	2024 Electric Large C&I Retrofit Process, Cool Pump

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Process, Cool Pump	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Process, Cool Pump	13	1.00	1.00		0.94	0.99	0.99	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Process, Cool Pump	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Process, Cool Pump	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Process, Cool Pump	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.42 / kWh

Incentive: $0.42 / kWh

Process, Exhaust Fan

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I Retrofit

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Process, Exhaust Fan	2024 Electric Large C&I Retrofit Process, Exhaust Fan

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Process, Exhaust Fan	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Process, Exhaust Fan	13	1.00	1.00		0.94	0.99	0.99	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Process, Exhaust Fan	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Process, Exhaust Fan	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Process, Exhaust Fan	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.42 / kWh

Incentive: $0.42 / kWh

Refrigerated beverage vending machine

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Refrigeration **Measure Type:** Controls **Measure Sub Type:** Vending Miser

Program: Large C&I Retrofit

Measure Description

Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintaina cool product that meets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated snack vending machines, and glass front refrigerated coolers. This measure should not be applied to ENERGY STAR® qualified vending machines, as they already have built-in controls.

Baseline Description

The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

BCR Measures

BCR Measure Name	Unique Identifier
Refrigerated beverage vending machine	2024 Electric Large C&I Retrofit Refrigerated beverage vending machine

Savings Principle

The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

Savings Method

Deemed

Unit

Installed vending miser.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: 8760

Hours Note: It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Refrigerated beverage vending machine	1612.0	0.1840	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.

Electric kW Source: USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Refrigerated beverage vending machine	5	1.00	1.00		1.04	1.00	1.00	0.94	0.97

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Refrigerated beverage vending machine	26.40%	16.60%	34.90%	22.10%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRsp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRwp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

CFsp Note: Coincidence Factors are set to zero since demand savings typically occur during off-peak hours

CFwp Note: Coincidence Factors are set to zero since demand savings typically occur during off-peak hours

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Refrigerated beverage vending machine	0	0	0.00	0.11	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Refrigerated beverage vending machine	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.9 / kWh

Incentive: $0.5 / kWh

Street Lighting

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Street Lights **Measure Sub Type:** Street lighting

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Street Lighting - Lighting	2024 Electric Large C&I Retrofit Street Lighting - Lighting
Street lighting - Lighting w/ Controls	2024 Electric Large C&I Retrofit Street lighting - Lighting w/ Controls

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Street Lighting - Lighting Street lighting - Lighting w/ Controls	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Street Lighting	See Table 12 in Appendix A	1.00	1.00	0.95	0.95	0.94	0.75		0.85

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Street Lighting	15.00%	52.00%	7.00%	26.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

RRsp Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

RRwp Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Street Lighting	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: Tetra Tech (2012). Final Report – Commercial and Industrial Non-Energy Impacts Study. https://www.puc.nh.gov/EESE%20Board/Meetings/2017/021017EERSWorkshop1/Commercial%20and%20Industrial%20Non-Energy%20Impacts%20Study.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Street Lighting	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.83 / kWh

Transformers

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Transformers **Measure Sub Type:** Transformers

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Transformers	2024 Electric Large C&I Retrofit Transformers

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Transformers	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Transformers	multi	1.00	1.00	0.89	0.89	0.74	1.05	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Transformers	0.00%	0.00%	50.00%	50.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Transformers	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Transformers	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $1.04 / kWh

Incentive: $0.35 / kWh

Upstream Lighting

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Lighting **Measure Type:** Prescriptive **Measure Sub Type:** Upstream

Program: Large C&I Retrofit

Measure Description

The installation of efficient lighting discounted at the distribution level.

Baseline Description

The baseline case is a mix of fluorescent and halogen fixtures for LEDs and low efficiency fluorescents for high efficiency fluorescents.

BCR Measures

BCR Measure Name	Unique Identifier
UPSTR Lighting - LED Controls	2024 Electric Large C&I Retrofit UPSTR Lighting - LED Controls
UPSTR Lighting - High/Low Bay Controls	2024 Electric Large C&I Retrofit UPSTR Lighting - High/Low Bay Controls
UPSTR Lighting - LED	2024 Electric Large C&I Retrofit UPSTR Lighting - LED
UPSTR Lighting - LED Exterior	2024 Electric Large C&I Retrofit UPSTR Lighting - LED Exterior
UPSTR Lighting - LED High/Low Bay	2024 Electric Large C&I Retrofit UPSTR Lighting - LED High/Low Bay
UPSTR Lighting - LED Stairwell	2024 Electric Large C&I Retrofit UPSTR Lighting - LED Stairwell
UPSTR Lighting - Linear LED	2024 Electric Large C&I Retrofit UPSTR Lighting - Linear LED
UPSTR Lighting - General	2024 Electric Large C&I Retrofit UPSTR Lighting - General
UPSTR Lighting - LED Outdoor Control	2024 Electric Large C&I Retrofit UPSTR Lighting - LED Outdoor Control

Savings Principle

The high efficiency case is high efficiency LED. Please refer to Table 6 in Appendix A for wattage details.

Savings Method

Deemed

Unit

Installed high-efficiency lighting project.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Hours Note: The annual hours of operation are application specific and can be seen in Table 6: Upstream Lighting.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
UPSTR Lighting - LED Controls UPSTR Lighting - High/Low Bay Controls UPSTR Lighting - LED UPSTR Lighting - LED Exterior UPSTR Lighting - LED High/Low Bay UPSTR Lighting - LED Stairwell UPSTR Lighting - Linear LED UPSTR Lighting - General UPSTR Lighting - LED Outdoor Control	Table 6	Table 6	6.00	0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: DNV GL (2018).Impact Evaluation of PY2015 RI C&I Upstream Lighting Initiative. http://rieermc.ri.gov/wp-content/uploads/2019/04/impact_eval_of_ri_upstream_lighting_finalreport.pdf

Gas Heat MMBtu Note: NEI per kWh

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Upstream Lighting - Interior	See Table 12 in Appendix A	1.00	1.00		0.93	1.05	0.90	0.59	0.54
Upstream Lighting - Exterior					0.95	0.95	0.95	0.93	0.53

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Upstream Lighting - Interior	30.27%	17.38%	34.27%	18.08%
Upstream Lighting - Exterior	20.12%	31.63%	19.22%	29.03%

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Upstream Lighting	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: Tetra Tech (2012). Final Report – Commercial and Industrial Non-Energy Impacts Study. https://www.puc.nh.gov/EESE%20Board/Meetings/2017/021017EERSWorkshop1/Commercial%20and%20Industrial%20Non-Energy%20Impacts%20Study.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Upstream Lighting	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

VARICOMP

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Compressed Air

Measure Type: Compressor

Measure Sub Type: Variable compressor up to 75 HP

Program: Large C&I Retrofit

Measure Description

The installation of oil flooded, rotary screw compressors with Variable Displacement capacity control schemes to improve compression efficiencies at partial loads, including a properly sized air receiver.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
VARICOMP - 25 HP	2024 Electric Large C&I Retrofit VARICOMP - 25 HP
VARICOMP - 75 HP	2024 Electric Large C&I Retrofit VARICOMP - 75 HP

Savings Principle

The high efficiency case is an oil-flooded, rotary screw compressor with Variable Displacement capacity control with a properly sized air receiver.

Savings Method

Calculated using site-specific inputs

Unit

kW saved per horsepower (hp) of installed air compressor capacity.

Savings Equation

Gross kWh = HP_compressor × deltakW/HP × Hours

Gross kW = HP_compressor × deltakW/HP

Where:

HP_compressor = Nominal rated horsepower of high efficiency air compressor: site-specific

Hours = Annual operating hours of the air compressor: site-specific

deltakW/HP = Air compressor kW reduction per HP

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis; RR adjusts for evaluation results.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
VARICOMP - 25 HP VARICOMP - 75 HP	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Algorithm Input kwh/horsepower based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations

Electric kW Note: Algorithm Input kwh/horsepower based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
VARICOMP - 25 HP	13	1.00	1.00					0.80	0.54
VARICOMP - 75 HP								1.00	0.82

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
VARICOMP - 25 HP	17.24%	15.91%	33.69%	33.16%
VARICOMP - 75 HP	25.54%	25.54%	24.65%	24.27%

Measure Life Source: DOE (2016). Technical Support Document: Air Compressors. EERE-2013-BT-STD-0040-0082. https://www.regulations.gov/document/EERE-2013-BT-STD-0040-0082

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
VARICOMP	0	0	0.00	0.06	0.00	0.00	0.00	0.00

Annual $ Source: Tetra Tech (2012). Final Report – Commercial and Industrial Non-Energy Impacts Study. https://www.puc.nh.gov/EESE%20Board/Meetings/2017/021017EERSWorkshop1/Commercial%20and%20Industrial%20Non-Energy%20Impacts%20Study.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
VARICOMP	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.1 / kWh

Incentive: $0.08 / kWh

Verified savings

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Verified savings **Measure Sub Type:** Verified savings

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Verified savings	2024 Electric Large C&I Retrofit Verified savings

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Verified savings	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Verified savings	10,15	1.00	1.00	1.00	1.00	0.71	0.86	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Verified savings	0.00%	0.00%	50.00%	50.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRsp Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

RRwp Source: DNV (2022). RI PY2018 & PY2019 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2023/01/rice2018-19-program-report_final.pdf

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Verified savings	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Verified savings	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

VFD Secondary

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Large C&I Retrofit

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
VFD Secondary	2024 Electric Large C&I Retrofit VFD Secondary

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
VFD Secondary	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
VFD Secondary	15	1.00	1.00		0.94	0.99	0.99	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
VFD Secondary	23.70%	27.20%	23.80%	25.30%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
VFD Secondary	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
VFD Secondary	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.42 / kWh

Incentive: $0.42 / kWh

VSD

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** VSD **Measure Sub Type:** HVAC

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
VSD-HVAC	2024 Electric Large C&I Retrofit VSD-HVAC
VSD-Non HVAC	2024 Electric Large C&I Retrofit VSD-Non HVAC

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
VSD-HVAC VSD-Non HVAC	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
VSD	10,15	1.00	1.00	0.83	0.83	0.67	0.85	0.69	0.37

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
VSD	23.70%	27.20%	23.80%	25.30%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2022). Rhode Island PY2020 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2022/11/dnvs-rice2020_impact-evaluation_program-report.pdf

RRsp Source: DNV (2022). Rhode Island PY2020 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2022/11/dnvs-rice2020_impact-evaluation_program-report.pdf

RRwp Source: DNV (2022). Rhode Island PY2020 Custom Electric Installations. http://rieermc.ri.gov/wp-content/uploads/2022/11/dnvs-rice2020_impact-evaluation_program-report.pdf

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
VSD	0	0	0.00	0.02	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
VSD	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.42 / kWh

Incentive: $0.35 / kWh

VSD compressor up to 75 HP

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Compressed Air

Measure Type: Compressor

Measure Sub Type: VSD compressor up to 75 HP

Program: Large C&I Retrofit

Measure Description

The installation of oil flooded, rotary screw compressors with Variable Speed Drive capacity control schemes to improve compression efficiencies at partial loads, including a properly sized air receiver.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
VSD compressor up to 75 HP	2024 Electric Large C&I Retrofit VSD compressor up to 75 HP

Savings Principle

The high efficiency case is an oil-flooded, rotary screw compressor with Variable Speed Drive capacity control with a properly sized air receiver.

Savings Method

Calculated using site-specific inputs

Unit

kW saved per horsepower (hp) of installed air compressor capacity.

Savings Equation

Gross kWh = HP_compressor × deltakW/HP × Hours

Gross kW = HP_compressor × deltakW/HP

Where:

HP_compressor = Nominal rated horsepower of high efficiency air compressor: site-specific

Hours = Annual operating hours of the air compressor: site-specific

deltakW/HP = Air compressor kW reduction per HP

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis; RR adjusts for evaluation results.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
VSD compressor up to 75 HP	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Algorithm Input kwh/horsepower based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations

Electric kW Note: Algorithm Input kwh/horsepower based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
VSD compressor up to 75 HP	13	1.00	1.00		1.41	1.00	1.00	1.00	0.82

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
VSD compressor up to 75 HP	25.54%	25.54%	24.65%	24.27%

Measure Life Source: DOE (2016). Technical Support Document: Air Compressors. EERE-2013-BT-STD-0040-0082. https://www.regulations.gov/document/EERE-2013-BT-STD-0040-0082

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

RRsp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

RRwp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

CFsp Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

CFwp Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
VSD compressor up to 75 HP	0	0	0.00	0.06	0.00	0.00	0.00	0.00

Annual $ Source: Tetra Tech (2012). Final Report – Commercial and Industrial Non-Energy Impacts Study. https://www.puc.nh.gov/EESE%20Board/Meetings/2017/021017EERSWorkshop1/Commercial%20and%20Industrial%20Non-Energy%20Impacts%20Study.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
VSD compressor up to 75 HP	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Water Source Heat Pump

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Pump

Program: Large C&I Retrofit

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Water Source Heat Pump	2024 Electric Large C&I Retrofit Water Source Heat Pump

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Water Source Heat Pump	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Water Source Heat Pump	15	1.00	1.00		0.94	0.99	0.99	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Water Source Heat Pump	23.70%	27.20%	23.80%	25.30%

Measure Life Source: California Public Utilities Commission (CPUC), Energy Division (2008). EUL_Summary_10-1-08.xls.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Water Source Heat Pump	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Water Source Heat Pump	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.42 / kWh

Incentive: $0.42 / kWh

Water/Waste Pump

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Pump

Program: Large C&I Retrofit

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Water/Waste Pump	2024 Electric Large C&I Retrofit Water/Waste Pump

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Water/Waste Pump	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Water/Waste Pump	15	1.00	1.00		0.94	0.99	0.99	1.00	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Water/Waste Pump	23.70%	27.20%	23.80%	25.30%

Measure Life Source: California Public Utilities Commission (CPUC), Energy Division (2008). EUL_Summary_10-1-08.xls.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council

CFsp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

CFwp Note: The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Water/Waste Pump	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Water/Waste Pump	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.42 / kWh

Incentive: $0.42 / kWh

Custom Weatherization

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Weatherization **Measure Sub Type:**

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Custom Weatherization	2024 Electric Large C&I Retrofit Custom Weatherization

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom Weatherization	Calc	Calc	Calc	Calc	Calc	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom Weatherization	multi	1.00	1.00	0.89	0.89	0.74	1.05	0.95	0.38

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom Weatherization	32.36%	34.31%	16.18%	17.15%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRsp Source: DNV (2023). RI PY2021 Custom Electric Installations.

RRwp Source: DNV (2023). RI PY2021 Custom Electric Installations.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom Weatherization	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom Weatherization	0.36	0.01	0.01	0.65

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

Zero Loss Drain

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Compressed Air **Measure Type:** Drain **Measure Sub Type:** Zero Loss Drain

Program: Large C&I Retrofit

Measure Description

Drains remove water from a compressed air system. Zero loss condensate drains remove water from a compressed air system without venting any air, resulting in less air demand and consequently greater efficiency.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Zero Loss Drain	2024 Electric Large C&I Retrofit Zero Loss Drain

Savings Principle

The high efficiency case is the installation of a zero loss condensate drain on a single operating compressor rated <= 75 HP.

Savings Method

Calculated using site-specific inputs

Unit

Installed drain.

Savings Equation

Gross kWh = CFM_pipe × deltaCFM/CFM_pipe × deltakW/CFM × Hours

Gross kW = CFM_pipe × deltaCFM/CFM_pipe × deltakW/CFM

Where:

CFM_pipe = CFM capacity of piping: site-specific

0.049 deltaCFM/CFM_pipe = Average CFM saved per CFM of piping capacity

0.24386 deltakW/CFM = Average demand savings per CFM; Based on regional analysis assuming a typical timed drain settings discharge scenario.

Hours = Annual operating hours of the zero loss condensate drain: site-specific

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Zero Loss Drain	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Zero Loss Drain	13	1.00	1.00		1.00	1.00	1.00	1.00	0.82

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Zero Loss Drain	34.24%	28.94%	18.41%	18.41%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA (2016). Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations. http://rieermc.ri.gov/wp-content/uploads/2017/08/20160715_py2014_pres_cair_finalreport.pdf

RRsp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

RRwp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

CFsp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

CFwp Source: DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Zero Loss Drain	0	0	0.00	0.06	0.00	0.00	0.00	0.00

Annual $ Source: Tetra Tech (2012). Final Report – Commercial and Industrial Non-Energy Impacts Study. https://www.puc.nh.gov/EESE%20Board/Meetings/2017/021017EERSWorkshop1/Commercial%20and%20Industrial%20Non-Energy%20Impacts%20Study.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Zero Loss Drain	0.15	0.00	0.00	0.86

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Compressed Air, Custom

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Compressed air **Measure Sub Type:** CAIR

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Compressed Air, Custom	2024 Electric Small Business Direct Install Compressed Air, Custom

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Compressed Air, Custom	Calc	Calc	Calc	0.00	0.00	0.00	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Compressed Air, Custom	multi	1.00	1.00	0.81	0.81			0.77	0.64

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Compressed Air, Custom	39.30%	27.40%	19.60%	13.70%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Compressed Air, Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Compressed Air, Custom	0.29	0.00	0.00	0.71

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

CUSTOM LIGHTING

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Lighting **Measure Sub Type:** Lighting

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
CUSTOM LIGHTING	2024 Electric Small Business Direct Install CUSTOM LIGHTING

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CUSTOM LIGHTING	Calc	Calc	Calc	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
CUSTOM LIGHTING	multi	1.00	1.00	1.04	1.04	1.18	1.03	0.59	0.54

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
CUSTOM LIGHTING	30.27%	17.38%	34.27%	18.08%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2019). PY2016 Rhode Island Commercial and Industrial Small Business Initiative Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/07/py2016-ri-ci-small-business-initiative-impact-evaluation.pdf

RRsp Source: DNV GL (2019). PY2016 Rhode Island Commercial and Industrial Small Business Initiative Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/07/py2016-ri-ci-small-business-initiative-impact-evaluation.pdf

RRwp Source: DNV GL (2019). PY2016 Rhode Island Commercial and Industrial Small Business Initiative Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/07/py2016-ri-ci-small-business-initiative-impact-evaluation.pdf

CFsp Source: DNV GL (2019). PY2016 Rhode Island Commercial and Industrial Small Business Initiative Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/07/py2016-ri-ci-small-business-initiative-impact-evaluation.pdf

CFwp Source: DNV GL (2019). PY2016 Rhode Island Commercial and Industrial Small Business Initiative Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/07/py2016-ri-ci-small-business-initiative-impact-evaluation.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
CUSTOM LIGHTING	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
CUSTOM LIGHTING	0.12	0.00	0.00	0.88

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.86 / kWh

Incentive: $0.68 / kWh

Custom Motors/Drives, HVAC

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Motors/Drives **Measure Sub Type:** HVAC

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Custom Motors/Drives, HVAC	2024 Electric Small Business Direct Install Custom Motors/Drives, HVAC

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom Motors/Drives, HVAC	Calc	Calc	Calc	0.00	0.00	0.00	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom Motors/Drives, HVAC	multi	1.00	1.00	0.81	0.81			0.77	0.64

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom Motors/Drives, HVAC	39.30%	27.40%	19.60%	13.70%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: DNV GL (2019). PY2016 Rhode Island Commercial and Industrial Small Business Initiative Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/07/py2016-ri-ci-small-business-initiative-impact-evaluation.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom Motors/Drives, HVAC	0	0	0.00	0.02	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom Motors/Drives, HVAC	0.29	0.00	0.00	0.71

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $1.05 / kWh

Incentive: $0.75 / kWh

Custom Motors/Drives, Non-HVAC

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Motors/Drives **Measure Sub Type:** Non-HVAC

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Custom Motors/Drives, Non-HVAC	2024 Electric Small Business Direct Install Custom Motors/Drives, Non-HVAC

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom Motors/Drives, Non-HVAC	Calc	Calc	Calc	0.00	0.00	0.00	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom Motors/Drives, Non-HVAC	multi	1.00	1.00	0.81	0.81	1.00	1.00	0.77	0.64

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom Motors/Drives, Non-HVAC	39.30%	27.40%	19.60%	13.70%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: DNV GL (2019). PY2016 Rhode Island Commercial and Industrial Small Business Initiative Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/07/py2016-ri-ci-small-business-initiative-impact-evaluation.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom Motors/Drives, Non-HVAC	0	0	0.00	0.02	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom Motors/Drives, Non-HVAC	0.29	0.00	0.00	0.71

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $1.05 / kWh

Incentive: $0.75 / kWh

CUSTOM REFRIGERATION

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Refrigeration **Measure Sub Type:** Refrigeration

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
CUSTOM REFRIGERATION	2024 Electric Small Business Direct Install CUSTOM REFRIGERATION

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom energy-efficiency project.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CUSTOM REFRIGERATION	Calc	Calc	Calc	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
CUSTOM REFRIGERATION	multi	1.00	1.00	1.05	1.05	1.49	0.69	0.77	0.64

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
CUSTOM REFRIGERATION	39.30%	27.40%	19.60%	13.70%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2020). Impact Evaluation of PY 2017 Small Business Initiative Non-lighting Measures (MA19C03-E-SBIMPCT). https://ma-eeac.org/wp-content/uploads/Final-Report-MA19C03-E-SBIMPCT-03202020.pdf

RRsp Source: RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.

RRwp Source: RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.

CFsp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

CFwp Note: For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
CUSTOM REFRIGERATION	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
CUSTOM REFRIGERATION	0.29	0.00	0.00	0.71

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Door heater control

Sector: C&I

Fuel: Electric

Program Type: Custom

Measure Category: Refrigeration

Measure Type: Controls

Measure Sub Type: Door Heater Control

Program: Small Business Direct Install

Measure Description

The Installation of controls to reduce the run time of door and frame heaters for freezers and walk-in or reach-in coolers. The reduced heating also results in a reduced cooling load.

Baseline Description

The baseline efficiency case is a cooler or freezer door heater that operates 8,760 hours per year without any controls.

BCR Measures

BCR Measure Name	Unique Identifier
Door heater control	2024 Electric Small Business Direct Install Door heater control

Savings Principle

The high efficiency case is a cooler or freezer door heater connected to a heater control system, which controls the door heaters by calculating the dew point of the store, and controlling the anti-sweat heater based on specific algorithms for freezer andcooler doors.

Savings Method

Calculated using site-specific inputs

Unit

Installed door heater controls on existing cooler/freezer.

Savings Equation

Gross kWh = kW_DoorHeater × %OFF × Hours

Gross kW = kW_DoorHeater × %OFF

Where:

kW_DoorHeater = Total demand of the door heater, calculated as Volts * Amps / 1000: site-specific

%OFF = Door heater Off time: 46% for freezer door heaters or 74% for cooler door heaters

Hours = Door heater annual run hours before controls

Hours: N/A

Hours Note: Pre-retrofit hours are 8,760 hours per year. After controls are installed, the door heaters in freezers are on for an average 4,730.4 hours/year (46% off time) and the door heaters for coolers are on for an average 2,277.6 hours/year (74% off time) basedon National Resource Management field experience.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Door heater control	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Spreadsheet

Electric kW Note: Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Spreadsheet

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Door heater control	10	1.00	1.00		1.05	1.00	1.00	0.77	0.64

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Door heater control	39.30%	27.40%	19.60%	13.70%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2020). Impact Evaluation of PY 2017 Small Business Initiative Non-lighting Measures (MA19C03-E-SBIMPCT). https://ma-eeac.org/wp-content/uploads/Final-Report-MA19C03-E-SBIMPCT-03202020.pdf

RRsp Note: Realization rate is assumed 100% because savings are based on researched assumptions.

RRwp Note: Realization rate is assumed 100% because savings are based on researched assumptions.

CFsp Source: Cadmus (2015). Commercial Refrigeration Load shape Project Final Report. https://cadmusgroup.com/wp-content/uploads/2016/02/NEEP-CRL_Report_FINAL_clean.pdf?submissionGuid=cb214243-bab8-479a-a4c4-

CFwp Source: HEC, Inc. (1995). Analysis of Door Master Walk-In Cooler Anti-Sweat Door Heater Controls Installed at 10 Sites in MA. Prepared for NEPSCo; Table 9.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Door heater control	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Door heater control	0.29	0.00	0.00	0.71

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Fan Control

Sector: C&I | **Fuel:** Electric | **Program Type:** Custom

Measure Category: Refrigeration | **Measure Type:** Controls | **Measure Sub Type:** Fan Control

Program: Small Business Direct Install

Measure Description

Installation of controls to modulate the evaporator fans based on temperature control. Energy savings include: fan energy savings from reduced fan operating hours, refrigeration energy savings from reduced waste heat, and compressor energy savings resulting from the electronic temperature control.

Baseline Description

The baseline efficiency case assumes evaporator fans that run 8760 annual hours with no temperature control.

BCR Measures

BCR Measure Name	Unique Identifier
Fan Control	2024 Electric Small Business Direct Install Fan Control

Savings Principle

The high efficiency case is the use of an energy management system to control evaporator fan operation based on temperature.

Savings Method

Calculated using site-specific inputs

Unit

Installed controls on evaporator fans in existing cooler/freezer.

Savings Equation

Gross kWh = kW_Fan × %OFF × (Hours per year) × (1 + RefrigEff × (Btu/hr per kW) / (Btu/hr per ton)) + [kW_cp × Hours_cp + kW_fan × (Hours per year) × (1-%OFF)] × %SAVE

Gross kW = Gross kWh / Hours

Where:

kW_Fan = Power demand of evaporator fan calculatedfrom equipment nameplate data and estimated 0.55 power factor/adjustment

%OFF_heater = Door heater Off time: 46% for freezer door heaters or 74% for cooler door heaters

8760 Hours per year = Conversion factor

1.6 RefrigEff = Efficiency of typical refrigeration system (kW/ton); Estimate based on NRM field experience.

3,413 Btu/hr per kW = Conversion factor

12 kBtu/hr per ton = Conversion factor

kW_cp = Total power demand of compressor motor and condenser fan calculated from equipment nameplate data and estimated 0.85 power factor

Hours_cp = Equivalent annual full load hours of compressor operation; Estimate based on NRM field experience.

%OFF_evap = Percent of annual hours that the evaporator is turned off; Estimate based on NRM field experience.

%SAVE = Reduced run-time of compressor and evaporator due to electronic controls; Estimate based on NRM field experience.

Hours: 4072

Hours Note: The average annual operating hours are 4072 hours/year, based on National Resource Management field experience.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Fan Control	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Calculation assumptions based off of NRM field experience and data

Electric kW Note: Calculation assumptions based off of NRM field experience and data

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Fan Control	10	1.00	1.00		1.05	1.00	1.00	0.77	0.64

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Fan Control	39.30%	27.40%	19.60%	13.70%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2020). Impact Evaluation of PY 2017 Small Business Initiative Non-lighting Measures (MA19C03-E-SBIMPCT). https://ma-eeac.org/wp-content/uploads/Final-Report-MA19C03-E-SBIMPCT-03202020.pdf

RRsp Source: HEC, Inc. (1996). Analysis of Savings from Walkiin Cooler Air Economizers and Evaporator Fan Controls. Prepared for NEPSco.

RRwp Source: HEC, Inc. (1996). Analysis of Savings from Walkiin Cooler Air Economizers and Evaporator Fan Controls. Prepared for NEPSco.

CFsp Source: HEC, Inc. (1995). Analysis of Door Master Walk-In Cooler Anti-Sweat Door Heater Controls Installed at 10 Sites in MA. Prepared for NEPSCo; Table 9.

CFwp Source: HEC, Inc. (1995). Analysis of Door Master Walk-In Cooler Anti-Sweat Door Heater Controls Installed at 10 Sites in MA. Prepared for NEPSCo; Table 9.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Fan Control	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Fan Control	0.29	0.00	0.00	0.71

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Fluorescent Lighting

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Lighting **Measure Type:** Prescriptive **Measure Sub Type:** Prescriptive

Program: Small Business Direct Install

Measure Description

This measure promotes the installation of efficient lighting including, but not limited to, efficient fluorescent lamps, ballasts, and fixtures, solid state lighting, and efficient high intensity discharge (HID) lamps, ballasts, and fixtures.

Baseline Description

The baseline efficiency case is project-specific and is determined using actual fixture types and counts from the existing space. Existing fixture wattages are provided in the Table 4 of Appendix A.

BCR Measures

BCR Measure Name	Unique Identifier
Fluorescent Lighting - Compact, Exterior HW	2024 Electric Small Business Direct Install Fluorescent Lighting - Compact, Exterior HW
Fluorescent Lighting - Compact, Hard Wired	2024 Electric Small Business Direct Install Fluorescent Lighting - Compact, Hard Wired
Fluorescent Lighting - Compact, Interior Screw-In	2024 Electric Small Business Direct Install Fluorescent Lighting - Compact, Interior Screw-In
Fluorescent Lighting - Elig Ballast	2024 Electric Small Business Direct Install Fluorescent Lighting - Elig Ballast

Savings Principle

The high efficiency case is project-specific and is determined using actual fixture counts for the project and wattages found in Tables 3 and 5 in Appendix A.

Savings Method

Calculated using site-specific inputs

Unit

Installed high-efficiency lighting project.

Savings Equation

Gross kWh = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) × Hours

Gross kW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW)

Where:

QTY_base_i = Quantity of baseline fixtures in location i

Watts_base_i = Connected wattage of baseline fixtures in location i

QTY_ee_j = Quantity of efficient fixtures in location j

Watts_ee_j = Connected wattage of efficient fixtures in location j

1,000 Watts per kW = Conversion factor

Hours = Lighting annual hours of operation: site-specific.

deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved.

deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Fluorescent Lighting - Compact, Exterior HW Fluorescent Lighting - Compact, Hard Wired Fluorescent Lighting - Compact, Interior Screw-In Fluorescent Lighting - Elig Ballast	Calc	Calc	Calc	0.00	0.00	0.00 Calc Calc Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Fluorescent Lighting	See Table 12 in Appendix A	1.00	1.00		1.03	0.96	0.96	0.59	0.54

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Fluorescent Lighting	30.27%	17.38%	34.27%	18.08%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: Summit Blue Consulting (2008). Large Commercial and Industrial Retrofit Program Impact Evaluation 2007. Prepared for National Grid.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Fluorescent Lighting	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Fluorescent Lighting	0.12	0.00	0.00	0.88

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Freezer Door Heater Controls

Sector: C&I

Fuel: Electric

Program Type: Custom

Measure Category: Refrigeration

Measure Type: Controls

Measure Sub Type: Door Heater Control

Program: Small Business Direct Install

Measure Description

The Installation of controls to reduce the run time of door and frame heaters for freezers and walk-in or reach-in coolers. The reduced heating also results in a reduced cooling load.

Baseline Description

The baseline efficiency case is a cooler or freezer door heater that operates 8,760 hours per year without any controls.

BCR Measures

BCR Measure Name	Unique Identifier
Freezer Door Heater Controls	2024 Electric Small Business Direct Install Freezer Door Heater Controls

Savings Principle

The high efficiency case is a cooler or freezer door heater connected to a heater control system, which controls the door heaters by calculating the dew point of the store, and controlling the anti-sweat heater based on specific algorithms for freezer andcooler doors.

Savings Method

Calculated using site-specific inputs

Unit

Installed door heater controls on existing cooler/freezer.

Savings Equation

Gross kWh = kW_DoorHeater × %OFF × Hours

Gross kW = kW_DoorHeater × %OFF

Where:

kW_DoorHeater = Total demand of the door heater, calculated as Volts * Amps / 1000: site-specific

%OFF = Door heater Off time: 46% for freezer door heaters or 74% for cooler door heaters

Hours = Door heater annual run hours before controls

Hours: N/A

Hours Note: Pre-retrofit hours are 8,760 hours per year. After controls are installed, the door heaters in freezers are on for an average 4,730.4 hours/year (46% off time) and the door heaters for coolers are on for an average 2,277.6 hours/year (74% off time) basedon National Resource Management field experience.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Freezer Door Heater Controls	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Spreadsheet

Electric kW Note: Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Spreadsheet

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Freezer Door Heater Controls	10	1.00	1.00		1.05	1.00	1.00	0.77	0.64

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Freezer Door Heater Controls	39.30%	27.40%	19.60%	13.70%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2020). Impact Evaluation of PY 2017 Small Business Initiative Non-lighting Measures (MA19C03-E-SBIMPCT). https://ma-eeac.org/wp-content/uploads/Final-Report-MA19C03-E-SBIMPCT-03202020.pdf

RRsp Note: Realization rate is assumed 100% because savings are based on researched assumptions.

RRwp Note: Realization rate is assumed 100% because savings are based on researched assumptions.

CFsp Source: Cadmus (2015). Commercial Refrigeration Load shape Project Final Report. https://cadmusgroup.com/wp-content/uploads/2016/02/NEEP-CRL_Report_FINAL_clean.pdf?submissionGuid=cb214243-bab8-479a-a4c4-

CFwp Source: HEC, Inc. (1995). Analysis of Door Master Walk-In Cooler Anti-Sweat Door Heater Controls Installed at 10 Sites in MA. Prepared for NEPSCo; Table 9.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Freezer Door Heater Controls	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Freezer Door Heater Controls	0.29	0.00	0.00	0.71

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Freezer Recycling

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Appliances **Measure Type:** Recycling **Measure Sub Type:** Freezer Recycling

Program: Small Business Direct Install

Measure Description

The retirement of old, inefficient secondary refrigerators and freezers.

Baseline Description

The baseline efficiency case is an old, inefficient secondary working refrigerator or freezer. Estimated average usage is based on combined weight of freezer energy use and refrigerator energy use.

BCR Measures

BCR Measure Name	Unique Identifier
Freezer Recycling	2024 Electric Small Business Direct Install Freezer Recycling

Savings Principle

The high efficiency case assumes no replacement of secondary unit.

Savings Method

Deemed

Unit

Removal of existing refrigerator or freezer.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: 8760

Hours Note: The average annual operating hours are 8760 hours/year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Freezer Recycling	663.0	0.0820	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR Group, Inc. (2011). Massachusetts Appliance Turn-In Program Evaluation Integrated Report Findings – FINAL. Prepared for National Grid, NSTAR Electric, Cape Light Compact, and Western Massachusetts Electric Company.

Electric kW Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Freezer Recycling	8	1.00	1.00		1.00	1.00	1.00	0.77	0.64

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Freezer Recycling	39.30%	27.40%	19.60%	13.70%

Measure Life Source: NMR Group, Inc. (2011). Massachusetts Appliance Turn-In Program Evaluation Integrated Report Findings – FINAL. Prepared for National Grid, NSTAR Electric, Cape Light Compact, and Western Massachusetts Electric Company.

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

RRsp Note: National Grid assumption based on regional PA working groups.

RRwp Note: National Grid assumption based on regional PA working groups.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Freezer Recycling	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Freezer Recycling	0.29	0.00	0.00	0.71

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.47 / kWh

Incentive: $0.33 / kWh

High Intensity Discharge, Exterior

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Lighting **Measure Type:** Exterior **Measure Sub Type:** Fixture

Program: Small Business Direct Install

Measure Description

The installation of a high intensity discharge exterior light.

Baseline Description

For retrofit installations, the baseline efficiency case is project-specific and is determined using actual fixture types and counts from the existing space. Existing fixture wattages are provided in the Table 4 of Appendix A. For lost opportunity installations, the baseline case is based on comparable code-compliant installations and standard practices.

BCR Measures

BCR Measure Name	Unique Identifier
High Intensity Discharge, Exterior	2024 Electric Small Business Direct Install High Intensity Discharge, Exterior

Savings Principle

Savings Method

Calculated using site-specific inputs

Unit

Installed high-efficiency lighting project.

Savings Equation

Gross kWh = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) × Hours

Gross kW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW)

Where:

QTY_base_i = Quantity of baseline fixtures in location i

Watts_base_i = Connected wattage of baseline fixtures in location i

QTY_ee_j = Quantity of efficient fixtures in location j

Watts_ee_j = Connected wattage of efficient fixtures in location j

1,000 Watts per kW = Conversion factor

Hours = Lighting annual hours of operation: site-specific.

deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved.

deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
High Intensity Discharge, Exterior	Calc	Calc	Calc	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
High Intensity Discharge, Exterior	5	1.00	1.00	1.00	1.00	1.00	1.00	0.59	0.54

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
High Intensity Discharge, Exterior	30.27%	17.38%	34.27%	18.08%

Measure Life Source: DNV (2022). RI C&I Lighting Market Characterization and Adjusted Measure Life Study. http://rieermc.ri.gov/wp-content/uploads/2022/11/rhode-island_ci-lighting-market-characterization-and-adjusted-measure-life-report_final.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
High Intensity Discharge, Exterior	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
High Intensity Discharge, Exterior	0.12	0.00	0.00	0.88

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Hot Water, Custom

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Hot Water **Measure Type:** **Measure Sub Type:**

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Hot Water, Custom	2024 Electric Small Business Direct Install Hot Water, Custom

Savings Principle

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Hot Water, Custom	Calc	Calc	0.00	Calc	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Hot Water, Custom	5,10,13,15	1.00	1.00		0.81			0.77	0.64

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Hot Water, Custom	39.30%	27.40%	19.60%	13.70%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Hot Water, Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Hot Water, Custom	0.29	0.00	0.00	0.71

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $1.05 / kWh

Incentive: $0.75 / kWh

HVAC, Custom

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: HVAC **Measure Type:** **Measure Sub Type:**

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
HVAC, Custom	2024 Electric Small Business Direct Install HVAC, Custom

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
HVAC, Custom	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
HVAC, Custom	multi	1.00	1.00		0.81			0.77	0.64

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
HVAC, Custom	39.30%	27.40%	19.60%	13.70%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
HVAC, Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
HVAC, Custom	0.29	0.00	0.00	0.71

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $1.05 / kWh

Incentive: $0.75 / kWh

LED

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Lighting **Measure Type:** LED Fixture **Measure Sub Type:**

Program: Small Business Direct Install

Measure Description

The installation of hardwired ENERGY STAR® LED outdoor fixtures with pin-based bulbs, LED indoor fixtures with pin-based bulbs, and LED indoor screw in fixtures . Savings for this measure are attributable to high efficiency outdoor lighting fixtures and high efficiency indoor lighting fixtures.

Baseline Description

The baseline efficiency case is project-specific and is determined using actual fixture types and counts from the existing space. Existing fixture wattages are provided in the Table 4 of Appendix A.

BCR Measures

BCR Measure Name	Unique Identifier
LED - Exterior HW	2024 Electric Small Business Direct Install LED - Exterior HW
LED - Interior HW	2024 Electric Small Business Direct Install LED - Interior HW
LED - Interior SI	2024 Electric Small Business Direct Install LED - Interior SI

Savings Principle

The high efficiency case is the installation of LED lighting fixtures.

Savings Method

Calculated using deemed inputs

Unit

Installed LED fixtures

Savings Equation

Gross kWh = Qty × deltakW × Hours

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

DeltakW = Deemed average kW reduction per unit.

Hours = Deemed average annual operating hours.

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
LED - Exterior HW						0.00	
LED - Interior HW	Calc	Calc	Calc	0.00	0.00	Calc	0.00
LED - Interior SI						Calc	

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
LED	See Table 12 in Appendix A	1.00	1.00					0.59	0.54

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
LED	30.27%	17.38%	34.27%	18.08%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
LED	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
LED	0.12	0.00	0.00	0.88

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: Exterior HW - $0.86/kWh; Interior HW - $0.97/kWh; Interior SI - $0.92/kWh

Incentive: $0.7 / kWh

LED Exit Signs

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Lighting **Measure Type:** Signage **Measure Sub Type:** Exit Sign LED

Program: Small Business Direct Install

Measure Description

The installation of an LED exit sign

Baseline Description

For retrofit installations, the baseline efficiency case is project-specific and is determined using actual fixture types and counts from the existing space. For lost opportunity installations, the baseline case is based on comparable code-compliant installations and standard practices.

BCR Measures

BCR Measure Name	Unique Identifier
LED Exit Signs	2024 Electric Small Business Direct Install LED Exit Signs

Savings Principle

The high efficiency case is the installation of LED exit signs.

Savings Method

Calculated using site-specific inputs

Unit

Installed high-efficiency lighting project.

Savings Equation

Gross kWh = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) × Hours

Gross kW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW)

Where:

QTY_base_i = Quantity of baseline fixtures in location i

Watts_base_i = Connected wattage of baseline fixtures in location i

QTY_ee_j = Quantity of efficient fixtures in location j

Watts_ee_j = Connected wattage of efficient fixtures in location j

1,000 Watts per kW = Conversion factor

Hours = Lighting annual hours of operation: site-specific.

deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved.

deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
LED Exit Signs	Calc	Calc	Calc	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
LED Exit Signs	6	1.00	1.00	1.03	1.03	0.98	0.98	0.59	0.54

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
LED Exit Signs	30.27%	17.38%	34.27%	18.08%

Measure Life Source: DNV (2022). RI C&I Lighting Market Characterization and Adjusted Measure Life Study. http://rieermc.ri.gov/wp-content/uploads/2022/11/rhode-island_ci-lighting-market-characterization-and-adjusted-measure-life-report_final.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: Summit Blue Consulting (2008). Large Commercial and Industrial Retrofit Program Impact Evaluation 2007. Prepared for National Grid.

RRsp Source: Summit Blue Consulting (2008). Large Commercial and Industrial Retrofit Program Impact Evaluation 2007. Prepared for National Grid.

RRwp Source: Summit Blue Consulting (2008). Large Commercial and Industrial Retrofit Program Impact Evaluation 2007. Prepared for National Grid.

CFsp Note: Coincidence Factors are assumed to be 1.0 since exit signs are on 8,760 hours a year

CFwp Note: Coincidence Factors are assumed to be 1.0 since exit signs are on 8,760 hours a year

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
LED Exit Signs	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
LED Exit Signs	0.12	0.00	0.00	0.88

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Refrigerated case LED

Sector: C&I | **Fuel:** Electric | **Program Type:** Prescriptive

Measure Category: Refrigeration | **Measure Type:** Refrigeration Lighting | **Measure Sub Type:** Refrigerator Case LED

Program: Small Business Direct Install

Measure Description

Installation of LED lighting in freezer and/or cooler cases. The LED lighting consumes less energy, and results in less waste heat which reduces the cooling/freezing load.

Baseline Description

The baseline efficiency case is the existing lighting fixtures in the cooler or freezer cases.

BCR Measures

BCR Measure Name	Unique Identifier
Refrigerated case LED	2024 Electric Small Business Direct Install Refrigerated case LED

Savings Principle

Savings Method

The high efficiency case is the installation of LED lighting fixtures on the cooler or freezer cases, replacing the existing lighting fixtures.

Unit

Completed lighting project.

Savings Equation

Gross kWh = [SUM(QTY_base × Watts_base × Hours_base) - SUM(QTY_ee × kW_ee × Hours_ee)] × (1 + EffRefrig × (Btu/hr per kW) / (Btu/hr per ton))

Gross kW = Gross kWh / Hours_ee

Where:

QTY_base = Quantity of baseline lighting fixtures in cooler/freezer case

Watts_base = Connected wattage of baseline lighting fixtures in cooler/freezer case

Hours_base = Annual operating hours of baseline lighting fixtures in cooler/freezer case

QTY_ee = Quantity of efficient lighting fixtures in cooler/freezer case

Watts_ee =Connected wattage of efficient lighting fixtures in cooler/freezer case

Hours_ee = Annual operating hours of efficient lighting fixtures in cooler/freezer case

1.9 RefrigEff = Efficiency of typical refrigeration system (kW/ton); Estimate based on NRM field experience.

3413 Btu/hr per kW = Conversion factor

12,000 Btu/hr per ton = Conversion factor

Hours_ee = Annual operating hours of efficient lighting fixtures in cooler/freezer case

Hours: 8760

Hours Note: The average annual operating hours are 8760 hours/year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Refrigerated case LED	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Refrigerated case LED	6	1.00	1.00		0.94	1.00	1.00	0.59	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Refrigerated case LED	30.27%	17.38%	34.27%	18.08%

Measure Life Source: DNV (2022). RI C&I Lighting Market Characterization and Adjusted Measure Life Study. http://rieermc.ri.gov/wp-content/uploads/2022/11/rhode-island_ci-lighting-market-characterization-and-adjusted-measure-life-report_final.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Refrigerated case LED	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Refrigerated case LED	0.12	0.00	0.00	0.88

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.72 / kWh

Incentive: $0.5 / kWh

Refrigerator case LED, Custom

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Lighting **Measure Sub Type:** Refrigeration

Program: Small Business Direct Install

Measure Description

Installation of LED lighting in freezer and/or cooler cases. The LED lighting consumes less energy, and results in less waste heat which reduces the cooling/freezing load.

Baseline Description

The baseline efficiency case is the existing lighting fixtures in the cooler or freezer cases.

BCR Measures

BCR Measure Name	Unique Identifier
Refrigerator case LED, Custom	2024 Electric Small Business Direct Install Refrigerator case LED, Custom

Savings Principle

The high efficiency case is the installation of LED lighting fixtures on the cooler or freezer cases, replacing the existing lighting fixtures.

Savings Method

Calculated using site-specific inputs

Unit

Completed lighting project.

Savings Equation

Gross kWh = [SUM(QTY_base × Watts_base × Hours_base) - SUM(QTY_ee × kW_ee × Hours_ee)] × (1 + EffRefrig × (Btu/hr per kW) / (Btu/hr per ton))

Gross kW = Gross kWh / Hours_ee

Where:

QTY_base = Quantity of baseline lighting fixtures in cooler/freezer case

Watts_base = Connected wattage of baseline lighting fixtures in cooler/freezer case

Hours_base = Annual operating hours of baseline lighting fixtures in cooler/freezer case

QTY_ee = Quantity of efficient lighting fixtures in cooler/freezer case

Watts_ee =Connected wattage of efficient lighting fixtures in cooler/freezer case

Hours_ee = Annual operating hours of efficient lighting fixtures in cooler/freezer case

1.9 RefrigEff = Efficiency of typical refrigeration system (kW/ton); Estimate based on NRM field experience.

3413 Btu/hr per kW = Conversion factor

12,000 Btu/hr per ton = Conversion factor

Hours_ee = Annual operating hours of efficient lighting fixtures in cooler/freezer case

Hours: 8760

Hours Note: The average annual operating hours are 8760 hours/year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Refrigerator case LED, Custom	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Refrigerator case LED, Custom	6	1.00	1.00		1.04	1.00	1.00	0.59	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Refrigerator case LED, Custom	30.27%	17.38%	34.27%	18.08%

Measure Life Source: DNV (2022). RI C&I Lighting Market Characterization and Adjusted Measure Life Study. http://rieermc.ri.gov/wp-content/uploads/2022/11/rhode-island_ci-lighting-market-characterization-and-adjusted-measure-life-report_final.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Refrigerator case LED, Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Refrigerator case LED, Custom	0.12	0.00	0.00	0.88

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Motor/Drives, Non-HVAC

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Small Business Direct Install

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
Motor/Drives, Non-HVAC	2024 Electric Small Business Direct Install Motor/Drives, Non-HVAC

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Motor/Drives, Non-HVAC	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Motor/Drives, Non-HVAC	13	1.00	1.00		1.00	1.00	1.00	0.77	0.64

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Motor/Drives, Non-HVAC	39.30%	27.40%	19.60%	13.70%

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Motor/Drives, Non-HVAC	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Motor/Drives, Non-HVAC	0.29	0.00	0.00	0.71

TRC: $0 / kWh

Incentive: $0 / kWh

Novelty cooler shutoff

Sector: C&I

Fuel: Electric

Program Type: Custom

Measure Category: Refrigeration

Measure Type: Controls

Measure Sub Type: Novelty Cooler Control

Program: Small Business Direct Install

Measure Description

Installation of controls to shut off a facility's novelty coolers for non-perishable goods based on pre-programmed store hours. Energy savings occur as coolers cycle off during facility unoccupied hours.

Baseline Description

The baseline efficiency case is the novelty coolers operating 8,760 hours per year.

BCR Measures

BCR Measure Name	Unique Identifier
Novelty cooler shutoff	2024 Electric Small Business Direct Install Novelty cooler shutoff

Savings Principle

The high efficiency case is the novelty coolers operating fewer than 8,760 hours per year since they are controlled to cycle each night based on pre-programmed facility unoccupied hours.

Savings Method

Calculated using site-specific inputs

Unit

Installed controls on existing cooler/freezer.

Savings Equation

Gross kWh = kW_nc × DC_nc × HoursOff

Gross kW = 0

Where:

kW_nc = Power demand of novelty cooler calculated from equipment nameplate data and estimated 0.85 power factor.

DC_nc = Weighted average annual duty cycle; Estimate based on NRM field experience.

HoursOff = Potential hours off every night per year, estimated as one less than the number of hours the store is closed per day: site-specific.

Hours: N/A

Hours Note: Energy and demand savings are based on the reduced operation hours of the cooler equipment. Hours reduced per day are estimated on a case-by-case basis, and are typically calculated as one less than the number of hours per day that the facility is closed;the baseline assumes equipment operated 24/7/365.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Novelty cooler shutoff	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Spreadsheet

Electric kW Note: Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Spreadsheet

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Novelty cooler shutoff	10	1.00	1.00		1.05	1.00	1.00	0.77	0.64

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Novelty cooler shutoff	39.30%	27.40%	19.60%	13.70%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2020). Impact Evaluation of PY 2017 Small Business Initiative Non-lighting Measures (MA19C03-E-SBIMPCT). https://ma-eeac.org/wp-content/uploads/Final-Report-MA19C03-E-SBIMPCT-03202020.pdf

RRsp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRwp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

CFsp Note: Coincidence Factors are set to zero since demand savings typically occur during off-peak hours

CFwp Note: Coincidence Factors are set to zero since demand savings typically occur during off-peak hours

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Novelty cooler shutoff	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Novelty cooler shutoff	0.29	0.00	0.00	0.71

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

OCCUPANCY SENSORS

Sector: C&I

Fuel: Electric

Program Type: Custom

Measure Category: Lighting

Measure Type: Controls

Measure Sub Type: Occupancy Sensor

Program: Small Business Direct Install

Measure Description

This measure promotes the installation of lighting controls in both lost-opportunity and retrofit applications. Promoted technologies include occupancy sensors and daylight dimming controls.

Baseline Description

The baseline efficiency case assumes no controls (retrofit) or code-compliant controls (new construction).

BCR Measures

BCR Measure Name	Unique Identifier
OCCUPANCY SENSORS	2024 Electric Small Business Direct Install OCCUPANCY SENSORS

Savings Principle

The high efficiency case involves lighting fixtures connected to controls that reduce the pre-retrofit or baseline hours of operation.

Savings Method

Calculated using site-specific inputs

Unit

Installed lighting controls project.

Savings Equation

Gross kWh = SUM[QTY_i × Watts_i × (Hours_base_i - Hours_ee_i)] / (Watts per kW)

Gross kW = SUM(QTY_i × Watts_i) / (Watts per kW)

Where:

QTY_i = Quantity in controlled fixtures in location i

Watts_i = Connected wattage of controlled fixtures in location i

Hours_base_i = Total annual hours that the connected lighting in location i operated without controls (for retrofit installations) or would have operated with code-compliance controls (for new construction installations).

Hours_ee_i = Total annual hours that the connected lighting in location i operates with the lighting controls implemented.

1,000 Watts per kW = Conversion factor

deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved.

deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
OCCUPANCY SENSORS	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Gas Heat MMBtu Source: DNV GL (2019). PY2016 Rhode Island Commercial and Industrial Small Business Initiative Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/07/py2016-ri-ci-small-business-initiative-impact-evaluation.pdf

Oil MMBtu Source: DNV GL (2019). PY2016 Rhode Island Commercial and Industrial Small Business Initiative Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/07/py2016-ri-ci-small-business-initiative-impact-evaluation.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
OCCUPANCY SENSORS	9	1.00	1.00	1.00	1.00	0.94	0.94	0.59	0.54

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
OCCUPANCY SENSORS	30.27%	17.38%	34.27%	18.08%

Measure Life Source: Dan Mellinger (2022). Lighting Control Measure Life Memo.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations

RRsp Source: KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations

RRwp Source: KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations

CFsp Source: KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations

CFwp Source: KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
OCCUPANCY SENSORS	0	0	0.00	0.09	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
OCCUPANCY SENSORS	0.12	0.00	0.00	0.88

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.86 / kWh

Incentive: $0.66 / kWh

PHOTOCELLS

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Lighting **Measure Type:** Controls **Measure Sub Type:** Photocells

Program: Small Business Direct Install

Measure Description

Installing a photocell to control lighting.

Baseline Description

Lighting that runs 24/7.

BCR Measures

BCR Measure Name	Unique Identifier
PHOTOCELLS	2024 Electric Small Business Direct Install PHOTOCELLS

Savings Principle

Installed photocell controls lighting.

Savings Method

Calculated using site-specific inputs

Unit

Installed lighting controls project.

Savings Equation

Gross kWh = SUM[QTY_i × Watts_i × (Hours_base_i - Hours_ee_i)] / (Watts per kW)

Gross kW = SUM(QTY_i × Watts_i) / (Watts per kW)

Where:

QTY_i = Quantity in controlled fixtures in location i

Watts_i = Connected wattage of controlled fixtures in location i

Hours_base_i = Total annual hours that the connected lighting in location i operated without controls (for retrofit installations) or would have operated with code-compliance controls (for new construction installations).

Hours_ee_i = Total annual hours that the connected lighting in location i operates with the lighting controls implemented.

1,000 Watts per kW = Conversion factor

deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved.

deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
PHOTOCELLS	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Gas Heat MMBtu Source: DNV GL (2019). PY2016 Rhode Island Commercial and Industrial Small Business Initiative Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/07/py2016-ri-ci-small-business-initiative-impact-evaluation.pdf

Oil MMBtu Source: DNV GL (2019). PY2016 Rhode Island Commercial and Industrial Small Business Initiative Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/07/py2016-ri-ci-small-business-initiative-impact-evaluation.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
PHOTOCELLS	9	1.00	1.00	1.00	1.00	0.94	0.94	0.59	0.54

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
PHOTOCELLS	30.27%	17.38%	34.27%	18.08%

Measure Life Source: Dan Mellinger (2022). Lighting Control Measure Life Memo.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations

RRsp Source: KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations

RRwp Source: KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations

CFsp Source: KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations

CFwp Source: KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
PHOTOCELLS	0	0	0.00	0.09	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
PHOTOCELLS	0.12	0.00	0.00	0.88

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

Process, Custom

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Custom **Measure Type:** Prcoess **Measure Sub Type:** Process

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

Defined per project.

BCR Measures

BCR Measure Name	Unique Identifier
Process, Custom	2024 Electric Small Business Direct Install Process, Custom

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Process, Custom	Calc	Calc	Calc	0.00	0.00	0.00	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Process, Custom	13	1.00	1.00	1.04	1.04			0.77	0.64

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Process, Custom	39.30%	27.40%	19.60%	13.70%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Process, Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Process, Custom	0.29	0.00	0.00	0.71

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $1.05 / kWh

Incentive: $0.75 / kWh

PROGRAMMABLE THERMOSTATS

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** Thermostat

Program: Small Business Direct Install

Measure Description

Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.

Baseline Description

The baseline efficiency case is an HVAC system providing space heating or cooling without a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
PROGRAMMABLE THERMOSTATS	2024 Electric Small Business Direct Install PROGRAMMABLE THERMOSTATS

Savings Principle

The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed.

Savings Method

Deemed

Unit

Installed thermostat

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
PROGRAMMABLE THERMOSTATS	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
PROGRAMMABLE THERMOSTATS	15	1.00	1.00		1.00	1.00	1.00	0.77	0.64

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
PROGRAMMABLE THERMOSTATS	39.30%	27.40%	19.60%	13.70%

Measure Life Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV GL (2020). Impact Evaluation of PY 2017 Small Business Initiative Non-lighting Measures (MA19C03-E-SBIMPCT). https://ma-eeac.org/wp-content/uploads/Final-Report-MA19C03-E-SBIMPCT-03202020.pdf

RRsp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRwp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

CFsp Note: Coincidence Factors are set to zero since demand savings typically occur during off-peak hours

CFwp Note: Coincidence Factors are set to zero since demand savings typically occur during off-peak hours

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
PROGRAMMABLE THERMOSTATS	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
PROGRAMMABLE THERMOSTATS	0.29	0.00	0.00	0.71

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.86 / kWh

Incentive: $0.6 / kWh

Refrigerator Recycling

Sector: C&I

Fuel: Electric

Program Type: Prescriptive

Measure Category: Appliances

Measure Type: Recycling

Measure Sub Type: Refrigerator Recycling

Program: Small Business Direct Install

Measure Description

The retirement of old, inefficient secondary refrigerators and freezers.

Baseline Description

The baseline efficiency case is an old, inefficient primary working refrigerator or freezer. Estimated average usage is based on combined weight of freezer energy use and refrigerator energy use.

BCR Measures

BCR Measure Name	Unique Identifier
Refrigerator Recycling	2024 Electric Small Business Direct Install Refrigerator Recycling

Savings Principle

The high efficiency case assumes no replacement of secondary unit.

Savings Method

Deemed

Unit

Removal of existing refrigerator or freezer.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: 8760

Hours Note: The average annual operating hours are 8760 hours/year.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Refrigerator Recycling	755.0	0.0930	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR Group, Inc. (2011). Massachusetts Appliance Turn-In Program Evaluation Integrated Report Findings – FINAL. Prepared for National Grid, NSTAR Electric, Cape Light Compact, and Western Massachusetts Electric Company.

Electric kW Source: Cadmus Demand Impact Model (2012). Estimated using the demand allocation methodology, Prepared for the Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Refrigerator Recycling	4	1.00	1.00		1.00	1.00	1.00	0.77	0.64

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Refrigerator Recycling	39.30%	27.40%	19.60%	13.70%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRsp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRwp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Refrigerator Recycling	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Refrigerator Recycling	0.29	0.00	0.00	0.71

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / kWh

Incentive: $0 / kWh

TIMECLOCKS

Sector: C&I **Fuel:** Electric **Program Type:** Custom

Measure Category: Lighting **Measure Type:** Controls **Measure Sub Type:** Timeclocks

Program: Small Business Direct Install

Measure Description

Installing a timeclock to control lighting.

Baseline Description

Lighting that runs unnecessarily.

BCR Measures

BCR Measure Name	Unique Identifier
TIMECLOCKS	2024 Electric Small Business Direct Install TIMECLOCKS

Savings Principle

Installed timeclock controls lighting.

Savings Method

Calculated using site-specific inputs

Unit

Installed lighting controls project.

Savings Equation

Gross kWh = SUM[QTY_i × Watts_i × (Hours_base_i - Hours_ee_i)] / (Watts per kW)

Gross kW = SUM(QTY_i × Watts_i) / (Watts per kW)

Where:

QTY_i = Quantity in controlled fixtures in location i

Watts_i = Connected wattage of controlled fixtures in location i

Hours_base_i = Total annual hours that the connected lighting in location i operated without controls (for retrofit installations) or would have operated with code-compliance controls (for new construction installations).

Hours_ee_i = Total annual hours that the connected lighting in location i operates with the lighting controls implemented.

1,000 Watts per kW = Conversion factor

deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved.

deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
TIMECLOCKS	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Gas Heat MMBtu Source: DNV GL (2019). PY2016 Rhode Island Commercial and Industrial Small Business Initiative Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/07/py2016-ri-ci-small-business-initiative-impact-evaluation.pdf

Oil MMBtu Source: DNV GL (2019). PY2016 Rhode Island Commercial and Industrial Small Business Initiative Impact Evaluation. http://rieermc.ri.gov/wp-content/uploads/2019/07/py2016-ri-ci-small-business-initiative-impact-evaluation.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
TIMECLOCKS	9	1.00	1.00	1.00	1.00	0.94	0.94	0.59	0.54

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
TIMECLOCKS	30.27%	17.38%	34.27%	18.08%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations

RRsp Source: KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations

RRwp Source: KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations

CFsp Source: KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations

CFwp Source: KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
TIMECLOCKS	0	0	0.00	0.09	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
TIMECLOCKS	0.12	0.00	0.00	0.88

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.74 / kWh

Incentive: $0.52 / kWh

VENDING MACHINES

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Refrigeration **Measure Type:** Controls **Measure Sub Type:** Vending Miser

Program: Small Business Direct Install

Measure Description

Controls significantly reduce the energy consumption of vending machines lighting and refrigeration systems by powering down these systems during periods of inactivity. This measure does not apply to ENERGY STAR® qualified vending machines, as they already have built-in controls.

Baseline Description

The baseline efficiency case is a standard efficiency vending machine, or glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

BCR Measures

BCR Measure Name	Unique Identifier
VENDING MACHINES	2024 Electric Small Business Direct Install VENDING MACHINES

Savings Principle

The high efficiency case is a standard efficiency vending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

Savings Method

Deemed

Unit

Installed vending miser.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: 8760

Hours Note: It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
VENDING MACHINES	1612.0	0.1840	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.

Electric kW Source: USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
VENDING MACHINES	5	1.00	1.00		1.00	1.00	1.00	0.77	0.64

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
VENDING MACHINES	39.30%	27.40%	19.60%	13.70%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRsp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRwp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

CFsp Note: Coincidence Factors are set to zero since demand savings typically occur during off-peak hours

CFwp Note: Coincidence Factors are set to zero since demand savings typically occur during off-peak hours

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
VENDING MACHINES	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
VENDING MACHINES	0.29	0.00	0.00	0.71

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.41 / kWh

Incentive: $0.29 / kWh

Water Heating

Sector: C&I **Fuel:** Electric **Program Type:** Prescriptive

Measure Category: Water Heating **Measure Type:** Flow Control **Measure Sub Type:** DHW

Program: Small Business Direct Install

Measure Description

The installation of a high efficiency water heating measures, such as faucet aerators, showerheads, spray valves, and salon nozzles.

Baseline Description

Standard efficiency DHW fixture.

BCR Measures

BCR Measure Name	Unique Identifier
Water Heating	2024 Electric Small Business Direct Install Water Heating

Savings Principle

High efficiency / low flow DHW fixture.

Savings Method

Calc

Unit

Installed fixture.

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Where:

Qty = Total number of units.

Delta kWh = Deemed average annual kWh reduction per unit.

Delta kW = Deemed average kW reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Water Heating	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Water Heating	7	1.00	1.00		1.00	1.00	1.00	0.77	0.64

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Water Heating	39.30%	27.40%	19.60%	13.70%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRsp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRwp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Water Heating	calc	calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Water Heating	0.29	0.00	0.00	0.71

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0.57 / kWh

Incentive: $0.4 / kWh

Advanced Building

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Whole Building **Measure Sub Type:** Heating

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Advanced Building	2024 Gas Large C&I New Construction Advanced Building

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Advanced Building	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Advanced Building	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Advanced Building	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Advanced Building	Calc	Calc	0.00	0.00	-0.04	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Advanced Building	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

Boiler

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Heating **Measure Sub Type:** Boiler

Program: Large C&I New Construction

Measure Description

The installation of a high efficiency natural gas fired condensing boilers. High efficiency boilers take advantage of improved design, sealed combustion and condensing flue gases in a second heat exchanger to achieve improved efficiency. (Only condensingboilers are offered as prescriptive measures. Program incentives for other boiler types are offered through the custom program.)

Baseline Description

The baseline efficiency assumes compliance with the International Energy Conservation Code (IECC) 2012. Table 11 in Appendix A details the specific efficiency requirements by equipment type and capacity.

BCR Measures

BCR Measure Name	Unique Identifier
Boiler - 96% AFUE	2024 Gas Large C&I New Construction Boiler - 96% AFUE
Boiler - 95% AFUE < 300 MBU	2024 Gas Large C&I New Construction Boiler - 95% AFUE < 300 MBU

Savings Principle

The high efficiency case assumes a gas-fired boiler that exceeds the efficiency levels required by Rhode Island State Building Code. Actual site efficiencies should be determined on a case-by-case basis.

Savings Method

Deemed

Unit

Installed high-efficiency condensing boiler

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Boiler - 96% AFUE Boiler - 95% AFUE < 300 MBU				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: DNV GL (2017). Gas Boiler Market Characterization Study Phase II -Final Report. https://ma-eeac.org/wp-content/uploads/Gas-Boiler-Market-Characterization-Study-Phase-II-Final-Report.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Boiler	20	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Boiler	0.00%	0.00%	0.00%	0.00%

Measure Life Source: MA19C02-B-EUL - C&I Measure Life Report. https://ma-eeac.org/wp-content/uploads/MA19C02_B_EUL-final-report-03_31_20-v2.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Energy realization rate is 100% because deemed savings are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Boiler	0	0	0.00	0.00	-0.85	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Boiler	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: 96% AFUE - $40 / therm; 95% AFUE - $48 / therm

Incentive: $30 / therm

BOILER RESET 1 STAGE

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** Boiler Control

Program: Large C&I New Construction

Measure Description

Boiler reset controls are devices that improve the efficiency of an existing boiler system by modulating the hot water temperature set point. Reset controls automatically control boiler water temperature based on outdoor temperature using a software program; load controls sense the thermal demand of the heating system and resets the water temperature based on the demand.

Baseline Description

The baseline efficiency case is a boiler without reset or load controls.

BCR Measures

BCR Measure Name	Unique Identifier
BOILER RESET 1 STAGE	2024 Gas Large C&I New Construction BOILER RESET 1 STAGE

Savings Principle

The efficient case is a boiler with reset or load controls, which reset the supply water temperature based on outdoor temperatures and/or building load.

Savings Method

Deemed

Unit

Installation of boiler reset control on existing boiler

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
BOILER RESET 1 STAGE				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: GDS Associates, Inc. and Summit Blue Consulting (2009), Natural Gas Energy Efficiency Potential in Massachusetts, Appendix B-2,

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
BOILER RESET 1 STAGE	20	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
BOILER RESET 1 STAGE	0.00%	0.00%	0.00%	0.00%

Measure Life Source: MA19C02-B-EUL - C&I Measure Life Report. https://ma-eeac.org/wp-content/uploads/MA19C02_B_EUL-final-report-03_31_20-v2.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
BOILER RESET 1 STAGE	0	0	0.00	0.00	-0.85	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
BOILER RESET 1 STAGE	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $48 / therm

Incentive: $30 / therm

Building Shell

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Whole Building **Measure Sub Type:** Heating

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Building Shell	2024 Gas Large C&I New Construction Building Shell

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Building Shell	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Building Shell	5,10,15,20, 25	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Building Shell	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Building Shell	Calc	Calc	0.00	0.00	3.26	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Building Shell	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

CODES AND STANDARDS

Sector: C&I

Fuel: Gas

Program Type: Custom

Measure Category: Codes and Standards

Measure Type: Codes and Standards

Measure Sub Type: Codes and Standards

Program: Large C&I New Construction

Measure Description

Energy efficiency code trainings and advocacy work to improve energy efficiency of buildings and equipment within Rhode Island.

Baseline Description

Un-influenced adoption curve of federal minimum codes and standards.

BCR Measures

BCR Measure Name	Unique Identifier
CODES AND STANDARDS	2024 Gas Large C&I New Construction CODES AND STANDARDS

Savings Principle

Accelerated adoption of advancing energy codes and equipment standards.

Savings Method

Calculated based on attribution study

Unit

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
CODES AND STANDARDS	Calc		Calc	0.00	0.00	0.00	0.00

Electric kWh Source: NMR (2017). Rhode Island Code Compliance Enhancement Initiative Attribution and Savings Study. http://rieermc.ri.gov/wp-content/uploads/2018/03/ri-ccei-attribution-and-savings-final-report-12-12-17-clean.pdf

Gas Heat MMBtu Source: NMR (2017). Rhode Island Code Compliance Enhancement Initiative Attribution and Savings Study. http://rieermc.ri.gov/wp-content/uploads/2018/03/ri-ccei-attribution-and-savings-final-report-12-12-17-clean.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
CODES AND STANDARDS	20	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
CODES AND STANDARDS	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
CODES AND STANDARDS	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
CODES AND STANDARDS	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $0 / therm

Incentive: $0 / therm

Combined Heat and Power (Gas)

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** CHP **Measure Sub Type:** Blend

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Combined Heat and Power (Gas)	2024 Gas Large C&I New Construction Combined Heat and Power (Gas)

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Combined Heat and Power (Gas)	Calc	Calc	0.00	0.00	Calc	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Combined Heat and Power (Gas)	15,20,25	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Combined Heat and Power (Gas)	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Combined Heat and Power (Gas)	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Combined Heat and Power (Gas)	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

COMBO COND FURN/WTR HTR

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Heating **Measure Sub Type:** Furnace

Program: Large C&I New Construction

Measure Description

Installation of a combination furnace/water heater.

Baseline Description

It is assumed that the baseline is an 85% AFUE furnace and a separate high draw gas fired storage water heater with an efficiency rating of 0.63 UEF.

BCR Measures

BCR Measure Name	Unique Identifier
COMBO COND FURN/WTR HTR	2024 Gas Large C&I New Construction COMBO COND FURN/WTR HTR

Savings Principle

A new combination 97% AFUE furnace and 0.90 tankless water heater.

Savings Method

Deemed

Unit

Installed high-efficiency combination condensing furnace/DHW heater

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
COMBO COND FURN/WTR HTR			0.00	0.00	14.30	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
COMBO COND FURN/WTR HTR	18	1.00	1.00	1.00		1.00	1.00		0.45

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
COMBO COND FURN/WTR HTR	44.58%	55.42%	0.00%	0.00%

Measure Life Source: Ecotope, Inc. (2003). Natural Gas Efficiency and Conservation Measure Resource Assessment for the Residential and Commercial Sectors. Prepared for the Energy Trust of Oregon. https://ecotope-publications-database.ecotope.com/2003_007_NaturalGasEfficiency.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
COMBO COND FURN/WTR HTR	0	0	0.00	0.00	0.54	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
COMBO COND FURN/WTR HTR	0.71	0.00	0.00	0.29

NTG Source: DNV GL, NMR, Tetra Tech (2018). Massachusetts Commercial and Industrial Upstream HVAC/Heat Pump and Hot Water NTG and Market Effects Indicator Study. https://ma-eeac.org/wp-content/uploads/TXC_35_Report_5Sep2018_FINAL.pdf

TRC: $0 / therm

Incentive: $0 / therm

Combo Condensing Boiler/ Water Heater

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: HVAC

Measure Type: Boiler

Measure Sub Type: Combo Condensing

Program: Large C&I New Construction

Measure Description

This measure promotes the installation of a combined high-efficiency boiler and water heating unit. Combined boiler and water heating systems are more efficient than separate systems because they eliminate the standby heat losses of an additional tank.

Baseline Description

The baseline efficiency case is an 80% AFUE boiler with a 0.594 EF water heater.

BCR Measures

BCR Measure Name	Unique Identifier
Combo Condensing Boiler/ Water Heater - 95% AFUE	2024 Gas Large C&I New Construction Combo Condensing Boiler/ Water Heater - 95% AFUE
Combo Condensing Boiler/ Water Heater - 90% AFUE	2024 Gas Large C&I New Construction Combo Condensing Boiler/ Water Heater - 90% AFUE

Savings Principle

The high efficiency case is a condensing, integrated water heater/boiler with an AFUE >= 90% or AFUE >= 95%.

Savings Method

Deemed

Unit

Installed high-efficiency condensing combination DHW heater / boiler

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Combo Condensing Boiler/ Water Heater - 95% AFUE				0.00	0.00	0.00	0.00
Combo Condensing Boiler/ Water Heater - 90% AFUE							

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Combo Condensing Boiler/ Water Heater	20	1.00	1.00	1.00		1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Combo Condensing Boiler/ Water Heater	0.00%	0.00%	0.00%	0.00%

Measure Life Source: GDS Associates, Inc. and Summit Blue Consulting (2009), Natural Gas Energy Efficiency Potential in Massachusetts, Appendix B-2,

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Combo Condensing Boiler/ Water Heater	0	0	0.00	0.00	-0.85	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Combo Condensing Boiler/ Water Heater	0.71	0.00	0.00	0.29

NTG Source: DNV GL, NMR, Tetra Tech (2018). Massachusetts Commercial and Industrial Upstream HVAC/Heat Pump and Hot Water NTG and Market Effects Indicator Study. https://ma-eeac.org/wp-content/uploads/TXC_35_Report_5Sep2018_FINAL.pdf

TRC: $32 / therm

Incentive: $20 / therm

Comprehensive Design

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Whole Building **Measure Sub Type:** Heating

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Comprehensive Design	2024 Gas Large C&I New Construction Comprehensive Design

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Comprehensive Design	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Comprehensive Design	multi	1.00	1.00	0.97					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Comprehensive Design	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Comprehensive Design	Calc	Calc	0.00	0.00	-0.04	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Comprehensive Design	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $64 / therm

Incentive: $40 / therm

Comprehensive Design Assessment

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Whole Building **Measure Sub Type:** Heating

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Comprehensive Design Assessment	2024 Gas Large C&I New Construction Comprehensive Design Assessment

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Comprehensive Design Assessment	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Comprehensive Design Assessment	multi	1.00	1.00	0.97					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Comprehensive Design Assessment	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Comprehensive Design Assessment	Calc	Calc	0.00	0.00	-0.04	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Comprehensive Design Assessment	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

COND UNIT HEATER 151-400 MBH

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Heating **Measure Sub Type:** Unit Heater

Program: Large C&I New Construction

Measure Description

The baseline efficiency case is a standard efficiency gas fired unit heater with minimum combustion efficiency of 80%, interrupted or intermittent ignition device (IID), and either power venting or an automatic flue damper.

Baseline Description

The baseline efficiency case is a standard efficiency unit heater.

BCR Measures

BCR Measure Name	Unique Identifier
COND UNIT HEATER 151-400 MBH	2024 Gas Large C&I New Construction COND UNIT HEATER 151-400 MBH

Savings Principle

The high efficiency case is a condensing gas unit heater with 90% AFUE or greater.

Savings Method

Deemed

Unit

Installed condensing unit heater.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
COND UNIT HEATER 151-400 MBH				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: NYSERDA Deemed Savings Database (Rev 11); Measure Name: A.UNIT-HEATER-COND.<300000.CI.).).N. The database provides savings of 204.6 MMBtu per million BTU/hr of heater input capacity. Assume average unit size of 200,000 BTU capacity.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
COND UNIT HEATER 151-400 MBH	18	1.00	1.00	1.00					0.45

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
COND UNIT HEATER 151-400 MBH	44.58%	55.42%	0.00%	0.00%

Measure Life Source: Ecotope, Inc. (2003). Natural Gas Efficiency and Conservation Measure Resource Assessment for the Residential and Commercial Sectors. Prepared for the Energy Trust of Oregon. https://ecotope-publications-database.ecotope.com/2003_007_NaturalGasEfficiency.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
COND UNIT HEATER 151-400 MBH	0	0	0.00	0.00	0.54	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
COND UNIT HEATER 151-400 MBH	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

Condensing Boiler

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Heating **Measure Sub Type:** Boiler

Program: Large C&I New Construction

Measure Description

The installation of a high efficiency natural gas fired condensing boilers. High efficiency boilers take advantage of improved design, sealed combustion and condensing flue gases in a second heat exchanger to achieve improved efficiency. (Only condensingboilers are offered as prescriptive measures. Program incentives for other boiler types are offered through the custom program.)

Baseline Description

The baseline efficiency is an 85% AFUE Boiler. Table 11 in Appendix A details the specific efficiency requirements by equipment type and capacity.

BCR Measures

BCR Measure Name	Unique Identifier
Condensing Boiler - <= 300 mbh	2024 Gas Large C&I New Construction Condensing Boiler - <= 300 mbh
Condensing Boiler - 1701+ mbh	2024 Gas Large C&I New Construction Condensing Boiler - 1701+ mbh
Condensing Boiler - 300-499 mbh	2024 Gas Large C&I New Construction Condensing Boiler - 300-499 mbh
Condensing Boiler - 500-999 mbh	2024 Gas Large C&I New Construction Condensing Boiler - 500-999 mbh
Condensing Boiler - 1000-1700 mbh	2024 Gas Large C&I New Construction Condensing Boiler - 1000-1700 mbh

Savings Principle

The high efficiency case assumes a gas-fired boiler of the specified size that is >= 90% AFUE.

Savings Method

Deemed

Unit

Installed high-efficiency condensing boiler with 90%+ AFUE or 95%+ AFUE.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Condensing Boiler - <= 300 mbh	0.0	0.0	14.7	0.00	0.00	0.00	0.00
Condensing Boiler - 1701+ mbh	0.0	0.0	165.3				
Condensing Boiler - 300-499 mbh	0.0	0.0	28				
Condensing Boiler - 500-999 mbh	0.0	0.0	51.4				
Condensing Boiler - 1000-1700 mbh	0.0	0.0	94.5				
	Calc	Calc					

Gas Heat MMBtu Source: DNV (2021). Memo for Application of MA NRNC Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Condensing Boiler	20	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Condensing Boiler	0.00%	0.00%	0.00%	0.00%

Measure Life Source: MA19C02-B-EUL - C&I Measure Life Report. https://ma-eeac.org/wp-content/uploads/MA19C02_B_EUL-final-report-03_31_20-v2.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Energy realization rate is 100% because deemed savings are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Condensing Boiler	0	0	0.00	0.00	-0.85	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Condensing Boiler	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: <=300 mbh - $40 / therm; >300 mbh - $48 / therm

Incentive: $30 / therm

Condensing Boiler

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Boiler **Measure Sub Type:** Condensing

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Condensing Boiler - Year Round	2024 Gas Large C&I New Construction Condensing Boiler - Year Round
Condensing Boiler - All	2024 Gas Large C&I New Construction Condensing Boiler - All
Condensing Boiler - Seasonal	2024 Gas Large C&I New Construction Condensing Boiler - Seasonal

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Condensing Boiler - Year Round Condensing Boiler - All Condensing Boiler - Seasonal	Calc	Calc	Calc	Calc	Calc	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Condensing Boiler	5,10,15,20, 25	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Condensing Boiler	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Condensing Boiler	Calc	Calc	0.00	0.00	-0.06	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Condensing Boiler	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $33.33 / therm

Incentive: $25 / therm

Condensing Water Heater, 90%MIN 75-800

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: DHW

Measure Sub Type: Condensing Water Heater

Program: Large C&I New Construction

Measure Description

The installation of a high-efficiency condensing water heater over 90% and between 75-800 kBtuh.

Baseline Description

The baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code. For condensing stand-alone water heaters, the baseline is a stand-alone tank water heater with a thermal efficiency of 80%.

BCR Measures

BCR Measure Name	Unique Identifier
Condensing Water Heater, 90%MIN 75-800	2024 Gas Large C&I New Construction Condensing Water Heater, 90%MIN 75-800

Savings Principle

The high efficiency case is a condensing stand-alone commercial water heater with a thermal efficiency of 95% or greater and a capacity between 75,000 Btu and 300,000 Btu.

Savings Method

Deemed

Unit

Installed high-efficiency DHW tank

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Condensing Water Heater, 90%MIN 75-800			0.00	23.05	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Condensing Water Heater, 90%MIN 75-800	15	1.00	1.00	1.00		1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Condensing Water Heater, 90%MIN 75-800	0.00%	0.00%	0.00%	0.00%

Measure Life Source: GDS Associates, Inc. and Summit Blue Consulting (2009), Natural Gas Energy Efficiency Potential in Massachusetts, Appendix B-2,

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Condensing Water Heater, 90%MIN 75-800	0	0	0.00	0.00	-0.85	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Condensing Water Heater, 90%MIN 75-800	0.71	0.00	0.00	0.29

NTG Source: DNV (2021). MA C&I Upstream HVAC & Gas Water Heating NTG Study (MA20X08-B-CIHVACNTG). https://ma-eeac.org/wp-content/uploads/MA20X08-B-CIHVACNTG_Final_Report_Clean_9.10.pdf

TRC: $46 / therm

Incentive: $29.01 / therm

Condensing Storage Water Heater, 94%MIN 75-300

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Water Heater

Measure Sub Type: Condensing Water Heater

Program: Large C&I New Construction

Measure Description

The installation of a high-efficiency condensing water heater over 94% and between 75-300 kBtuh.

Baseline Description

The baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code. For condensing stand-alone water heaters, the baseline is a stand-alone tank water heater with a thermal efficiency of 80%.

BCR Measures

BCR Measure Name	Unique Identifier
Condensing Storage Water Heater, 94%MIN 75-300	2024 Gas Large C&I New Construction Condensing Storage Water Heater, 94%MIN 75-300

Savings Principle

The high efficiency case is a condensing stand-alone commercial water heater with a thermal efficiency of 95% or greater and a capacity between 75,000 Btu and 300,000 Btu.

Savings Method

Deemed

Unit

Installed high-efficiency water heater.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Condensing Storage Water Heater, 94%MIN 75-300			0.00	31.80	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Condensing Storage Water Heater, 94%MIN 75-300	18	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Condensing Storage Water Heater, 94%MIN 75-300	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Ecotope, Inc. (2003). Natural Gas Efficiency and Conservation Measure Resource Assessment for the Residential and Commercial Sectors. Prepared for the Energy Trust of Oregon. https://ecotope-publications-database.ecotope.com/2003_007_NaturalGasEfficiency.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Condensing Storage Water Heater, 94%MIN 75-300	0	0	0.00	0.00	-0.85	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Condensing Storage Water Heater, 94%MIN 75-300	0.71	0.00	0.00	0.29

NTG Source: DNV GL, NMR, Tetra Tech (2018). Massachusetts Commercial and Industrial Upstream HVAC/Heat Pump and Hot Water NTG and Market Effects Indicator Study. https://ma-eeac.org/wp-content/uploads/TXC_35_Report_5Sep2018_FINAL.pdf

TRC: $0 / therm

Incentive: $0 / therm

Conveyor Broiler Upstream

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: Food Service

Measure Type: Upstream Cooking Equipment

Measure Sub Type: Conveyor Broiler

Program: Large C&I New Construction

Measure Description

Installation of an energy efficient underfired broiler to replace a conventional automatic constant input rate conveyor broiler. This measure has both electric and gas savings.

Baseline Description

Baseline broiler must be an automatic conveyor broiler capable of maintaining a temperature above 600 F with a tested idle rate greater than 60 kBtu/h for size 22-28" wide, greater than 70 kBtu/h for >28" wide, and greater than 40 kBtu/h for <22" wide.

BCR Measures

BCR Measure Name	Unique Identifier
Conveyor Broiler Upstream - <22	2024 Gas Large C&I New Construction Conveyor Broiler Upstream - <22
Conveyor Broiler Upstream - <28	2024 Gas Large C&I New Construction Conveyor Broiler Upstream - <28
Conveyor Broiler Upstream - 22-28	2024 Gas Large C&I New Construction Conveyor Broiler Upstream - 22-28

Savings Principle

The high efficiency case for a conveyor broiler must have a catalyst and an input rate less than 80 kBtu/h or a dual stage or modulating gas valve with a capability of throttling the input rate below 80 kBtu/h. Baseline broiler must be replaced by a broiler similar in size or smaller. Must be installed under a Type II Hood.

Savings Method

Deemed

Unit

Installed high-efficiency gas-fired conveyor broiler

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Conveyor Broiler Upstream - <22 Conveyor Broiler Upstream - <28 Conveyor Broiler Upstream - 22-28				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: SoCalGas. (2019). Commercial Conveyor Broilers workpaper WPSCGNRCC171226A11. http://deeresources.net/workpapers

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Conveyor Broiler Upstream	12	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Conveyor Broiler Upstream	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Robert Mowris & Associates (2005). Ninth Year Retention Study of the 1995 Southern California Gas Company Commercial New Construction Program. https://www.caetrm.com/media/reference-documents/Ninth_Year_Retention_Study_No_718A_for_1995_SCG_CNC_Program.pdf

ISR Note: In-service rates are set to 100% based on the assumption that all purchased units are installed.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rates are 100% since savings estimates are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Conveyor Broiler Upstream	0	0	0.00	0.00	34.45	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Conveyor Broiler Upstream	0.48	0.02	0.03	0.58

TRC: $0 / therm

Incentive: $0 / therm

DIRECT FIRE HEATER

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Heating **Measure Sub Type:** Furnace

Program: Large C&I New Construction

Measure Description

The installation of a high efficiency natural gas warm air furnace with an electronically commutated motor (ECM) for the fan. High efficiency furnaces are better at converting fuel into direct heat and better insulated to reduce heat loss. ECM fan motorssignificantly reduce fan motor electric consumption as compared to both shaped-pole and permanent split capacitor motors.

Baseline Description

The baseline efficiency case is a 85% AFUE furnace in the <150 kBTuh size category.

BCR Measures

BCR Measure Name	Unique Identifier
DIRECT FIRE HEATER	2024 Gas Large C&I New Construction DIRECT FIRE HEATER

Savings Principle

The high efficiency case is a new furnace with AFUE >= 96% and an electronically commutated motor.

Savings Method

Deemed

Unit

Installed high-efficiency warm air furnace with ECM fan motor

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
DIRECT FIRE HEATER			0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
DIRECT FIRE HEATER	18	1.00	1.00	1.00					0.45

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
DIRECT FIRE HEATER	44.58%	55.42%	0.00%	0.00%

Measure Life Source: ASHRAE Applications Handbook (2003); Page 36.3, assumes combined boiler and water heating systems have a measure life similar to a typical boiler.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
DIRECT FIRE HEATER	0	0	0.00	0.00	0.54	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
DIRECT FIRE HEATER	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

Domestic Hot Water

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** DHW **Measure Sub Type:** Year round

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Domestic Hot Water	2024 Gas Large C&I New Construction Domestic Hot Water

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Domestic Hot Water	Calc	Calc	0.00	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Domestic Hot Water	5,10,15	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Domestic Hot Water	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Domestic Hot Water	Calc	Calc	0.00	0.00	3.54	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Domestic Hot Water	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

ERV

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: HVAC

Measure Type: Upstream

Measure Sub Type: Energy Recovery Ventilator

Program: Large C&I New Construction

Measure Description

Installation of a gas fired heated air system with ERV ≥60% total effectiveness.

Baseline Description

The baseline is a gas fired heating system without ERV.

BCR Measures

BCR Measure Name	Unique Identifier
ERV - Rotary Wheel UPSTR	2024 Gas Large C&I New Construction ERV - Rotary Wheel UPSTR
ERV - Fixed Plate UPSTR	2024 Gas Large C&I New Construction ERV - Fixed Plate UPSTR

Savings Principle

The high efficiency case is a gas fired heated air system with ERV ≥60% total effectiveness.

Savings Method

Calc

Unit

Installed gas fired heating system with ERV.

Savings Equation

Unit Peak kWh Savings =((4.5*CFM*deltah_cooling)*(1/EER*ERV_E)/1000 - (CFM*PD/6356/Eff_Motor/Eff_fan*0.746*2)*CF

Unit Dth Savings per Year = (4.5*CFM*deltah_heating)/η*((HDD65*24)/(T_indoor-T_design))*(Hours/24))/1,000,000*ERV_E*0.75

Where:

CF = Coincidence Factor = 0.9

CFM=Outside Air Flow in cubic feet per minute

EER = Provided by customer. If SEER provided, SEER*0.875. If value, not provided use default values in Table 4.

Eff_Fan = Efficiency of fan. Provided by customer. If value not provided assume 0.705.

Eff_Motor = Efficiency of motor. Provided by customer. If value not provided assume 0.855.

ERV_E = Total Energy Effectiveness of ERV. Provided by manufacturer/customer. If values not provided, fixedplate - sensible heat only = 0.355, fixed plate - sensible&latent heat =0.577, fixedplate - unk = 0.466, rotarywheel = 0.647, heatpipe = 0.31.

Hours = Hours of operation, per day. Provided by customer. If none provided, assume 12.

HDD65 = Heating Degree Days see table 1 (ref3)

PD = Additional pressure drop through heat exchanger, inches of water column. Provided by customer. If value is not provided, fixedplate - sensible heat only = 0.00035, fixedplate-sensible&latentheat = 0.00074, fixedplate-unk = 0.00055, rotarywheel = 0.00012, heatpipe=0.00011.

T_indoor = Customer provided indoor heating conditioned space temperature in degreesF

η= Efficiency of heating equipment. Assume r0.8 unless different efficiency is provided by customer.

deltah_cooling = difference in enthalpies (btu/lb) between the design day cooling enthalpy and exhaust air heat exchanger inlet enthalpy.

deltah_heating = difference in enthalpies (btu/lb) between the exhaust air heat exchanger inlet enthalpy and design day heating enthalpy.

1,000 = conversion factor of watts per kWh

1,000,000 = conversion factor for BTU to Dth

0.75 = factor to account for prevention of freezing of condensate. Control strategies incorporate full air flow by-pass or other strategies that reduce the number of hours of operation at lower temperatures,multiply ERE_E by 0.75 if not adjusted by manufacturer or customer.

See MN TRM 3.1 for more detail.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
ERV - Rotary Wheel UPSTR ERV - Fixed Plate UPSTR		Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Note: It is assumed cooling savings are equal to the increased fan energy usage.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
ERV	15	1.00	1.00	1.00		1.00	1.00	0.47	0.22

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
ERV	25.25%	29.25%	24.25%	21.25%

Measure Life Source: FEMP (2004). Demand-Control Ventilation Using CO2 Sensors. https://p2infohouse.org/ref/43/42844.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Guidehouse (2020). Massachusetts Residential Baseline Study. https://ma-eeac.org/wp-content/uploads/RES-1-Residential-Baseline-Study-Ph4-Comprehensive-Report-2020-04-02.pdf

CFwp Source: Guidehouse (2020). Massachusetts Residential Baseline Study. https://ma-eeac.org/wp-content/uploads/RES-1-Residential-Baseline-Study-Ph4-Comprehensive-Report-2020-04-02.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
ERV	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
ERV	0.33	0.12	0.01	0.80

NTG Note: Massachusetts Common Assumption

RC: Rotary Wheel - $97/therm; Fixed Plate - $83/therm

Incentive: Rotary Wheel - $16.5/therm; Fixed Plate - $19.3/therm

Food Service

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Food Service **Measure Sub Type:** Year round

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Food Service	2024 Gas Large C&I New Construction Food Service

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Food Service	Calc	Calc	0.00	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Food Service	12	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Food Service	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Robert Mowris & Associates (2005). Ninth Year Retention Study of the 1995 Southern California Gas Company Commercial New Construction Program. https://www.caetrm.com/media/reference-documents/Ninth_Year_Retention_Study_No_718A_for_1995_SCG_CNC_Program.pdf

Measure Life Note: Assume 1/3 of measure life

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Food Service	Calc	Calc	0.00	0.00	34.45	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Food Service	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

Fryer, Upstream

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: Food Service

Measure Type: Upstream Cooking Equipment

Measure Sub Type: Fryer

Program: Large C&I New Construction

Measure Description

The installation of a natural-gas fired fryer that is either ENERGY Star rated or has a heavy-load cooking efficiency of at least 50%. Qualified fryers use advanced burner and heat exchanger designs to use fuel more efficiently, as well as increased insulation to reduce standby heat loss.

Baseline Description

The baseline efficiency case is a non-Energy Star qualified fryer.

BCR Measures

BCR Measure Name	Unique Identifier
Fryer, Upstream	2024 Gas Large C&I New Construction Fryer, Upstream

Savings Principle

The high efficiency case is an Energy Star qualified fryer.

Savings Method

Deemed

Unit

Installed high-efficiency gas-fired fryer.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Fryer, Upstream			0.00	0.00	19.00	0.00	0.00

Gas Other MMBtu Source: DNV (2023). Kitchen Equipment ISP Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Fryer, Upstream	12	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Fryer, Upstream	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Robert Mowris & Associates (2005). Ninth Year Retention Study of the 1995 Southern California Gas Company Commercial New Construction Program. https://www.caetrm.com/media/reference-documents/Ninth_Year_Retention_Study_No_718A_for_1995_SCG_CNC_Program.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Fryer, Upstream	0	0	0.00	0.00	34.45	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Fryer, Upstream	0.48	0.02	0.03	0.58

TRC: $27 / therm

Incentive: $16.6 / therm

Furnace

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Furnace **Measure Sub Type:**

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Furnace - All	2024 Gas Large C&I New Construction Furnace - All
Furnace - Seasonal	2024 Gas Large C&I New Construction Furnace - Seasonal
Furnace - Year Round	2024 Gas Large C&I New Construction Furnace - Year Round

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Furnace - All	Calc		Calc				
Furnace - Seasonal	Calc		Calc	0.00	0.00	0.00	0.00
Furnace - Year Round	Calc		Calc				

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Furnace	multi	1.00	1.00	0.84					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Furnace	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Furnace	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Furnace	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

Furnace w/ECM

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Heating **Measure Sub Type:** Furnace

Program: Large C&I New Construction

Measure Description

The installation of a high efficiency natural gas warm air furnace with an electronically commutated motor (ECM) for the fan. High efficiency furnaces are better at converting fuel into direct heat and better insulated to reduce heat loss. ECM fan motorssignificantly reduce fan motor electric consumption as compared to both shaped-pole and permanent split capacitor motors.

Baseline Description

The baseline efficiency case is a 85% AFUE furnace in the <150 kBTuh size category.

BCR Measures

BCR Measure Name	Unique Identifier
Furnace w/ECM - 96% AFUE	2024 Gas Large C&I New Construction Furnace w/ECM - 96% AFUE
Furnace w/ECM - 95% AFUE	2024 Gas Large C&I New Construction Furnace w/ECM - 95% AFUE
Furnace w/ECM - 97% AFUE	2024 Gas Large C&I New Construction Furnace w/ECM - 97% AFUE
Furnace w/ ECM - 92% AFUE	2024 Gas Large C&I New Construction Furnace w/ ECM - 92% AFUE

Savings Principle

The high efficiency case is a new furnace with the appropriate AFUE and an electronically commutated motor.

Savings Method

Deemed

Unit

Installed high-efficiency warm air furnace with ECM fan motor

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Furnace w/ECM - 96% AFUE Furnace w/ECM - 95% AFUE Furnace w/ECM - 97% AFUE Furnace w/ ECM - 92% AFUE	168.0	0.1240	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.

Electric kW Source: Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.

Gas Heat MMBtu Source: DNV (2021). Prescriptive Measures NRNC and ISP Results.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Furnace w/ECM	23	1.00	1.00	1.00		1.00	1.00		0.45

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Furnace w/ECM	44.58%	55.42%	0.00%	0.00%

Measure Life Source: DOE (2015). Technical Support Document: Commercial Warm Air Furnaces. EERE-2013-BT-STD-0021-0050. https://www.regulations.gov/document/EERE-2013-BT-STD-0021-0050

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRwp Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Furnace w/ECM	0	0	0.00	0.00	0.54	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Furnace w/ECM	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

Gas driven cooling

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Cooling **Measure Sub Type:** Year round

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Gas driven cooling	2024 Gas Large C&I New Construction Gas driven cooling

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Gas driven cooling	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Gas driven cooling	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Gas driven cooling	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Gas driven cooling	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Gas driven cooling	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $26 / therm

Incentive: $0 / therm

Gas Oven Upstream

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: Food Service

Measure Type: Upstream Cooking Equipment

Measure Sub Type: Oven

Program: Large C&I New Construction

Measure Description

Installation of high efficiency gas-fired ovens.

Baseline Description

The baseline efficiency is a standard efficiency oven with the following baseline efficiencies: convection oven (44% cooking efficiency), combination oven (38% cooking efficiency for steam and 53% cooking equipment for convection), conveyor oven (20% cooking efficiency) and rack oven (30% cooking efficiency).

BCR Measures

BCR Measure Name	Unique Identifier
Gas Oven Upstream- Combination Oven	2024 Gas Large C&I New Construction Gas Oven Upstream- Combination Oven
Gas Oven Upstream - Convection Oven	2024 Gas Large C&I New Construction Gas Oven Upstream - Convection Oven
Gas Oven Upstream - Conveyor Oven	2024 Gas Large C&I New Construction Gas Oven Upstream - Conveyor Oven
Gas Oven Upstream - Rack Oven	2024 Gas Large C&I New Construction Gas Oven Upstream - Rack Oven

Savings Principle

The high efficiency case is an oven that meets or exceeds the following high efficiency ratings per oven type: combination oven (58% efficiency convection mode, 48% steam mode), convection oven (51% efficiency), rack oven (52% efficiency), and conveyor oven (50% efficiency)

Savings Method

Deemed

Unit

Installed high-efficiency gas-fired oven.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Gas Oven Upstream-Combination Oven Gas Oven Upstream - Convection Oven Gas Oven Upstream - Conveyor Oven Gas Oven Upstream - Rack Oven				0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Gas Oven Upstream	12	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Gas Oven Upstream	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Robert Mowris & Associates (2005). Ninth Year Retention Study of the 1995 Southern California Gas Company Commercial New Construction Program. https://www.caetrm.com/media/reference-documents/Ninth_Year_Retention_Study_No_718A_for_1995_SCG_CNC_Program.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Gas Oven Upstream	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Gas Oven Upstream	0.48	0.02	0.03	0.58

TRC: Combo - 19/therm; Convection - $49/therm; Conveyor - $19.9/therm; Rack - $8/therm

Incentive: Combo - $11.69/therm; Convection - $30.81/therm; Conveyor - $12.44/therm; Rack - $4.97/therm

Griddle, Upstream

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: Food Service

Measure Type: Upstream Cooking Equipment

Measure Sub Type: Griddle

Program: Large C&I New Construction

Measure Description

Installation of a high efficiency gas griddle that meets ENERGY STAR® specifications or have a tested heavy load cooking efficiency of at least 38% and an idle energy rate <= 2,650 Btu/h per square foot of cooking surface utilizing ASTM Standard F1275.

Baseline Description

The baseline efficiency case is a non-ENERGY STAR® qualified gas griddle.

BCR Measures

BCR Measure Name	Unique Identifier
Griddle, Upstream	2024 Gas Large C&I New Construction Griddle, Upstream

Savings Principle

The high efficiency case is an ENERGY STAR® qualified gas griddle.

Savings Method

Deemed

Unit

Installed high-efficiency gas-fired griddle

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Griddle, Upstream				0.00	0.00	0.00	0.00

Gas Other MMBtu Source: Unit savings are deemed based on the FSTC Commercial Kitchen Equipment Savings Calculator. https://caenergywise.com/calculators/

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Griddle, Upstream	12	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Griddle, Upstream	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Robert Mowris & Associates (2005). Ninth Year Retention Study of the 1995 Southern California Gas Company Commercial New Construction Program. https://www.caetrm.com/media/reference-documents/Ninth_Year_Retention_Study_No_718A_for_1995_SCG_CNC_Program.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Griddle, Upstream	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Griddle, Upstream	0.48	0.02	0.03	0.58

TRC: $23.22 / therm

Incentive: $14.51 / therm

Heat Pump

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Heat Pump **Measure Sub Type:** Year round

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Heat Pump	2024 Gas Large C&I New Construction Heat Pump

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heat Pump	Calc	Calc	0.00	Calc	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heat Pump	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heat Pump	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heat Pump	Calc	Calc	0.00	0.00	-0.68	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heat Pump	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

Heat Recovery

Sector: C&I | **Fuel:** Gas | **Program Type:** Custom

Measure Category: Custom | **Measure Type:** Heat Recovery | **Measure Sub Type:**

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Heat Recovery - Seasonal	2024 Gas Large C&I New Construction Heat Recovery - Seasonal
Heat Recovery - Year Round	2024 Gas Large C&I New Construction Heat Recovery - Year Round
Heat Recovery - All	2024 Gas Large C&I New Construction Heat Recovery - All

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heat Recovery - Seasonal	Calc		0.00	0.00	0.00	0.00	0.00
Heat Recovery - Year Round	Calc				Calc		
Heat Recovery - All	Calc						

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heat Recovery	10,15,20	1.00	1.00	0.84					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heat Recovery	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Consistent with MA TRM

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heat Recovery	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heat Recovery	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $26 / therm

Incentive: $16 / therm

HVAC

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** HVAC **Measure Sub Type:** Heating

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
HVAC - Controls and EMS HVAC - Equipment	2024 Gas Large C&I New Construction HVAC - Controls and EMS 2024 Gas Large C&I New Construction HVAC - Equipment

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
HVAC - Controls and EMS HVAC - Equipment	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
HVAC	5,10,15	1.00	1.00	0.84					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
HVAC	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
HVAC	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
HVAC	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

HVAC insulation

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** HVAC **Measure Sub Type:** Heating

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
HVAC insulation	2024 Gas Large C&I New Construction HVAC insulation

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
HVAC insulation	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
HVAC insulation	10,15,20	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
HVAC insulation	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
HVAC insulation	Calc	Calc	0.00	0.00	-0.68	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
HVAC insulation	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

INFRARED HEATER - LOW INT

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Heating **Measure Sub Type:** Infrared Heater

Program: Large C&I New Construction

Measure Description

The installation of a gas-fired low intensity infrared heating system in place of a unit heater, furnace, or other standard efficiency equipment. Infrared heating uses radiant heat as opposed to warm air to heat buildings. In commercial environments withhigh air exchange rates, heat loss is minimal because the space's heat comes from surfaces rather than air.

Baseline Description

The baseline efficiency case is a standard efficiency gas-fired unit heater with combustion efficiency of 80%.

BCR Measures

BCR Measure Name	Unique Identifier
INFRARED HEATER - LOW INT	2024 Gas Large C&I New Construction INFRARED HEATER - LOW INT

Savings Principle

The high efficiency case is a gas-fired low-intensity infrared heating unit.

Savings Method

Deemed

Unit

Installed infrared heater

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
INFRARED HEATER - LOW INT			0.00	0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: KEMA (2013). Project 25 Prescriptive Gas Program Final Evaluation Report. Prepared for Massachusetts Energy Efficiency Program Administrators; Page 1-5

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
INFRARED HEATER - LOW INT	17	1.00	1.00	1.00					0.45

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
INFRARED HEATER - LOW INT	44.58%	55.42%	0.00%	0.00%

Measure Life Source: GDS Associates (2016). Natural Gas Efficiency Potential Study. https://www.michigan.gov/-/media/Project/Websites/mpsc/regulatory/reports/3rdparty/DTE_2016_NG_ee_potential_study_w_appendices_vFINAL.pdf?rev=3950a130b5ee4620b2f5faf46f7554b4

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
INFRARED HEATER - LOW INT	0	0	0.00	0.00	0.54	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
INFRARED HEATER - LOW INT	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $26 / therm

Incentive: $19.2 / therm

Kitchen Equipment

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Food Service **Measure Sub Type:** Year round

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Kitchen Equipment	2024 Gas Large C&I New Construction Kitchen Equipment

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Kitchen Equipment	Calc	Calc	0.00	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Kitchen Equipment	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Kitchen Equipment	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Assume 1/3 of measure life

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Kitchen Equipment	Calc	Calc	0.00	0.00	34.45	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Kitchen Equipment	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

Low Flow Cooking Spray Nozzle, Upstream

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Food Service **Measure Type:** **Measure Sub Type:**

Program: Large C&I New Construction

Measure Description

The installation of a high efficiency low flow cooking spray nozzle.

Baseline Description

The baseline efficiency case is a standard efficiency cooking spray valve.

BCR Measures

BCR Measure Name	Unique Identifier
Low Flow Cooking Spray Nozzle, Upstream	2024 Gas Large C&I New Construction Low Flow Cooking Spray Nozzle, Upstream

Savings Principle

The high efficiency case is a low flow pre-rinse spray valve for cooking equipment with an average flow rate of 1.6 GPM.

Savings Method

Deemed

Unit

Installed cooking low flow pre-rinse spray valve.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Low Flow Cooking Spray Nozzle, Upstream			0.00	0.00	0.00	0.00	0.00

Gas DHW MMBtu Source: DNV GL (2014)Impact Evaluation of Massachusetts Prescriptive Gas Pre-Rinse Spray Valve Measure

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Low Flow Cooking Spray Nozzle, Upstream	8	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Low Flow Cooking Spray Nozzle, Upstream	0.00%	0.00%	0.00%	0.00%

Measure Life Source: DNV GL (2014)Impact Evaluation of Massachusetts Prescriptive Gas Pre-Rinse Spray Valve Measure

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Low Flow Cooking Spray Nozzle, Upstream	6410	6410	0.00	0.00	34.45	0.00	0.00	0.00

Water/Sewer Source: DNV GL (2014)Impact Evaluation of Massachusetts Prescriptive Gas Pre-Rinse Spray Valve Measure

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Low Flow Cooking Spray Nozzle, Upstream	0.48	0.02	0.03	0.58

TRC: $10.53 / therm

Incentive: $6.58 / therm

Non-Condensing Boiler

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Boiler **Measure Sub Type:** Blend

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Non-Condensing Boiler - All	2024 Gas Large C&I New Construction Non-Condensing Boiler - All
Non-Condensing Boiler - Seasonal	2024 Gas Large C&I New Construction Non-Condensing Boiler - Seasonal
Non-Condensing Boiler - Year Round	2024 Gas Large C&I New Construction Non-Condensing Boiler - Year Round

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Non-Condensing Boiler - All	Calc	Calc	0.00	0.00	0.00	Calc	0.00
Non-Condensing Boiler - Seasonal	Calc	Calc		Calc		Calc	
Non-Condensing Boiler - Year Round	Calc	Calc				Calc	

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Non-Condensing Boiler	5,10,15,20, 25	1.00	1.00	0.84					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Non-Condensing Boiler	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Assume 1/3 of measure life

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Non-Condensing Boiler	Calc	Calc	0.00	0.00	-0.06	0.00	0.00	0.00

Annual $ Source: DNV GL (2015). Massachusetts Electric & Gas Program Administrators: C&I New Construction Non-Energy Impacts Study.https://ma-eeac.org/wp-content/uploads/CI-New-Construction-Non-Energy-Impacts-Study-Stage-1-Results-and-Stage-2-Detailed-Research-Plan.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Non-Condensing Boiler	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

Other Gas

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Other **Measure Sub Type:** HVAC

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Other Gas - Seasonal	2024 Gas Large C&I New Construction Other Gas - Seasonal
Other Gas - Year Round	2024 Gas Large C&I New Construction Other Gas - Year Round
Other Gas - All	2024 Gas Large C&I New Construction Other Gas - All

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Other Gas - Seasonal	Calc	Calc	Calc			Calc	
Other Gas - Year Round	Calc	Calc	Calc	0.00	Calc	Calc	0.00
Other Gas - All	Calc	Calc	Calc			Calc	

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Other Gas	5,10,15,20, 25	1.00	1.00	0.84					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Other Gas	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Other Gas	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Other Gas	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $26 / therm

Incentive: $16 / therm

Pasta Cooker, Upstream

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: Food Service

Measure Type: Upstream Cooking Equipment

Measure Sub Type: Pasta Cooker

Program: Large C&I New Construction

Measure Description

The installation of an energy efficient pasta cooker.

Baseline Description

Baseline case is the standard natural gas stove with stock pot with 27.5% standard efficiency.

BCR Measures

BCR Measure Name	Unique Identifier
Pasta Cooker, Upstream	2024 Gas Large C&I New Construction Pasta Cooker, Upstream

Savings Principle

A dedicated natural high efficiency gas-fueled pasta cooker(equivalent to 50% efficiency) with a removable strainer

Savings Method

Deemed

Unit

Per Pasta Cooker

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Pasta Cooker, Upstream			0.00	0.00	0.00	0.00	0.00

Gas Other MMBtu Note: Deemed savings are based on Arkansas Technical Reference Manual V4.0 Volume 2.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Pasta Cooker, Upstream	12	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Pasta Cooker, Upstream	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Robert Mowris & Associates (2005). Ninth Year Retention Study of the 1995 Southern California Gas Company Commercial New Construction Program. https://www.caetrm.com/media/reference-documents/Ninth_Year_Retention_Study_No_718A_for_1995_SCG_CNC_Program.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Pasta Cooker, Upstream	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Pasta Cooker, Upstream	0.48	0.02	0.03	0.58

TRC: $25.68 / therm

Incentive: $16.05 / therm

Process

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Process **Measure Sub Type:** Year round

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Process	2024 Gas Large C&I New Construction Process

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Process	Calc	Calc	0.00	Calc	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Process	5,10	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Process	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Process	Calc	Calc	0.00	0.00	0.07	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Process	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

Renovation Rehab Multifamily High Rise Cooling, Gas

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Whole Home **Measure Type:** Custom **Measure Sub Type:** Gas Cooling

Program: Large C&I New Construction

Measure Description

The gas cooling savings resulting from MFHR Renovation Rehab projects that include the installation of roof, wall, and basement insulation.

Baseline Description

The baseline case is the current version of the RI energy code and/or UDRH performance.

BCR Measures

BCR Measure Name	Unique Identifier
Renovation Rehab MFHR -Gas Cooling Tier 1	2024 Gas Large C&I New Construction Renovation Rehab MFHR -Gas Cooling Tier 1
Renovation Rehab MFHR - Gas Cooling Tier 2	2024 Gas Large C&I New Construction Renovation Rehab MFHR - Gas Cooling Tier 2
Renovation Rehab MFHR - Gas Cooling Tier 3	2024 Gas Large C&I New Construction Renovation Rehab MFHR - Gas Cooling Tier 3

Savings Principle

The efficient case is the post-retrofit performance of a house participating the program

Savings Method

Calculated using site-specific inputs

Unit

Complete Renovation Rehab project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Renovation Rehab MFHR -Gas Cooling Tier 1 Renovation Rehab MFHR - Gas Cooling Tier 2 Renovation Rehab MFHR - Gas Cooling Tier 3	Calc	Calc	Calc	0.00	0.00	0.00	0.00

Electric kWh Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Electric kW Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Gas Heat MMBtu Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Renovation Rehab Multifamily High Rise Cooling, Gas	25	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Renovation Rehab Multifamily High Rise Cooling, Gas	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

CFwp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Renovation Rehab Multifamily High Rise Cooling, Gas	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Renovation Rehab Multifamily High Rise Cooling, Gas	0.48	0.02	0.03	0.58

TRC: $0 / therm

Incentive: $0 / therm

Renovation Rehab Multifamily High Rise CP, Gas

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Whole Home **Measure Type:** Custom **Measure Sub Type:** CP

Program: Large C&I New Construction

Measure Description

The heating, cooling, and DHW savings resulting from CP Renovation Rehab projects.The cooling and heating savings resulting from Renovation Rehab projects that include the installation of roof, wall, and basement insulation. The DHW savings resulting fromRenovation Rehab projects that include more efficient water heating systems.

Baseline Description

The baseline case is the current version of the RI energy code and/or UDRH performance.

BCR Measures

BCR Measure Name	Unique Identifier
Renovation Rehab MFHR - Gas Cooling CP	2024 Gas Large C&I New Construction Renovation Rehab MFHR - Gas Cooling CP
Renovation Rehab MFHR - Heating CP	2024 Gas Large C&I New Construction Renovation Rehab MFHR - Heating CP
Renovation Rehab MFHR - DHW CP	2024 Gas Large C&I New Construction Renovation Rehab MFHR - DHW CP

Savings Principle

The efficient case is the post-retrofit performance of a house participating the program

Savings Method

Calculated using site-specific inputs

Unit

Complete Renovation Rehab project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Renovation Rehab MFHR - Gas Cooling CP Renovation Rehab MFHR - Heating CP Renovation Rehab MFHR - DHW CP	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Electric kWh Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Electric kW Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Gas Heat MMBtu Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Renovation Rehab Multifamily High Rise CP, Gas	multi	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Renovation Rehab Multifamily High Rise CP, Gas	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

CFwp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Renovation Rehab Multifamily High Rise CP, Gas	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Renovation Rehab Multifamily High Rise CP, Gas	0.48	0.02	0.03	0.58

TRC: $0 / therm

Incentive: $0 / therm

Renovation Rehab Multifamily High Rise DHW, Gas

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Whole Home **Measure Type:** Custom **Measure Sub Type:** DHW

Program: Large C&I New Construction

Measure Description

The DHW savings resulting from Renovation Rehab projects that include more efficient water heating systems.

Baseline Description

The baseline case is the current version of the RI energy code and/or UDRH performance.

BCR Measures

BCR Measure Name	Unique Identifier
Renovation Rehab MFHR - Heating Tier 1	2024 Gas Large C&I New Construction Renovation Rehab MFHR - Heating Tier 1
Renovation Rehab MFHR - Heating Tier 2	2024 Gas Large C&I New Construction Renovation Rehab MFHR - Heating Tier 2
Renovation Rehab MFHR - Heating Tier 3	2024 Gas Large C&I New Construction Renovation Rehab MFHR - Heating Tier 3

Savings Principle

The efficient case is the post-retrofit performance of a house participating the program

Savings Method

Calculated using site-specific inputs

Unit

Complete Renovation Rehab project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Renovation Rehab MFHR - Heating Tier 1	Calc	Calc	0.00	0.00	0.00	0.00	0.00
Renovation Rehab MFHR - Heating Tier 2							
Renovation Rehab MFHR - Heating Tier 3							

Electric kWh Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Electric kWh Note: Supplied by vendor

Electric kW Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Electric kW Note: Supplied by vendor

Gas Heat MMBtu Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Renovation Rehab Multifamily High Rise DHW, Gas	25	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Renovation Rehab Multifamily High Rise DHW, Gas	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

CFwp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Renovation Rehab Multifamily High Rise DHW, Gas	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Renovation Rehab Multifamily High Rise DHW, Gas	0.48	0.02	0.03	0.58

TRC: $0 / therm

Incentive: $0 / therm

Renovation Rehab Multifamily High Rise Heating, Gas

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Whole Home **Measure Type:** Custom **Measure Sub Type:** Heating

Program: Large C&I New Construction

Measure Description

The heating savings resulting from MFHR Renovation Rehab projects that include the installation of roof, wall, and basement insulation.

Baseline Description

The baseline case is the current version of the RI energy code and/or UDRH performance.

BCR Measures

BCR Measure Name	Unique Identifier
Renovation Rehab MFHR - DHW Tier 1	2024 Gas Large C&I New Construction Renovation Rehab MFHR - DHW Tier 1
Renovation Rehab MFHR - DHW Tier 2	2024 Gas Large C&I New Construction Renovation Rehab MFHR - DHW Tier 2
Renovation Rehab MFHR - DHW Tier 3	2024 Gas Large C&I New Construction Renovation Rehab MFHR - DHW Tier 3

Savings Principle

The efficient case is the post-retrofit performance of a house participating the program

Savings Method

Calculated using site-specific inputs

Unit

Complete Renovation Rehab project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Renovation Rehab MFHR - DHW Tier 1	Calc	Calc	Calc	0.00	0.00	0.00	0.00
Renovation Rehab MFHR - DHW Tier 2							
Renovation Rehab MFHR - DHW Tier 3							

Electric kWh Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Electric kW Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Electric kW Note: Calculated, per 100ft2

Gas Heat MMBtu Source: NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Renovation Rehab Multifamily High Rise Heating, Gas	15	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Renovation Rehab Multifamily High Rise Heating, Gas	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Note: Coincidence factors are custom calculated based on project-specific detail.

CFwp Note: Coincidence factors are custom calculated based on project-specific detail.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Renovation Rehab Multifamily High Rise Heating, Gas	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Renovation Rehab Multifamily High Rise Heating, Gas	0.48	0.02	0.03	0.58

TRC: $0 / therm

Incentive: $0 / therm

Solar Thermal

Sector: C&I | **Fuel:** Gas | **Program Type:** Custom

Measure Category: Custom | **Measure Type:** Solar Heat | **Measure Sub Type:** Thermal

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Solar Thermal - All	2024 Gas Large C&I New Construction Solar Thermal - All
Solar Thermal - Year Round	2024 Gas Large C&I New Construction Solar Thermal - Year Round
Solar Thermal - Seasonal	2024 Gas Large C&I New Construction Solar Thermal - Seasonal

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Solar Thermal - All Solar Thermal - Year Round Solar Thermal - Seasonal	Calc	Calc	Calc	0.00	Calc	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Solar Thermal	multi	1.00	1.00	0.84					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Solar Thermal	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Solar Thermal	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Solar Thermal	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

Steam boiler

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Boiler **Measure Sub Type:** Heating

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Steam boiler	2024 Gas Large C&I New Construction Steam boiler

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Steam boiler	Calc	Calc	0.00	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Steam boiler	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Steam boiler	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Steam boiler	Calc	Calc	0.00	0.00	-0.06	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Steam boiler	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $40 / therm

Incentive: $25 / therm

Steam Trap

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Steam Traps **Measure Sub Type:** Heating

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Steam Trap	2024 Gas Large C&I New Construction Steam Trap

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Steam Trap	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Steam Trap	6	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Steam Trap	0.00%	0.00%	0.00%	0.00%

Measure Life Source: DNV GL MA 2013,2017 Prescriptive Gas Impact Evaluation: Steam Trap Evaulation Phase 1 & 2. https://ma-eeac.org/wp-content/uploads/MA-2013-Prescriptive-Gas-Impact-Evaluation-Steam-Trap-Evaluation-Phase-1.pdf; http://rieermc.ri.gov/wp-content/uploads/2018/03/ma-ciec-p59-steam-trap-evaluation-report-final-20170308.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Steam Trap	Calc	Calc	0.00	0.00	-0.52	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Steam Trap	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

Steamer, Upstream

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: Food Service

Measure Type: Upstream Cooking Equipment

Measure Sub Type: Steamer

Program: Large C&I New Construction

Measure Description

The installation of an ENERGY STAR® rated natural-gas fired steamer, either connectionless or steam-generator design, with heavy-load cooking efficiency of at least 38%. Qualified steamers reduce heat loss due to better insulation, improved heat exchange, and more efficient steam delivery systems.

Baseline Description

The baseline efficiency case is a steamer with a 15% cooking efficiency. These performance parameters are drawn from a sample of economy grade equipment tested by the Food Service Technology Center based on ASTM F1484.

BCR Measures

BCR Measure Name	Unique Identifier
Steamer, Upstream	2024 Gas Large C&I New Construction Steamer, Upstream

Savings Principle

The high efficiency case is an ENERGY STAR® rated natural-gas fired steamer, with a tested heavy-load cooking efficiency of at least 38% utilizing ASTM F1484.

Savings Method

Deemed

Unit

Installed high-efficiency gas-fired steamer.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: 4380

Hours Source: Environmental Protection Agency (2011). Savings Calculator for ENERGY Star Qualified Commercial Kitchen Equipment: Steam Cooker Calcs. Accessed on 10/12/2011.

Hours Note: The deemed savings assumes 4,380 annual operating hours (12 hours a day * 365 days/year).

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Steamer, Upstream				0.00	0.00	0.00	0.00

Gas Other MMBtu Source: DNV (2023). Kitchen Equipment ISP Study.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Steamer, Upstream	12	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Steamer, Upstream	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Robert Mowris & Associates (2005). Ninth Year Retention Study of the 1995 Southern California Gas Company Commercial New Construction Program. https://www.caetrm.com/media/reference-documents/Ninth_Year_Retention_Study_No_718A_for_1995_SCG_CNC_Program.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Steamer, Upstream	162060	162060	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Environmental Protection Agency (2011). Savings Calculator for ENERGY STAR Qualified Commercial Kitchen Equipment: Steam Cooker Calcs.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Steamer, Upstream	0.48	0.02	0.03	0.58

TRC: $8 / therm

Incentive: $4.86 / therm

Underfired Broiler, Upstream

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Food Service **Measure Type:** Cooking Equipment **Measure Sub Type:** Broiler

Program: Large C&I New Construction

Measure Description

The installation of a high efficiency natural-gas underfired broiler.

Baseline Description

The baseline efficiency case is a unit with an input rate > 22 kBtu/hr/ln-ft at 600 degrees F and an idle and cooking energy rate = 25,000 Btu/hr with a production capacity of 25 lb/hr.

BCR Measures

BCR Measure Name	Unique Identifier
Underfired Broiler, Upstream	2024 Gas Large C&I New Construction Underfired Broiler, Upstream

Savings Principle

The high efficiency case is a unit with an input rate <= 22 kBtu/hr/ln-ft at 600 degrees F and an idle and cooking energy rate <=20,000 Btu/hr with a production capacity of 20 lb/hr.

Savings Method

Deemed

Unit

Installed high-efficiency gas underfired broiler

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Underfired Broiler, Upstream				0.00	0.00	0.00	0.00

Gas Other MMBtu Note: Savings are based on an algorithm in the CA eTRM for underfired broilers.
https://www.caetrm.com/measure/SWFS019/02/

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Underfired Broiler, Upstream	12	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Underfired Broiler, Upstream	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Robert Mowris & Associates (2005). Ninth Year Retention Study of the 1995 Southern California Gas Company Commercial New Construction Program. https://www.caetrm.com/media/reference-documents/Ninth_Year_Retention_Study_No_718A_for_1995_SCG_CNC_Program.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: 100% realization rates are assumed because savings are based on researched assumptions by FSTC.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Underfired Broiler, Upstream	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Underfired Broiler, Upstream	0.48	0.02	0.03	0.58

TRC: $0 / therm

Incentive: $0 / therm

Ventilation Reduction

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Ventilation **Measure Sub Type:** Heating

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Ventilation Reduction	2024 Gas Large C&I New Construction Ventilation Reduction

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Ventilation Reduction	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Ventilation Reduction	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Ventilation Reduction	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Ventilation Reduction	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Ventilation Reduction	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

VSDs

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** VSD **Measure Sub Type:** Heating

Program: Large C&I New Construction

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
VSDs - Non-HVAC	2024 Gas Large C&I New Construction VSDs - Non-HVAC

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
VSDs - Non-HVAC	Calc	Calc	Calc	0.00	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
VSDs	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
VSDs	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
VSDs	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
VSDs	0.48	0.02	0.03	0.58

NTG Source: Tetra Tech (2021). PY2019 C&I Free Ridership/Spillover study. http://rieermc.ri.gov/wp-content/uploads/2021/01/national-grid-rhode-island-2020-ci-fr-so-report_final.pdf

TRC: $0 / therm

Incentive: $0 / therm

WATER HEATER - INDIRECT

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Water Heater

Measure Sub Type: Indirect Water Heater

Program: Large C&I New Construction

Measure Description

The installation of a an indirect water heater that uses a storage tank that is heated by the main boiler. The energy stored by the water tank allows the boiler to turn off and on less often.

Baseline Description

The baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code. For condensing stand-alone water heaters, the baseline is a stand-alone tank water heater with a thermal efficiency of 80%.

BCR Measures

BCR Measure Name	Unique Identifier
WATER HEATER - INDIRECT	2024 Gas Large C&I New Construction WATER HEATER - INDIRECT

Savings Principle

The high efficiency case is an indirect water heater with a Combined Appliance Efficiency (CAE) of 85% or greater.

Savings Method

Deemed

Unit

Installed high-efficiency water heater.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
WATER HEATER - INDIRECT				19.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
WATER HEATER - INDIRECT	15	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
WATER HEATER - INDIRECT	0.00%	0.00%	0.00%	0.00%

Measure Life Source: GDS Associates, Inc. and Summit Blue Consulting (2009), Natural Gas Energy Efficiency Potential in Massachusetts, Appendix B-2,

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
WATER HEATER - INDIRECT	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
WATER HEATER - INDIRECT	0.64	0.00	0.00	0.36

NTG Source: DNV (2021). MA C&I Upstream HVAC & Gas Water Heating NTG Study (MA20X08-B-CIHVACNTG). https://ma-eeac.org/wp-content/uploads/MA20X08-B-CIHVACNTG_Final_Report_Clean_9.10.pdf

TRC: $33.65 / therm

Incentive: $21.03 / therm

Water Heating Boiler

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Water Heating **Measure Type:** DHW **Measure Sub Type:** Hot water boiler

Program: Large C&I New Construction

Measure Description

The installation of a high efficiency natural gas fired DHW boilers. High efficiency boilers take advantage of improved design to achieve improved efficiency.

Baseline Description

The baseline efficiency assumes compliance with the International Energy Conservation Code (IECC) 2021. Table 11 in Appendix A details the specific efficiency requirements by equipment type and capacity.

BCR Measures

BCR Measure Name	Unique Identifier
Water Heating Boiler - 85% TE	2024 Gas Large C&I New Construction Water Heating Boiler - 85% TE
Water Heating Boiler - 92% TE	2024 Gas Large C&I New Construction Water Heating Boiler - 92% TE
Water Heating Boiler - 94% TE	2024 Gas Large C&I New Construction Water Heating Boiler - 94% TE

Savings Principle

The high efficiency case assumes a gas-fired boiler that meets or exceeds 85% efficiency, 92% efficiency, and 94% efficiency, respectively.

Savings Method

Deemed

Unit

Installed high-efficiency DHW boiler

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Water Heating Boiler - 85% TE							
Water Heating Boiler - 92% TE				0.00	0.00	0.00	0.00
Water Heating Boiler - 94% TE							

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Water Heating Boiler	15	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Water Heating Boiler	0.00%	0.00%	0.00%	0.00%

Measure Life Source: GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group. https://library.cee1.org/sites/default/files/library/8842/CEE_Eval_MeasureLifeStudyLights&HVACGDS_1Jun2007.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Water Heating Boiler	0	0	0.00	0.00	-0.85	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Water Heating Boiler	0.56	0.00	0.00	0.44

NTG Source: DNV (2021). MA C&I Upstream HVAC & Gas Water Heating NTG Study (MA20X08-B-CIHVACNTG). https://ma-eeac.org/wp-content/uploads/MA20X08-B-CIHVACNTG_Final_Report_Clean_9.10.pdf

TRC: $17 / therm

Incentive: $10.81 / therm

Boiler Reset

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** Boiler Control

Program: Large C&I Retrofit

Measure Description

Boiler reset controls are devices that improve the efficiency of an existing boiler system by modulating the hot water temperature set point. Reset controls automatically control boiler water temperature based on outdoor temperature using a software program; load controls sense the thermal demand of the heating system and resets the water temperature based on the demand.

Baseline Description

The baseline efficiency case is a boiler without reset or load controls.

BCR Measures

BCR Measure Name	Unique Identifier
Boiler Reset - Multi-Stage	2024 Gas Large C&I Retrofit Boiler Reset - Multi-Stage
Boiler Reset - One-Stage	2024 Gas Large C&I Retrofit Boiler Reset - One-Stage

Savings Principle

The efficient case is a boiler with reset or load controls, which reset the supply water temperature based on outdoor temperatures and/or building load.

Savings Method

Deemed

Unit

Installation of boiler reset control on existing boiler.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Boiler Reset - Multi-Stage Boiler Reset - One-Stage				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: GDS Associates, Inc. and Summit Blue Consulting (2009), Natural Gas Energy Efficiency Potential in Massachusetts, Appendix B-2,

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Boiler Reset	15	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Boiler Reset	0.00%	0.00%	0.00%	0.00%

Measure Life Source: ACEEE (2006). Emerging Technologies Report: Advanced Boiler Controls. Prepared for ACEEE.https://www.aceee.org/files/pdf/2006_BoilerControls.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Boiler Reset	0	0	0.00	0.00	6.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Boiler Reset	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

Boiler, 95% AFUE < 300 MBU

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Heating **Measure Sub Type:** Boiler

Program: Large C&I Retrofit

Measure Description

The installation of a high efficiency natural gas fired condensing boilers. High efficiency boilers take advantage of improved design, sealed combustion and condensing flue gases in a second heat exchanger to achieve improved efficiency. (Only condensingboilers are offered as prescriptive measures. Program incentives for other boiler types are offered through the custom program.)

Baseline Description

The baseline efficiency assumes compliance with the International Energy Conservation Code (IECC) 2021. Table 19 in Appendix A details the specific efficiency requirements by equipment type and capacity.

BCR Measures

BCR Measure Name	Unique Identifier
Boiler, 95% AFUE < 300 MBU	2024 Gas Large C&I Retrofit Boiler, 95% AFUE < 300 MBU

Savings Principle

The high efficiency case assumes a gas-fired boiler that exceeds the efficiency levels required by Rhode Island State Building Code. Actual site efficiencies should be determined on a case-by-case basis.

Savings Method

Deemed

Unit

Installed high-efficiency condensing boiler

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Boiler, 95% AFUE < 300 MBU				0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Boiler, 95% AFUE < 300 MBU	20	1.00	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Boiler, 95% AFUE < 300 MBU	0.00%	0.00%	0.00%	0.00%

Measure Life Source: MA19C02-B-EUL - C&I Measure Life Report. https://ma-eeac.org/wp-content/uploads/MA19C02_B_EUL-final-report-03_31_20-v2.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Boiler, 95% AFUE < 300 MBU	0	0	0.00	0.00	6.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Boiler, 95% AFUE < 300 MBU	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

Building operator certification

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Whole Building **Measure Type:** BOC Training **Measure Sub Type:** Certification

Program: Large C&I Retrofit

Measure Description

The Building Operator Certification (BOC) class improves operators' ability to optimize / minimize gas and electricity use in buildings.

Baseline Description

The base case is a building operator without specific training on efficient use of gas and electricity in buildings.

BCR Measures

BCR Measure Name	Unique Identifier
Building operator certification	2024 Gas Large C&I Retrofit Building operator certification

Savings Principle

The high efficiency case is a building operator attending a class on improving the efficiency of gas and electricity use in buildings.

Savings Method

Deemed

Unit

MMBTU/SF/BOC completion

Savings Equation

Gross kWh = Qty × deltakWh

Gross kW = Qty × deltakW

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltakWh = Average annual kWh reduction per unit.

deltakW = Average kW reduction per unit.

deltaMMBtu_Gas = Average annual natural gas reduction per unit

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Building operator certification				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: Navigant Consulting (2015). Comprehensive Review of Non-Residential Training and Education Programs, with a Focus on Building Operator Certification. Prepared for the Massachusetts PAs and EEAC

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Building operator certification	5	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Building operator certification	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Navigant Consulting (2015). Comprehensive Review of Non-Residential Training and Education Programs, with a Focus on Building Operator Certification. Prepared for the Massachusetts PAs and EEAC

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Building operator certification	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Building operator certification	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

Building Shell

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Whole Building **Measure Sub Type:** Heating

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Building Shell	2024 Gas Large C&I Retrofit Building Shell

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Building Shell	Calc	Calc	Calc	Calc	Calc	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Building Shell	5,10,15,20, 25	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Building Shell	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Building Shell	Calc	Calc	0.00	0.00	3.26	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Building Shell	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

Comprehensive Design

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Whole Building **Measure Sub Type:** Heating

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Comprehensive Design - CD	2024 Gas Large C&I Retrofit Comprehensive Design - CD
Comprehensive Design - CDA	2024 Gas Large C&I Retrofit Comprehensive Design - CDA

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Comprehensive Design - CD Comprehensive Design - CDA	Calc	Calc	Calc	Calc	Calc	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Comprehensive Design	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Comprehensive Design	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Comprehensive Design	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Comprehensive Design	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

Comprehensive Retrofit

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Whole Building **Measure Sub Type:** Heating

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Comprehensive Retrofit	2024 Gas Large C&I Retrofit Comprehensive Retrofit

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Comprehensive Retrofit	Calc	Calc	Calc	Calc	Calc	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Comprehensive Retrofit	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Comprehensive Retrofit	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Comprehensive Retrofit	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Comprehensive Retrofit	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

Condensing Boiler

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Boiler **Measure Sub Type:**

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Condensing Boiler - All	2024 Gas Large C&I Retrofit Condensing Boiler - All
Condensing Boiler - Seasonal	2024 Gas Large C&I Retrofit Condensing Boiler - Seasonal
Condensing Boiler - Year Round	2024 Gas Large C&I Retrofit Condensing Boiler - Year Round

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Condensing Boiler - All Condensing Boiler - Seasonal Condensing Boiler - Year Round	Calc	Calc	Calc	Calc	Calc	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Condensing Boiler	5,10,15,20, 25	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Condensing Boiler	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Condensing Boiler	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Condensing Boiler	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

Custom Other

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Whole Building **Measure Sub Type:** Whole Building

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Custom Other	2024 Gas Large C&I Retrofit Custom Other

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom Other	Calc	Calc	Calc	Calc	Calc	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom Other	5,10,15,20, 25	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom Other	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom Other	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom Other	0.07	0.00	0.16	1.09

TRC: $50 / therm

Incentive: $25 / therm

Custom: SEM

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** SEM **Measure Sub Type:** SEM

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Custom: SEM	2024 Gas Large C&I Retrofit Custom: SEM

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom: SEM	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom: SEM	multi	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom: SEM	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom: SEM	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom: SEM	0.00	0.00	0.00	1.00

TRC: $0 / therm

Incentive: $0 / therm

Domestic Hot Water

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** DHW **Measure Sub Type:** Year round

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Domestic Hot Water	2024 Gas Large C&I Retrofit Domestic Hot Water

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Domestic Hot Water	Calc	Calc	Calc	Calc	Calc	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Domestic Hot Water	5,10,15	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Domestic Hot Water	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Domestic Hot Water	Calc	Calc	0.00	0.00	3.55	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Domestic Hot Water	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

ERV

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: HVAC

Measure Type: Upstream

Measure Sub Type: Energy Recovery Ventilator

Program: Large C&I Retrofit

Measure Description

Installation of a gas fired heated air system with ERV ≥60% total effectiveness.

Baseline Description

The baseline is a gas fired heating system without ERV.

BCR Measures

BCR Measure Name	Unique Identifier
ERV - Rotary Wheel UPSTR	2024 Gas Large C&I Retrofit ERV - Rotary Wheel UPSTR
ERV - Fixed Plate UPSTR	2024 Gas Large C&I Retrofit ERV - Fixed Plate UPSTR

Savings Principle

The high efficiency case is a gas fired heated air system with ERV ≥60% total effectiveness.

Savings Method

Calc

Unit

Installed gas fired heating system with ERV.

Savings Equation

Unit Peak kWh Savings =((4.5*CFM*deltah_cooling)*(1/EER*ERV_E)/1000 - (CFM*PD/6356/Eff_Motor/Eff_fan*0.746*2)*CF

Unit Dth Savings per Year = (4.5*CFM*deltah_heating)/η*((HDD65*24)/(T_indoor-T_design))*(Hours/24))/1,000,000*ERV_E*0.75

Where:

CF = Coincidence Factor = 0.9

CFM=Outside Air Flow in cubic feet per minute

EER = Provided by customer. If SEER provided, SEER*0.875. If value, not provided use default values in Table 4.

Eff_Fan = Efficiency of fan. Provided by customer. If value not provided assume 0.705.

Eff_Motor = Efficiency of motor. Provided by customer. If value not provided assume 0.855.

ERV_E = Total Energy Effectiveness of ERV. Provided by manufacturer/customer. If values not provided, fixedplate - sensible heat only = 0.355, fixed plate - sensible&latent heat =0.577, fixedplate - unk = 0.466, rotarywheel = 0.647, heatpipe = 0.31.

Hours = Hours of operation, per day. Provided by customer. If none provided, assume 12.

HDD65 = Heating Degree Days see tab

PD = Additional pressure drop through heat exchanger, inches of water column. Provided by customer. If value is not provided, fixedplate - sensible heat only = 0.00035, fixedplate-sensible&latentheat = 0.00074, fixedplate-unk = 0.00055, rotarywheel = 0.00012, heatpipe=0.00011.

T_indoor = Customer provided indoor heating conditioned space temperature in degreesF

η= Efficiency of heating equipment. Assume r0.8 unless different efficiency is provided by customer.

deltah_cooling = difference in enthalpies (btu/lb) between the design day cooling enthalpy and exhaust air heat exchanger inlet enthalpy.

deltah_heating = difference in enthalpies (btu/lb) between the exhaust air heat exchanger inlet enthalpy and design day heating enthalpy.

1,000 = conversion factor of watts per kWh

1,000,000 = conversion factor for BTU to Dth

0.75 = factor to account for prevention of freezing of condensate. Control strategies incorporate full air flow by-pass or other strategies that reduce the number of hours of operation at lower temperatures,multiply ERE_E by 0.75 if not adjusted by manufacturer or customer.

See MN TRM 3.1 for more detail.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
ERV - Rotary Wheel UPSTR ERV - Fixed Plate UPSTR		Calc		0.00	0.00	0.00	0.00

Electric kWh Note: It is assumed cooling savings are equal to the increased fan energy usage.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
ERV	15	1.00	1.00	1.00	1.00	1.00	1.00	0.47	0.22

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
ERV	25.25%	29.25%	24.25%	21.25%

Measure Life Source: FEMP (2004). Demand-Control Ventilation Using CO2 Sensors. https://p2infohouse.org/ref/43/42844.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Guidehouse (2020). Massachusetts Residential Baseline Study. https://ma-eeac.org/wp-content/uploads/RES-1-Residential-Baseline-Study-Ph4-Comprehensive-Report-2020-04-02.pdf

CFwp Source: Guidehouse (2020). Massachusetts Residential Baseline Study. https://ma-eeac.org/wp-content/uploads/RES-1-Residential-Baseline-Study-Ph4-Comprehensive-Report-2020-04-02.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
ERV	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
ERV	0.33	0.12	0.01	0.80

NTG Note: Massachusetts Common Assumption

TRC: $0 / therm

Incentive: $0 / therm

Faucet aerator

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Water Heating **Measure Type:** Flow Control **Measure Sub Type:** Faucet Aerator

Program: Large C&I Retrofit

Measure Description

Installation of a faucet aerator with a flow rate of 1.5 GPM or less on an existing faucet with high flow in a commercial setting with service water heated by natural gas.

Baseline Description

The baseline efficiency case is a 2.2 GPM faucet.

BCR Measures

BCR Measure Name	Unique Identifier
Faucet aerator	2024 Gas Large C&I Retrofit Faucet aerator

Savings Principle

The high efficiency case is a faucet with 1.5 GPM or less aerator installed.

Savings Method

Deemed

Unit

Installed faucet aerator.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: 130

Hours Source: Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads. Accessed on 10/12/2011.

Hours Note: The calculator used to determine the deemed savings uses a default operation of 30 minuts/day, 260 days/year. Not applicable for Multifamily applications.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Faucet aerator			0.00	1.70	0.00	0.00	0.00

Gas DHW MMBtu Source: GDS Associates, Inc. and Summit Blue Consulting (2009), Natural Gas Energy Efficiency Potential in Massachusetts, Appendix B-2,

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Faucet aerator	3	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Faucet aerator	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Faucet aerator	5460	5460	0.00	0.00	0.81	0.00	0.00	0.00

Water/Sewer Source: Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads. Accessed on 10/12/2011.

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Faucet aerator	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

Food Service

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Food Service **Measure Sub Type:** Year round

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Food Service	2024 Gas Large C&I Retrofit Food Service

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Food Service	Calc	Calc	Calc	Calc	Calc	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Food Service	12	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Food Service	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Robert Mowris & Associates (2005). Ninth Year Retention Study of the 1995 Southern California Gas Company Commercial New Construction Program. https://www.caetrm.com/media/reference-documents/Ninth_Year_Retention_Study_No_718A_for_1995_SCG_CNC_Program.pdf

Measure Life Note: Assume 1/3 of measure life

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Food Service	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Food Service	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

Furnace

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Furnace **Measure Sub Type:** Blend

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Furnace - All	2024 Gas Large C&I Retrofit Furnace - All
Furnace - Seasonal	2024 Gas Large C&I Retrofit Furnace - Seasonal
Furnace - Year Round	2024 Gas Large C&I Retrofit Furnace - Year Round

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Furnace - All	Calc	Calc	Calc	0.00	0.00 Calc	Calc	0.00
Furnace - Seasonal	Calc	Calc	Calc			Calc	
Furnace - Year Round	Calc	Calc	Calc			Calc	

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Furnace	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Furnace	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Furnace	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Furnace	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

Heat Pump

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Heat pump **Measure Sub Type:** Blend

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Heat Pump	2024 Gas Large C&I Retrofit Heat Pump

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heat Pump	Calc	Calc	Calc	Calc	Calc	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heat Pump	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heat Pump	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heat Pump	Calc	Calc	0.00	0.00	-0.68	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heat Pump	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

Heat Recovery

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Heat Recovery **Measure Sub Type:**

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Heat Recovery - Seasonal	2024 Gas Large C&I Retrofit Heat Recovery - Seasonal
Heat Recovery - Year Round	2024 Gas Large C&I Retrofit Heat Recovery - Year Round
Heat Recovery - All	2024 Gas Large C&I Retrofit Heat Recovery - All

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heat Recovery - Seasonal	Calc	Calc	Calc	0.00	0.00 Calc	Calc	0.00
Heat Recovery - Year Round	Calc	Calc	Calc			Calc	
Heat Recovery - All	Calc	Calc	Calc			Calc	

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heat Recovery	10,15,20	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heat Recovery	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heat Recovery	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heat Recovery	0.07	0.00	0.16	1.09

TRC: $60 / therm

Incentive: $30 / therm

HVAC

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** HVAC **Measure Sub Type:** Heating

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
HVAC - Controls and EMS	2024 Gas Large C&I Retrofit HVAC - Controls and EMS
HVAC - Equipment	2024 Gas Large C&I Retrofit HVAC - Equipment

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
HVAC - Controls and EMS HVAC - Equipment	Calc	Calc	0.00	Calc	Calc	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
HVAC	10,15,20	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
HVAC	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
HVAC	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
HVAC	0.07	0.00	0.16	1.09

TRC: $60 / therm

Incentive: $30 / therm

HVAC insulation

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** HVAC **Measure Sub Type:** Heating

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
HVAC insulation	2024 Gas Large C&I Retrofit HVAC insulation

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
HVAC insulation	Calc	Calc	0.00	Calc	Calc	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
HVAC insulation	10,15,20	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
HVAC insulation	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
HVAC insulation	Calc	Calc	0.00	0.00	-0.68	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
HVAC insulation	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

Low Flow Cooking Spray Nozzle

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Food Service **Measure Type:** **Measure Sub Type:**

Program: Large C&I Retrofit

Measure Description

Retrofitting existing standard spray nozzles in locations where service water is supplied by natural gas fired hot water heater with new low flow pre-rinse spray nozzles with an average flow rate of 1.6 GPM.

Baseline Description

The baseline efficiency case is a standard efficiency cooking spray valve.

BCR Measures

BCR Measure Name	Unique Identifier
Low Flow Cooking Spray Nozzle	2024 Gas Large C&I Retrofit Low Flow Cooking Spray Nozzle

Savings Principle

The high efficiency case is a low flow pre-rinse spray valve for cooking equipment with an average flow rate of 1.6 GPM.

Savings Method

Deemed

Unit

Installed cooking low flow pre-rinse spray valve.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Low Flow Cooking Spray Nozzle			0.00	11.40	0.00	0.00	0.00

Gas DHW MMBtu Source: DNV GL (2014)Impact Evaluation of Massachusetts Prescriptive Gas Pre-Rinse Spray Valve Measure

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Low Flow Cooking Spray Nozzle	3	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Low Flow Cooking Spray Nozzle	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Based on MA EUL assumptions

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Low Flow Cooking Spray Nozzle	6410	6410	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: DNV GL (2014)Impact Evaluation of Massachusetts Prescriptive Gas Pre-Rinse Spray Valve Measure

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Low Flow Cooking Spray Nozzle	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

Low-Flow Showerhead

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Showerhead

Program: Large C&I Retrofit

Measure Description

Installation of a low flow showerhead with a flow rate of 1.5 GPM or less in a commercial setting with service water heated by natural gas.

Baseline Description

The baseline efficiency case is a 2.5 GPM showerhead.

BCR Measures

BCR Measure Name	Unique Identifier
Low-Flow Showerhead	2024 Gas Large C&I Retrofit Low-Flow Showerhead

Savings Principle

The high efficiency case is a 1.5 GPM showerhead.

Savings Method

Deemed

Unit

Installed low-flow showerhead

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Low-Flow Showerhead			0.00	5.20	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Low-Flow Showerhead	10	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Low-Flow Showerhead	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2018). ComEd Effective Useful Life Research Report. https://www.icc.illinois.gov/docket/P2017-0312/documents/287811/files/501915.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Low-Flow Showerhead	7300	7300	0.00	0.00	0.81	0.00	0.00	0.00

Water/Sewer Source: Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads. Accessed on 10/12/2011.

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Low-Flow Showerhead	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

Non-Condensing Boiler

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Boiler **Measure Sub Type:** Blend

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Non-Condensing Boiler - Seasonal	2024 Gas Large C&I Retrofit Non-Condensing Boiler - Seasonal
Non-Condensing Boiler - All	2024 Gas Large C&I Retrofit Non-Condensing Boiler - All
Non-Condensing Boiler - Year Round	2024 Gas Large C&I Retrofit Non-Condensing Boiler - Year Round

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Non-Condensing Boiler - Seasonal	Calc	Calc	Calc	0.00	0.00 Calc	Calc	0.00
Non-Condensing Boiler - All	Calc	Calc	Calc			Calc	
Non-Condensing Boiler - Year Round	Calc	Calc	Calc			Calc	

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Non-Condensing Boiler	5,10,15,20, 25	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Non-Condensing Boiler	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Non-Condensing Boiler	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Non-Condensing Boiler	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

Operation & Maintenance

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** O&M **Measure Sub Type:** Heating

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Operation & Maintenance	2024 Gas Large C&I Retrofit Operation & Maintenance

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Operation & Maintenance	Calc	Calc	Calc	Calc	Calc	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Operation & Maintenance	1,2,3,4,5	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Operation & Maintenance	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Operation & Maintenance	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Operation & Maintenance	0.07	0.00	0.16	1.09

TRC: $25 / therm

Incentive: $12.5 / therm

Other Gas

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Other **Measure Sub Type:**

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Other Gas - Seasonal	2024 Gas Large C&I Retrofit Other Gas - Seasonal
Other Gas - Year Round	2024 Gas Large C&I Retrofit Other Gas - Year Round
Other Gas - All	2024 Gas Large C&I Retrofit Other Gas - All

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Other Gas - Seasonal	Calc	Calc	Calc	0.00	0.00 Calc	Calc	0.00
Other Gas - Year Round	Calc	Calc	Calc			Calc	
Other Gas - All	Calc	Calc	Calc			Calc	

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Other Gas	5,10,15,20, 25	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Other Gas	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Other Gas	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Other Gas	0.07	0.00	0.16	1.09

TRC: $68 / therm

Incentive: $34 / therm

Pre-rinse spray valve

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Spray Valve

Program: Large C&I Retrofit

Measure Description

Retrofitting existing standard spray nozzles in locations where service water is supplied by natural gas fired hot water heater with new low flow pre-rinse spray nozzles with an average flow rate of 1.6 GPM.

Baseline Description

The baseline efficiency case is a standard efficiency spray valve.

BCR Measures

BCR Measure Name	Unique Identifier
Pre-rinse spray valve	2024 Gas Large C&I Retrofit Pre-rinse spray valve

Savings Principle

The high efficiency case is a low flow pre-rinse spray valve with an average flow rate of 1.6 GPM.

Savings Method

Deemed

Unit

Installed pre-rinse spray valve.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Pre-rinse spray valve			0.00	11.40	0.00	0.00	0.00

Gas DHW MMBtu Source: DNV GL (2014)Impact Evaluation of Massachusetts Prescriptive Gas Pre-Rinse Spray Valve Measure

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Pre-rinse spray valve	3	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Pre-rinse spray valve	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Based on MA EUL assumptions

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Pre-rinse spray valve	6410	6410	0.00	0.00	0.81	0.00	0.00	0.00

Water/Sewer Source: DNV GL (2014)Impact Evaluation of Massachusetts Prescriptive Gas Pre-Rinse Spray Valve Measure

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Pre-rinse spray valve	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

Process

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Process **Measure Sub Type:** Year round

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Process	2024 Gas Large C&I Retrofit Process

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Process	Calc	Calc	Calc	Calc	Calc	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Process	5,10	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Process	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Process	Calc	Calc	0.00	0.00	-0.46	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Process	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

Programmable thermostat

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** Thermostat

Program: Large C&I Retrofit

Measure Description

Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.

Baseline Description

The baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Programmable thermostat	2024 Gas Large C&I Retrofit Programmable thermostat

Savings Principle

The high efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat installed.

Savings Method

Deemed

Unit

Installed programmable thermostat

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Programmable thermostat				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: DNV-GL (2017). MA45 Prescriptive Programmable Thermostats. http://rieermc.ri.gov/wp-content/uploads/2018/03/ma45-phase-2-programmable-thermostat-final-memo_170317.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Programmable thermostat	11	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Programmable thermostat	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Southern California Edison (2017). Residential Smart Thermostat Workpaper (Work Paper SCE17HC054, Revision #0). https://www.peakload.org/assets/SCE17HC054.0_Residential_Sma.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Programmable thermostat	0	0	0.00	0.00	6.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Programmable thermostat	0.07	0.00	0.16	1.09

TRC: $44 / therm

Incentive: $22 / therm

Solar Thermal

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Solar heat **Measure Sub Type:** Blend

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Solar Thermal - All	2024 Gas Large C&I Retrofit Solar Thermal - All
Solar Thermal - Year Round	2024 Gas Large C&I Retrofit Solar Thermal - Year Round
Solar Thermal - Seasonal	2024 Gas Large C&I Retrofit Solar Thermal - Seasonal

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Solar Thermal - All							
Solar Thermal - Year Round	Calc	Calc	Calc	Calc	Calc	Calc	Calc
Solar Thermal - Seasonal							

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Solar Thermal	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Solar Thermal	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Solar Thermal	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Solar Thermal	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

Steam Trap, Custom

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Steam Traps **Measure Sub Type:** Heating

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Steam Trap, Custom - Low Pressure	2024 Gas Large C&I Retrofit Steam Trap, Custom - Low Pressure
Steam Trap, Custom - Repair and Replace	2024 Gas Large C&I Retrofit Steam Trap, Custom - Repair and Replace

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Steam Trap, Custom - Low Pressure Steam Trap, Custom - Repair and Replace	Calc	Calc	Calc	Calc	Calc	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Steam Trap, Custom	6	1.00	1.00	0.87					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Steam Trap, Custom	0.00%	0.00%	0.00%	0.00%

Measure Life Source: DNV GL MA 2013,2017 Prescriptive Gas Impact Evaluation: Steam Trap Evaulation Phase 1 & 2. https://ma-eeac.org/wp-content/uploads/MA-2013-Prescriptive-Gas-Impact-Evaluation-Steam-Trap-Evaluation-Phase-1.pdf; http://rieermc.ri.gov/wp-content/uploads/2018/03/ma-ciec-p59-steam-trap-evaluation-report-final-20170308.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2021). Impact Evaluation of PY2019 Custom Gas Installations in RI (RI-20-CG-CustGasPY19). http://rieermc.ri.gov/wp-content/uploads/2022/02/national-grid-ri-py2019-custom-gas-program-report-final.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Steam Trap, Custom	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Steam Trap, Custom	0.07	0.00	0.16	1.09

TRC: $35 / therm

Incentive: $12.5 / therm

Steam Trap HVAC

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Steam Traps **Measure Sub Type:** Steam Trap

Program: Large C&I Retrofit

Measure Description

The repair or replacement of malfunctioning steam traps in systems with an operating pressure greater than 15 psig.

Baseline Description

The baseline efficiency case is a failed steam trap.

BCR Measures

BCR Measure Name	Unique Identifier
Steam Trap HVAC - High Pressure	2024 Gas Large C&I Retrofit Steam Trap HVAC - High Pressure
Steam Trap HVAC - Low Pressure	2024 Gas Large C&I Retrofit Steam Trap HVAC - Low Pressure

Savings Principle

The high efficiency case is a repaired or replaced steam trap.

Savings Method

Deemed

Unit

Repaired or replaced steam trap.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Steam Trap HVAC - High Pressure Steam Trap HVAC - Low Pressure				0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Steam Trap HVAC	6	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Steam Trap HVAC	0.00%	0.00%	0.00%	0.00%

Measure Life Source: DNV GL MA 2013,2017 Prescriptive Gas Impact Evaluation: Steam Trap Evaulation Phase 1 & 2. https://ma-eeac.org/wp-content/uploads/MA-2013-Prescriptive-Gas-Impact-Evaluation-Steam-Trap-Evaluation-Phase-1.pdf; http://rieermc.ri.gov/wp-content/uploads/2018/03/ma-ciec-p59-steam-trap-evaluation-report-final-20170308.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Steam Trap HVAC	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Steam Trap HVAC	0.07	0.00	0.16	1.09

TRC: $44 / therm

Incentive: $22 / therm

Ventilation Reduction

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Ventilation **Measure Sub Type:** Heating

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Ventilation Reduction	2024 Gas Large C&I Retrofit Ventilation Reduction

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Ventilation Reduction	Calc	Calc	Calc	Calc	Calc	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Ventilation Reduction	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Ventilation Reduction	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Ventilation Reduction	Calc	Calc	0.00	0.00	-0.68	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Ventilation Reduction	0.07	0.00	0.16	1.09

TRC: $44 / therm

Incentive: $22 / therm

Verified savings

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Verified savings **Measure Sub Type:** Heating

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Verified savings	2024 Gas Large C&I Retrofit Verified savings

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Verified savings	Calc	Calc	Calc	Calc	Calc	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Verified savings	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Verified savings	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Verified savings	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Verified savings	0.07	0.00	0.16	1.09

TRC: $44 / therm

Incentive: $22 / therm

VSDs

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** VSD **Measure Sub Type:** Heating

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
VSDs - HVAC	2024 Gas Large C&I Retrofit VSDs - HVAC
VSDs - Non-HVAC	2024 Gas Large C&I Retrofit VSDs - Non-HVAC

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
VSDs - HVAC VSDs - Non-HVAC	Calc	Calc	Calc	Calc	Calc	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
VSDs	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
VSDs	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
VSDs	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
VSDs	0.07	0.00	0.16	1.09

TRC: $60 / therm

Incentive: $30 / therm

WiFi Thermostat - Heat Only, Custom

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** WiFi T-stat

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
WiFi Thermostat - Heat Only, Custom	2024 Gas Large C&I Retrofit WiFi Thermostat - Heat Only, Custom

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Deemed

Unit

Per thermostat

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
WiFi Thermostat - Heat Only, Custom				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
WiFi Thermostat - Heat Only, Custom	15	1.00	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
WiFi Thermostat - Heat Only, Custom	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats.https://www.energystar.gov/ia/partners/promotions/cool_change/downloads/CalculatorProgrammableThermostat.xls

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
WiFi Thermostat - Heat Only, Custom	0	0	0.00	0.00	-0.68	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
WiFi Thermostat - Heat Only, Custom	0.07	0.00	0.16	1.09

TRC: $50 / therm

Incentive: $25 / therm

Custom Weatherization

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Weatherization **Measure Sub Type:**

Program: Large C&I Retrofit

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Custom Weatherization	2024 Gas Large C&I Retrofit Custom Weatherization

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom Weatherization	Calc	Calc	Calc	Calc	Calc	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom Weatherization	10,15,20	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom Weatherization	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom Weatherization	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom Weatherization	0.07	0.00	0.16	1.09

WiFi Thermostat Gas

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** WiFi T-stat

Program: Large C&I Retrofit

Measure Description

A communicating thermostat which allows remote set point adjustment and control via remote application. System requires an outdoor air temperature algorithm in the control logic to operate heating and/or cooling systems. Primary Energy Impact: Natural Gas.

Baseline Description

The baseline efficiency case is an HVAC system with either a manual or a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
WiFi Thermostat Gas - Cooling and Heating	2024 Gas Large C&I Retrofit WiFi Thermostat Gas - Cooling and Heating
WiFi Thermostat Gas - Heating	2024 Gas Large C&I Retrofit WiFi Thermostat Gas - Heating

Savings Principle

The high efficiency case is an HVAC system that has a Wi-Fi thermostat installed.

Savings Method

Deemed

Unit

Installation of WiFi programmable thermostat

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
WiFi Thermostat Gas - Cooling and Heating				0.00	0.00	0.00	0.00
WiFi Thermostat Gas - Heating							

Gas Heat MMBtu Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
WiFi Thermostat Gas	15	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
WiFi Thermostat Gas	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats.https://www.energystar.gov/ia/partners/promotions/cool_change/downloads/CalculatorProgrammableThermostat.xls

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
WiFi Thermostat Gas	0	0	0.00	0.00	6.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
WiFi Thermostat Gas	0.07	0.00	0.16	1.09

TRC: $50 / therm

Incentive: $25 / therm

Programmable Thermostat, Custom

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Controls **Measure Sub Type:** Thermostat

Program: Large C&I Retrofit

Measure Description

Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.

Baseline Description

The baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Programmable Thermostat, Custom	2024 Gas Large C&I Retrofit Programmable Thermostat, Custom

Savings Principle

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Programmable Thermostat, Custom				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: DNV-GL (2017). MA45 Prescriptive Programmable Thermostats. http://rieermc.ri.gov/wp-content/uploads/2018/03/ma45-phase-2-programmable-thermostat-final-memo_170317.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Programmable Thermostat, Custom	15	1.00	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Programmable Thermostat, Custom	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Programmable Thermostat, Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Programmable Thermostat, Custom	0.07	0.00	0.16	1.09

TRC: $0 / therm

Incentive: $0 / therm

Boiler Reset Control

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** Boiler Control

Program: Small Business Direct Install

Measure Description

Boiler reset controls are devices that automatically control boiler water temperature based on outdoor temperature using a software program.

Baseline Description

Fixed boiler water temperature.

BCR Measures

BCR Measure Name	Unique Identifier
Boiler Reset Control	2024 Gas Small Business Direct Install Boiler Reset Control

Savings Principle

The high efficiency case is a boiler with reset controls.

Savings Method

Deemed

Unit

Installed boiler reset control

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Boiler Reset Control				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: GDS Associates, Inc. and Summit Blue Consulting (2009), Natural Gas Energy Efficiency Potential in Massachusetts, Appendix B-2,

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Boiler Reset Control	15	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Boiler Reset Control	0.00%	0.00%	0.00%	0.00%

Measure Life Source: ACEEE (2006). Emerging Technologies Report: Advanced Boiler Controls. Prepared for ACEEE.https://www.aceee.org/files/pdf/2006_BoilerControls.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Boiler Reset Control	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Boiler Reset Control	0.11	0.02	0.00	0.90

TRC: $0 / therm

Incentive: $0 / therm

Building Shell

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Whole Building **Measure Sub Type:** Heating

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Building Shell	2024 Gas Small Business Direct Install Building Shell

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Building Shell	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Building Shell	5,10,15,20, 25	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Building Shell	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Building Shell	Calc	Calc	0.00	0.00	3.26	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Building Shell	0.11	0.02	0.00	0.90

TRC: $114.29 / therm

Incentive: $80 / therm

Comprehensive Design

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Whole Building **Measure Sub Type:** Heating

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Comprehensive Design - CD	2024 Gas Small Business Direct Install Comprehensive Design - CD
Comprehensive Design - CDA	2024 Gas Small Business Direct Install Comprehensive Design - CDA

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Comprehensive Design - CD Comprehensive Design - CDA	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Comprehensive Design	multi	1.00	1.00	0.97					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Comprehensive Design	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2022). Impact Evaluations of PY2020 Custom Gas Installations in Rhode Island. http://rieermc.ri.gov/wp-content/uploads/2023/01/rhode-island-energy-py2020-custom-gas-program-report_final.pdf

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Comprehensive Design	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Comprehensive Design	0.11	0.02	0.00	0.90

TRC: $0 / therm

Incentive: $0 / therm

Comprehensive Retrofit

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Whole Building **Measure Sub Type:** Heating

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Comprehensive Retrofit	2024 Gas Small Business Direct Install Comprehensive Retrofit

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Comprehensive Retrofit	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Comprehensive Retrofit	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Comprehensive Retrofit	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Comprehensive Retrofit	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Comprehensive Retrofit	0.11	0.02	0.00	0.90

TRC: $0 / therm

Incentive: $0 / therm

Condensing Boiler

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Boiler **Measure Sub Type:**

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Condensing Boiler - All	2024 Gas Small Business Direct Install Condensing Boiler - All
Condensing Boiler - Seasonal	2024 Gas Small Business Direct Install Condensing Boiler - Seasonal
Condensing Boiler - Year Round	2024 Gas Small Business Direct Install Condensing Boiler - Year Round

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Condensing Boiler - All Condensing Boiler - Seasonal Condensing Boiler - Year Round	Calc	Calc	0.00	0.00	Calc	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Condensing Boiler	5,10,15,20, 25	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Condensing Boiler	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Condensing Boiler	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Condensing Boiler	0.11	0.02	0.00	0.90

TRC: $71.43 / therm

Incentive: $50 / therm

Cooling (CP)

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Whole Home **Measure Type:** Custom **Measure Sub Type:** Cooling

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Cooling (CP)	2024 Gas Small Business Direct Install Cooling (CP)

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Cooling (CP)	Calc	Calc	0.00	Calc	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Cooling (CP)	multi	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Cooling (CP)	2.50%	4.80%	42.58%	50.13%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Cooling (CP)	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Cooling (CP)	0.11	0.02	0.00	0.90

TRC: $0 / therm

Incentive: $0 / therm

DEMAND CIRCULATOR

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Water Heating **Measure Type:** Controls **Measure Sub Type:** Recirc

Program: Small Business Direct Install

Measure Description

Installation of a demand controller on a re-circulation loop.

Baseline Description

Full time operation of re-circ pump.

BCR Measures

BCR Measure Name	Unique Identifier
DEMAND CIRCULATOR	2024 Gas Small Business Direct Install DEMAND CIRCULATOR

Savings Principle

The re-circulation pump is controlled by a demand signal or timer to reduce operating hours when no hot water usage occurs.

Savings Method

Deemed

Unit

Installed recirc controller

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
DEMAND CIRCULATOR	96.0	0.1600	0.00	195.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
DEMAND CIRCULATOR	15	1.00	1.00	1.00				0.58	1.00

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
DEMAND CIRCULATOR	39.89%	32.98%	14.54%	12.58%

Measure Life Source: California Public Utilities Commission (2014). Energy Division, DEER EUL Table Update.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

CFsp Source: P72 Prescriptive C&I Loadshapes of Savings

CFwp Source: P72 Prescriptive C&I Loadshapes of Savings

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
DEMAND CIRCULATOR	0	0	0.00	0.00	0.81	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
DEMAND CIRCULATOR	0.11	0.02	0.00	0.90

TRC: $42.86 / therm

Incentive: $30 / therm

DHW

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** DHW **Measure Sub Type:**

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
DHW	2024 Gas Small Business Direct Install DHW

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Installed custom efficiency application.

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
DHW	Calc	Calc	Calc	Calc	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
DHW	5,10,13,15	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
DHW	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
DHW	Calc	Calc	0.00	0.00	3.55	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
DHW	0.11	0.02	0.00	0.90

TRC: $42.86 / therm

Incentive: $30 / therm

Drives on HVAC Systems

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Drives on HVAC Systems	2024 Gas Small Business Direct Install Drives on HVAC Systems

Savings Principle

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Drives on HVAC Systems	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Drives on HVAC Systems	15	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Drives on HVAC Systems	0.00%	0.00%	0.00%	0.00%

Measure Life Source: ACEEE (2006). Emerging Technologies Report: Advanced Boiler Controls. Prepared for ACEEE.https://www.aceee.org/files/pdf/2006_BoilerControls.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Drives on HVAC Systems	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Drives on HVAC Systems	0.11	0.02	0.00	0.90

TRC: $35.71 / therm

Incentive: $25 / therm

Drives on non-HVAC Systems

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Drives on non-HVAC Systems	2024 Gas Small Business Direct Install Drives on non-HVAC Systems

Savings Principle

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Drives on non-HVAC Systems	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Drives on non-HVAC Systems	15	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Drives on non-HVAC Systems	0.00%	0.00%	0.00%	0.00%

Measure Life Source: ACEEE (2006). Emerging Technologies Report: Advanced Boiler Controls. Prepared for ACEEE.https://www.aceee.org/files/pdf/2006_BoilerControls.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Drives on non-HVAC Systems	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Drives on non-HVAC Systems	0.11	0.02	0.00	0.90

TRC: $35.71 / therm

Incentive: $25 / therm

Duct Insulation

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Insulation **Measure Sub Type:** Duct

Program: Small Business Direct Install

Measure Description

The installation of duct insulation and air sealing.

Baseline Description

Un-insulated ductwork with air leaks

BCR Measures

BCR Measure Name	Unique Identifier
Duct Insulation	2024 Gas Small Business Direct Install Duct Insulation

Savings Principle

Insulating and air sealing ductwork reduces heat loss / gain, thereby saving energy.

Savings Method

Deemed

Unit

SF of installed insulation

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Duct Insulation	Calc	Calc	Calc	0.00	0.00	0.00	0.00

Gas Heat MMBtu Note: National Grid Staff Estimate (2010) MA SBS-DI Duct Sealing and Insulation Scenario and Deemed Savings.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Duct Insulation	20	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Duct Insulation	0.00%	0.00%	0.00%	0.00%

Measure Life Source: National Grid Staff Calculations (2010). Pipe insulation for SBS DI measures 2010 Workbook.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Duct Insulation	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Duct Insulation	0.11	0.02	0.00	0.90

TRC: $128.57 / therm

Incentive: $90 / therm

Faucet aerator

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Water Heating **Measure Type:** Flow Control **Measure Sub Type:** Faucet Aerator

Program: Small Business Direct Install

Measure Description

Installation of a faucet aerator with a flow rate of 1.5 GPM or less on an existing faucet with high flow in a commercial setting with service water heated by natural gas.

Baseline Description

The baseline efficiency case is a 2.2 GPM faucet.

BCR Measures

BCR Measure Name	Unique Identifier
Faucet aerator	2024 Gas Small Business Direct Install Faucet aerator

Savings Principle

The high efficiency case is a faucet with 1.5 GPM or less aerator installed.

Savings Method

Deemed

Unit

Installed faucet aerator.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: 130

Hours Source: Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads. Accessed on 10/12/2011.

Hours Note: The calculator used to determine the deemed savings uses a default operation of 30 minuts/day, 260 days/year. Not applicable for Multifamily applications.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Faucet aerator			0.00	1.70	0.00	0.00	0.00

Gas DHW MMBtu Source: GDS Associates, Inc. and Summit Blue Consulting (2009), Natural Gas Energy Efficiency Potential in Massachusetts, Appendix B-2,

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Faucet aerator	3	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Faucet aerator	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Faucet aerator	5460	5460	0.00	0.00	0.81	0.00	0.00	0.00

Water/Sewer Source: Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads. Accessed on 10/12/2011.

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Faucet aerator	0.11	0.02	0.00	0.90

TRC: $42.86 / therm

Incentive: $30 / therm

Food Service

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Food Service **Measure Type:** Food Service **Measure Sub Type:** Food Service

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Food Service	2024 Gas Small Business Direct Install Food Service

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Food Service	Calc	Calc	0.00	Calc	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Food Service	10,15	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Food Service	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Food Service	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Food Service	0.11	0.02	0.00	0.90

TRC: $0 / therm

Incentive: $0 / therm

Furnace

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Furnace **Measure Sub Type:** Blend

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Furnace - All	2024 Gas Small Business Direct Install Furnace - All
Furnace - Seasonal	2024 Gas Small Business Direct Install Furnace - Seasonal
Furnace - Year Round	2024 Gas Small Business Direct Install Furnace - Year Round

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Furnace - All						Calc	
Furnace - Seasonal	Calc	Calc	Calc	Calc	Calc	Calc	0.00
Furnace - Year Round						Calc	

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Furnace	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Furnace	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Furnace	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Furnace	0.11	0.02	0.00	0.90

TRC: $0 / therm

Incentive: $0 / therm

Heat Pump

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: HVAC **Measure Type:** Heat Pump **Measure Sub Type:** Heat Pump

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Heat Pump	2024 Gas Small Business Direct Install Heat Pump

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heat Pump	Calc	Calc	0.00	0.00	Calc	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heat Pump	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heat Pump	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heat Pump	0	0	0.00	0.00	-0.68	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heat Pump	0.11	0.02	0.00	0.90

TRC: $0 / therm

Incentive: $0 / therm

Heat Recovery

Sector: C&I | **Fuel:** Gas | **Program Type:** Custom

Measure Category: Custom | **Measure Type:** Heat Recovery | **Measure Sub Type:**

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Heat Recovery - Seasonal	2024 Gas Small Business Direct Install Heat Recovery - Seasonal
Heat Recovery - Year Round	2024 Gas Small Business Direct Install Heat Recovery - Year Round
Heat Recovery - All	2024 Gas Small Business Direct Install Heat Recovery - All

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heat Recovery - Seasonal						Calc	
Heat Recovery - Year Round	Calc	Calc	Calc	Calc	Calc	Calc	0.00
Heat Recovery - All						Calc	

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heat Recovery	10,15,20	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heat Recovery	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heat Recovery	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heat Recovery	0.11	0.02	0.00	0.90

TRC: $35.71 / therm

Incentive: $25 / therm

Steam Trap Repair or Replacement

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Steam Traps **Measure Sub Type:** Steam Trap

Program: Small Business Direct Install

Measure Description

The repair or replacement of malfunctioning steam traps in systems with an operating pressure greater than 15 psig.

Baseline Description

The baseline efficiency case is a failed steam trap.

BCR Measures

BCR Measure Name	Unique Identifier
Steam Trap Repair or Replacement	2024 Gas Small Business Direct Install Steam Trap Repair or Replacement

Savings Principle

The high efficiency case is a repaired or replaced steam trap.

Savings Method

Deemed

Unit

Repaired or replaced steam trap.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Steam Trap Repair or Replacement				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: ERS (2018). Two-Tier Steam Trap Savings Study. https://ma-eeac.org/wp-content/uploads/MA-CIEC-Two-Tier-Steam-Traps-Memo-FINAL.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Steam Trap Repair or Replacement	6	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Steam Trap Repair or Replacement	0.00%	0.00%	0.00%	0.00%

Measure Life Source: DNV GL MA 2013,2017 Prescriptive Gas Impact Evaluation: Steam Trap Evaulation Phase 1 & 2. https://ma-eeac.org/wp-content/uploads/MA-2013-Prescriptive-Gas-Impact-Evaluation-Steam-Trap-Evaluation-Phase-1.pdf; http://rieermc.ri.gov/wp-content/uploads/2018/03/ma-ciec-p59-steam-trap-evaluation-report-final-20170308.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Steam Trap Repair or Replacement	0	0	0.00	0.00	-0.46	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Steam Trap Repair or Replacement	0.11	0.02	0.00	0.90

TRC: $0 / therm

Incentive: $0 / therm

HVAC

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** HVAC **Measure Sub Type:** Heating

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
HVAC - Controls and EMS HVAC - Equipment	2024 Gas Small Business Direct Install HVAC - Controls and EMS 2024 Gas Small Business Direct Install HVAC - Equipment

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
HVAC - Controls and EMS HVAC - Equipment		Calc	0.00	Calc	Calc	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
HVAC	10,15,20	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
HVAC	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
HVAC	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
HVAC	0.11	0.02	0.00	0.90

TRC: $35.71 / therm

Incentive: $25 / therm

Insulation Pipe H2O

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Water Heater Insulation

Measure Sub Type: Insulation

Program: Small Business Direct Install

Measure Description

Install insulation on hot water piping located in non-conditioned spaces.

Baseline Description

Existing uninsulated pipe.

BCR Measures

BCR Measure Name	Unique Identifier
Insulation Pipe H2O - Diameter 1.5in	2024 Gas Small Business Direct Install Insulation Pipe H2O - Diameter 1.5in
Insulation Pipe H2O - Diameter 2in	2024 Gas Small Business Direct Install Insulation Pipe H2O - Diameter 2in

Savings Principle

The high efficiency condition is hot water piping in unconditional space with insulation installed.

Savings Method

Deemed

Unit

Installed LF of pipe insulation

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Insulation Pipe H2O - Diameter 1.5in				0.00	0.00	0.00	0.00
Insulation Pipe H2O - Diameter 2in							

Gas Heat MMBtu Source: National Grid Staff Calculations (2010). Pipe insulation for SBS DI measures 2010 Workbook.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Insulation Pipe H2O	15	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Insulation Pipe H2O	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Insulation Pipe H2O	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Insulation Pipe H2O	0.11	0.02	0.00	0.90

TRC: $42.86 / therm

Incentive: $30 / therm

Insulation Pipe Steam

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Water Heater Insulation

Measure Sub Type: Insulation

Program: Small Business Direct Install

Measure Description

Install insulation on steam piping located in non-conditioned spaces.

Baseline Description

Existing uninsulated pipe.

BCR Measures

BCR Measure Name	Unique Identifier
Insulation Pipe Steam - Diameter 1.5in	2024 Gas Small Business Direct Install Insulation Pipe Steam - Diameter 1.5in
Insulation Pipe Steam - Diameter 2in	2024 Gas Small Business Direct Install Insulation Pipe Steam - Diameter 2in

Savings Principle

The high efficiency condition is steam piping in unconditional space with insulation installed.

Savings Method

Deemed

Unit

Installed LF of pipe insulation

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Insulation Pipe Steam - Diameter 1.5in Insulation Pipe Steam - Diameter 2in				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: National Grid Staff Calculations (2010). Pipe insulation for SBS DI measures 2010 Workbook.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Insulation Pipe Steam	15	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Insulation Pipe Steam	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities, https://www.ers-inc.com/wp-content/uploads/2018/04/Measure-Life-Study_MA-Joint-Utilities_ERS.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Insulation Pipe Steam	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Insulation Pipe Steam	0.11	0.02	0.00	0.90

TRC: $42.86 / therm

Incentive: $30 / therm

Low-flow showerhead

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Showerhead

Program: Small Business Direct Install

Measure Description

Installation of a low flow showerhead with a flow rate of 1.5 GPM or less in a commercial setting with service water heated by natural gas.

Baseline Description

The baseline efficiency case is a 2.5 GPM showerhead.

BCR Measures

BCR Measure Name	Unique Identifier
Low-flow showerhead	2024 Gas Small Business Direct Install Low-flow showerhead

Savings Principle

The high efficiency case is a 1.5 GPM showerhead.

Savings Method

Deemed

Unit

Installed low-flow showerhead

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: 121.6

Hours Source: Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads. Accessed on 10/12/2011.

Hours Note: The calculator used to determine the deemed savings uses a default operation of 20 minutes/day, 365 days/year. Not applicable for Multifamily applications.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Low-flow showerhead			0.00	5.20	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Low-flow showerhead	10	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Low-flow showerhead	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2018). ComEd Effective Useful Life Research Report. https://www.icc.illinois.gov/docket/P2017-0312/documents/287811/files/501915.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Low-flow showerhead	7300	7300	0.00	0.00	0.81	0.00	0.00	0.00

Water/Sewer Source: Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads. Accessed on 10/12/2011.

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Low-flow showerhead	0.11	0.02	0.00	0.90

TRC: $35.71 / therm

Incentive: $25 / therm

Low-Pressure Steam Trap

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Steam Traps **Measure Sub Type:** Steam Trap

Program: Small Business Direct Install

Measure Description

The repair or replacement of malfunctioning steam traps in systems with an operating pressure less than or equal to 15 psig.

Baseline Description

The baseline efficiency case is a failed steam trap.

BCR Measures

BCR Measure Name	Unique Identifier
Low-Pressure Steam Trap	2024 Gas Small Business Direct Install Low-Pressure Steam Trap

Savings Principle

The high efficiency case is a repaired or replaced steam trap.

Savings Method

Deemed

Unit

Repaired or replaced steam trap.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Low-Pressure Steam Trap				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: ERS (2018). Two-Tier Steam Trap Savings Study. https://ma-eeac.org/wp-content/uploads/MA-CIEC-Two-Tier-Steam-Traps-Memo-FINAL.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Low-Pressure Steam Trap	6	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Low-Pressure Steam Trap	0.00%	0.00%	0.00%	0.00%

Measure Life Source: DNV GL MA 2013,2017 Prescriptive Gas Impact Evaluation: Steam Trap Evaulation Phase 1 & 2. https://ma-eeac.org/wp-content/uploads/MA-2013-Prescriptive-Gas-Impact-Evaluation-Steam-Trap-Evaluation-Phase-1.pdf; http://rieermc.ri.gov/wp-content/uploads/2018/03/ma-ciec-p59-steam-trap-evaluation-report-final-20170308.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Low-Pressure Steam Trap	0	0	0.00	0.00	3.55	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Low-Pressure Steam Trap	0.11	0.02	0.00	0.90

TRC: $0 / therm

Incentive: $0 / therm

Non-Condensing Boiler

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Boiler **Measure Sub Type:**

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Non-Condensing Boiler - Seasonal	2024 Gas Small Business Direct Install Non-Condensing Boiler - Seasonal
Non-Condensing Boiler - Year Round	2024 Gas Small Business Direct Install Non-Condensing Boiler - Year Round
Non-Condensing Boiler - All	2024 Gas Small Business Direct Install Non-Condensing Boiler - All

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Non-Condensing Boiler - Seasonal	Calc	Calc	Calc	0.00	0.00	Calc	0.00
Non-Condensing Boiler - Year Round				Calc	Calc	Calc	
Non-Condensing Boiler - All							

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Non-Condensing Boiler	5,10,15,20, 25	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Non-Condensing Boiler	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Non-Condensing Boiler	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Non-Condensing Boiler	0.11	0.02	0.00	0.90

TRC: $71.43 / therm

Incentive: $50 / therm

Operation & Maintenance

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Other **Measure Sub Type:** O&M

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Operation & Maintenance	2024 Gas Small Business Direct Install Operation & Maintenance

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Operation & Maintenance	Calc	Calc	0.00	Calc	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Operation & Maintenance	1,2,3,4,5	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Operation & Maintenance	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Operation & Maintenance	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Operation & Maintenance	0.11	0.02	0.00	0.90

TRC: $21.43 / therm

Incentive: $15 / therm

Other Gas

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Other **Measure Sub Type:**

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Other Gas - Seasonal	2024 Gas Small Business Direct Install Other Gas - Seasonal
Other Gas - Year Round	2024 Gas Small Business Direct Install Other Gas - Year Round
Other Gas - All	2024 Gas Small Business Direct Install Other Gas - All

Savings Principle

Savings Method

Unit

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Other Gas - Seasonal						Calc	
Other Gas - Year Round	Calc	Calc	Calc	Calc	Calc	Calc	0.00
Other Gas - All						Calc	

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Other Gas	5,10,15,20, 25	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Other Gas	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Other Gas	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Other Gas	0.11	0.02	0.00	0.90

TRC: $35.71 / therm

Incentive: $25 / therm

Other, Custom

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Other **Measure Sub Type:**

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Other, Custom	2024 Gas Small Business Direct Install Other, Custom

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Other, Custom	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Other, Custom	5,10,15,20, 25	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Other, Custom	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Other, Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Other, Custom	0.11	0.02	0.00	0.90

TRC: $114.29 / therm

Incentive: $80 / therm

Pipe/Tank/Duct/HVAC Insulation

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** HVAC **Measure Sub Type:** Insulation

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Pipe/Tank/Duct/HVAC Insulation	2024 Gas Small Business Direct Install Pipe/Tank/Duct/HVAC Insulation

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Pipe/Tank/Duct/HVAC Insulation	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Pipe/Tank/Duct/HVAC Insulation	10,15,20	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Pipe/Tank/Duct/HVAC Insulation	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Pipe/Tank/Duct/HVAC Insulation	0	0	0.00	0.00	-0.68	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Pipe/Tank/Duct/HVAC Insulation	0.11	0.02	0.00	0.90

TRC: $42.86 / therm

Incentive: $30 / therm

Pre-rinse spray valve

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Spray Valve

Program: Small Business Direct Install

Measure Description

Retrofitting existing standard spray nozzles in locations where service water is supplied by natural gas fired hot water heater with new low flow pre-rinse spray nozzles with an average flow rate of 1.6 GPM.

Baseline Description

The baseline efficiency case is a standard efficiency spray valve.

BCR Measures

BCR Measure Name	Unique Identifier
Pre-rinse spray valve	2024 Gas Small Business Direct Install Pre-rinse spray valve

Savings Principle

The high efficiency case is a low flow pre-rinse spray valve with an average flow rate of 1.6 GPM.

Savings Method

Deemed

Unit

Installed pre-rinse spray valve.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Pre-rinse spray valve			0.00	11.40	0.00	0.00	0.00

Gas DHW MMBtu Source: DNV GL (2014)Impact Evaluation of Massachusetts Prescriptive Gas Pre-Rinse Spray Valve Measure

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Pre-rinse spray valve	3	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Pre-rinse spray valve	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Based on MA EUL assumptions

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Pre-rinse spray valve	6410	6410	0.00	0.00	0.81	0.00	0.00	0.00

Water/Sewer Source: DNV GL (2014)Impact Evaluation of Massachusetts Prescriptive Gas Pre-Rinse Spray Valve Measure

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Pre-rinse spray valve	0.11	0.02	0.00	0.90

TRC: $35.71 / therm

Incentive: $25 / therm

Process Equipment/Controls

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Process **Measure Sub Type:** Process

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Process Equipment/Controls	2024 Gas Small Business Direct Install Process Equipment/Controls

Savings Principle

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Process Equipment/Controls	Calc	Calc	0.00	Calc	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Process Equipment/Controls	5,10	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Process Equipment/Controls	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Process Equipment/Controls	0	0	0.00	0.00	-0.46	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Process Equipment/Controls	0.11	0.02	0.00	0.90

TRC: $0 / therm

Incentive: $0 / therm

Programmable thermostat

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** Thermostat

Program: Small Business Direct Install

Measure Description

Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.

Baseline Description

The baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Programmable thermostat	2024 Gas Small Business Direct Install Programmable thermostat

Savings Principle

The high efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat installed.

Savings Method

Deemed

Unit

Installed programmable thermostat

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Programmable thermostat				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: DNV-GL (2017). MA45 Prescriptive Programmable Thermostats. http://rieermc.ri.gov/wp-content/uploads/2018/03/ma45-phase-2-programmable-thermostat-final-memo_170317.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Programmable thermostat	11	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Programmable thermostat	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Southern California Edison (2017). Residential Smart Thermostat Workpaper (Work Paper SCE17HC054, Revision #0). https://www.peakload.org/assets/SCE17HC054.0_Residential_Sma.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Programmable thermostat	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Programmable thermostat	0.11	0.02	0.00	0.90

TRC: $57.14 / therm

Incentive: $40 / therm

Salon Nozzle

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Spray Valve

Program: Small Business Direct Install

Measure Description

The installation of a high efficiency salon nozzle.

Baseline Description

Standard salon nozzle.

BCR Measures

BCR Measure Name	Unique Identifier
Salon Nozzle	2024 Gas Small Business Direct Install Salon Nozzle

Savings Principle

An efficient salon nozzle.

Savings Method

Deemed

Unit

Installed salon nozzle

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Salon Nozzle			0.00	20.40	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Salon Nozzle	3	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Salon Nozzle	0.00%	0.00%	0.00%	0.00%

Measure Life Source: DNV (2021). Prescriptive Measures NRNC and ISP Results.

Measure Life Note: Based on MA EUL assumptions

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Salon Nozzle	28639	28639	0.00	0.00	0.81	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Salon Nozzle	0.11	0.02	0.00	0.90

TRC: $28.57 / therm

Incentive: $20 / therm

Solar Thermal - All

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Solar heat **Measure Sub Type:** All

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Solar Thermal - All	2024 Gas Small Business Direct Install Solar Thermal - All

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Solar Thermal - All	Calc	Calc	0.00	0.00	Calc	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Solar Thermal - All	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Solar Thermal - All	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Solar Thermal - All	0	0	0.00	0.00	-0.46	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Solar Thermal - All	0.05	0.01	0.00	0.97

TRC: $0 / therm

Incentive: $0 / therm

Solar Thermal - Seasonal

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Solar heat **Measure Sub Type:** Seasonal

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Solar Thermal - Seasonal	2024 Gas Small Business Direct Install Solar Thermal - Seasonal

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Solar Thermal - Seasonal	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Solar Thermal - Seasonal	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Solar Thermal - Seasonal	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Solar Thermal - Seasonal	0	0	0.00	0.00	-0.68	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Solar Thermal - Seasonal	0.05	0.01	0.00	0.97

TRC: $0 / therm

Incentive: $0 / therm

Solar Thermal - Year Round

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Solar heat **Measure Sub Type:** Year round

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Solar Thermal - Year Round	2024 Gas Small Business Direct Install Solar Thermal - Year Round

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Solar Thermal - Year Round	Calc	Calc	0.00	Calc	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Solar Thermal - Year Round	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Solar Thermal - Year Round	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Solar Thermal - Year Round	0	0	0.00	0.00	3.55	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Solar Thermal - Year Round	0.05	0.01	0.00	0.97

TRC: $0 / therm

Incentive: $0 / therm

Ventilation reduction

Sector: C&I

Fuel: Gas

Program Type: Custom

Measure Category: HVAC

Measure Type: Ventilation

Measure Sub Type: Ventilation Reduction

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Ventilation reduction	2024 Gas Small Business Direct Install Ventilation reduction

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Ventilation reduction	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Ventilation reduction	multi	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Ventilation reduction	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Ventilation reduction	0	0	0.00	0.00	-0.68	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Ventilation reduction	0.11	0.02	0.00	0.90

TRC: $40 / therm

Incentive: $28 / therm

Verified Savings Project

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Verified savings **Measure Sub Type:** Heating

Program: Small Business Direct Install

Measure Description

The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

Baseline Description

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case isbased on site-specific information.

BCR Measures

BCR Measure Name	Unique Identifier
Verified Savings Project	2024 Gas Small Business Direct Install Verified Savings Project

Savings Principle

The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Savings Method

Custom

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Verified Savings Project	Calc	Calc	Calc	0.00	0.00	Calc	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Verified Savings Project	10, 15	1.00	1.00	0.84	0.84				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Verified Savings Project	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Source: DNV (2023). RI PY2021 Custom Gas Installations.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Verified Savings Project	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Verified Savings Project	0.11	0.02	0.00	0.90

TRC: $35.71 / therm

Incentive: $25 / therm

WiFi Thermostat

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** Thermostat

Program: Small Business Direct Install

Measure Description

A communicating thermostat which allows remote set point adjustment and control via remote application. System requires an outdoor air temperature algorithm in the control logic to operate heating and cooling systems.

Baseline Description

The baseline efficiency case is an HVAC system with either a manual or a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
WiFi Thermostat - cooling and htg	2024 Gas Small Business Direct Install WiFi Thermostat - cooling and htg
WiFi Tstat-heat only	2024 Gas Small Business Direct Install WiFi Tstat-heat only

Savings Principle

The high efficiency case is an HVAC system that has a Wi-Fi thermostat installed.

Savings Method

Deemed

Unit

Installation of WiFi programmable thermostat

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
WiFi Thermostat - cooling and htg				0.00	0.00	0.00	0.00
WiFi Tstat-heat only							

Gas Heat MMBtu Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
WiFi Thermostat	15	1.00	1.00	1.00	1.00	1.00	1.00		

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
WiFi Thermostat	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Residential Wi-Fi and Programmable Thermostats (RES24 Final Report). https://ma-eeac.org/wp-content/uploads/MARES24-Final-Report-2021-09-29.pdf

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
WiFi Thermostat	0	0	0.00	0.00	6.00	0.00	0.00	0.00

Annual $ Source: NMR (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMMNEI). https://ma-eeac.org/wp-content/uploads/MA20X10-B-CIOMNEI_OM-NON-OM-NEIs-Report.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
WiFi Thermostat	0.11	0.02	0.00	0.90

TRC: $40 / therm

Incentive: $28 / therm

Air Sealing

Sector: C&I

Fuel: Gas

Program Type: Custom

Measure Category: Building Shell

Measure Type: Air Sealing

Measure Sub Type: Air Sealing/Infiltration

Program: C&I Multifamily

Measure Description

Thermal shell air leaks are sealed through strategic use and location of air-tight materials.

Baseline Description

The baseline efficiency case is the existing building before the air sealing measure is implemented. The baseline building is characterized by the existing CFM50 measurement (CFM50PRE) for single family homes, or the existing air changes per hour (ACHPRE)

BCR Measures

BCR Measure Name	Unique Identifier
Air Sealing	2024 Gas C&I Multifamily Air Sealing

Savings Principle

The high efficiency case is the existing building after the air sealing measure is implemented. The high efficiency building is characterized by the new CFM50 measurement for single family homes (CFM50POST), or the new air changes per hour (ACHPOST) for multi-family facilities, which is measured after the air sealing measure is implemented.

Savings Method

Calculated using site-specific inputs

Unit

Completed air sealing project.

Savings Equation

Gross MMBtu Gas = (CFM50_pre - CFM50_post) / LBL × HDD × (Hours per Day) × (Minutes per Hour) × (Btu/ft3-°F) × CorrectionFactor / SeasonalEff / (Btu per MMBtu)

Where:

CFM50_pre = CFM50 measurement before air sealing

CFM50_post = CFM50 measurement after air sealing (cu.ft./min)

LBL = LBL factor - This factor is determined as the product of the N-factor and a Height Correction Factor according to BPI Protocol

4644 HDD = Heating degree days (deg. F-day); This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data. http://www.ncdc.noaa.gov

24 Hours per Day = Conversion factor

60 Minutes per Hour = Conversion factor

0.018 Btu/ft3-°F = Heat capacity of 1 cubic foot of air at 70 °F

1 CorrectionFactor = Correction factor determined by auditor (e.g. for seasonal homes): Default

0.7 SeasonalEff = Heating system seasonal efficiency factor determined by auditor for homes heated with natural gas: Default

1,000,000 Btuper MMBtu = Conversion factor

Hours: 4644

Hours Source: NOAA Weather data: An average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.

Hours Note: Heating hours are characterized by the heating degree days for the facility, 4644.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Air Sealing	Calc	Calc	Calc	0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Air Sealing	20	1.00	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Air Sealing	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2018). ComEd Effective Useful Life Research Report. https://www.icc.illinois.gov/docket/P2017-0312/documents/287811/files/501915.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Energy realization rate is 100% because deemed savings are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Air Sealing	0	0	19.61	0.00	0.00	137.66	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

One-time $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Air Sealing	0.33	0.01	0.00	0.68

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $245 / MF Bundled costs (see Participant listing)

Incentive: $245 / MF Bundled costs (see Participant listing)

Boiler, Hot Water_MF

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Hot Water **Measure Type:** Boiler **Measure Sub Type:**

Program: C&I Multifamily

Measure Description

Installation of hot water boiler(s) at a multifamily facility.

Baseline Description

For retrofit projects, the baseline efficiency case is the same as the existing, or pre-retrofit hot water boiler.

BCR Measures

BCR Measure Name	Unique Identifier
Boiler, Hot Water_MF	2024 Gas C&I Multifamily Boiler, Hot Water_MF

Savings Principle

The high efficiency scenario is specific to the facility.

Savings Method

Calc

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Boiler, Hot Water_MF				0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Boiler, Hot Water_MF	Multi	1.00	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Boiler, Hot Water_MF	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Boiler, Hot Water_MF	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Boiler, Hot Water_MF	0.00	0.00	0.00	1.00

TRC: $0 / MF Bundled costs (see Participant listing)

Incentive: $0 / MF Bundled costs (see Participant listing)

Custom

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Custom **Measure Type:** Custom **Measure Sub Type:** Custom

Program: C&I Multifamily

Measure Description

Vendors install a variety of measures at multifamily facilities. Measures include

Baseline Description

For retrofit projects, the baseline efficiency case is the same as the existing, or pre-retrofit, case for the

BCR Measures

BCR Measure Name	Unique Identifier
Custom	2024 Gas C&I Multifamily Custom

Savings Principle

The high efficiency scenario is specific to the facility and may include one or more energy efficiency

Savings Method

Calc

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Custom	Calc	Calc	Calc	Calc	0.00	Calc	Calc

Gas Heat MMBtu Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Custom	Multi	1.00	1.00	0.99	0.99				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Custom	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Custom	0.00	0.00	0.00	1.00

TRC: $0 / MF Bundled costs (see Participant listing)

Incentive: $0 / MF Bundled costs (see Participant listing)

Demand Circulator

Sector: C&I

Fuel: Gas

Program Type: Custom

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Demand Circulator

Program: C&I Multifamily

Measure Description

Installation of a demand controller on a re-circulation loop.

Baseline Description

Full time operation of re-circ pump.

BCR Measures

BCR Measure Name	Unique Identifier
Demand Circulator	2024 Gas C&I Multifamily Demand Circulator

Savings Principle

The re-circulation pump is controlled by a demand signal or timer to reduce operating hours when no hot water usage occurs.

Savings Method

Calc

Unit

Installed recirc controller

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Demand Circulator				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Demand Circulator	Multi	1.00	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Demand Circulator	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Demand Circulator	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Demand Circulator	0.00	0.00	0.00	1.00

TRC: $3500 / MF Bundled costs (see Participant listing)

Incentive: $2100 / MF Bundled costs (see Participant listing)

Duct Insulation_MF

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Envelope **Measure Type:** Ducting **Measure Sub Type:** Duct Insulation

Program: C&I Multifamily

Measure Description

For existing ductwork in non-conditioned spaces, seal and insulate ductwork. This could include replacing un-insulated flexible duct with rigid insulated ductwork or sealing leaky fixed ductwork with mastic or aerosol and installing 1" – 2" of duct-wrap insulation.

Baseline Description

The baseline efficiency case is existing, uninsulated ductwork in unconditioned spaces (e.g. attic or basement).

BCR Measures

BCR Measure Name	Unique Identifier
Duct Insulation_MF	2024 Gas C&I Multifamily Duct Insulation_MF

Savings Principle

The high efficiency condition is insulated ductwork in unconditioned spaces.

Savings Method

Calculated using site-specific inputs

Unit

Square Foot

Savings Equation

MMBTUannual = (((1/Rexist)-(1/Rnew)) x HDD x 24 x Area) / (1,000,000) X Nheat

kWhannual = MMBtuannaul x 293.1

kW = kWhannual x kW/kWhNheating

Where:

Rexist = Existing effective R-value (R-ExistingInsulation + R-Assembly), ft2-°F/Btuh

Rnew = New total effective R-value (R-ProposedMeasure + R-ExistingInsulation + R-Assembly), ft2-°F/Btuh

Area = Square footage of insulated area

ηheat = Efficiency of the heating system (AFUE or COP)

293.1 = Conversion constant (1MMBtu = 293.1 kWh)

24 = Conversion for hours per day

HDD = Heating Degree Days; dependent on location, see table below

1,000,000 = Conversion from Btu to MMBtu

kW/kWh heating = Average annual kW reduction per kWh reduction: 0.00050 kW/kWh

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Duct Insulation_MF				0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Duct Insulation_MF	20	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Duct Insulation_MF	0.00%	0.00%	0.00%	0.00%

Measure Life Source: National Grid Staff Calculations (2010). Pipe insulation for SBS DI measures 2010 Workbook.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRsp Note: Realization rate is 100% since gross savings values are based on evaluation results.

RRwp Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Duct Insulation_MF	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Duct Insulation_MF	0.33	0.01	0.00	0.68

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $0 / MF Bundled costs (see Participant listing)

Incentive: $0 / MF Bundled costs (see Participant listing)

Duct Sealing

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: HVAC **Measure Type:** Ducting **Measure Sub Type:** Duct Sealing

Program: C&I Multifamily

Measure Description

Ducts are sealed by reconnecting disconnected duct joints and sealing gaps or seams with mastic and fiber-mesh tape as appropriate

Baseline Description

The baseline efficiency case is the existing facility or equipment prior to the implementation of duct sealing.

BCR Measures

BCR Measure Name	Unique Identifier
Duct Sealing	2024 Gas C&I Multifamily Duct Sealing

Savings Principle

The baseline efficiency case is the existing facility or equipment after the implementation of duct sealing.

Savings Method

Calc

Unit

Savings Equation

MMBtu = Annualheatingconsumption x %SAVE x (1/1000000)

Where:

AnnualHeatingConsumption = The total annual heating consumption for the facility (Btu)

%SAVE = Average reduction in energy consumption.

1/1,000,000 = Conversion from Btu to MMBtu

Savings Factors for Multifamily Duct Sealing

Measure Type %SAVE158

Savings Factors for Multifamily Duct Sealing

Surface Area < 50 SQFT 7%

Surface Area > 50 SQFT and < 200 SQFT 3%

Surface Area > 200 SQFT 1%

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Duct Sealing	Calc	Calc	Calc	0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Duct Sealing	Multi	1.00	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Duct Sealing	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Duct Sealing	0	0	0.23	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Duct Sealing	0.33	0.01	0.00	0.68

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $0 / MF Bundled costs (see Participant listing)

Incentive: $0 / MF Bundled costs (see Participant listing)

Faucet aerator

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Water Heating **Measure Type:** Flow Control **Measure Sub Type:** Faucet Aerator

Program: C&I Multifamily

Measure Description

Installation of a faucet aerator with a flow rate of 1.5 GPM or less on an existing faucet with high flow in a commercial setting with service water heated by natural gas.

Baseline Description

The baseline efficiency case is a 2.2 GPM faucet.

BCR Measures

BCR Measure Name	Unique Identifier
Faucet aerator	2024 Gas C&I Multifamily Faucet aerator

Savings Principle

The high efficiency case is a faucet with 1.5 GPM or less aerator installed.

Savings Method

Deemed

Unit

Installed faucet aerator.

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Faucet aerator			0.00	0.20	0.00	0.00	0.00

Gas DHW MMBtu Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Faucet aerator	3	0.90	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Faucet aerator	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

ISR Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Faucet aerator	359	0	0.59	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Faucet aerator	0.08	0.01	0.00	0.93

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $5 / MF Bundled costs (see Participant listing)

Incentive: $5 / MF Bundled costs (see Participant listing)

Heat Pump, Custom

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: HVAC **Measure Type:** Heat Pumps **Measure Sub Type:** Heat Pump

Program: C&I Multifamily

Measure Description

Installation of a heat pump to displace electric, oil, or propane heat.

Baseline Description

The baseline efficiency case is existing site conditions.

BCR Measures

BCR Measure Name	Unique Identifier
Heat Pump, Custom	2024 Gas C&I Multifamily Heat Pump, Custom

Savings Principle

Savings Method

Unit

Savings Equation

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heat Pump, Custom			0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heat Pump, Custom	Multi	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heat Pump, Custom	36.40%	48.20%	8.00%	7.40%

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heat Pump, Custom	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heat Pump, Custom	0.08	0.01	0.00	0.93

TRC: $0 / MF Bundled costs (see Participant listing)

Incentive: $0 / MF Bundled costs (see Participant listing)

Heating, Custom

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: HVAC **Measure Type:** Heating **Measure Sub Type:**

Program: C&I Multifamily

Measure Description

Vendors install a variety of gas measures at multifamily facilities. The measure is associated with commercial gas meters. This measure includes heating equipment and measures.

Baseline Description

For retrofit projects, the baseline efficiency case is the same as the existing, or pre-retrofit, case for the facility.

BCR Measures

BCR Measure Name	Unique Identifier
Heating, Custom	2024 Gas C&I Multifamily Heating, Custom

Savings Principle

The high efficiency scenario is specific to the facility and may include one or more energy efficiency measures.

Savings Method

Calc

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Heating, Custom	Calc	Calc	0.00	Calc	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Heating, Custom	Multi	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Heating, Custom	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Heating, Custom	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Heating, Custom	0.00	0.00	0.00	1.00

TRC: $80000 / MF Bundled costs (see Participant listing)

Incentive: $48000 / MF Bundled costs (see Participant listing)

Hot Water, Custom

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Hot Water **Measure Type:** **Measure Sub Type:**

Program: C&I Multifamily

Measure Description

Vendors install a variety of gas measures at multifamily facilities. The measure is associated with commercial gas meters. This measure includes domestic hot water equipment and measures.

Baseline Description

For retrofit projects, the baseline efficiency case is the same as the existing, or pre-retrofit, case for the facility.

BCR Measures

BCR Measure Name	Unique Identifier
Hot Water, Custom	2024 Gas C&I Multifamily Hot Water, Custom

Savings Principle

The high efficiency scenario is specific to the facility and may include one or more energy efficiency measures.

Savings Method

Calc

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Hot Water, Custom	Calc	Calc	0.00	Calc	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Hot Water, Custom	Multi	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Hot Water, Custom	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Hot Water, Custom	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Hot Water, Custom	0.00	0.00	0.00	1.00

TRC: $0 / MF Bundled costs (see Participant listing)

Incentive: $0 / MF Bundled costs (see Participant listing)

HVAC, Custom

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: HVAC **Measure Type:** **Measure Sub Type:**

Program: C&I Multifamily

Measure Description

Vendors install a variety of gas measures at multifamily facilities. The measure is associated with commercial gas meters. This measure includes HVAC measures.

Baseline Description

For retrofit projects, the baseline efficiency case is the same as the existing, or pre-retrofit, case for the facility.

BCR Measures

BCR Measure Name	Unique Identifier
HVAC, Custom	2024 Gas C&I Multifamily HVAC, Custom

Savings Principle

The high efficiency scenario is specific to the facility and may include one or more energy efficiency measures.

Savings Method

Calc

Unit

Completed custom project

Savings Equation

Gross kWh = deltakWh_custom

Gross Summer kW = deltakW_sp_custom

Gross Winter kW = deltakW_wp_custom

Gross MMBtu Gas = deltaMMBtu_Gas_custom

Gross MMBtu Oil = deltaMMBtu_Oil_custom

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
HVAC, Custom	Calc	Calc	0.00	Calc	0.00	Calc	Calc

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
HVAC, Custom	Multi	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
HVAC, Custom	0.00%	0.00%	0.00%	0.00%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
HVAC, Custom	Calc	Calc	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
HVAC, Custom	0.00	0.00	0.00	1.00

TRC: $0 / MF Bundled costs (see Participant listing)

Incentive: $0 / MF Bundled costs (see Participant listing)

Low Flow Showerhead

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Showerhead

Program: C&I Multifamily

Measure Description

Installation of a low flow showerhead with a flow rate of 1.5 GPM or less in a commercial setting with service water heated by natural gas.

Baseline Description

The baseline efficiency case is a 2.5 GPM showerhead.

BCR Measures

BCR Measure Name	Unique Identifier
Low Flow Showerhead	2024 Gas C&I Multifamily Low Flow Showerhead

Savings Principle

The high efficiency case is a 1.5 GPM showerhead.

Savings Method

Deemed

Unit

Installed low-flow showerhead

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Low Flow Showerhead			0.00	1.30	0.00	0.00	0.00

Gas DHW MMBtu Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Low Flow Showerhead	15	0.90	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Low Flow Showerhead	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Low Flow Showerhead	1786	0	0.59	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Low Flow Showerhead	0.08	0.01	0.00	0.93

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $0 / MF Bundled costs (see Participant listing)

Incentive: $0 / MF Bundled costs (see Participant listing)

Low Flow Showerhead w/ Thermostatic Valve

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Showerhead

Program: C&I Multifamily

Measure Description

A showerhead with a control that limits flow once water is heated.

Baseline Description

The baseline case is a showerhead with a flow of 2.5 gallons per minute, or for the case of the adapter, a low flow showerhead with flow of 1.5 gpm or less.

BCR Measures

BCR Measure Name	Unique Identifier
Low Flow Showerhead w/ Thermostatic Valve	2024 Gas C&I Multifamily Low Flow Showerhead w/ Thermostatic Valve

Savings Principle

The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.

Savings Method

Deemed

Unit

Installed low-flow showerhead

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Low Flow Showerhead w/ Thermostatic Valve			0.00	1.41	0.00	0.00	0.00

Gas DHW MMBtu Source: Guidehouse (2020). Massachusetts Residential Baseline Study. https://ma-eeac.org/wp-content/uploads/RES-1-Residential-Baseline-Study-Ph4-Comprehensive-Report-2020-04-02.pdf

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Low Flow Showerhead w/ Thermostatic Valve	15	0.90	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Low Flow Showerhead w/ Thermostatic Valve	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Low Flow Showerhead w/ Thermostatic Valve	1786	0	0.59	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: Cadeo/Illume (2020). Impact Evaluation of Income Eligible Multifamily Program. http://rieermc.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Low Flow Showerhead w/ Thermostatic Valve	0.08	0.01	0.00	0.93

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $40 / MF Bundled costs (see Participant listing)

Incentive: $40 / MF Bundled costs (see Participant listing)

MF Shell Insulation

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Building Shell **Measure Type:** Insulation **Measure Sub Type:** Shell

Program: C&I Multifamily

Measure Description

Insulation upgrades are applied in existing multifamily facilities.

Baseline Description

The baseline efficiency case is characterized by the total R-value of the existing attic, basement or sidewall (Rexisit). This is calculated as the R-value of the existing insulation, estimated by the program contractor, plus the R-value of the ceiling, floor, or wall (for all projects: RCEILING = 3.36; RFLOOR = 6.16; RWALL = 6.65)

BCR Measures

BCR Measure Name	Unique Identifier
MF Shell Insulation	2024 Gas C&I Multifamily MF Shell Insulation

Savings Principle

The high efficiency case is characterized by the total R-value of the attic after the installation of additional attic, basement or sidewall insulation. This is calculated as the sum of the existing R-value (RBASE) plus the R-value of the added insulation(RADD).

Savings Method

Calculated using site-specific inputs

Unit

Completed insulation project.

Savings Equation

MMBTUannual = (((1/Rexist)-(1/Rnew)) x HDD x 24 x Area) / (1,000,000) X Nheat

kWhannual = MMBtuannaul x 293.1

kW = kWhannual x kW/kWhNheating

Where:

Rexist = Existing effective R-value (R-ExistingInsulation + R-Assembly), ft2-°F/Btuh

Rnew = New total effective R-value (R-ProposedMeasure + R-ExistingInsulation + R-Assembly), ft2-°F/Btuh

Area = Square footage of insulated area

ηheat = Efficiency of the heating system (AFUE or COP)

293.1 = Conversion constant (1MMBtu = 293.1 kWh)

24 = Conversion for hours per day

HDD = Heating Degree Days; dependent on location, see table below

1,000,000 = Conversion from Btu to MMBtu

kW/kWh heating = Average annual kW reduction per kWh reduction: 0.00050 kW/kWh

Hours: 4644

Hours Source: NOAA Weather data: An average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.

Hours Note: Heating hours are characterized by the heating degree days for the facility, 4644.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
MF Shell Insulation	Calc	Calc	Calc	0.00	0.00	0.00	0.00

Gas Heat MMBtu Source: The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
MF Shell Insulation	25	1.00	1.00	1.00	1.00			0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
MF Shell Insulation	6.59%	3.85%	47.32%	42.24%

Measure Life Source: The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
MF Shell Insulation	0	0	47.95	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
MF Shell Insulation	0.33	0.01	0.00	0.68

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $3 / MF Bundled costs (see Participant listing)

Incentive: $2.25 / MF Bundled costs (see Participant listing)

Participant

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Participant **Measure Type:** Participant **Measure Sub Type:** C&I MF

Program: C&I Multifamily

Measure Description

This row identifies a participant for tracking and cost purposes.

Baseline Description

BCR Measures

BCR Measure Name	Unique Identifier
Participant	2024 Gas C&I Multifamily Participant

Savings Principle

Savings Method

Unit

Savings Equation

N/A

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Participant			0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Participant	1	1.00	1.00	1.00					

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Participant	0.00%	0.00%	0.00%	0.00%

Measure Life Note: Massachusetts Common Assumption

SPF Note: Savings persistence is 100% since measure life is 1 year.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Participant	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Participant	0.00	0.00	0.00	1.00

TRC: $560 / participant

Incentive: $504 / participant

Pipe Wrap (Water Heating)

Sector: C&I **Fuel:** Gas **Program Type:** Prescriptive

Measure Category: Water Heating **Measure Type:** Insulation **Measure Sub Type:** Pipe Insulation

Program: C&I Multifamily

Measure Description

Installation of DHW pipe wraps

Baseline Description

The baseline efficiency case is the existing hot water equipment.

BCR Measures

BCR Measure Name	Unique Identifier
Pipe Wrap (Water Heating)	2024 Gas C&I Multifamily Pipe Wrap (Water Heating)

Savings Principle

The high efficiency case includes pipe wrap.

Savings Method

Deemed

Unit

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Pipe Wrap (Water Heating)			0.00	0.15	0.00	0.00	0.00

Gas DHW MMBtu Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Gas DHW MMBtu Note: 3 feet per piece

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Pipe Wrap (Water Heating)	13	0.90	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Pipe Wrap (Water Heating)	0.00%	0.00%	0.00%	0.00%

Measure Life Source: GDS Associates, Inc. and Summit Blue Consulting (2009), Natural Gas Energy Efficiency Potential in Massachusetts, Appendix B-2,

ISR Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Pipe Wrap (Water Heating)	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Pipe Wrap (Water Heating)	0.08	0.01	0.00	0.93

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $3 / MF Bundled costs (see Participant listing)

Incentive: $3 / MF Bundled costs (see Participant listing)

Programmable thermostat

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** Thermostat

Program: C&I Multifamily

Measure Description

Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.

Baseline Description

For the installation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the installation of a wi-fi programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Programmable thermostat	2024 Gas C&I Multifamily Programmable thermostat

Savings Principle

The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed.

Savings Method

Deemed

Unit

Installation of programmable thermostat

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Programmable thermostat	29.0	0.0461	29.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Electric kW Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Gas Heat MMBtu Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Programmable thermostat	19	0.95	1.00	1.00	1.00			0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Programmable thermostat	6.59%	3.85%	47.32%	42.24%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Programmable thermostat	0	0	12.12	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Programmable thermostat	0.48	0.01	0.00	0.53

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $125 / MF Bundled costs (see Participant listing)

Incentive: $125 / MF Bundled costs (see Participant listing)

Thermostatic Shut-off Valve

Sector: C&I

Fuel: Gas

Program Type: Prescriptive

Measure Category: Water Heating

Measure Type: Flow Control

Measure Sub Type: Low Flow Showerhead

Program: C&I Multifamily

Measure Description

A showerhead with a control that limits flow once water is heated.

Baseline Description

The baseline case is a showerhead with a flow of 2.5 gallons per minute, or for the case of the adapter, a low flow showerhead with flow of 1.5 gpm or less.

BCR Measures

BCR Measure Name	Unique Identifier
Thermostatic Shut-off Valve	2024 Gas C&I Multifamily Thermostatic Shut-off Valve

Savings Principle

The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.

Savings Method

Deemed

Unit

Installed low-flow showerhead

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Thermostatic Shut-off Valve			0.00	0.34	0.00	0.00	0.00

Gas DHW MMBtu Source: National Grid (2014). Review of ShowerStart evolve.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Thermostatic Shut-off Valve	15	1.00	1.00	1.00	1.00				

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Thermostatic Shut-off Valve	0.00%	0.00%	0.00%	0.00%

Measure Life Source: Guidehouse (2021). Comprehensive TRM Review (MA19R17-B-TRM). https://ma-eeac.org/wp-content/uploads/MA19R17-B-TRM_Final_Report_2021-04-12_clean.pdf

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: National Grid assumption based on regional PA working groups.

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Thermostatic Shut-off Valve	558	0	0.00	0.00	0.00	0.00	0.00	0.00

Water/Sewer Source: National Grid (2014). Review of ShowerStart evolve.

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Thermostatic Shut-off Valve	0.08	0.01	0.00	0.93

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $0 / MF Bundled costs (see Participant listing)

Incentive: $0 / MF Bundled costs (see Participant listing)

VFD

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: Motors/Drives **Measure Type:** Variable Speed Drive **Measure Sub Type:** Motors/Drives

Program: C&I Multifamily

Measure Description

This measure covers the installation of variable speed drives for multiple end uses and building types.

Baseline Description

The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

BCR Measures

BCR Measure Name	Unique Identifier
VFD	2024 Gas C&I Multifamily VFD

Savings Principle

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

Savings Method

Calculated using site-specific inputs

Unit

Installed variable speed drive on existing motor or with new NEMA premium efficiency motor.

Savings Equation

Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP

Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP

Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP

Where:

HP_motor = Total horsepower of controlled motor: site-specific.

MotorEff = Motor efficiency: site-specific.

deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type

HP_motor = Total horsepower of controlled motor: site-specific.

deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type

deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type

Hours: N/A

Hours Note: The annual hours of operation are site specific and will be determined on a case by case basis.

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
VFD	Calc	Calc	0.00	0.00	0.00	0.00	0.00

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
VFD	Multi	1.00	1.00	1.00	0.99	0.99	0.99	0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
VFD	6.59%	3.85%	47.32%	42.24%

ISR Note: All installations have 100% in-service rate since programs include verification of equipment installations.

SPF Note: Savings persistence is assumed to be 100%.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
VFD	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
VFD	0.00	0.00	0.00	1.00

NTG Note: The Net-to-Gross ratio is assumed to be 100%.

TRC: $0 / MF Bundled costs (see Participant listing)

Incentive: $0 / MF Bundled costs (see Participant listing)

Wi-Fi programmable thermostat (controls gas heat only)

Sector: C&I **Fuel:** Gas **Program Type:** Custom

Measure Category: HVAC **Measure Type:** Controls **Measure Sub Type:** Thermostat

Program: C&I Multifamily

Measure Description

A communicating thermostat which allows remote set point adjustment and control via remote application. System requires an outdoor air temperature algorithm in the control logic to operate heating and cooling systems Primary Energy Impact: Natural Gas

Baseline Description

For the installation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the installation of a wi-fi programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat.

BCR Measures

BCR Measure Name	Unique Identifier
Wi-Fi programmable thermostat (controls gas heat only)	2024 Gas C&I Multifamily Wi-Fi programmable thermostat (controls gas heat only)

Savings Principle

The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed.

Savings Method

Deemed

Unit

Installation of WiFi programmable thermostat

Savings Equation

Gross MMBtu_Gas = Qty × deltaMMBtu_Gas

Where:

Qty = Total number of units.

deltaMMBtu_Gas = Average annual natural gas reduction per unit.

Hours: N/A

Measure Gross Savings per Unit

Measure	kWh	kW	Gas Heat MMBtu	Gas DHW MMBtu	Gas Other MMBtu	Oil MMBtu	Propane MMBtu
Wi-Fi programmable thermostat (controls gas heat only)	31.0	0.0493	31.00	0.00	0.00	0.00	0.00

Electric kWh Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Electric kW Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Gas Heat MMBtu Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

Energy Impact Factors

Measure	Measure Life	ISR	SPF	RRe Gas	RRe Electric	RR sp	RR wp	CF sp	CF wp
Wi-Fi programmable thermostat (controls gas heat only)	15	0.95	1.00	1.00	1.00			0.35	

Measure	Winter Peak Energy %	Winter Off-Peak Energy %	Summer Peak Energy %	Summer Off-Peak Energy %
Wi-Fi programmable thermostat (controls gas heat only)	6.59%	3.85%	47.32%	42.24%

Measure Life Source: Southern California Edison (2017). Residential Smart Thermostat Workpaper (Work Paper SCE17HC054, Revision #0). https://www.peakload.org/assets/SCE17HC054.0_Residential_Sma.pdf

ISR Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

SPF Note: Savings persistence is assumed to be 100%.

RRe Note: Realization rate is 100% since gross savings values are based on evaluation results.

CFsp Source: Navigant Consulting (2018). Baseline Loadshape Study

CFwp Source: Navigant Consulting (2018). Baseline Loadshape Study

Non-Energy Impact Factors

Measure	Water: Gallons	Sewer: Gallons	Annual $ per unit	Annual $ per kWh	Annual $ per MMBtu	One-time $ per unit	One-time $ per kWh	One-time per MMBtu
Wi-Fi programmable thermostat (controls gas heat only)	0	0	12.12	0.00	0.00	0.00	0.00	0.00

Annual $ Source: NMR and DNV GL (2018). TXC 29 Market-Rate Multifamily NEI - Phase I Final Memo. https://ma-eeac.org/wp-content/uploads/TXC29-MA-MR-MF-NEI-Phase-I-memo-FINAL-033018.pdf

Net-to-Gross Factors

Measure	FR	Sop	Sonp	NTG
Wi-Fi programmable thermostat (controls gas heat only)	0.48	0.01	0.00	0.53

NTG Source: Cadeo/Illume (2020). Impact & Process Evaluation of EnergyWise Multifamily Program.

TRC: $350 / MF Bundled costs (see Participant listing)

Incentive: $300 / MF Bundled costs (see Participant listing)

Appendix A: Tables

Table 1: Lighting Power Densities Using the Building Area Method (WATTSb,i)

Building Area Type	Lighting Power Density (W/ft2) [1]
Automotive Facility	0.75
Convention Center	0.64
Court House	0.79
Dining: Bar Lounge/Leisure	0.80
Dining: Cafeteria/Fast Food	0.76
Dining: Family	0.71
Dormitory	0.53
Exercise Center	0.72
Fire Stations	0.56
Gymnasium	0.76
Healthcare-Clinic	0.81
Hospital	0.96
Hotel/Motel	0.56
Library	0.83
Manufacturing Facility	0.82
Motion Picture Theatre	0.44
Multi-Family	0.45
Museum	0.55
Office	0.64
Parking Garage	0.18
Penitentiary	0.69
Performing Arts Theatre	0.84
Police Station	0.66
Post Office	0.65
Religious Building	0.67
Retail	0.84
School/University	0.72
Sports Arena	0.76
Town Hall	0.69
Transportation	0.50
Warehouse	0.45
Workshop	0.91

[1] IECC 2021

Table 2: Lighting Power Densities Using the Space-by-Space Method (WATTSb,i)

Common Space Types	Lighting Power Density (W/ft^2)
Atrium – Less than 40 feet in Height	0.48
Atrium – Greater than 40 feet in Height	0.60
Audience/seating	
In an Auditorium	0.61
In a Gymnasium	0.23
In a Motion Picture Theater	0.27
In a Penitentiary	0.67
In a Performing Arts Theater	1.16
In a religious building	0.72
In a sports arena	0.33
Otherwise	0.33
Banking Activity Area	0.61
Classroom/lecture/training	
In a penitentiary	0.89
Otherwise	0.71
Computer room, data center	0.9
Conference/meeting/multipurpose	0.97
Copy/print room	0.31
Corridor	
In a facility for the visually impaired (not primarily used by staff)	0.71
In a hospital	0.71
Otherwise	0.41
Courtroom	1.20
Dining Area	
Bar/lounge/leisure dining	0.86
Cafeteria/fast food dining	0.40
Facility for the visually impaired (not primarily used by staff)	1.27
Family dining area	0.60
Penitentiary	0.42
Otherwise	0.43
Electrical/mechanical	0.43
Emergency vehicle garage	0.52
Food preparation	1.09
Guestroom	0.41
Laboratory	
In or as a classroom	1.11
Otherwise	1.33
Laundry/washing area	0.53
Loading dock, interior	0.88
Lobby	
For an elevator	0.65

Facility for the visually impaired (not primarily used by staff)	1.69
In a hotel	0.51
In a motion picture theater	0.23
In a performing arts theater	1.25
Otherwise	0.84
Locker room	0.52
Lounge/Breakroom	
In a healthcare facility	0.42
Otherwise	0.59
Office - enclosed	0.74
Office – open plan	0.61
Parking area, interior	0.15
Pharmacy Area	1.66
Restroom	0.63
Restroom in a facility for the visually impaired (not primarily used by staff)	1.26
Sales area	1.05
Seating area, general	0.23
Stairwell	0.49
Storage	0.38
Vehicular maintenance area	0.60
Workshop	1.26
BUILDING SPECIFIC SPACE-BY-SPACE TYPES	
Automotive – service/repair	0.60
Convention Center – exhibit space	0.61
Dormitory living quarters	0.50
Facility for the visually impaired	
In a chapel	0.70
In a recreation room	1.77
Fire station – sleeping quarters	0.23
Gymnasium/fitness center	
Exercise area	0.9
Playing area	0.85
Healthcare clinic/hospital	
Imaging room	0.94
Exam/treatment	1.4
Medical Supplies	0.62
Nursery	0.92
Nurse Station	1.17
Operating Room	2.26
Patient room	0.68
Physical therapy room	0.91
Recovery Room	1.25
Library	
Reading Area	0.96

Stacks	1.18
Manufacturing Facility	
Detailed manufacturing area	0.80
Equipment room	0.76
Extra high-bay area (greater than 50 ft floor to ceiling height)	1.42
High-bay area (25-50 ft floor to ceiling height)	1.24
Low-bay area (less than 25 ft floor to ceiling height)	0.86
Museum	1.2
General exhibition area	0.31
Restoration room	1.10
Performing arts theater - dressing room	0.41
Post office – sorting area	0.76
Religious buildings	
Fellowship hall	0.54
Worship/pulpit/choir area	0.85
Retail	
Dressing/fitting area	0.51
Mall concourse	0.82
Sports arena – playing area	
Class 1 Facility	2.94
Class 2 Facility	2.01
Class 3 Facility	1.30
Class 4 Facility	0.86
Transportation	
Air/train/bus baggage area	0.39
Airport concourse	0.25
Terminal – ticket counter	0.51
Warehouse	
For smaller, hand-carried items	0.33
Medium/bulky material	0.69

[1] IECC 2021

Table 3: New Construction Proposed Lighting Wattage Tables

Device Code	Device Description	Rated Watts
LED Exit Signs		
1E0002	2.0 WATT LED	2
1E0003	3.0 WATT LED	3
1E0005	5.0 WLED	5
1E0005C	0.5 WATT LEC	0.5
1E0008	8.0 WLED	8
1E0015	1.5 WATT LED	1.5
1E0105	10.5 WATT LED	10.5
Compact Fluorescents (CFL's)		
2C0007S	2/7W COMPACT HW	18
1C0005S	5W COMPACT HW	7
1C0007S	7W COMPACT HW	9
1C0009S	9W COMPACT HW	11
1C0011S	11W COMPACT HW	13
1C0013S	13W COMPACT HW	15
1C0018E	18W COMPACT HW ELIG	20
1C0018S	18W COMPACT HW	20
1C0022S	22W COMPACT HW	24
1C0023E	1/23W COMPACT HW ELIG	25
1C0026E	26W COMPACT HW ELIG	28
1C0026S	26W COMPACT HW	28
1C0028S	28W COMPACT HW	30
1C0032E	32W COMPACT HW ELIG	34
1C0032S	32W CIRCLINE HW	34
1C0042E	1/42W COMPACT HW ELIG	48
1C0044S	44W CIRCLINE HW	46
1C0057E	1/57W COMPACT HW ELIG	65
1C2232S	22/32W CIRCLINE HW	58
1C2D10E	10W 2D COMPACT HW ELIG	12
1C2D16E	16W 2D COMPACT HW ELIG	18
1C2D21E	21W 2D COMPACT HW ELIG	22
1C2D28E	28W 2D COMPACT HW ELIG	28
1C2D38E	38W 2D COMP.HW ELIG	36
Compact Fluorescents (CFL's) (cont)		
1C3240S	32/40W CIRCLINE HW	80

Device Code	Device Description	Rated Watts
2C0005S	2/5W COMPACT HW	14
2C0009S	2/9W COMPACT HW	22
2C0011S	2/11W COMPACT HW	26
2C0013E	2/13W COMPACT HW ELIG	28
2C0013S	2/13W COMPACT HW	30
2C0018E	2/18W COMP. HW ELIG	40
2C0026E	2/26W COMP. HW ELIG	54
2C0032E	2/32W COMPACT HW ELIG	68
2C0042E	2/42W COMPACT HW ELIG	100
3C0009S	3/9W COMPACT HW	33
3C0013S	3/13W COMPACT HW	45
3C0018E	3/18W COMPACT HW ELIG	60
3C0026E	3/26W COMPACT HW ELIG	82
3C0032E	3/32W COMPACT HW ELIG	114
3C0042E	3/42W COMPACT HW ELIG	141
4C0018E	4/18W COMPACT HW ELIG	80
4C0026E	4/26W COMPACT HW ELIG	108
4C0032E	4/32W COMPACT HW ELIG	152
4C0042E	4/42W COMPACT HW ELIG	188
6C0026E	6/26W COMPACT HW ELIG	162
6C0032E	6/32W COMPACT HW ELIG	228
6C0042E	6/42W COMPACT HW ELIG	282
8C0026E	8/26W COMPACT HW ELIG	216
8C0032E	8/32W COMPACT HW ELIG	304
8C0042E	8/42W COMPACT HW ELIG	376
T5 Systems		
1F14SSE	1L2’ 14W T5/ELIG	16
2F14SSE	2L2’ 14W T5/ELIG	32
3F14SSE	3L2’ 14W T5/ELIG	50
4F14SSE	4L2’ 14W T5/ELIG	68
1F24HSE	1L2’ 24W T5HO/ELIG	29
2F24HSE	2L2’ 24W T5HO/ELIG	52
3F24HSE	3L2’ 24W T5HO/ELIG	80
	T5 Systems (cont.)	
1F21SSE	1L3' 21W T5/ELIG	24
2F21SSE	2L3' 21W T5/ELIG	47
1F39HSE	1L3' 39W T5HO/ELIG	42

Device Code	Device Description	Rated Watts
2F39HSE	2L3' 39W T5HO/ELIG	85
1F28SSE	1L4' 28W T5/ELIG	32
2F28SSE	2L4' 28W T5/ELIG	63
3F28SSE	3L4' 28W T5/ELIG	95
4F28SSE	4L4' 28W T5/ELIG	126
6F28SSE	6L4' 28W T5/ELIG	189
1F47HSE	1L4' 47W T5HO/ELIG	53
2F47HSE	2L4' 47W T5HO/ELIG	103
3F47HSE	3L4' 47W T5HO/ELIG	157
4F47HSE	4L4' 47W T5HO/ELIG	200
5F47HSE	5L4' 47W T5HO/ELIG	260
6F47HSE	6L4' 47W T5HO/ELIG	303
1F50HSE	1L4' 50W T5HO/ELIG	58
2F50HSE	2L4' 50W T5HO/ELIG	110
3F50HSE	3L4' 50W T5HO/ELIG	168
4F50HSE	4L4' 50W T5HO/ELIG	215
5F50HSE	5L4' 50W T5HO/ELIG	278
6F50HSE	6L4' 50W T5HO/ELIG	325
1F54HSE	1L4' 54W T5HO/ELIG	59
2F54HSE	2L4' 54W T5HO/ELIG	117
3F54HSE	3L4' 54W T5HO/ELIG	177
4F54HSE	4L4’ 54W T5HO/ELIG	234
5F54HSE	5L4' 54W T5HO/ELIG	294
6F54HSE	6L4’ 54W T5HO/ELIG	351
8F54HSE	8L4' 54W T5HO/ELIG	468
10F54HSE	10L4’ 54W T5HO/ELIG	585
Two Foot High Efficient T8 Systems		
1F17ESL	1L2' 17W T8EE/ELEE LOW PWR	14
1F17ESN	1L2' 17W T8EE/ELEE	17
1F17ESH	1L2' 17W T8EE/ELEE HIGH PWR	20
1F28BXE	1L2' F28BX/ELIG	32
2F17ESL	2L2' 17W T8EE/ELEE LOW PWR	27
2F17ESN	2L2' 17W T8EE/ELEE	32
2F17ESH	2L2' 17W T8EE/ELEE HIGH PWR	40
2F28BXE	2L2' F28BX/ELIG	63
3F17ESL	3L2' 17W T8EE/ELEE LOW PWR	39
3F17ESN	3L2' 17W T8EE/ELEE	46

Device Code	Device Description	Rated Watts
3F17ESH	3L2' 17W T8EE/ELEE HIGH PWR	61
3F28BXE	3L2' F28BX/ELIG	94
Three Foot High Efficient T8 Systems		
1F25ESL	1L3' 25W T8EE/ELEE LOW PWR	21
1F25ESN	1L3' 25W T8EE/ELEE	24
1F25ESH	1L3' 25W T8EE/ELEE HIGH PWR	30
2F25ESL	2L3' 25W T8EE/ELEE LOW PWR	40
2F25ESN	2L3' 25W T8EE/ELEE	45
2F25ESH	2L3' 25W T8EE/ELEE HIGH PWR	60
3F25ESL	3L3' 25W T8EE/ELEE LOW PWR	58
3F25ESN	3L3' 25W T8EE/ELEE	67
3F25ESH	3L3' 25W T8EE/ELEE HIGH PWR	90
Four Foot T8 High Efficient / Reduce Wattage Systems		
1F25EEH	1L4' 25W T8EE/ELEE HIGH PWR	30
1F25EEE	1L4' 25W T8EE/ELEE	22
1F25EEL	1L4' 25W T8EE/ELEE LOW PWR	19
2F25EEH	2L4' 25W T8EE/ELEE HIGH PWR	57
2F25EEE	2L4' 25W T8EE/ELEE	43
2F25EEL	2L4' 25W T8EE/ELEE LOW PWR	37
3F25EEH	3L4' 25W T8EE/ELEE HIGH PWR	86
3F25EEE	3L4' 25W T8EE/ELEE	64
3F25EEL	3L4' 25W T8EE/ELEE LOW PWR	57
4F25EEH	4L4' 25W T8EE/ELEE HIGH PWR	111
4F25EEE	4L4' 25W T8EE/ELEE	86
4F25EEL	4L4' 25W T8EE/ELEE LOW PWR	75
1F28EEH	1L4' 28W T8EE/ELEE HIGH PWR	33
1F28EEE	1L4' 28W T8EE/ELEE	24
1F28EEL	1L4' 28W T8EE/ELEE LOW PWR	22
2F28EEH	2L4' 28WT8EE/ELEE HIGH PWR	64
2F28EEE	2L4' 28W T8EE/ELEE	48
2F28EEL	2L4' 28W T8EE/ELEE LOW PWR	42
3F28EEH	3L4' 28W T8EE/ELEE HIGH PWR	96
3F28EEE	3L4' 28W T8EE/ELEE	72
3F28EEL	3L4' 28W T8EE/ELEE LOW PWR	63
4F28EEH	4L4' 28W T8EE/ELEE HIGH PWR	126
4F28EEE	4L4' 28W T8EE/ELEE	94
4F28EEL	4L4' 28W T8EE/ELEE LOW PWR	83

Device Code	Device Description	Rated Watts
1F30EEH	1L4' 30W T8EE/ELEE HIGH PWR	36
1F30EEE	1L4' 30W T8EE/ELEE	26
1F30EEL	1L4' 30W T8EE/ELEE LOW PWR	24
2F30EEH	2L4' 30WT8EE/ELEE HIGH PWR	69
2F30EEE	2L4' 30W T8EE/ELEE	52
2F30EEL	2L4' 30W T8EE/ELEE LOW PWR	45
3F30EEH	3L4' 30W T8EE/ELEE HIGH PWR	103
3F30EEE	3L4' 30W T8EE/ELEE	77
3F30EEL	3L4' 30W T8EE/ELEE LOW PWR	68
Four Foot T8 High Efficient / Reduce Wattage Systems (cont.)		
4F30EEH	4L4' 30W T8EE/ELEE HIGH PWR	133
4F30EEE	4L4' 30W T8EE/ELEE	101
4F30EEL	4L4' 30W T8EE/ELEE LOW PWR	89
1F32EEH	1L4' 32W T8EE/ELEE HIGH PWR	38
1F32EEE	1L4' 32W T8EE/ELEE	28
1F32EEL	1L4' 32W T8EE/ELEE LOW PWR	25
2F32EEH	2L4' 32W T8EE/ELEE HIGH PWR	73
2F32EEE	2L4' 32W T8EE/ELEE	53
2F32EEL	2L4' 32W T8EE/ELEE LOW PWR	47
3F32EEH	3L4' 32W T8EE/ELEE HIGH PWR	109
3F32EEE	3L4' 32W T8EE/ELEE	82
3F32EEL	3L4' 32W T8EE/ELEE LOW PWR	72
4F32EEH	4L4' 32W T8EE/ELEE HIGH PWR	141
4F32EEE	4L4' 32W T8EE/ELEE	107
4F32EEL	4L4' 32W T8EE/ELEE LOW PWR	95
6F32EEH	6L4' 32W T8EE/ELEE HIGH PWR	218
6F32EEE	6L4' 32W T8EE/ELEE	168
6F32EEL	6L4' 32W T8EE/ELEE LOW PWR	146
Eight Foot T8 Systems		
1F59SSE	1L8' T8/ELIG	60
1F80SSE	1L8' T8 HO/ELIG	85
2F59SSE	2L8' T8/ELIG	109
2F59SSL	2L8' T8/ELIG LOW PWR	100
2F80SSE	2L8' T8 HO/ELIG	160
LED Lighting Fixtures		
1L002	2 WATT LED	2
1L003	3 WATT LED	3

Device Code	Device Description	Rated Watts
1L004	4 WATT LED	4
1L005	5 WATT LED	5
1L006	6 WATT LED	6
1L007	7 WATT LED	7
1L008	8 WATT LED	8
1L009	9 WATT LED	9
1L010	10 WATT LED	10
1L011	11 WATT LED	11
1L012	12 WATT LED	12
1L013	13 WATT LED	13
1L014	14 WATT LED	14
1L015	15 WATT LED	15
1L016	16 WATT LED	16
1L017	17 WATT LED	17
LED Lighting Fixtures (cont.)		
1L018	18 WATT LED	18
1L019	19 WATT LED	19
1L020	20 WATT LED	20
1L021	21 WATT LED	21
1L022	22 WATT LED	22
1L023	23 WATT LED	23
1L024	24 WATT LED	24
1L025	25 WATT LED	25
1L026	26 WATT LED	26
1L027	27 WATT LED	27
1L028	28 WATT LED	28
1L029	29 WATT LED	29
1L030	30 WATT LED	30
1L031	31 WATT LED	31
1L032	32 WATT LED	32
1L033	33 WATT LED	33
1L034	34 WATT LED	34
1L035	35 WATT LED	35
1L036	36 WATT LED	36
1L037	37 WATT LED	37
1L038	38 WATT LED	38
1L039	39 WATT LED	39

Device Code	Device Description	Rated Watts
1L040	40 WATT LED	40
1L041	41 WATT LED	41
1L042	42 WATT LED	42
1L043	43 WATT LED	43
1L044	44 WATT LED	44
1L045	45 WATT LED	45
1L046	46 WATT LED	46
1L047	47 WATT LED	47
1L048	48 WATT LED	48
1L049	49 WATT LED	49
1L050	50 WATT LED	50
1L055	55 WATT LED	55
1L060	60 WATT LED	60
1L070	70 WATT LED	70
1L073	73 WATT LED	73
1L075	75 WATT LED	75
1L080	90 WATT LED	90
1L085	85 WATT LED	85
1L090	90 WATT LED	90
LED Lighting Fixtures (cont.)		
1L095	95 WATT LED	95
1L100	100 WATT LED	100
1L106	106 WATT LED	106
1L107	107 WATT LED	107
1L116	116 WATT LED	116
1L120	120 WATT LED	120
1L125	125 WATT LED	125
1L130	130 WATT LED	130
1L135	135 WATT LED	135
1L140	140 WATT LED	140
1L145	145 WATT LED	145
1L150	150 WATT LED	150
1L155	155 WATT LED	155
1L160	160 WATT LED	160
1L165	165 WATT LED	165
1L170	170 WATT LED	170
1L175	175 WATT LED	175

Device Code	Device Description	Rated Watts
1L180	180 WATT LED	180
1L185	185 WATT LED	185
1L190	190 WATT LED	190
1L200	200 WATT LED	200
1L210	210 WATT LED	210
1L220	220 WATT LED	220
1L240	240 WATT LED	240
Electronic Metal Halide Lamps		
1M0150E	150W METAL HALIDE EB	160
1M0200E	200W METAL HALIDE EB	215
1M0250E	250W METAL HALIDE EB	270
1M0320E	320W METAL HALIDE EB	345
1M0350E	350W METAL HALIDE EB	375
1M0400E	400W METAL HALIDE EB	430
1M0450E	400W METAL HALIDE EB	480
MH Track Lighting		
1M0020E	20W MH SPOT	25
1M0025E	25W MH SPOT	25
1M0035E	35W MH SPOT	44
1M0039E	39W MH SPOT	47
1M0050E	50W MH SPOT	60
1M0070E	70W MH SPOT	80
1M0100E	100W MH SPOT	111
1M0150E	150W MH SPOT	162

Table 4: Retrofit Existing Lighting Wattage Tables

Device Code	Device Description	Rated Watts
Incandescent Lamps		
1I0015	15W INC	15
1I0020	20W INC	20
1I0025	25W INC	25
1I0034	34W INC	34
1I0036	36W INC	36
1I0040	40W INC	40
1I0042	42W INC	42
1I0045	45W INC	45
1I0050	50W INC	50
1I0052	52W INC	52
1I0054	54W INC	54
1I0055	55W INC	55
1I0060	60W INC	60
1I0065	65W INC	65
1I0067	67W INC	67
1I0069	69W INC	69
1I0072	72W INC	72
1I0075	75W INC	75
1I0080	80W INC	80
1I0085	85W INC	85
1I0090	90W INC	90
1I0093	93W INC	93
1I0100	100W INC	100
1I0120	120W INC	120
1I0125	125W INC	125
1I0135	135W INC	135
1I0150	150W INC	150
1I0200	200W INC	200
1I0300	300W INC	300
1I0448	448W INC	448
1I0500	500W INC	500
1I0750	750W INC	750
1I1000	1000W INC	1000
1I1500	1500W INC	1500
Low Voltage Halogen Fixture (includes Transformer)		
1R0020	20W LV HALOGEN FIXT	30
1R0025	25W LV HALOGEN FIXT	35
1R0035	35W LV HALOGEN FIXT	45
Low Voltage Halogen Fixture (includes Transformer) (cont.)		
1R0042	42W LV HALOGEN FIXT	52
1R0050	50W LV HALOGEN FIXT	60
1R0065	65W LV HALOGEN FIXT	75
1R0075	75W LV HALOGEN FIXT	85
Halogen/Quartz Lamps		
1T0035	35W HALOGEN LAMP	35

Device Code	Device Description	Rated Watts
1T0040	40W HALOGEN LAMP	40
1T0042	42W HALOGEN LAMP	42
1T0045	45W HALOGEN LAMP	45
1T0047	47W HALOGEN LAMP	47
1T0050	50W HALOGEN LAMP	50
1T0052	52W HALOGEN LAMP	52
1T0055	55W HALOGEN LAMP	55
1T0060	60W HALOGEN LAMP	60
1T0072	72W HALOGEN LAMP	72
1T0075	75W HALOGEN LAMP	75
1T0090	90W HALOGEN LAMP	90
1T0100	100W HALOGEN LAMP	100
1T0150	150W HALOGEN LAMP	150
1T0200	200W HALOGEN LAMP	200
1T0250	250W HALOGEN LAMP	250
1T0300	300W HALOGEN LAMP	300
1T0350	350W HALOGEN LAMP	350
1T0400	400W HALOGEN LAMP	400
1T0425	425W HALOGEN LAMP	425
1T0500	500W HALOGEN LAMP	500
1T0750	750W HALOGEN LAMP	750
1T0900	900W HALOGEN LAMP	900
1T1000	1000W HALOGEN LAMP	1000
1T1200	1200W HALOGEN LAMP	1200
1T1500	1500W HALOGEN LAMP	1500
Mercury Vapor (MV)		
1V0040S	40W MERCURY	50
1V0050S	50W MERCURY	75
1V0075S	75W MERCURY	95
1V0100S	100W MERCURY	120
1V0175S	175W MERCURY	205
1V0250S	250W MERCURY	290
1V0400S	400W MERCURY	455
Low Pressure Sodium (LPS)		
1V0700S	700W MERCURY	775
1V1000S	1000W MERCURY	1075
2V0400S	2/400W MERCURY	880
1L0035S	35W LPS	60
1L0055S	55W LPS	85
1L0090S	90W LPS	130
1L0135S	135W LPS	180
1L0180S	180W LPS	230
High Pressure Sodium (HPS)		
1H0035S	35W HPS	45
1H0050S	50W HPS	65
1H0070S	70W HPS	90
1H0100S	100W HPS	130

Device Code	Device Description	Rated Watts
1H0150S	150W HPS	190
1H0200S	200W HPS	240
1H0225S	225W HPS	275
1H0250S	250W HPS	295
1H0310S	310W HPS	350
1H0360S	360W HPS	435
1H0400S	400W HPS	460
1H0600S	600W HPS	675
1H0750S	750W HPS	835
1H1000S	1000W HPS	1085
Metal Halide (MH)		
1M0032S	32W METAL HALIDE	40
1M0050S	50W METAL HALIDE	65
1M0070S	70W METAL HALIDE	95
1M0100S	100W METAL HALIDE	120
1M0150S	150W METAL HALIDE	190
1M0175S	175W METAL HALIDE	205
1M0250S	250W METAL HALIDE	295
1M0360S	360W METAL HALIDE	430
1M0400S	400W METAL HALIDE	455
1M0750S	750W METAL HALIDE	825
1M1000S	1000W METAL HALIDE	1075
1M1500S	1500W METAL HALIDE	1615
1M1800S	1800W METAL HALIDE	1875
Pulse Start Metal Halide Lamp/Ballast		
1M0100P	100W MH CWA	128
1M0100R	100W MH LINEAR	118
1M0150P	150W MH CWA	190
1M0150R	150W MH LINEAR	172
1M0175P	175W MH CWA	208
1M0175R	175W MH LINEAR	190
1M0200P	200W MH CWA	232
1M0200R	200W MH LINEAR	218
1M0250P	250W MH CWA	288
1M0250R	250W MH LINEAR	265
1M0300P	300W MH CWA	342
1M0300R	300W MH LINEAR	324
1M0320P	320W MH CWA	365
1M0320R	320W MH LINEAR	345
1M0350P	350W MH CWA	400
1M0350R	350W MH LINEAR	375
1M0400P	400W MH CWA	455
1M0400R	400W MH LINEAR	430
1M0450P	450W MH CWA	508
1M0450R	450W MH LINEAR	480
1M0750P	750W MH CWA	815
1M0750R	750W MH LINEAR	805

Device Code	Device Description	Rated Watts
1M0875P	875W MH CWA	950
1M0875R	875W MH LINEAR	927
1M1000P	1000W MH CWA	1080
Two Foot T8 / T12 Systems		
1F20SSS	F20T12/HPF(1)	32
1F80BXE	1L2' F80BXE/ELIG	90
1F55BXE	1L2' F55BX/ELIG	56
2F17SSE	2L2' 17W T8/ELIG	37
2F17SSL	2L2' 17W T8/ELIG LOW POWER	27
2F17SSM	2L2' 17W T8/EEMAG	45
2F20SSS	F20T12/HPF(2)	56
2F24HSS	2L2' 24 T12HO/STD/STD	85
2F40BXE	2L2' F40BX/ELIG	72
2F50BXE	2L2' F50BX/ELIG	108
2F55BXE	2L2'55BXE/ELIG	112
3F17SSE	3L2' 17W T8/ELIG	53
3F17SSL	3L2' 17W T8/ELIG LOW POWER	39
Two Foot T8 / T12 Systems (cont.)		
3F20SSS	F20T12/HPF(3)	78
3F40BXE	3L2' F40BX/ELIG	102
3F50BXE	3L2' F50BX/ELIG	162
3F55BXE	3L2' F55BX/ELIG	168
4F17SSE	4L2' 17W T8/ELIG	62
4F36BXE	4L2' F36BX/ELIG	148
4F40BXE	4L2' F40BX/ELIG	144
4F40BXH	4L 40W T5 (Std.) HIGH LMN	170
4F50BXE	4L2' F50BX/ELIG	216
4F55BXE	4L2' F55BX/ELIG	224
5F40BXE	5L2' F40BX/ELIG	190
5F50BXE	5L2' F50BX/ELIG	270
5F55BXE	5L2' F55BX/ELIG	280
6F36BXE	6L2' F36BX/ELIG	212
6F40BXE	6L2' F40BX/ELIG	204
6F50BXE	6L2' F50BX/ELIG	324
6F55BXE	6L2' F55BX/ELIG	336
8F36BXE	8L2' F36BX/ELIG	296
8F40BXE	8L2' F40BX/ELIG	288
8F50BXE	8L2' F50BX/ELIG	432
8F55BXE	8L2' F55BX/ELIG	448
9F36BXE	9L2' F36BX/ELIG	318
9F40BXE	9L2' F40BX/ELIG	306
9F50BXE	9L2' F50BX/ELIG	486
9F55BXE	9L2' F55BX/ELIG	504
12F40BE	12L2' F40BX/ELIG	408
12F50BE	12L2' F50BX/ELIG	648
12F55BE	12L2' F55BX/ELIG	672
Three Foot T8 / T12 Systems		

Device Code	Device Description	Rated Watts
1F30SEM	1L3' 30W T12 EE/EEMAG	38
1F30SES	1L3' 30W T12 EE/STD	42
1F30SSS	1L3' 30W T12 STD/STD	46
1F25SSE	1L3' 25W T8/ELIG	24
1F25SSH	1L3' 25W T8/ELIG HIGH LMN	28
2F30SEE	2L3' 30W T12 EE/ELIG	49
2F30SEM	2L3' 30W T12 EE/EEMAG	66
2F30SES	2L3' 30W T12 EE/STD	73
2F30SSS	2L3' 30W T12 STD/STD	80
2F25SSE	2L3' 25W T8/ELIG	47
2F25SSM	2L3' 25W T8/EEMAG	65
Three Foot T8 / T12 Systems		
3F30SSS	3L3' 30W T12 STD/STD	140
3F30SES	3L3' 30W T12 EE/STD	127
3F25SSE	3L3’ 25W T8/ELIG	68
4F25SSE	4L3' 25W T8/ELIG	88
Four Foot F48 T8 Systems		
1F48SES	1L4' F48T12EE/STD	50
1F48SSS	1L4' F48T12/STD	60
2F48SES	2L4' F48T12EE/STD	82
2F48SSS	2L4' F48T12/STD	102
3F48SES	3L4' F48T12EE/STD	132
3F48SSS	3L4' F48T12/STD	162
4F48SES	4L4' F48T12EE/STD	164
4F48SSS	4L4' F48T12/STD	204
1F48HES	1L4' F48HO/EE/STD	80
1F48HSS	1L4' F48H0/STD/STD	85
2F48HES	2L4' F48HO/EE/STD	135
2F48HSS	2L4' F48H0/STD/STD	145
3F48HES	3L4' F48HO/EE/STD	215
3F48HSS	3L4' F48H0/STD/STD	230
4F48HES	4L4' F48HO/EE/STD	270
4F48HSS	4L4' F48H0/STD/STD	290
Four Foot F48VHO T12 Systems		
1F48VES	1L4' F48VHO/EE/STD	123
1F48VSS	1L4' F48VHO/STD/STD	138
2F48VES	2L4' F48VHO/EE/STD	210
2F48VSS	2L4' F48VHO/STD/STD	240
3F48VES	3L4' F48VHO/EE/STD	333
3F48VSS	3L4' F48VHO/STD/STD	378
4F48VES	4L4' F48VHO/EE/STD	420
4F48VSS	4L4' F48VHO/STD/STD	480
Four Foot T12 Systems		
1F40SEE	1L4' EE/ELIG	38
1F40SEM	1L4' EE/EEMAG	40
1F40SES	1L4' EE/STD	50
1F40SSE	1L4' STD/ELIG	46

Device Code	Device Description	Rated Watts
1F40SSM	1L4' STD/EEMAG	50
1F40SSS	1L4' STD/STD	57
1F40HSE	1L4' HO/STD/ELIG	59
Four Foot T12 Systems (cont.)		
2F40SEE	2L4' EE/ELIG	60
2F40SEM	2L4' EE/EEMAG	70
2F40SES	2L4' EE/STD	80
2F40SSE	2L4' STD/ELIG	72
2F40SSM	2L4' STD/EEMAG	86
2F40SSS	2L4' STD/STD	94
3F40SEE	3L4' EE/ELIG	90
3F40SEM	3L4' EE/EEMAG	110
3F40SES	3L4' EE/STD	130
3F40SSE	3L4' STD/ELIG	110
3F40SSM	3L4' STD/EEMAG	136
3F40SSS	3L4' STD/STD	151
4F40SEE	4L4' EE/ELIG	120
4F40SEM	4L4' EE/EEMAG	140
4F40SES	4L4' EE/STD	160
4F40SSE	4L4' STD/ELIG	144
4F40SSM	4L4' STD/EEMAG	172
4F40SSS	4L4' STD/STD	188
6F40SSS	6L4' STD/STD	282
Four Foot T8 Systems		
1F32SSE	1L4' T8/ELIG	30
1F32SSL	1L4’ T8/ELIG LOW POWER	26
1F32SSM	1L4' T8/EEMAG	37
1F32SSH	1L4’ T8/ELIG HIGH LMN	36
2F32SSE	2L4' T8/ELIG	60
2F32SSH	2L4' T8/ELIG HIGH LMN	78
2F32SSL	2L4’ T8/ELIG LOW PWR	52
2F32SSM	2L4' T8/EEMAG	70
3F32SSE	3L4' T8/ELIG	88
3F32SSH	3L4' T8/ELIG HIGH LMN	112
3F32SSL	3L4’ T8/ELIG LOW POWER	76
3F32SSM	3L4' T8/EEMAG	107
4F32SSE	4L4' T8/ELIG	112
4F32SSH	4L4' T8/ELIG HIGH LMN	156
4F32SSL	4L4’ T8/ELIG LOW PWR	98
4F32SSM	4L4' T8/EEMAG	140
5F32SSE	5L4' T8/ELIG	148
5F32SSH	5L4' T8/ELIG HIGH LMN	190
6F32SSE	6L4' T8/ELIG	174
8F32SSH	8L4' T8/ELIG HIGH LMN	312
Five Foot T8 / T12 Systems		
1F60HSM	1L5' HO/STD/EEMAG	90
1F60HSE	1L5' HO/STD/ELIG	70

Device Code	Device Description	Rated Watts
1F60SSM	1L5'/STD/EEMAG	73
1F60TSM	1L5' T10HO/STD/EEMAG	135
2F40HSE	2L5' HO/STD/ELIG	123
2F40TSE	2L5'T8/ELIG	68
2F60HSM	2L5' HO/STD/EEMAG	178
2F60SSM	2L5'/STD/EEMAG	122
3F40TSE	3L5'T8/ELIG	106
Six Foot T12 & T12HO Systems		
1F72HSE	1L6' T8HO/ELIG	80
1F72HSS	1L6' F72HO/STD/STD	113
1F72SSM	1L6' STD/EEMAG	80
1F72SSS	1L6' STD/STD	95
2F72HSE	2L6'T8 HO/ELIG	160
2F72HSM	2L6' F72HO/STD/EEMAG	193
2F72HSS	2L6' F72HO/STD	195
2F72SSM	2L6' STD/EEMAG	135
2F72SSS	2L6' STD/STD	173
Eight Foot T12HO Systems		
1F96HES	1L8' HO/EE/STD	125
1F96HSS	1L8' HO/STD/STD	135
2F96HEE	2L8' HO/EE/ELIG	170
2F96HEM	2L8' HO/EE/EEMAG	207
2F96HES	2L8' HO/EE/STD	227
2F96HSE	2L8' HO/STD/ELIG	195
2F96HSM	2L8' HO/STD/EEMAG	237
2F96HSS	2L8' HO/STD/STD	257
3F96HES	3L8' HO/EE/STD	352
3F96HSS	3L8' HO/STD/STD	392
4F96HEE	4L8' HO/EE/ELIG	340
4F96HEM	4L8' HO/EE/EEMAG	414
4F96HES	4L8' HO/EE/STD	454
4F96HSE	4L8' HO/STD/ELIG	390
4F96HSM	4L8' HO/STD/EEMAG	474
4F96HSS	4L8' HO/STD/STD	514
Eight Foot T12VHO Systems		
1F96VES	1L8' VHO/EE/STD	200
1F96VSS	1L8' VHO/STD/STD	230
2F96VES	2L8' VHO/EE/STD	390
2F96VSS	2L8' VHO/STD/STD	450
3F96VES	3L8' VHO/EE/STD	590
3F96VSS	3L8' VHO/STD/STD	680
4F96VES	4L8' VHO/EE/STD	780
4F96VSS	4L8' VHO/STD/STD	900
Eight Foot T8 Systems		
1F59SSE	1L8' T8/ELIG	60
1F80SSE	1L8' T8 HO/ELIG	85
2F59SSE	2L8' T8/ELIG	109

Device Code	Device Description	Rated Watts
2F59SSL	2L8' T8/ELIG LOW PWR	100
2F80SSE	2L8' T8 HO/ELIG	160
Eight Foot T12 Systems		
1F96SEE	1L8' EE/ELIG	60
1F96SES	1L8' EE/STD	83
1F96SSE	1L8' STD/ELIG	70
1F96SSS	1L8' STD/STD	100
2F96SEE	2L8' EE/ELIG	109
2F96SEM	2L8' EE/EEMAG	123
2F96SES	2L8' EE/STD	138
2F96SSE	2L8' STD/ELIG	134
2F96SSM	2L8' STD/EEMAG	158
2F96SSS	2L8' STD/STD	173
3F96SES	3L8' EE/STD	221
3F96SSS	3L8' STD/STD	273
4F96SEE	4L8' EE/ELIG	218
4F96SEM	4L8' EE/EEMAG	246
4F96SES	4L8' EE/STD	276
4F96SSE	4L8' STD/ELIG	268
4F96SSM	4L8' STD/EEMAG	316
4F96SSS	4L8' STD/STD	346
LED Lighting Fixtures		
1L002	2 WATT LED	2
1L003	3 WATT LED	3
1L004	4 WATT LED	4
1L005	5 WATT LED	5
1L006	6 WATT LED	6
1L007	7 WATT LED	7
1L008	8 WATT LED	8
1L009	9 WATT LED	9
1L010	10 WATT LED	10
1L011	11 WATT LED	11
1L012	12 WATT LED	12
1L013	13 WATT LED	13
1L014	14 WATT LED	14
1L015	15 WATT LED	15
1L016	16 WATT LED	16
1L017	17 WATT LED	17
LED Lighting Fixtures (cont.)		
1L018	18 WATT LED	18
1L019	19 WATT LED	19
1L020	20 WATT LED	20

Device Code	Device Description	Rated Watts
1L021	21 WATT LED	21
1L022	22 WATT LED	22
1L023	23 WATT LED	23
1L024	24 WATT LED	24
1L025	25 WATT LED	25
1L026	26 WATT LED	26
1L027	27 WATT LED	27
1L028	28 WATT LED	28
1L029	29 WATT LED	29
1L030	30 WATT LED	30
1L031	31 WATT LED	31
1L032	32 WATT LED	32
1L033	33 WATT LED	33
1L034	34 WATT LED	34
1L035	35 WATT LED	35
1L036	36 WATT LED	36
1L037	37 WATT LED	37
1L038	38 WATT LED	38
1L039	39 WATT LED	39
1L040	40 WATT LED	40
1L041	41 WATT LED	41
1L042	42 WATT LED	42
1L043	43 WATT LED	43
1L044	44 WATT LED	44
1L045	45 WATT LED	45
1L046	46 WATT LED	46
1L047	47 WATT LED	47
1L048	48 WATT LED	48
1L049	49 WATT LED	49
1L050	50 WATT LED	50
1L055	55 WATT LED	55
1L060	60 WATT LED	60
1L070	70 WATT LED	70
1L073	73 WATT LED	73
1L075	75 WATT LED	75
1L080	90 WATT LED	90
1L085	85 WATT LED	85

Device Code	Device Description	Rated Watts
1L090	90 WATT LED	90
LED Lighting Fixtures (cont.)		
1L095	95 WATT LED	95
1L100	100 WATT LED	100
1L106	106 WATT LED	106
1L107	107 WATT LED	107
1L116	116 WATT LED	116
1L120	120 WATT LED	120
1L125	125 WATT LED	125
1L130	130 WATT LED	130
1L135	135 WATT LED	135
1L140	140 WATT LED	140
1L145	145 WATT LED	145
1L150	150 WATT LED	150
1L155	155 WATT LED	155
1L160	160 WATT LED	160
1L165	165 WATT LED	165
1L170	170 WATT LED	170
1L175	175 WATT LED	175
1L180	180 WATT LED	180
1L185	185 WATT LED	185
1L190	190 WATT LED	190
1L200	200 WATT LED	200
1L210	210 WATT LED	210
1L220	220 WATT LED	220
1L240	240 WATT LED	240

Table 5: Retrofit Proposed Lighting Wattage Tables

Device Code	Device Description	Rated Watts
LED Exit Signs		
1E0002	2.0 WATT LED	2
1E0003	3.0 WATT LED	3
1E0005	5.0 WLED	5
1E0005C	0.5 WATT LEC	0.5
1E0008	8.0 WLED	8
1E0015	1.5 WATT LED	1.5
1E0105	10.5 WATT LED	10.5
Compact Fluorescents (CFL's)		
2C0007S	2/7W COMPACT HW	18
1C0005S	5W COMPACT HW	7
1C0007S	7W COMPACT HW	9
1C0009S	9W COMPACT HW	11
1C0011S	11W COMPACT HW	13
1C0013S	13W COMPACT HW	15
1C0018E	18W COMPACT HW ELIG	20
1C0018S	18W COMPACT HW	20
1C0022S	22W COMPACT HW	24
1C0023E	1/23W COMPACT HW ELIG	25
1C0026E	26W COMPACT HW ELIG	28
1C0026S	26W COMPACT HW	28
1C0028S	28W COMPACT HW	30
1C0032E	32W COMPACT HW ELIG	34
1C0032S	32W CIRCLINE HW	34
1C0042E	1/42W COMPACT HW ELIG	48
1C0044S	44W CIRCLINE HW	46
1C0057E	1/57W COMPACT HW ELIG	65
1C2232S	22/32W CIRCLINE HW	58
1C2D10E	10W 2D COMPACT HW ELIG	12
1C2D16E	16W 2D COMPACT HW ELIG	18
1C2D21E	21W 2D COMPACT HW ELIG	22
1C2D28E	28W 2D COMPACT HW ELIG	28
1C2D38E	38W 2D COMP.HW ELIG	36
1C3240S	32/40W CIRCLINE HW	80
2C0005S	2/5W COMPACT HW	14
2C0009S	2/9W COMPACT HW	22
2C0011S	2/11W COMPACT HW	26

Device Code	Device Description	Rated Watts
2C0013E	2/13W COMPACT HW ELIG	28
2C0013S	2/13W COMPACT HW	30
Compact Fluorescents (CFL's) (cont.)		
2C0018E	2/18W COMP. HW ELIG	40
2C0026E	2/26W COMP. HW ELIG	54
2C0032E	2/32W COMPACT HW ELIG	68
2C0042E	2/42W COMPACT HW ELIG	100
3C0009S	3/9W COMPACT HW	33
3C0013S	3/13W COMPACT HW	45
3C0018E	3/18W COMPACT HW ELIG	60
3C0026E	3/26W COMPACT HW ELIG	82
3C0032E	3/32W COMPACT HW ELIG	114
3C0042E	3/42W COMPACT HW ELIG	141
4C0018E	4/18W COMPACT HW ELIG	80
4C0026E	4/26W COMPACT HW ELIG	108
4C0032E	4/32W COMPACT HW ELIG	152
4C0042E	4/42W COMPACT HW ELIG	188
6C0026E	6/26W COMPACT HW ELIG	162
6C0032E	6/32W COMPACT HW ELIG	228
6C0042E	6/42W COMPACT HW ELIG	282
8C0026E	8/26W COMPACT HW ELIG	216
8C0032E	8/32W COMPACT HW ELIG	304
8C0042E	8/42W COMPACT HW ELIG	376
T5 Systems		
1F14SSE	1L2' 14W T5/ELIG	16
2F14SSE	2L2' 14W T5/ELIG	32
3F14SSE	3L2' 14W T5/ELIG	50
4F14SSE	4L2' 14W T5/ELIG	68
1F24HSE	1L2' 24W T5HO/ELIG	29
2F24HSE	2L2' 24W T5HO/ELIG	52
3F24HSE	3L2' 24W T5HO/ELIG	80
1F21SSE	1L3' 21W T5/ELIG	24
2F21SSE	2L3' 21W T5/ELIG	47
1F39HSE	1L3' 39W T5HO/ELIG	42
2F39HSE	2L3' 39W T5HO/ELIG	85
1F28SSE	1L4' 28W T5/ELIG	32
2F28SSE	2L4' 28W T5/ELIG	63
3F28SSE	3L4' 28W T5/ELIG	95
4F28SSE	4L4' 28W T5/ELIG	126

Device Code	Device Description	Rated Watts
6F28SSE	6L4' 28W T5/ELIG	189
1F47HSE	1L4' 47W T5HO/ELIG	53
2F47HSE	2L4' 47W T5HO/ELIG	103
3F47HSE	3L4' 47W T5HO/ELIG	157
T5 Systems (cont.)		
4F47HSE	4L4' 47W T5HO/ELIG	200
5F47HSE	5L4' 47W T5HO/ELIG	260
6F47HSE	6L4' 47W T5HO/ELIG	303
1F50HSE	1L4' 50W T5HO/ELIG	58
2F50HSE	2L4' 50W T5HO/ELIG	110
3F50HSE	3L4' 50W T5HO/ELIG	168
4F50HSE	4L4' 50W T5HO/ELIG	215
5F50HSE	5L4' 50W T5HO/ELIG	278
6F50HSE	6L4' 50W T5HO/ELIG	325
1F54HSE	1L4' 54W T5HO/ELIG	59
2F54HSE	2L4' 54W T5HO/ELIG	117
3F54HSE	3L4' 54W T5HO/ELIG	177
4F54HSE	4L4’ 54W T5HO/ELIG	234
5F54HSE	5L4' 54W T5HO/ELIG	294
6F54HSE	6L4’ 54W T5HO/ELIG	351
8F54HSE	8L4' 54W T5HO/ELIG	468
10F54HSE	10L4’ 54W T5HO/ELIG	585
Two Foot High Efficient T8 Systems		
1F17ESL	1L2' 17W T8EE/ELEE LOW PWR	14
1F17ESN	1L2' 17W T8EE/ELEE	17
1F17ESH	1L2' 17W T8EE/ELEE HIGH PWR	20
1F28BXE	1L2' F28BX/ELIG	32
2F17ESL	2L2' 17W T8EE/ELEE LOW PWR	27
2F17ESN	2L2' 17W T8EE/ELEE	32
2F17ESH	2L2' 17W T8EE/ELEE HIGH PWR	40
2F28BXE	2L2' F28BX/ELIG	63
3F17ESL	3L2' 17W T8EE/ELEE LOW PWR	39
3F17ESN	3L2' 17W T8EE/ELEE	46
3F17ESH	3L2' 17W T8EE/ELEE HIGH PWR	61
3F28BXE	3L2' F28BX/ELIG	94
Three Foot High Efficient T8 Systems		
1F25ESL	1L3' 25W T8EE/ELEE LOW PWR	21
1F25ESN	1L3' 25W T8EE/ELEE	24
1F25ESH	1L3' 25W T8EE/ELEE HIGH PWR	30

Device Code	Device Description	Rated Watts
2F25ESL	2L3' 25W T8EE/ELEE LOW PWR	40
2F25ESN	2L3' 25W T8EE/ELEE	45
2F25ESH	2L3' 25W T8EE/ELEE HIGH PWR	60
3F25ESL	3L3' 25W T8EE/ELEE LOW PWR	58
3F25ESN	3L3' 25W T8EE/ELEE	67
3F25ESH	3L3' 25W T8EE/ELEE HIGH PWR	90
Four Foot T8 High Efficient / Reduce Wattage Systems		
1F25EEH	1L4' 25W T8EE/ELEE HIGH PWR	30
1F25EEE	1L4' 25W T8EE/ELEE	22
1F25EEL	1L4' 25W T8EE/ELEE LOW PWR	19
2F25EEH	2L4' 25W T8EE/ELEE HIGH PWR	57
2F25EEE	2L4' 25W T8EE/ELEE	43
2F25EEL	2L4' 25W T8EE/ELEE LOW PWR	37
3F25EEH	3L4' 25W T8EE/ELEE HIGH PWR	86
3F25EEE	3L4' 25W T8EE/ELEE	64
3F25EEL	3L4' 25W T8EE/ELEE LOW PWR	57
4F25EEH	4L4' 25W T8EE/ELEE HIGH PWR	111
4F25EEE	4L4' 25W T8EE/ELEE	86
4F25EEL	4L4' 25W T8EE/ELEE LOW PWR	75
1F28EEH	1L4' 28W T8EE/ELEE HIGH PWR	33
1F28EEE	1L4' 28W T8EE/ELEE	24
1F28EEL	1L4' 28W T8EE/ELEE LOW PWR	22
2F28EEH	2L4' 28WT8EE/ELEE HIGH PWR	64
2F28EEE	2L4' 28W T8EE/ELEE	48
2F28EEL	2L4' 28W T8EE/ELEE LOW PWR	42
3F28EEH	3L4' 28W T8EE/ELEE HIGH PWR	96
3F28EEE	3L4' 28W T8EE/ELEE	72
3F28EEL	3L4' 28W T8EE/ELEE LOW PWR	63
4F28EEH	4L4' 28W T8EE/ELEE HIGH PWR	126
4F28EEE	4L4' 28W T8EE/ELEE	94
4F28EEL	4L4' 28W T8EE/ELEE LOW PWR	83
1F30EEH	1L4' 30W T8EE/ELEE HIGH PWR	36
1F30EEE	1L4' 30W T8EE/ELEE	26
1F30EEL	1L4' 30W T8EE/ELEE LOW PWR	24
2F30EEH	2L4' 30WT8EE/ELEE HIGH PWR	69
2F30EEE	2L4' 30W T8EE/ELEE	52
2F30EEL	2L4' 30W T8EE/ELEE LOW PWR	45
3F30EEH	3L4' 30W T8EE/ELEE HIGH PWR	103
3F30EEE	3L4' 30W T8EE/ELEE	77

Device Code	Device Description	Rated Watts
3F30EEL	3L4' 30W T8EE/ELEE LOW PWR	68
4F30EEH	4L4' 30W T8EE/ELEE HIGH PWR	133
4F30EEE	4L4' 30W T8EE/ELEE	101
4F30EEL	4L4' 30W T8EE/ELEE LOW PWR	89
1F32EEH	1L4' 32W T8EE/ELEE HIGH PWR	38
1F32EEE	1L4' 32W T8EE/ELEE	28
1F32EEL	1L4' 32W T8EE/ELEE LOW PWR	25
2F32EEH	2L4' 32W T8EE/ELEE HIGH PWR	73
2F32EEE	2L4' 32W T8EE/ELEE	53
Four Foot T8 High Efficient / Reduce Wattage Systems (cont.)		
2F32EEL	2L4' 32W T8EE/ELEE LOW PWR	47
3F32EEH	3L4' 32W T8EE/ELEE HIGH PWR	109
3F32EEE	3L4' 32W T8EE/ELEE	82
3F32EEL	3L4' 32W T8EE/ELEE LOW PWR	72
4F32EEH	4L4' 32W T8EE/ELEE HIGH PWR	141
4F32EEE	4L4' 32W T8EE/ELEE	107
4F32EEL	4L4' 32W T8EE/ELEE LOW PWR	95
6F32EEH	6L4' 32W T8EE/ELEE HIGH PWR	218
6F32EEE	6L4' 32W T8EE/ELEE	168
6F32EEL	6L4' 32W T8EE/ELEE LOW PWR	146
Eight Foot T8 Systems		
1F59SSE	1L8' T8/ELIG	60
1F80SSE	1L8' T8 HO/ELIG	85
2F59SSE	2L8' T8/ELIG	109
2F59SSL	2L8' T8/ELIG LOW PWR	100
2F80SSE	2L8' T8 HO/ELIG	160
LED Lighting Fixtures		
1L002	2 WATT LED	2
1L003	3 WATT LED	3
1L004	4 WATT LED	4
1L005	5 WATT LED	5
1L006	6 WATT LED	6
1L007	7 WATT LED	7
1L008	8 WATT LED	8
1L009	9 WATT LED	9
1L010	10 WATT LED	10
1L011	11 WATT LED	11
1L012	12 WATT LED	12
1L013	13 WATT LED	13

Device Code	Device Description	Rated Watts
1L014	14 WATT LED	14
1L015	15 WATT LED	15
1L016	16 WATT LED	16
1L017	17 WATT LED	17
1L018	18 WATT LED	18
1L019	19 WATT LED	19
1L020	20 WATT LED	20
1L021	21 WATT LED	21
1L022	22 WATT LED	22
1L023	23 WATT LED	23
LED Lighting Fixtures (cont.)		
1L024	24 WATT LED	24
1L025	25 WATT LED	25
1L026	26 WATT LED	26
1L027	27 WATT LED	27
1L028	28 WATT LED	28
1L029	29 WATT LED	29
1L030	30 WATT LED	30
1L031	31 WATT LED	31
1L032	32 WATT LED	32
1L033	33 WATT LED	33
1L034	34 WATT LED	34
1L035	35 WATT LED	35
1L036	36 WATT LED	36
1L037	37 WATT LED	37
1L038	38 WATT LED	38
1L039	39 WATT LED	39
1L040	40 WATT LED	40
1L041	41 WATT LED	41
1L042	42 WATT LED	42
1L043	43 WATT LED	43
1L044	44 WATT LED	44
1L045	45 WATT LED	45
1L046	46 WATT LED	46
1L047	47 WATT LED	47
1L048	48 WATT LED	48
1L049	49 WATT LED	49
1L050	50 WATT LED	50
1L055	55 WATT LED	55

Device Code	Device Description	Rated Watts
1L060	60 WATT LED	60
1L070	70 WATT LED	70
1L073	73 WATT LED	73
1L075	75 WATT LED	75
1L080	90 WATT LED	90
1L085	85 WATT LED	85
1L090	90 WATT LED	90
1L095	95 WATT LED	95
1L100	100 WATT LED	100
1L106	106 WATT LED	106
1L107	107 WATT LED	107
1L116	116 WATT LED	116
1L120	120 WATT LED	120
LED Lighting Fixtures (cont.)		
1L125	125 WATT LED	125
1L130	130 WATT LED	130
1L135	135 WATT LED	135
1L140	140 WATT LED	140
1L145	145 WATT LED	145
1L150	150 WATT LED	150
1L155	155 WATT LED	155
1L160	160 WATT LED	160
1L165	165 WATT LED	165
1L170	170 WATT LED	170
1L175	175 WATT LED	175
1L180	180 WATT LED	180
1L185	185 WATT LED	185
1L190	190 WATT LED	190
1L200	200 WATT LED	200
1L210	210 WATT LED	210
1L220	220 WATT LED	220
1L240	240 WATT LED	240
Electronic Metal Halide Lamps		
1M0150E	150W METAL HALIDE EB	160
1M0200E	200W METAL HALIDE EB	215
1M0250E	250W METAL HALIDE EB	270
1M0320E	320W METAL HALIDE EB	345
1M0350E	350W METAL HALIDE EB	375
1M0400E	400W METAL HALIDE EB	430

Device Code	Device Description	Rated Watts
1M0450E	400W METAL HALIDE EB	480
MH Track Lighting		
1M0020E	20W MH SPOT	25
1M0025E	25W MH SPOT	25
1M0035E	35W MH SPOT	44
1M0039E	39W MH SPOT	47
1M0050E	50W MH SPOT	60
1M0070E	70W MH SPOT	80
1M0100E	100W MH SPOT	111
1M0150E	150W MH SPOT	162

Table 6a: Upstream Lighting Savings[1]

Product type	Category	Installation Rate	Gross kW Saved per Unit	HVAC Interactive Effect (kWh)
G24 LED	4	49%	0.0216	103%
A-line, 40/60w	4	49%	0.0306	103%
A-line, 75/100w	4	49%	0.043	103%
Decoratives	4	49%	0.0192	103%
LED Retrofit kit, <25W	2	98%	0.0434	103%
LED Retrofit kit, >25W	2	98%	0.0561	103%
MR16	4	49%	0.0311	103%
PAR20	4	49%	0.0396	103%
PAR30	4	49%	0.0537	103%
PAR38	4	49%	0.0623	103%
Stairwell Kit, 2ft w/sensor	2	97%	0.0358[2]	100%[2]
Stairwell Kit, 4ft w/sensor	2	97%	0.0309[2]	100%[2]
TLED, 2ft	1	96%	0.0079	102%
TLED, 4ft	1	96%	0.0158	102%

(1) Values in the table are from DNV (2021). Impact Evaluation of PY2019 Rhode Island C&I Upstream Lighting Initiative.

(2) Controls were not updated as part of the aforementioned study.

Table 6b: Upstream Lighting Hours of Use

Building Type	**Hours of Use**[1]
College & University	4,132
Grocery/Food Sales	5,920
Hospital	5,601
Industrial/Manufacturing	5,229
K-12 School	2,902
Lodging	4,194
Medical Office	3,673
Office Building	4,171
Other	4,141
Parking Garage	8,760
Restaurant/Food Service	4,891
Retail	4,957
Warehouse and storage	6,512

(1) DNV (2021). Impact Evaluation of PY2019 Rhode Island C&I Upstream Lighting Initiative.

Table 7: Efficiency Requirements for C&I Air Conditioning

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure[a]
Air conditioners, air cooled	< 65,000 Btu/h[b]	All	Split System, three phase and applications outside U.S. single phase[b]	13.4 SEER2	AHRI 201/240-2023
			Single package, three phase and applications outside U.S. single phase[b]	13.4 SEER2	
Space constrained, air cooled	≤ 30,000 Btu/h[b]	All	Split System, three phase and applications outside U.S. single phase[b]	11.7 SEER2	
			Single package, three phase and applications outside U.S. single phase[b]	11.7 SEER2	
Small duct high velocity, air cooled	≤ 65,000 Btu/h[b]	All	Split System, three phase and applications outside U.S. single phase[b]	12.1 SEER2	
Air conditioners, air cooled	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.2 EER 14.8 IEER	AHRI 340/360
		All other	Split System and Single Package	11.0 EER 14.6 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 14.2 IEER	
		All other	Split System and Single Package	10.8 EER 14.0 IEER	
	≥ 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	10.0 EER 13.2 IEER	
		All other	Split System and Single Package	9.8 EER 13.0 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	9.7 EER 12.5 IEER	
		All other	Split System and Single Package	9.5 EER 12.3 IEER	

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure[a]
Air conditioners, water cooled	< 65,000 Btu/h[b]	All	Split System and Single Package	12.1 EER 12.3 IEER	AHRI 210/240
	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.1 EER 13.9 IEER	AHRI 340/360
		All other	Split System and Single Package	11.9 EER 13.7 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.5 EER 13.9 IEER	
		All other	Split System and Single Package	12.3 EER 13.7 IEER	
	≥ 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.4 EER 13.6 IEER	
		All other	Split System and Single Package	12.2 EER 13.4 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.2 EER 13.5 IEER	
		All other	Split System and Single Package	12.0 EER 13.3 IEER	
Air conditioners, evaporatively cooled	< 65,000 Btu/h[b]	All	Split System and Single Package	12.1 EER 12.3 IEER	AHRI 210/240
	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.1 EER 12.3 IEER	AHRI 340/360
		All other	Split System and Single Package	11.9 EER 12.1 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.0 EER 12.2 IEER	
		All other	Split System and Single Package	11.8 EER 12.0 IEER	
	≥ 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.9 EER 12.1 IEER	
		All other	Split System and Single Package	11.7 EER 11.9 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.7 EER 11.9 EER	
		All other	Split System and Single Package	11.5 EER 11.7 EER	
Condensing units, air cooled	≥ 135,000 Btu/h			10.5 EER 11.8 IEER	AHRI 365
Condensing units, water cooled	≥ 135,000 Btu/h			13.5 EER 14.0 IEER	
Condensing units, evaporatively cooled	≥ 135,000 Btu/h			13.5 EER 14.0 IEER	

a. Equipment capacity is AHRI rated capacity or capacity at AHRI rating conditions for units without an AHRI rating

b. Table from IECC 2021 – Electrically Operated Unitary Air Conditioners and Condensing Units – Minimum Efficiency Requirements

Table 8: Efficiency Requirements for C&I Heat Pumps

TABLE C403.3.2(2)
ELECTRICALLY OPERATED AIR-COOLED UNITARY HEAT PUMPS—MINIMUM EFFICIENCY REQUIREMENTS[a, d]

EQUIPMENT TYPE	SIZE CATEGORY	HEADING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE[a]
Air cooled (cooling mode)	< 66,000 Btu/h	All	Split system, three phase and applications outside US single phase[b]	14.0 SEER before 1/1/2023 14.3 SEER2 after 1/1/2023	AHRI 210/240—2017 before 1/1/2023 AHRI 210/240—2023 after 1/1/2023
			Single package, three phase and applications outside US single phase[b]	14.0 SEER before 1/1/2023 13.4 SEER2 after 1/1/2023	
Space constrained, air cooled (cooling mode)	≤ 30,000 Btu/h	All	Split system, three phase and applications outside US single phase[b]	12.0 SEER before 1/1/2023 11.7 SEER2 after 1/1/2023	AHRI 210/240—2017 before 1/1/2023 AHRI 210/240—2023 after 1/1/2023
			Single package, three phase and applications outside US single phase[b]	12.0 SEER before 1/1/2023 11.7 SEER2 after 1/1/2023	
Single duct, high velocity, air cooled (cooling mode)	< 65,000	All	Split system, three phase and applications outside US single phase[b]	12.0 SEER before 1/1/2023 12.0 SEER2 after 1/1/2023	AHRI 210/240—2017 before 1/1/2023 AHRI 210/240—2023 after 1/1/2023
Air cooled (cooling mode)	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric resistance (or none)	Split system and single package	11.0 EER 12.2 IEER before 1/1/2023 14.1 IEER after 1/1/2023	AHRI 340/360
		All other		10.8 EER 12.0 IEER before 1/1/2023 13.9 IEER after 1/1/2023	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric resistance (or none)		10.6 EER 11.6 IEER before 1/1/2023 13.5 IEER after 1/1/2023	
		All other		10.4 EER 11.4 IEER before 1/1/2023 13.3 IEER after 1/1/2023	
	≥ 240,000 Btu/h	Electric resistance (or none)		9.5 EER 10.6 IEER before 1/1/2023 12.5 IEER after 1/1/2023	
		All other		9.3 EER 10.4 IEER before 1/1/2023 12.3 IEER after 1/1/2023	
Air cooled (heating mode)	< 65,000 Btu/h	All	Split system, three phase and applications outside US single phase[b]	8.2 HSPF before 1/1/2023 7.5 HSPF2 after 1/1/2023	AHRI 210/240—2017 before 1/1/2023 AHRI 210/240—2023 after 1/1/2023
			Single package, three phase and applications outside US single phase[b]	8.0 HSPF before 1/1/2023 6.7 HSPF2 after 1/1/2023	

TABLE C403.3.2(2)—continued
ELECTRICALLY OPERATED AIR-COOLED UNITARY HEAT PUMPS—MINIMUM EFFICIENCY REQUIREMENTS[a, d]

EQUIPMENT TYPE	SIZE CATEGORY	HEADING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE[a]
Space constrained, air cooled (heating mode)	≤ 30,000 Btu/h	All	Split system, three phase and applications outside US single phase[b]	7.4 HSPF before 1/1/2023 6.3 HSPF2 after 1/1/2023	AHRI 210/240—2017 before 1/1/2023 AHRI 210/240—2023 after 1/1/2023
			Single package, three phase and applications outside US single phase[b]	7.4 HSPF before 1/1/2023 6.3 HSPF2 after 1/1/2023	
Small duct, high velocity, air cooled (heating mode)	< 65,000 Btu/h	All	Split system, three phase and applications outside US single phase[b]	7.2 HSPF before 1/1/2023 6.1 HSPF2 after 1/1/2023	AHRI 210/240—2017 before 1/1/2023 AHRI 210/240—2023 after 1/1/2023
Air cooled (heating mode)	≥ 65,000 Btu/h and < 135,000 Btu/h (cooling capacity)	All	47°F db/43°F wb outdoor air	3.30 COP_H before 1/1/2023 3.40 COP_H after 1/1/2023	AHRI 340/360
			17°F db/15°F wb outdoor air	2.25 COP_H	
	≥ 135,000 Btu/h and < 240,000 Btu/h (cooling capacity)		47°F db/43°F wb outdoor air	3.20 COP_H before 1/1/2023 3.30 SOP_H after 1/1/2023	
			17°F db/15°F wb outdoor air	2.05 COP_H	
	≥ 240,000 Btu/h (cooling capacity)		47°F db/43°F wb outdoor air	3.20 COP_H	
			17°F db/15°F wb outdoor air	2.05 COP_H	

a. Table from IECC 2021 – Electrically Operated Air-Cooled Unitary Heat Pumps – Minimum Efficiency Requirements

Table 9: Water Chilling Packages - Minimum Efficiency Requirements

TABLE C403.3.2(3)
WATER-CHILLING PACKAGES—MINIMUM EFFICIENCY REQUIREMENTS[a, b, e, f]

EQUIPMENT TYPE	SIZE CATEGORY	UNITS	PATH A	PATH B	TEST PROCEDURE[c]
Air cooled chillers	< 150 tons	EER (Btu/Wh)	≥ 10.100 FL	≥ 9.700 FL	AHRI 550/590
			≥ 13.700 IPLV.IP	≥ 15.800 IPLV.IP	
	≥ 150 tons		≥ 10.100 FL	≥ 9.700FL	
			≥ 14.000 IPLV.IP	≥ 16.100 IPLV.IP	
Air cooled without condenser, electrically operated	All capacities	EER (Btu/Wh)	Air-cooled chillers without condenser must be rated with matching condensers and comply with air-cooled chiller efficiency requirements		AHRI 550/590
Water cooled, electrically operated positive displacement	< 75 tons	kW/ton	≤ 0.750 FL	≤ 0.780 FL	AHRI 550/590
			≤ 0.600 IPLV.IP	≤ 0.500 IPLV.IP	
	≥ 75 tons and < 150 tons		≤ 0.720 FL	≤ 0.750 FL	
			≤ 0.560 IPLV.IP	≤ 0.490 IPLV.IP	
	≥ 150 tons and < 300 tons		≤ 0.660 FL	≤ 0.680 FL	
			≤ 0.540 IPLV.IP	≤ 0.440 IPLV.IP	
	≥ 300 tons and < 600 tons		≤ 0.610 FL	≤ 0.625 FL	
			≤ 0.520 IPLV.IP	≤ 0.410 IPLV.IP	
	≥ 600 tons		≤ 0.560 FL	≤ 0.585 FL	
			≤ 0.500 IPLV.IP	≤ 0.380 IPLV.IP	
Water cooled, electrically operated centrifugal	< 150 tons	kW/ton	≤ 0.610 FL	≤ 0.695 FL	AHRI 550/590
			≤ 0.550 IPLV.IP	≤ 0.440 IPLV.IP	
			≤ 0.610 FL	≤ 0.635 FL	
			≤ 0.550 IPLV.IP	≤ 0.400 IPLV.IP	
	≥ 300 tons and < 400 tons		≤ 0.560 FL	≤ 0.595 FL	
			≤ 0.520 IPLV.IP	≤ 0.390 IPLV.IP	
	≥ 400 tons and < 600 tons		≤ 0.560 FL	≤ 0.585 FL	
			≤ 0.500 IPLV.IP	≤ 0.380 IPLV.IP	
	≥ 600 tons		≤ 0.560 FL	≤ 0.585 FL	
			≤ 0.500 IPLV.IP	≤ 0.380 IPLV.IP	
Air cooled absorption, single effect	All capacities	COP (W/W)	≥ 0.600 FL	NA[d]	AHRI 560
Water cooled absorption, single effect	All capacities	COP (W/W)	≥ 0.700 FL	NA[d]	AHRI 560
Absorption double effect, indirect fired	All capacities	COP (W/W)	≥ 1.000 FL	NA[d]	AHRI 560
			≥ 0.150 IPLV.IP		
Absorption double effect, direct fired	All capacities	COP (W/W)	≥ 1.000 FL	NA[d]	AHRI 560
			≥ 1.000 IPLV		

a. Chapter 6 contains a complete specification of the referenced standards, which include test procedures, including the reference year version of the test procedure.
b. The requirements for centrifugal chillers shall be adjusted for nonstandard rating conditions per Section C403.3.2.1 and are applicable only for the range of conditions listed there. The requirements for air-cooled, water-cooled positive displacement and absorption chillers are at standard rating conditions defined in the reference test procedure.
c. Both the full-load and IPLV.IP requirements must be met or exceeded to comply with this standard. When there is a Path B, compliance can be with either Path A or Path B for any application.
d. NA means the requirements are not applicable for Path B, and only Path A can be used for compliance.
e. FL is the full-load performance requirements, and IPLV.IP is for the part-load performance requirements.
f. This table is a replica of ASHRAE 90.1 Table 6.8.1-3 Water-Chilling Packages—Minimum Efficiency Requirements.

a. From IECC 2021 – Electric Chillers, Air-Cooled and Water-Cooled minimum efficiencies

Table 10: Cooling and Heating Equivalent Full Load Hours

Building (or Space) Type	Cooling Full Load Hours ($EFLH_{cool}$)[a]	Heating Full Load Hours ($EFLH_{heat}$)[b]
Rhode Island Energy (NE – South Coastal)	817	1137

a. Average Cooling EFLHs from the 2010 NEEP HVAC Loadshape study.
b. Average Heating EFLHs derived from 2010 NEEP HVAC Loadshape study and the Connecticut Program Savings Document for 2011 Program Year.

Table 11: Baseline Efficiency Requirements for C&I Gas-Fired Boilers

Equipment Type	Subcategory	Size Category (Input)	Baseline Efficiency[a]	Minimum Efficiency[b]
Boilers, hot water	Gas-fired	<300,000 Btu/h	85% AFUE	90% AFUE for Tier 1 95% AFUE for Tier 2
		>=300,000 Btu/h and <=2,000,000 Btu/h	85% AFUE	90% E_t

a. NMR (2017). Gas Boiler Market Characterization Sutdy Phase II – Final Report.
b. Annual Fuel Utilization Efficiency (AFUE), Thermal efficiency (Et)

Table 12: Energy initiative, Prescriptive Lighting

Measure	RRe	RR sp	RR wp	Measure Life	Source/Notes for Measure Life
Daylight Dimming Controls	92.9%	99.2%	99.2%	9	c
Integrated Controls	92.9%	99.2%	99.2%	11	c
Occupancy Sensors Controls	100%	93.6%	93.6%	9	c
Exterior Fixtures 24/7	92.9%	99.2%	99.2%	5	b
Exterior Controls, Photocells	100%	98.2%	98.2%	9	c
Exterior Fixtures, Dusk/Dawn	92.9%	99.2%	99.2%	5	b
Exterior Controls, Streetlights	92.9%	99.2%	99.2%	9	c
Compact Fluorescents	92.9%	99.2%	99.2%	2	b
High Intensity Discharge Systems	107%	107%	107%	5	b
Fluorescent System w/Ballast	92.9%	99.2%	99.2%	6	b
Case Refrigeration lighting	92.9%	99.2%	99.2%	6	b
General lighting	92.9%	99.2%	99.2%	6	b
Replacement Lighting	92.9%	99.2%	99.2%	6	b
LED Exit Signs	103.2%	96.1%	96.1%	6	b

a. Realization Rate entries come from the 2022 BC Model and are the weighted average from 2018 pre post.
b. DNV (2022). Rhode Island C&I Lighting Market Characterization and Adjusted Measure Life Study.
c. Dan Mellinger's Lighting Control Measure Life Memo

Table 13: Design 2000, Prescriptive Lighting

Measure	RRe	RR sp	RR wp	NTG	Measure Life	Source / Notes for Measure Life
Daylight Dimming Controls	94.8%	99.6%	99.6%	75.7%	9	d
Integrated Controls	94.8%	99.6%	99.6%	75.7%	11	d
Occupancy Sensors Controls	108%	108%	108%	75.7%	9	d
Exterior Fixtures 24/7	94.8%	99.6%	99.6%	75.7%	15	e
Exterior Controls, Photocells	78%	78%	78%	75.7%	9	d
Exterior Fixtures, Dusk/Dawn	94.8%	99.6%	99.6%	75.7%	15	e
Exterior Controls, Streetlights	94.8%	99.6%	99.6%	75.7%	9	d
Compact Fluorescents	94.8%	99.6%	99.6%	75.7%	15	e
High Intensity Discharge Systems	94.8%	99.6%	99.6%	75.7%	15	e
Fluorescent System w/Ballast	94.8%	99.6%	99.6%	75.7%	15	e
Case Refrigeration lighting	94.8%	99.6%	99.6%	75.7%	15	e
General lighting	94.8%	99.6%	99.6%	75.7%	15	e
Replacement Lighting	94.8%	99.6%	99.6%	75.7%	6	c
LED Exit Signs	94.8%	99.6%	99.6%	75.7%	15	e

a. Realization Rate entries come from PY2019 C&I Free-Ridership and Spillover Study. Prepared by Tetra Tech.
b. DNV (2022). Rhode Island C&I Lighting Market Characterization and Adjusted Measure Life Study.
c. Dan Mellinger's Lighting Control Measure Life Memo
d. Based on MA 2023 BC Model. Assuming all Design 2000 lighting is for new building and major renovation.

Table 14: High Efficiency Condensing Unit

For the upstream HECU measure, prescriptive deemed savings are claimed based on a unit's temperature application, power phase requirements and compressor horsepower rating. For the purposes of the TRM, horsepower ratings are specified in 1/2 horsepower increments. In the event a qualifying unit falls somewhere in the middle of an established category, it will be assigned to the closest category with the most conservative total kWh savings.

HECU Electric Demand Savings

The tabulated energy savings values for each of the three components of the HECU (scroll compressor, compressor fans, floating head pressure controls) were divided by their respective annual full load operation hours, as described in the following table:

Component	Annual Full Operating Hours	Source
Scroll Compressor	2913 (w/ Economizer), 3910 (w/o Economizer)	EVT Refrigeration Analysis Tool (CATInput worksheet)
Compressor Fan(s)	6087	As derived in HECU Compressor Fan Loadshape F
Floating Head Pressure Controls	7221	EVT Refrigeration Analysis Tool (CATInput worksheet)

The resulting connected load savings is shown in the following table. Units are in kW. For the purposes of coincident peak demand savings claims, the savings for each component will be treated separately against its respective loadshape, as described in the load shape section.

Temp	Phase	HP	Scroll Compressor	Condenser Fan(s)	Floating Head Pressure Controls	Total (kW)
Medium	1	1	0.21997	0.07605	0.12982	0.42585
		1.5	0.16477	0.08149	0.15421	0.40047
		2	0.19216	0.09504	0.17984	0.46704
		2.5	0.22508	0.11132	0.21065	0.54705
		3	0.21755	0.14153	0.28241	0.64149
		3.5	0.30964	0.16165	0.30956	0.78086
		4	0.34246	0.17879	0.34237	0.86362
		4.5	0.34856	0.18197	0.34847	0.87901
		5	0.22508	0.18197	0.38505	0.82928
	3	1	0.15623	0.06806	0.11695	0.34125
		1.5	0.13245	0.07799	0.14330	0.35374
		2	0.15447	0.09095	0.16712	0.41255
		2.5	0.18093	0.10654	0.19576	0.48323
		3	0.18620	0.13028	0.24637	0.56284
		3.5	0.27717	0.14907	0.26912	0.69535
		4	0.30654	0.16487	0.29764	0.76905
		4.5	0.31200	0.16780	0.30294	0.78275
		5	0.27084	0.18512	0.34883	0.80478
Low	1	2	0.12604	0.09116	0.16728	0.38449
		2.5	0.11317	0.10645	0.20257	0.42219

		3	0.12627	0.11877	0.22601	0.47105
		3.5	0.15284	0.14376	0.27357	0.57016
		4.5	0.15564	0.15828	0.30390	0.61783
	3	2	0.09065	0.08296	0.15547	0.32908
		2.5	0.09374	0.09918	0.18896	0.38187
		3	0.10458	0.11065	0.21082	0.42606
		3.5	0.12659	0.13394	0.25518	0.51571
		4.5	0.16792	0.15403	0.28875	0.61070

HECU Electric Energy Savings

The following table outlines the energy savings associated with each specified unit. Units are in kWh.

Temp	Phase	HP	Scroll Compressor	Condenser Fan(s)	Floating Head Pressure Controls	Total (kWh)
Medium	1	1	838.1	462.9	937.5	2238.5
		1.5	627.8	496.0	1113.5	2237.4
		2	732.2	578.5	1298.6	2609.3
		2.5	857.6	677.6	1521.1	3056.3
		3	828.9	861.5	2039.3	3729.7
		3.5	1179.8	984.0	2235.4	4399.1
		4	1304.9	1088.3	2472.3	4865.4
		4.5	1328.1	1107.7	2516.3	4952.1
		5	971.9	1151.4	2780.5	4903.8
	3	1	595.3	414.3	844.5	1854.1
		1.5	504.7	474.7	1034.8	2014.2
		2	588.6	553.6	1206.8	2349.0
		2.5	689.4	648.5	1413.6	2751.4
		3	709.4	793.0	1779.0	3281.5
		3.5	1056.0	90.4	1943.3	3906.7
		4	1168.0	1003.5	2149.3	4320.8
		4.5	1188.8	1021.4	2187.6	4397.8
		5	1032.0	1126.8	2518.9	4677.6
Low	1	2	521.7	554.9	1208.0	2284.5
		2.5	468.4	648.0	1462.8	2579.2
		3	522.6	722.9	1632.0	2877.6
		3.5	632.6	875.1	1975.4	3483.1
		4.5	644.2	963.5	2194.5	3802.2
	3	2	375.2	505.0	1122.7	2002.8
		2.5	388.0	603.7	1364.5	2356.1
		3	432.9	673.5	1522.3	2628.7
		3.5	523.9	815.3	1842.7	3181.9
		4.5	695.0	937.6	2085.1	3717.7

Table 15: Low Pressure Drop Filter NEMA Premium Motor Full Load Efficiency

HP	Efficiency
15	92.4%
20	93.0%
25	93.6%
30	93.6%
40	94.1%
50	94.5%
60	95.0%
75	95.4%

Source: U.S. Department of Energy (2014). Premium Efficiency Motor Selection and Application Guide. https://www.energy.gov/eere/amo/articles/premium-efficiency-motor-selection-and-application-guide-handbook-industry

Table 16: HVAC Interactive Lighting Effects for C&I Lighting

Program	Lighting Type	Gas Impact (MMBtu/ΔkWh)[i]	Oil Impact (MMBtu/ΔkWh)[i]
C&I New Construction	Lighting Systems	-0.00043	-0.00083
	Lighting Controls	-0.00028	-0.00055
	Upstream Lighting - LEDs	-0.00050[ii]	
	Upstream Lighting - Fluorescents	-0.00039	-0.00077
C&I Retrofit	Lighting Systems	-0.00043	-0.00083
	Lighting Controls	-0.00028	-0.00055

[i] C&I Lighting Interactive Effects 2015
[ii] Heating interactive effect; DNV-GL (2018), Impact Evaluation of PY2015 C&I Upstream Lighting

Appendix B: Non-Energy Impacts

Table 1: Per Measure Residential Non-Energy Impacts for Electric and Gas Programs

End Use	TRM Measures	NEI	Description	Value or Algorithm	Basis	Duration
Lighting	Indoor Fixture Outdoor Fixture LED Fixture	Lighting Quality and Lifetime	O&M savings due to more efficient fixtures	$3.50	per measure	One Time
	LED Bulb	Lighting Quality and Lifetime	O&M savings due to more efficient bulbs	$3.00	per measure	One Time
Various	All Measures with oil savings	National Security	Reducing the need for foreign energy imports thereby increasing national security	MMBTU Oil Savings * $1.83	per measure	Annual
	All electric measures with kWh savings and all gas measures with MMBTU savings.	Rate Discounts	Financial savings to utility as a result of a smaller portion of energy being sold at the low income rate	**Elec:** (kwh savings per measure)*(A16-A60) **Gas:** (therms savings per measure)*(R12-R13)	per measure	Annual

(1) The NEIs in this table represent impacts that accrue specifically to measures in the 2024 Rhode Island portfolio of programs.

(2) Lighting Quality and Lifetime Source: "Massachusetts Program Administrators: Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation," NMR Group, Inc., Tetra Tech. 8.15.2011

Table 2: Annual per kWh Non-Energy Impacts for Commercial and Industrial Electric Programs

Program		End Use	NEI	Annual $/kWh	Source
New Construction	Prescriptive	Lighting	O&M	0.020	1
		Motors/Drives	O&M, Non-O&M	0.003	3
		EMS	O&M, Non-O&M	0.111	3
		Envelope	O&M, Non-O&M	0.11	3
		Lighting Controls	O&M, Non-O&M	0.07	3
		Refrigeration	O&M, H&S, etc.	0.001	3
		Food Service	O&M, H&S, etc.	0.01	3
	Custom	EMS	O&M, Non-O&M	0.037	3
		Envelope	O&M, Non-O&M	0.036	3
		Lighting Controls	O&M, Non-O&M	0.087	3
		Refrigeration	O&M, Non-O&M	0.012	3
		Process	O&M, Non-O&M	0.091	3
		HVAC	O&M, Non-O&M	0.02	3
		Motors/Drives	O&M, Non-O&M	0.018	3
		Compressed Air	O&M	0.026	1
		Food Service	O&M, H&S, etc.	0.01	3
Retrofit	Prescriptive	HVAC	Administrative costs, other costs, other labor costs, O&M, rent revenue	0.11	2
		Lighting	Administrative costs, material handling, material movement, other labor costs, O&M, sales revenue, waste disposal	0.027	2
		Refrigeration	Administrative costs, material handling, material movement, other costs, other labor costs, O&M, product spoilage, rent revenue, sales revenue,	0.047	2
		EMS	O&M, Non-O&M	0.116	3
		Envelope	O&M, Non-O&M	0.119	3
		Lighting Controls	O&M, Non-O&M	0.101	3
		Motors/Drives	O&M, Non-O&M	0.003	3
		Process	O&M, Non-O&M	0.098	3

		Compressed Air	Administrative costs, material handling, material movement, other costs,	0.056	2
		Food Service	O&M, H&S, etc.	0.01	3
	Custom	EMS	O&M, Non-O&M	0.042	3
		Envelope	O&M, Non-O&M	0.045	3
		Lighting Controls	O&M, Non-O&M	0.084	3
		Motors/Drives	O&M, Non-O&M	0.018	3
		Refrigeration	Administrative costs, material handling, material movement, other costs, other labor costs, O&M, product spoilage, rent revenue, sales revenue,	0.0474	2
		HVAC	O&M, Non-O&M	0.037	3
		CHP Systems	Administrative costs, O&M	-0.0147	2
		Lighting	Administrative costs, material handling, material movement, other costs, other labor costs, O&M, product spoilage, rent revenue, sales revenue,	0.059	2
		Process	O&M, Non-O&M	0.098	3
		Compressed Air	Administrative costs, material handling, material movement, other costs, other labor costs, O&M, product spoilage, rent revenue, sales revenue,	0.056	2
		Food Service	O&M, H&S, etc.	0.01	3

(1) Tetra Tech (2015) Stage 2 Results - Commercial and Industrial New Construction Non-Energy Impacts Study - Final Report

(2) Tetra Tech (2012), Final Report - Commercial and Industrial Non-Energy Impacts Study

(3) DNV (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMNEI)

Table 3: Annual per Therm Non-Energy Impacts for Commercial and Industrial Gas Programs

Program		End Use	NEI	Annual $/Therm	Source
New Construction	Prescriptive	Boilers	Admin costs, material movement, other costs, other labor, O&M, product spoilage, waste disposal	-0.08	1
		Other Gas Heating	Admin costs, material movement, other costs, other labor, O&M, product spoilage, waste disposal	0.05	1
		Hot Water	O&M, Non-O&M	0.08	3
		EMS	O&M, Non-O&M	0.68	3
		HVAC	O&M, Non-O&M	0.56	3
		HVAC/Heat Recovery	Admin costs, material movement, other costs, other labor, O&M, product spoilage, waste disposal	0.24	1
		Envelope	O&M, Non-O&M	0.32	3
	Custom	Commercial Kitchen	Admin costs, material movement, other costs, other labor, O&M, product spoilage, waste disposal	3.40	1
		Hot Water	O&M, Non-O&M	0.35	3
		Process	O&M, Non-O&M	-0.05	3
		HVAC	O&M, Non-O&M	-0.07	3
		Other	Admin costs, material movement, other costs, other labor, O&M, product spoilage, waste disposal	-0.03	1
		Envelope	O&M, Non-O&M	0.32	3
Retrofit	Prescriptive	HVAC	Admin costs, material movement, other costs, other labor, O&M, product spoilage, waste disposal	1.35	2
		Hot Water	O&M, Non-O&M	0.08	3
		EMS	O&M, Non-O&M	0.68	3
		Envelope	O&M, Non-O&M	0.32	3
	Custom	HVAC	Admin costs, material movement, other costs, other labor, O&M, product spoilage, waste disposal	0.23	2
		Hot Water	O&M, Non-O&M	0.35	3
		Process	O&M, Non-O&M	-0.05	3
		EMS	O&M, Non-O&M	0.04	3
		Envelope	O&M, Non-O&M	0.32	3

(1) Tetra Tech (2015) Stage 2 Results - Commercial and Industrial New Construction Non-Energy Impacts Study - Final Report

(2) Tetra Tech (2012), Final Report - Commercial and Industrial Non-Energy Impacts Study

(3) DNV (2021). O&M and Non-O&M NEI Study (MA20X10-B-CIOMNEI)

Table 4: Per Participant Non-Energy Impacts for Residential Electric Measures

Program	NEI	Description	Measure Category	Value	Duration
Residential New Construction	Thermal Comfort	Greater participant-perceived comfort in home	Heating System	$91.50	Annual
	Noise Reduction	Less participant-perceived noise in the home		$47.53	Annual
	Asthma Related	Combustion stove NOx		$3.28	Annual
		ERV/HRV reduction of formaldehyde		$0.02	Annual
Residential Cooling and Heating Equipment	Thermal Comfort	Greater participant-perceived comfort in home	Cool Smart AC System	$2.24	Annual
			Cool Smart HP System	$2.88	
			Ductless Mini Split HP System	$2.53	
			Down size 1/2 ton	$0.19	
			QIV and Check up	$0.47	
			Thermostats	$3.07	
	Noise Reduction	Less participant-perceived noise in the home	Cool Smart AC System	$2.03	Annual
	Home Durability	Increased home durability from better quality heating, cooling and structural materials	Cool Smart AC System	$0.65	Annual
			Cool Smart HP System	$0.84	
			Ductless Mini Split HP System	$0.65	
			Down size 1/2 ton	$0.07	
			QIV and Check up	$0.18	
			Thermostats	$1.33	
	Equipment Maintenance	Reduced maintenance costs of owning newer and/or more efficient appliance equipment	Cool Smart AC System	$1.07	Annual
			Cool Smart HP System	$1.34	
			Ductless Mini Split HP System	$0.95	
			Down size 1/2 ton	$0.37	

Program	NEI	Description	Measure Category	Value	Duration
			QIV and Check up	$0.87	
	Health Benefits	Fewer colds and viruses, improved indoor air quality and ease of maintaining healthy relative humidity from weatherization	Cool Smart AC System	$0.07	Annual
			Cool Smart HP System	$0.09	
			Ductless Mini Split HP System	$0.08	
			Down size 1/2 ton	$0.01	
			QIV and Check up	$0.01	
			Thermostats	$0.13	
Single Family - Income Eligible Services	Arrearages	Reduced arrearage carrying costs as a result of customers being more able to pay their lower bills	Basic Educational Measures	$2.61	Annual
	Bad Debt Write-offs	Reduced costs to utility of uncollectable, unpaid balances as a result of customers being more able to pay their lower bills		$3.74	Annual
	Terminations and Reconnections	Reduced costs associated with terminations and reconnections to utility due to nonpayment as a result of customers being more able to pay their lower bills		$0.43	Annual
	Customer Calls and Collections	Utility savings in staff time and materials for fewer customer calls as a result of more timely bill payments		$0.58	Annual
	Notices	Financial savings to utility as a result of fewer notices sent to customers for late payments and		$0.34	Annual

Program	NEI	Description	Measure Category	Value	Duration
		terminations			
	Improved Safety	Reduced risk of fire and fire-related property damage		$2.67	Annual
	Price Hedging		NA	$0.005/kWh	One-Time
	Thermal Comfort	Greater participant-perceived comfort in home	Insulation	$30.13	Annual
			Air Sealing	$35.89	
			Heating System / Heat Pump	$33.24	
			Duct sealing	$0.81	
			Pipe wrap	$6.60	
			Thermostat	$5.78	
	Noise Reduction	Less participant-perceived noise in the home	Insulation	$13.56	Annual
			Air Sealing	$16.39	
	Home Durability	Increased home durability from better quality heating, cooling and structural materials	Insulation	$8.76	Annual
			Air Sealing	$10.61	
			Heat pumps	$9.72	
			Thermostat	$1.68	
			Hot Water System	$0.20	
			Air Sealing	$5.69	
			Duct Sealing	$0.23	
			Heating System	$27.43	
			HP Water Heater	$0.20	
	Equipment Maintenance	Reduced maintenance costs of owning newer and/or more efficient appliance equipment	Heating System	$9.72	Annual
			Heat Pumps	$27.43	

Program	NEI	Description	Measure Category	Value	Duration
	Health Benefits	Fewer colds and viruses, improved indoor air quality and ease of maintaining healthy relative humidity from weatherization	Insulation	$193.15	Annual
			Duct sealing	$5.17	
			Pipe wrap	$42.43	
			Air Sealing	$230.08	
			Heating System/Heat Pumps	213.13	
			Thermostat	37.07	
	Safety-Related Emergency Calls	Financial savings to the utility as a result of fewer safety related emergency calls being made	Heating System/Heat Pumps	$8.43	Annual
	Improved Safety	Reduced risk of fire and fire-related property damage	Insulation	$17.40	Annual
			Air Sealing	$2.24	
			Heating System/ Heat Pumps	$18.87	
			Hot Water System	$4.44	
			Replacement Freezer/Refrigerator	$1.40	
	Thermal Comfort	Greater participant-perceived comfort in home	Window AC	$49.50	Annual
	Property Value Increase		Replacement Freezer/Refrigerator	$26.61	One-Time
			Showerhead	$1.72	
EnergyWise Single Family	Thermal Comfort	Greater participant-perceived comfort in home	Insulation	$25.15	Annual
			Air Sealing	$10.13	
			Thermostat	$3.99	
	Noise Reduction	Less participant-perceived noise in the home	Insulation	$11.54	Annual
			Air Sealing	$4.88	
	Home Durability	Increased home durability in terms of maintenance requirements because of better quality heating,	Insulation	$9.82	Annual
			Air Sealing	$3.95	
			Thermostat	$1.33	

Program	NEI	Description	Measure Category	Value	Duration
		cooling and structural materials			
	Health Benefits	Fewer colds and viruses, improved indoor air quality and ease of maintaining healthy relative humidity as a result of weatherization in home	Insulation	$0.80	Annual
			Air Sealing	$0.32	
			Thermostat	$0.13	
	Property Value Increase		Showerheads	$0.37	One-Time
			Refrigerator	$1.44	
			Residential Window	$6.72	Annual
EnergyWise Multifamily	Thermal Comfort	Greater participant-perceived comfort in home	Insulation	$25.15	Annual
			Air Sealing	$10.13	
			Thermostat	$3.99	
	Noise Reduction	Less participant-perceived noise in the home	Insulation	$11.54	Annual
			Air Sealing	$4.88	
	Home Durability	Increased home durability in terms of maintenance requirements because of better quality heating, cooling and structural materials	Insulation	$9.82	Annual
			Air Sealing	$2.58	
			Aerator	$0.37	
			Showerheads	$0.37	
			Thermostat	$4.05	
	Health Benefits	Fewer colds and viruses, improved indoor air quality and ease of maintaining healthy relative humidity as a result of weatherization in home	Insulation	$0.80	Annual
			Air Sealing	$0.32	
			Thermostat	$0.13	
	Rental Units	Financial savings to owners	Showerheads/Aerator	$0.01	Annual

Program	NEI	Description	Measure Category	Value	Duration
	Marketability	of MF rental housing as a result of increased marketability of the more efficient housing.	Air Sealing	$0.07	
			Refrigerator	$0.34	
			Thermostat	$0.11	
	Reduced Tenant Complaints	Savings to owners of MF rental housing in terms of staff time and materials as a result of fewer tenant complaints with the more efficient measures.	Showerheads/Aerator	$0.20	Annual
			Air Sealing	$1.37	
			Refrigerator	$12.90	
			Thermostat	$2.16	
	Operations & Maintenance		Common Area Lighting	$0.03/kWh	Annual
				$14.12	Annual
	Equipment Maintenance	Reduced maintenance costs of owning newer and/or more efficient appliance equipment	Thermostat	$3.91	Annual
	Lighting Quality and Lifetime	Better lighting quality and longer life	Lighting - Bulbs	$3.00	One-Time
			Lighting - Fixtures	$3.50	One-Time
	Rental Property Value Increase		Refrigerator	$6.86	Annual
EnergyWise Income Eligible Multifamily	Arrearages	Reduced arrearage carrying costs as a result of customers being more able to pay lower bills	N/A	$2.61	Annual

Program	NEI	Description	Measure Category	Value	Duration
Retrofit	Bad Debt Write-offs	Reduced costs to utility of uncollectable, unpaid balances as a result of customers being more able to pay their lower bills		$3.74	Annual
	Terminations and Reconnections	Reduced costs associated with terminations and reconnections to utility due to nonpayment as a result of customers being more able to pay their lower bills		$0.43	Annual
	Customer Calls and Collections	Utility savings in staff time and materials for fewer customer calls as a result of more timely bill payments		$0.58	Annual
	Price Hedging			$0.005/kWh	One-Time
	Notices	Financial savings to utility as a result of fewer notices sent to customers for late payments and terminations		$0.34	Annual
	Thermal Comfort	Greater participant-perceived comfort in home	Insulation	$342.24	Annual
			Heating System	$741.52	
			Heat Pumps – Oil	$836.39	
			Air Sealing	$342.24	
	Noise Reduction	Less participant-perceived noise in the home	Insulation	$13.56	Annual
			Air Sealing	$16.39	
	Home Durability	Increased home durability in terms of maintenance	Insulation	$8.76	Annual
			Air Sealing	$2.58	

Program	NEI	Description	Measure Category	Value	Duration
		requirements because of better quality heating, cooling and structural materials	Heating System	$27.43	
			Thermostat	$4.05	
			Showerheads/Aerator	$0.37	
	Health Benefits	Fewer colds and viruses, improved indoor air quality and ease of maintaining healthy relative humidity as a result of weatherization in home	Insulation	$11.76	Annual
			Heating System	$25.48	
			Air Sealing	$11.76	
	Improved Safety	Reduced risk of fire and fire-related property damage	Insulation	$3.12	Annual
			Air Sealing	$3.12	
			Heating System	$6.76	
	Home Productivity	Reduced bad days due to rest/sleep	Insulation	$11.76	Annual
			Air Sealing	$11.76	
			Heating System	$25.48	
	Rental Units Marketability	Financial savings to owners of MF rental housing as a result of increased marketability of the more efficient housing.	Air Sealing	$0.07	Annual
			Water Heater	$0.01	
			Thermostat	$0.11	
			Common Area Lighting/Fixtures	$0.44	
			Showerheads/Aerator	$0.01	
	Reduced Tenant Complaints	Savings to owners of MF rental housing in terms of staff time and materials as a result of fewer tenant complaints with the more efficient measures.	Air Sealing	$1.37	Annual
			Water Heater	$0.20	
			Thermostat	$2.16	
			Showerheads/Aerator	$0.20	

Program	NEI	Description	Measure Category	Value	Duration
	Safety-Related Emergency Calls	Financial savings to the utility as a result of fewer safety related emergency calls being made	Heating System	$8.43	Annual
	Lighting Quality and Lifetime	Better lighting quality and longer life	Common Area Lighting/Fixtures	$0.03/kWh	Annual
				$16.95	
			Common Area Lighting	$3.00	One-Time
			Common Area Fixtures	$3.50	
	Rental Property Value Increase		Common Area Lighting/Fixtures	$7.83	One-Time
	Equipment Maintenance	Reduced maintenance costs of owning newer and/or more efficient appliance equipment	Heating System	$27.43	Annual
			Thermostat	$3.91	

Sources:

(1) Residential New Construction Source: Massachusetts Program Administrators: Massachusetts Special and Cross-Sector Studies Area, Residential New Construction Quick Hit Non-Energy Impacts (NEI) Evaluation, prepared by NMR Group, Inc. and Three3, Inc.

(2) EnergyWise Single Family and Income Eligible Services Single Family Sources: For Thermal Comfort, Health Benefits, and Improved Safety - "Massachusetts Special and Cross-Cutting Research Area: Low-Income Single-Family Health- and Safety-Related Non-Energy Impacts (NEIs) Study (August 5, 2016) prepared by Three3, Inc. and NMR Group." For other NEIs - "Massachusetts Program Administrators: Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation," NMR Group, Inc., Tetra Tech. 8.15.2011

(3) EnergyWise Multifamily Retrofit Source: Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation, prepared by NMR Group, Inc. and Tetra Tech. Massachusetts Market-Rate Rental Property NEI Study, prepared by NMR Group and DNV GL.

(4) EnergyWise Income Eligible Multifamily Retrofit Source: EnergyWise Multifamily Retrofit Source: Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation, prepared by NMR Group, Inc. and Tetra Tech. Massachusetts Market-Rate Rental Property NEI Study, prepared by NMR Group and DNV GL. Massachusetts Low-Income Multifamily Health- and Safety-Related NEIs Study, prepared by NMR Group, Inc. and Three3, Inc.

(5) Price Hedging Source: Lawrence Berkeley National Laboratory (2002). Quantifying the Value That Wind Power Provides as a Hedge Against Volatile Natural Gas Prices.

Table 5: Per Participant Non-Energy Impacts for Residential Gas Programs

Program	NEI	Description	Measure Category	Value	Duration
Residential Heating and Cooling equipment	Thermal Comfort	Greater participant-perceived comfort in home	Combo Condensing boiler/DHW	$1.21	Annual
			Furnace w/ECM	$27.18	
			Boiler 90%	$27.61	
			Boiler 95%	$27.49	
			Thermostat	$3.99	
	Home Durability	Increased home durability in terms of maintenance requirements because of better quality heating, cooling and structural materials	Combo Condensing boiler/DHW	$0.39	Annual
			DHW - Condensing	$0.70	
			DHW - Tankless	$1.23	
			DHW - Stand Alone	$1.30	
			Furnace w/ECM	$7.12	
			Boiler 90%	$7.33	
			Boiler 95%	$7.28	
			Thermostat	$1.33	
	Equipment Maintenance	Reduced maintenance costs of owning newer and/or more efficient appliance equipment	Combo Condensing boiler/DHW	$1.10	Annual
			Furnace w/ECM	$11.98	
			Boiler 90%	$13.88	
			Boiler 95%	$13.47	
	Health Benefits	Fewer colds and viruses, improved indoor air quality and ease of maintaining healthy relative humidity from weatherization	Combo Condensing boiler/DHW	$0.04	Annual
			Furnace w/ECM	$0.87	
			Boiler 90%	$0.89	
			Boiler 95%	$0.88	
			Thermostat	$0.13	
EnergyWise Single Family	Thermal Comfort	Greater participant-perceived comfort in home	Air Sealing	$10.13	
			Thermostat	$3.99	
			Insulation	$25.15	

Program	NEI	Description	Measure Category	Value	Duration
	Noise Reduction	Less participant-perceived noise in the home	Air Sealing	$4.88	Annual
			Insulation	$11.54	
	Home Durability	Increased home durability from better quality heating, cooling and structural materials	Air Sealing	$3.95	Annual
			Thermostat	$1.33	
			Insulation	$9.82	
	Health Benefits	Fewer colds and viruses, improved indoor air quality and ease of maintaining healthy relative humidity from weatherization	Air Sealing	$0.32	Annual
			Thermostat	$0.13	
			Insulation	$0.80	
EnergyWise Multi Family / C&I Multifamily	Thermal Comfort	Greater participant-perceived comfort in home	Insulation	$25.15	Annual
			Duct Sealing	$0.16	
			Thermostat	$3.99	
			Air Sealing	$10.13	
	Noise Reduction	Less participant-perceived noise in the home	Insulation	$11.54	Annual
			Air Sealing	$4.88	
	Property Durability	Increased home durability in terms of maintenance requirements because of better quality heating, cooling and structural materials	Insulation	$9.82	Annual
			Duct Sealing	$0.06	
			Thermostat	$4.05	
			Showerhead/Aerators	$0.37	
			Air Sealing	$3.95	
	Health Benefits	Fewer colds and viruses, improved indoor air quality and ease of maintaining healthy relative humidity as a result of weatherization in	Insulation	$0.80	Annual
			Duct Sealing	$0.01	
			Thermostat	$0.13	
			Air Sealing	$0.32	

Program	NEI	Description	Measure Category	Value	Duration
		home			
	Equipment Maintenance	Reduced maintenance costs of owning newer and/or more efficient appliance equipment	Thermostat	$3.91	Annual
	Rental Units Marketability	Financial savings to owners of MF rental housing as a result of increased marketability of the more efficient housing.	Thermostat	$0.11	Annual
			Showerhead/Aerators	$0.01	
	Reduced Tenant Complaints	Savings to owners of MF rental housing in terms of staff time and materials as a result of fewer tenant complaints with the more efficient measures.	Thermostat	$2.16	Annual
			Showerhead/Aerators	$0.20	
Single Family - Income Eligible Services	Safety-Related Emergency Calls	Financial savings to the utility as a result of fewer safety related emergency calls being made	Heating System	$8.43	Annual
	Thermal Comfort	Greater participant-perceived comfort in home	Insulation	$30.13	Annual
			Air Sealing	$35.89	
			Heating System	$33.24	
	Noise Reduction	Less participant-perceived noise in the home	Insulation	$13.56	Annual
			Air Sealing	$16.39	
	Home Durability	Increased home durability in terms of maintenance requirements because of better quality heating, cooling and structural materials	Insulation	$8.76	Annual
			Air Sealing	$10.61	
			Heating System	$27.43	

Program	NEI	Description	Measure Category	Value	Duration
	Equipment Maintenance	Reduced maintenance costs of owning newer and/or more efficient appliance equipment	Heating System	$9.72	Annual
	Health Benefits	Fewer colds and viruses, improved indoor air quality and ease of maintaining healthy relative humidity as a result of weatherization in home	Insulation	$193.15	Annual
			Air Sealing	$230.08	
			Heating System	$213.13	
	Improved Safety	Reduced risk of fire and fire-related property damage	Insulation	$17.40	Annual
			Air Sealing	$2.24	
			Heating System	$18.87	
	Price Hedging		N/A	$0.76/MMBtu	One Time
	Arrearages	Reduced arrearage carrying costs as a result of customers being more able to pay their lower bills	Participant	$2.61	Annual
	Bad Debt Write-offs	Reduced costs to utility of uncollectable, unpaid balances as a result of customers being more able to pay their lower bills		$3.74	Annual
	Terminations and Reconnections	Reduced costs associated with terminations and reconnections to utility due to nonpayment as a result of customers being more able to pay their lower bills		$0.43	Annual

Program	NEI	Description	Measure Category	Value	Duration
	Customer Calls and Collections	Utility savings in staff time and materials for fewer customer calls as a result of more timely bill payments		$0.58	Annual
	Notices	Financial savings to utility as a result of fewer notices sent to customers for late payments and terminations		$0.34	Annual
EnergyWise Income Eligible Multifamily Retrofit	Rental Units Marketability	Financial savings to owners of LI rental housing as a result of increased marketability of the more efficient housing.	Air Sealing	$0.07	Annual
			Water Heater	$0.01	
			Showerhead/Aerators	$0.01	
			Thermostat	$0.11	
	Improved Safety	Reduced risk of fire and fire-related property damage	Insulation	$2.40	Annual
			Air Sealing	$0.31	
			Water Heater	$0.61	
			Heating System	$2.60	
	Property Durability	Financial savings to owners of LI rental housing as a result of more durable and efficient materials being installed.	Air Sealing	$2.58	Annual
			Water Heater	$0.37	
			Showerhead/Aerators	$0.37	
			Heating System	$9.72	
	Reduced Tenant Complaints	Savings to owners of LI rental housing in terms of staff time and materials as a result of fewer tenant complaints with the more efficient measures.	Air Sealing	$1.37	Annual
			Water Heater	$0.20	
			Showerhead/Aerators	$0.20	
			Thermostat	$2.16	

Program	NEI	Description	Measure Category	Value	Duration
	Safety-Related Emergency Calls	Financial savings to the utility as a result of fewer safety related emergency calls being made	Heating System	$8.43	Annual
	Price Hedging		N/A	$0.76/MMBtu	One Time
	Arrearages	Reduced arrearage carrying costs as a result of customers being more able to pay their lower bills	Participant	$2.61	Annual
	Bad Debt Write-offs	Reduced costs to utility of uncollectable, unpaid balances as a result of customers being more able to pay their lower bills		$3.74	Annual
	Terminations and Reconnections	Reduced costs associated with terminations and reconnections to utility due to nonpayment as a result of customers being more able to pay their lower bills		$0.43	Annual
	Customer Calls and Collections	Utility savings in staff time and materials for fewer customer calls as a result of more timely bill payments		$0.58	Annual
	Notices	Financial savings to utility as a result of fewer notices sent to customers for late payments and terminations		$0.34	Annual
	Thermal Comfort	Greater participant-perceived comfort in home	Insulation	$42.46	Annual
			Duct Sealing	$0.68	

Program	NEI	Description	Measure Category	Value	Duration
			Air Sealing	$31.73	
			Pipe wrap	$5.56	
			Thermostat	$4.87	
			Heating System	$38.92	
	Noise Reduction	Less participant-perceived noise in the home	Insulation	$13.56	Annual
			Air Sealing	$16.39	
	Property Durability	Increased home durability in terms of maintenance requirements because of better quality heating, cooling and structural materials	Insulation	$8.76	Annual
			Duct Sealing	$0.23	
			Air Sealing	$10.61	
			Thermostat	$4.05	
			Heating System	$9.72	
	Equipment Maintenance	Reduced maintenance costs of owning newer and/or more efficient appliance equipment	Thermostat	$3.91	Annual
			Heating System	$27.43	
	Health Benefits	Fewer colds and viruses, improved indoor air quality and ease of maintaining healthy relative humidity as a result of weatherization in home	Insulation	$33.83	Annual
			Duct Sealing	$0.13	
			Air Sealing	$25.28	
			Pipe wrap	$1.05	
			Thermostat	$0.92	
			Heating System	$31.00	

Sources:

Residential New Construction Source: Massachusetts Program Administrators: Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation, prepared by NMR Group, Inc. and Tetra Tech.

EnergyWise Single Family and Income Eligible Services Single Family Sources: For Thermal Comfort, Health Benefits, and Improved Safety Massachusetts Special and Cross-Cutting Research Area: Low-Income Single-Family Health- and Safety-Related Non-Energy Impacts (NEIs) Study (August 5, 2016) prepared by Three3, Inc. and NMR

Group.For other NEIs - "Massachusetts Program Administrators: Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation," NMR Group, Inc., Tetra Tech. 8.15.2011

EnergyWise Multifamily Retrofit Source: Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation, prepared by NMR Group, Inc. and Tetra Tech. Massachusetts Market-Rate Rental Property NEI Study, prepared by NMR Group and DNV GL.

EnergyWise Income Eligible Multifamily Retrofit Source: EnergyWise Multifamily Retrofit Source: Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation, prepared by NMR Group, Inc. and Tetra Tech. Massachusetts Market-Rate Rental Property NEI Study, prepared by NMR Group and DNV GL. Massachusetts Low-Income Multifamily Health- and Safety-Related NEIs Study (Phase 1), prepared by NMR Group, Inc. and Three3, Inc.

Price Hedging Source: Lawrence Berkeley National Laboratory (2002). Quantifying the Value That Wind Power Provides as a Hedge Against Volatile Natural Gas Prices.

Appendix C: Acronyms

ACRONYM	DESCRIPTION
AC	Air Conditioning
AFUE	Annual Fuel Utilization Efficiency (see the Glossary)
AHU	Air Handling Unit
Btu	British Thermal Unit (see the Glossary)
CF	Coincidence Factor (see the Glossary)
CFL	Compact Fluorescent Lamp
CHP	Combined Heat and Power
COP	Coefficient of Performance (see the Glossary)
DCV	Demand Controlled Ventillation
DHW	Domestic Hot Water
DOER	Department of Energy Resources
DSM	Demand Side Management (see the Glossary)
ECM	Electrically Commutated Motor
EER	Energy Efficiency Ratio (see the Glossary)
EF	Efficiency Factor
EFLH	Equivalent Full Load Hours (see the Glossary)
ES	ENERGY STAR® (see the Glossary)
FCM	Forward Capacity Market
FR	Free-Ridership (see the Glossary)
HE	High-Efficiency
HID	High-Intensity Discharge (a lighting technology)
HP	Horse Power (see the Glossary)
HSPF	Heating Seasonal Performance Factor (see the Glossary)
HVAC	Heating, Ventilating, and Air Conditioning
ISO	Independent System Operator
ISR	In-Service Rate (see the Glossary)
kW	Kilo-Watt, a unit of electric demand equal to 1,000 watts
kWh	Kilowatt-Hour, a unit of energy (1 kilowatt of power supplied for one hour)
LED	Light-Emitting Diode (one type of solid-state lighting)
LCD	Liquid Crystal Display (a technology used for computer monitors and similar displays)
MMBtu	One million British Thermal Units (see “Btu” in the Glossary)
MW	Megawatt – a measure of electric demand equal to 1,000 kilowatts
MWh	Megawatt-hour – a measure of energy equal to 1,000 kilowatt-hours
NEB	Non-Electric Benefit (see the Glossary)
NEI	Non-Energy Impact
NE-ISO	New England Independent System Operator
NTG	Net-to-Gross (see the Glossary)
O&M	Operations and Maintenance
PA	Program Administrator (see the Glossary)
PC	Personal Computer
RR	Realization Rate (see the Glossary)
SEER	Seasonal Energy Efficiency Ratio (see the Glossary)
SO	Spillover (see the Glossary)
SPF	Savings Persistence Factor (see the Glossary)
SSL	Solid-State Lighting (e.g., LED lighting)
VSD	Variable-Speed Drive

Appendix D: Glossary

This glossary provides definitions as they are applied in this TRM for Rhode Island' energy efficiency programs. Alternate definitions may be used for some terms in other contexts.

TERM	DESCRIPTION
Adjusted Gross Savings	Gross savings (as calculated by the measure savings algorithms) that have been subsequently adjusted by the application of all impact factors except the net-to-gross factors (free-ridership and spillover).
AFUE	Annual Fuel Utilization Efficiency. The measure of seasonal or annual efficiency of a furnace or boiler. AFUE takes into account the cyclic on/off operation and associated energy losses of the heating unit as it responds to changes in the load, which in turn is affected by changes in weather and occupant controls.
Baseline Efficiency	The level of efficiency of the equipment that would have been installed without any influence from the program or, for retrofit cases where site-specific information is available, the actual efficiency of the existing equipment.
Btu	British thermal unit. A Btu is approximately the amount of energy needed to heat one pound of water by one degree Fahrenheit.
Coefficient of Performance (COP)	Coefficient of Performance is a measure of the efficiency of a heat pump, air conditioner, or refrigeration system. A COP value is given as the Btu output of a device divided by the Btu input of the device. The input and output are determined at AHRI testing standards conditions designed to reflect peak load operation.
Coincidence Factor (CF)	Coincidence Factors represent the fraction of connected load expected to occur concurrent to a particular system peak period; separate CF are found for summer and winter peaks. The CF given in the TRM includes both coincidence and diversity factors multiplied into one number. Coincidence factors are provided for peak periods defined by the NE-ISO for FCM purposes and calculated consistent with the FCM methodology.
Connected Load kW Savings	The connected load kW savings is the power saved by the equipment while in use. In some cases the savings reflect the maximum power draw of equipment at full load. In other cases the connected load may be variable, which must be accounted for in the savings algorithm.
Deemed Savings	Savings values (electric, fossil fuel and/or non-energy benefits) determined from savings algorithms with assumed values for all algorithm parameters. Alternatively, deemed savings values may be determined from evaluation studies. A measure with deemed savings will have the same savings per unit since all measure assumptions are the same. Deemed savings are used by program administrators to report savings for measures with well-defined performance characteristics relative to baseline efficiency cases. Deemed savings can simplify program planning and design, but may lead to over- or under-estimation of savings depending on product performance.
Deemed Calculated Savings	Savings values (electric, fossil fuel and/or non-energy benefits) that depend on a standard savings algorithm and for which at least one of the algorithm parameters (e.g., hours of operation) is project specific.
Demand Savings	The reduction in demand due to installation of an energy efficiency measure, usually expressed as kW and measured at the customer's meter (see Connected Load kW Savings).
Demand Side Management (DSM)	Strategies used to manage energy demand including energy efficiency, load management, fuel substitution, and load building.

TERM	DESCRIPTION
Diversity	A characteristic of a variety of electric loads whereby individual maximum demands occur at different times. For example, 50 efficient light fixtures may be installed, but they are not necessarily all on at the same time. See Coincidence Factor.
Diversity Factor	This TRM uses coincidence factors that incorporate diversity (See Coincidence Factor), thus this TRM has no separate diversity factors. A diversity factor is typically calculated as: 1) the percent of maximum demand savings from energy efficiency measures available at the time of the company's peak demand, or 2) the ratio of the sum of the demands of a group of users to their coincident maximum demand.
End Use	Refers to the category of end use or service provided by a measure or technology *(*e.g., lighting, cooling, etc.). For the purpose of this manual, the list of end-uses include: Lighting — HVAC Refrigeration — Hot Water Food Service — Behavior Compressed Air — Motors & Drives Products — Custom
Energy Efficiency Ratio (EER)	The Energy Efficiency Ratio is a measure of the efficiency of a cooling system at a specified peak, design temperature, or outdoor temperature. In technical terms, EER is the steady-state rate of heat energy removal (i.e. cooling capacity) of a product measured in Btuh output divided by watts input.
ENERGY STAR® (ES)	Brand name for the voluntary energy efficiency labeling initiative sponsored by the U.S. Environmental Protection Agency.
Energy Costing Period	A period of relatively high or low system energy cost, by season. The energy periods defined by ISO-NE are: • **Summer Peak**: 6am–10pm, Monday–Friday (except ISO holidays), June–September • **Summer Off-Peak:** Summer hours not included in the summer peak hours: 10pm–6am, Monday–Friday, all day on Saturday and Sunday, and ISO holidays, June–September • **Winter Peak:** 6am–10pm, Monday–Friday (except ISO holidays), January–May and October–December • **Winter Off-Peak:** Winter hours not included in the sinter peak hours: 10pm–6am, Monday–Friday, all day on Saturday and Sunday, and ISO holidays, January–May and October–December.
Equivalent Full Load Hours (EFLH)	The equivalent hours that equipment would need to operate at its peak capacity in order to consume its estimated annual kWh consumption (annual kWh/connected kW).
Free Rider	A customer who participates in an energy efficiency program, but would have installed some or all of the same measure(s) on their own, with no change in timing of the installation, if the program had not been available.
Free-Ridership Rate	The percentage of savings attributable to participants who would have installed the measures in the absence of program intervention.
Gross kW	Expected demand reduction based on a comparison of standard or replaced equipment and equipment installed through an energy efficiency program.
Gross kWh	Expected kWh reduction based on a comparison of standard or replaced equipment and equipment installed through an energy efficiency program.
Gross Savings	A saving estimate calculated from objective technical factors. In this TRM, "gross savings" are calculated with the measure algorithms and do not include any application of impact factors. Once impact factors are applied, the savings are called "Adjusted Gross Savings".

TERM	DESCRIPTION
High Efficiency (HE)	Refers to the efficiency measures that are installed and promoted by the energy efficiency programs.
Horsepower (HP)	A unit for measuring the rate of doing work. One horsepower equals about three-fourths of a kilowatt (745.7 watts).
Heating Seasonal Performance Factor (HSPF)	A measure of the seasonal heating mode efficiencies of heat pumps expressed as the ratio of the total heating output to the total seasonal input energy.
Impact Factor	Generic term for a value used to adjust the gross savings estimated by the savings algorithms in order to reflect the actual savings attributable to the efficiency program. In this TRM, impact factors include realization rates, in-service rates, savings persistence, peak demand coincidence factors, free-ridership, spillover and net-to-gross factors. See the section on Impact Factors for more detail.
In-Service Rate	The percentage of units that are actually installed. For example, efficient lamps may have an in-service rate less than 100% since some lamps are purchased as replacement units and are not immediately installed. The in-service rate for most measures is 100%.
Measure Life	The number of years that an efficiency measure is expected to garner savings. These are generally based on engineering lives, but sometimes adjusted based on observations of market conditions.
Lost Opportunity	Refers to a measure being installed at the time of planned investment in new equipment or systems. Often this reflects either new construction, renovation, remodeling, planned expansion or replacement, or replacement of failure.
Measure	A product (a piece of equipment), combination of products, or process designed to provide energy and/or demand savings. Measure can also refer to a service or a practice that provides savings. Measure can also refer to a specific combination of technology and market/customer/practice/strategy (e.g., direct install low income CFL).
Net Savings	The final value of savings that is attributable to a program or measure. Net savings differs from gross savings (or adjusted gross savings) because it includes adjustments due to free-ridership and/or spillover. Net savings is sometimes referred to as "verified" or “final” savings.
Net-to-Gross Ratio	The ratio of net savings to the adjusted gross savings (for a measure or program). The adjusted gross savings include any adjustment by the impact factors other than free-ridership or spillover. Net-to-gross is usually expressed as a percent.
Non-Electric Benefits (NEBs)	Quantifiable benefits (beyond electric savings) that are the result of the installation of a measure. Fossil fuel, water, and maintenance are examples of non-electric benefits. Non-electric benefits can be negative (i.e. increased maintenance or increased fossil fuel usage which results from a measure) and therefore are sometimes referred to as “non-electric impacts”.
Non-Participant	A customer that does not directly participate in an efficiency program.
On-Peak kW	See Summer/Winter On-peak kW
Operating Hours	Hours that a piece of equipment is expected to be in operation, not necessarily at full load (typically expressed per year).
Participant	A customer that reduces or otherwise modifies their energy end use patterns due to involvement in an efficiency program. Participation is measured differently in different programs. For several programs, a participant is defined as a customer account (electric or gas). In contrast, the Residential Consumer Products program measures participation by the number of rebates processed.

TERM	DESCRIPTION
Prescriptive Measure	A prescriptive measure is generally offered by use of a prescriptive form with a prescribed incentive based on the parameters of the efficient equipment or practice.
Realization Rate (RR)	The ratio of measure savings developed from impact evaluations to the estimated measure savings derived from the TRM savings algorithms. This factor is used to adjust the estimated savings when significant justification for such adjustment exists. The components of the realization rate are described in detail in the section on Impact Factors.
Retrofit	The replacement of a piece of equipment or device before the end of its useful or planned life for the purpose of achieving energy savings. "Retrofit" measures are sometimes referred to as "early retirement" when the removal of the old equipment is aggressively pursued.
Savings Persistence Factor (SPF)	Percentage of first-year energy or demand savings expected to persist over the life of the installed energy efficiency equipment. The SPF is developed by conducting surveys of installed equipment several years after installation to determine the operational capability of the equipment. In contrast, *measure persistence* takes into account business turnover, early retirement of installed equipment, and other reasons the installed equipment might be removed or discontinued. Measure persistence is generally incorporated as part of the measure life, and therefore is not included as a separate impact factor.
Seasonal Energy Efficiency Ratio (SEER)	A measurement of the efficiency of a central air conditioner over an entire season. In technical terms, SEER is a measure of equipment the total cooling of a central air conditioner or heat pump (in Btu) during the normal cooling season as compared to the total electric energy input (in watt-hours) consumed during the same period.
Sector	A grouping of participants by customer rate class. Programs are organized by these groupings. There are three sectors: Residential, Income Eligibe, and Commericial and Industrial.
Spillover Rate	The percentage of savings attributable to the program, but additional to the gross (tracked) savings of a program. Spillover includes the effects of (a) participants in the program who install additional energy efficient measures outside of the program as a result of hearing about the program and (b) non-participants who install or influence the installation of energy efficient measures as a result of being aware of the program.
Summer/Winter On-Peak kW	The average demand reduction during the summer/winter on-peak period. The summer on-peak period is 1pm-5pm on non-holiday weekdays in June, July and August; the winter on-peak period is 5pm-7pm on non-holiday weekdays in December and January.
Ton	Unit of measure for determining cooling capacity. One ton equals 12,000 Btu.
Watt	A unit of electrical power. Equal to 1/1000 of a kilowatt.

Fuel	TRM Sector	TRM Program Name	TRM Group Name	Change/Addition Made			Source of Change	Reason for Update
Electric, Gas	Res, Income Eligible, C&I	Identify the program name in the TRM	Identify the group/measure name in the TRM	What values were changed?	Previous Value	Updated Value	Identify the source of the change.	Please describe why the change was made.
Electric		ConnectedSolutions		Removed program from TRM				Removal from TRM no longer offered as part of EE programs
Electric	Residential	Residential New Construction	Residential New Construction Measures	Savings			Updated based on results from RNC Study	Cooling savings decreased by 2.61%, heating savings by 2.24%, hot water savings by 2.58%
Gas	Residential	Residential New Construction	Residential New Construction Measures	Savings			Updated based on results from RNC Study	Cooling savings decreased by 2.61%, heating savings by 2.24%, hot water savings by 2.58%
Electric	Residential	Residential Consumer Products	Most Efficient Dryer	Added measure			Energy Star Retail Products Platform	Added as a new measure to TRM/BCR model
Gas	Residential	Residential HVAC	WiFi Thermostat, Gas - Heat Only	Measure Life	15	11	S352	Recommnendation from Measure Life Review
Gas	Residential	Residential HVAC	WiFi Thermostat, Gas - Cooling and Heating	Measure Life	15	11	S352	Recommnendation from Measure Life Review
Electric	Residential	Residential HVAC	Central Heat Pump	Measure Life	18	20	S354	Recommnendation from Measure Life Review
Electric	Residential	Residential HVAC	Electric Resistance to MSHP	Measure Life	18	17	S354	Recommnendation from Measure Life Review
Electric	Residential	Residential HVAC	Mini Split Heat Pump QIV	Measure Life	18	17	S354	Recommnendation from Measure Life Review
Electric	Residential	Residential HVAC	MiniSplit HP	Measure Life	18	17	S354	Recommnendation from Measure Life Review
Electric	Residential	Energy Wise Single Family	Electric Resistance to MSHP	Measure Life	18	17	S354	Recommnendation from Measure Life Review
Electric	Residential	Energy Wise Multifamily	Heat Pumps	Measure Life	18	20	S354	Recommnendation from Measure Life Review
Electric	Residential	Energy Wise Multifamily	Refrig rebate	Measure Life	12	15	S356	Recommnendation from Measure Life Review
Electric	Residential	Energy Wise Single Family	Refrig rebate	Measure Life	12	15	S356	Recommnendation from Measure Life Review
Electric	Residential	Residential Consumer Products	Clothes Washer Most Efficient	Measure Life	11	14	S355	Recommnendation from Measure Life Review
Gas	Income Eligible	Income Eligible Single Family	Wi-Fi Thermostat, Gas	Measure Life	15	11	S352	Recommnendation from Measure Life Review
Electric	Income Eligible	Income Eligible Single Family	HP Water Heaters	Measure Life	10	15	S354	Recommnendation from Measure Life Review
Electric	Income Eligible	Income Eligible Single Family	MSHP - Electric Resistance	Measure Life	18	17	S354	Recommnendation from Measure Life Review
Electric	Income Eligible	Income Eligible Single Family	MSHP - Oil Fuel Switching	Measure Life	18	17	S354	Recommnendation from Measure Life Review
Electric	Income Eligible	Income Eligible Single Family	Replacement Refrigerator	Measure Life	19	15	S356	Recommnendation from Measure Life Review
Electric	Income Eligible	Income Eligible Multifamily	Heat Pumps	Measure Life	18	20	S354	Recommnendation from Measure Life Review
Electric	Income Eligible	Income Eligible Multifamily	WiFi Thermostat	Measure Life	15	11	S352	Recommnendation from Measure Life Review
Gas	C&I	C&I Multifamily	Duct Insulation_MF	Measure Life	25	20	S343	Recommnendation from Measure Life Review
Gas	C&I	C&I Multifamily	Faucet aerator	Measure Life	7	3	N13	Recommnendation from Measure Life Review
Gas	C&I	Small Business Direct Install	Faucet aerator	Measure Life	7	3	N13	Recommnendation from Measure Life Review
Gas	C&I	Small Business Direct Install	Programmable thermostat	Measure Life	15	11	S352	Recommnendation from Measure Life Review
Electric	C&I	Large C&I New Construction	VSD Compressor (15<=HP<=75)	Measure Life	15	13	S359	Recommnendation from Measure Life Review
Electric	C&I	Small Business Direct Install	Refrigerator Recycling	Measure Life	8	4	MA Common Assumption	Recommnendation from Measure Life Review
Gas	Residential	Energy Wise Single Family	WiFi thermostat	Measure Life	15	11	S352	Recommnendation from Measure Life Review
Gas	C&I	Large C&I Retrofit	Faucet aerator	Measure Life	7	3	N13	Recommnendation from Measure Life Review
Gas	C&I	Large C&I Retrofit	Programmable thermostat	Measure Life	15	11	S352	Recommnendation from Measure Life Review
Gas	C&I	Large C&I New Construction	Water Heater - On-Demand 82	Measure Life	20	17	S357	Recommnendation from Measure Life Review
Gas	Income Eligible	Income Eligible Multifamily	Wi-Fi Thermostat (controls gas heat only)	Measure Life	15	11	S352	Recommnendation from Measure Life Review
Gas	C&I	Large C&I Retrofit	ERV - Rotary Wheel UPSTR	Measure Life	20	15	S361	Recommnendation from Measure Life Review
Gas	C&I	Large C&I Retrofit	ERV - Fixed Plate UPSTR	Measure Life	20	15	S362	Recommnendation from Measure Life Review
Gas	C&I	Large C&I New Construction	ERV - Rotary Wheel UPSTR	Measure Life	20	15	S363	Recommnendation from Measure Life Review
Gas	C&I	Large C&I New Construction	ERV - Fixed Plate UPSTR	Measure Life	20	15	S364	Recommnendation from Measure Life Review
Electric	Income Eligible	Income Eligible Single Family	Early Retirement Clothes Washer Elec DHW & Elec Dryer	Measure Life	12	14	S355	Recommnendation from Measure Life Review
Electric	Income Eligible	Income Eligible Single Family	Early Retirement Clothes Washer Elec DHW & Gas Dryer	Measure Life	12	14	S355	Recommnendation from Measure Life Review
Electric	Income Eligible	Income Eligible Single Family	Early Retirement Clothes Washer Gas DHW & Elec Dryer	Measure Life	12	14	S355	Recommnendation from Measure Life Review
Electric	Income Eligible	Income Eligible Single Family	Early Retirement Clothes Washer Gas DHW & Gas Dryer	Measure Life	12	14	S355	Recommnendation from Measure Life Review
Electric	Income Eligible	Income Eligible Single Family	Early Retirement Clothes Washer Oil DHW & Elec Dryer	Measure Life	12	14	S355	Recommnendation from Measure Life Review
Electric	Income Eligible	Income Eligible Single Family	Early Retirement Clothes Washer Propane DHW & Elec Dryer	Measure Life	12	14	S355	Recommnendation from Measure Life Review
Electric	C&I	Large C&I New Construction	VRF HP - 11.25T-20T	Measure Life	15	17	S304	Recommnendation from Measure Life Review
Electric	C&I	Large C&I New Construction	VRF HP - 5.4T-11.25T	Measure Life	15	17	S304	Recommnendation from Measure Life Review
Electric	C&I	Large C&I New Construction	VRF HP - over 20T	Measure Life	15	17	S304	Recommnendation from Measure Life Review
Electric	C&I	Large C&I New Construction	VRF HP - to 5.4T	Measure Life	15	17	S304	Recommnendation from Measure Life Review

Gas	C&I	Large C&I New Construction	Furnace w/ECM - 96% AFUE	Measure Life	18	23	S362	Recommnendation from Measure Life Review
Gas	C&I	Large C&I New Construction	Furnace w/ECM - 95% AFUE	Measure Life	18	23	S362	Recommnendation from Measure Life Review
Gas	C&I	Large C&I New Construction	Furnace w/ECM - 97% AFUE	Measure Life	18	23	S362	Recommnendation from Measure Life Review
Gas	C&I	Large C&I New Construction	Furnace w/ ECM - 92% AFUE	Measure Life	18	23	S362	Recommnendation from Measure Life Review
Electric	C&I	Large C&I New Construction	Refrigerated Air Dryer - CAT<100	Measure Life	15	13	S310	Recommnendation from Measure Life Review
Electric	C&I	Large C&I New Construction	Refrigerated Air Dryer - CAT>400	Measure Life	15	13	S310	Recommnendation from Measure Life Review
Electric	C&I	Large C&I New Construction	Refrigerated Air Dryer - CAT-200	Measure Life	15	13	S310	Recommnendation from Measure Life Review
Electric	C&I	Large C&I New Construction	Refrigerated Air Dryer - CAT-300	Measure Life	15	13	S310	Recommnendation from Measure Life Review
Electric	C&I	Large C&I New Construction	Refrigerated Air Dryer - CAT-400	Measure Life	15	13	S310	Recommnendation from Measure Life Review
Electric	Residential	Residential Consumer Products	Refrigerator Recycling	Measure Life	8	4	MA Common Assumption	Recommnendation from Measure Life Review
Electric	Residential	Residential New Construction	Clothes Washer	Measure Life	11	14	S355	Recommnendation from Measure Life Review
Gas	Residential	Energy Wise Multifamily	Duct Insulation, MF	Measure Life	25	20	S343	Recommnendation from Measure Life Review
Gas	Residential	Residential HVAC	Furnace w/ ECM - 97% AFUE	Savings	7.6	4.3	IECC 2021	The minimum efficiency requirements for furnaces were increased in 2021. The minimum efficiency for a gas furnace is now 95 AFUE, up from 80 AFUE in 2018.
Gas	Residential	Residential HVAC	Furnace w/ ECM - 95% AFUE	Removed measure	6.8	0	IECC 2021	The minimum efficiency requirements for furnaces were increased in 2021. The minimum efficiency for a gas furnace is now 95 AFUE, up from 80 AFUE in 2018.
Gas	Residential	Residential HVAC	Combo Furnace	Savings	15.1	7.87	IECC 2021	The minimum efficiency requirements for furnaces were increased in 2021. The minimum efficiency for a gas furnace is now 95 AFUE, up from 80 AFUE in 2018.
Electric	C&I	Large C&I New Construction	VSD-HVAC	Removed measure		0	IECC 2021	The 2021 IECC requires VSDs on all new commercial HVAC systems with motors over 1 hp.
Gas	C&I	Large C&I New Construction	VSDs - HVAC	Removed measure		0	IECC 2021	The 2021 IECC requires VSDs on all new commercial HVAC systems with motors over 1 hp.
Electric	C&I	Large C&I New Construction	Air Cooled AC Measures	Savings	Calc	Savings decrease by approx 12.5%	IECC 2021	The minimum SEER for central air conditioners is now 16 in the 2021 IECC, up from 14 in the 2018 IECC. The minimum HSPF for heat pumps is now 10 in the 2021 IECC, up from 8.5 in the 2018 IECC.
Electric	C&I	Large C&I New Construction	Prescriptive Lighting - EXT-DUSKDAWN	Savings	Calc	Savings decrease by 20%	IECC 2021	Dusk-to-dawn lighting must be reduced after hours; IECC 2021 increases the reduction to 50% of full power.
Electric	C&I	Large C&I New Construction	Demand Control Ventilation	Removed measure	Calc	0	IECC 2021	DCV systems automatically adjust the ventilation rate based on the occupancy and CO2 levels in a building. The 2021 IECC requires DCV systems in all new commercial buildings, and in some residential buildings.
Electric	Residential	Residential Consumer Products	Clothes Washer Most Efficient	Electric kWh	57	265.45	Energy Star Retail Products Platform	Updated after review of retail products pl
Electric	Residential	Energy Wise Multifamily	Wi-Fi Thermostat	Electric kWh	74.8	64	S285	Updated during alignment of BCR and TRM
Electric	Income Eligible	Income Eligible Multifamily	Wi-Fi Thermostat	Electric kWh	74.8	64	S285	Updated during alignment of BCR and TRM
Electric	Income Eligible	Income Eligible Multifamily	Smart Strip	Measure Life	6	5	MA Common Assumption	Updated during alignment of BCR and TRM
Electric	Income Eligible	Income Eligible Single Family	DHWOIL	Measure Life	7	13	S282	Updated during alignment of BCR and TRM
Electric	Income Eligible	Income Eligible Multifamily	Dehumidifier - EE	Measure Life	12	17	S282	Updated during alignment of BCR and TRM
Gas	Income Eligible	Income Eligible Single Family	Heating System Retrofit, Boiler, Oil	Measure Life	7	23	S282	Updated during alignment of BCR and TRM
Gas	Income Eligible	Income Eligible Single Family	Heating System Retrofit, Boiler, Other	Measure Life	7	23	S282	Updated during alignment of BCR and TRM
Gas	Income Eligible	Income Eligible Single Family	Heating System Retrofit, Furnace, Oil	Measure Life	7	17	S282	Updated during alignment of BCR and TRM
Gas	Income Eligible	Income Eligible Single Family	Heating System Retrofit, Furnace, Other	Measure Life	19	17	S282	Updated during alignment of BCR and TRM
Electric	Residential	Residential New Construction	ROOMAC	Measure Life	15	12	S282	Updated during alignment of BCR and TRM
Electric	Residential	Residential Consumer Products	Thermostatic Shut-off Valve Oil	Measure Life	7	15	S282	Updated during alignment of BCR and TRM
Electric	Residential	Residential Consumer Products	Thermostatic Shut-off Valve Other	Measure Life	7	15	S282	Updated during alignment of BCR and TRM
Electric	Residential	Residential Consumer Products	Thermostatic Shutoff Valve, Elec	Measure Life	7	15	S282	Updated during alignment of BCR and TRM
Electric	Residential	Energy Wise Multifamily	Pipe Wrap DHW	Measure Life	13	15	S103	Updated during alignment of BCR and TRM
Electric	Residential	Residential HVAC	DMSHP CONTROLS RETROFIT, OIL	Measure Life	30	10	S103	Updated during alignment of BCR and TRM
Electric	Residential	Residential HVAC	DMSHP CONTROLS RETROFIT, PROP	Measure Life	30	10	S103	Updated during alignment of BCR and TRM
Gas	Residential	Residential HVAC	Triple Pane Windows	Measure Life	14	17	S103	Updated during alignment of BCR and TRM
Gas	Residential	Energy Wise Single Family	Triple Pane Windows	Measure Life	14	17	S103	Updated during alignment of BCR and TRM
Electric	Residential	Residential HVAC	Window - Electric Resistance	Measure Life	14	17	S103	Updated during alignment of BCR and TRM
Electric	Residential	Energy Wise Single Family	Window - Electric Resistance	Measure Life	14	17	S103	Updated during alignment of BCR and TRM
Electric	Residential	Residential HVAC	Window - Heat Pump	Measure Life	13	17	S103	Updated during alignment of BCR and TRM
Electric	Residential	Energy Wise Single Family	Window - Heat Pump	Measure Life	13	17	S103	Updated during alignment of BCR and TRM
Electric	Residential	Residential HVAC	Window - Oil	Measure Life	14	17	S103	Updated during alignment of BCR and TRM
Electric	Residential	Energy Wise Single Family	Window - Oil	Measure Life	14	17	S103	Updated during alignment of BCR and TRM
Electric	Residential	Residential HVAC	Window - Propane	Measure Life	14	17	S103	Updated during alignment of BCR and TRM
Electric	Residential	Energy Wise Single Family	Window - Propane	Measure Life	14	17	S103	Updated during alignment of BCR and TRM
Electric	Income Eligible	Income Eligible Single Family	Wx Other	Measure Life	7	20	S103	Updated during alignment of BCR and TRM
Electric	Residential	Energy Wise Single Family	Pipe Insulation - Electric	Measure Life	7	15	S103	Updated during alignment of BCR and TRM
Gas	Residential	Energy Wise Single Family	Pipe Insulation - Gas	Measure Life	7	15	S103	Updated during alignment of BCR and TRM
Electric	Residential	Energy Wise Single Family	Pipe Insulation - Oil	Measure Life	7	15	S103	Updated during alignment of BCR and TRM
Electric	Residential	Energy Wise Single Family	Pipe Insulation - Others	Measure Life	7	15	S103	Updated during alignment of BCR and TRM
Electric	Residential	Residential New Construction	DISHWASH	Measure Life	10	11	S339	Updated during alignment of BCR and TRM
Electric	Residential	Residential HVAC	Wi-Fi Tstat-cool and heat oil/propane	Measure Life	18	15	S105	Updated during alignment of BCR and TRM
Electric	Income Eligible	Income Eligible Single Family	FREEZER	Measure Life	19	12	S338	Updated during alignment of BCR and TRM
Electric	Income Eligible	Income Eligible Single Family	WI-FI THERMOSTAT, OTHER	Measure Life	18	15	S105	Updated during alignment of BCR and TRM
Electric	Residential	Residential HVAC	ECM Pumps	Measure Life	15	20	S119	Updated during alignment of BCR and TRM

Gas	C&I	Small Business Direct Install	WiFi Thermostat	Gas Heat MMBTU	6.6	2.79	S285	Updated during alignment of BCR and TRM
Gas	C&I	Large C&I Retrofit	WiFi Thermostat	Gas Heat MMBTU	6.6	2.79	S285	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	Ice Machine	Electric kWh		Updated values based on most updated FSTC calculator	Update with most recent FSTC savings calc	Updated during alignment of BCR and TRM
Gas	C&I	C&I Multifamily	Low Flow Showerhead w/ Thermostatic Valve	Water: gallons	2254	2130	S269	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	Hand Wrapper	Measure Life	12	10	S333	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	FREEZ-ULT	Measure Life	12	10	S340	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	Spray Valve - Electric HW	Measure Life	12	5	S334	Updated during alignment of BCR and TRM
Gas	C&I	Small Business Direct Install	LF_PRE_RINSE_SPRAY_NZL	Measure Life	8	3	MA Common Assumption; EUL is 8 years and adjusted measure life is 3 years based on maximum flow rate	Updated during alignment of BCR and TRM
Gas	C&I	Large C&I Retrofit	Pre Rinse Spray Valve	Measure Life	8	3	MA Common Assumption; EUL is 8 years and adjusted measure life is 3 years based on maximum flow rate	Updated during alignment of BCR and TRM
Gas	C&I	Small Business Direct Install	SALON_NOZZLE	Measure Life	5	3	MA Common Assumption; EUL is 8 years and adjusted measure life is 3 years based on maximum flow rate	Updated during alignment of BCR and TRM
Gas	C&I	C&I Multifamily	Pipe Wrap DHW_MF	Measure Life	15	13	S103	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	Sensors	Measure Life	23	10	S103	Updated during alignment of BCR and TRM
Electric	C&I	Large C&I Retrofit	Sensors	Measure Life	10	9	S103	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	Ice Machine - Cont. Remote	Measure Life	12	8	S168	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	Ice Making Head	Measure Life	12	8	S168	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	Ice Remote/Split	Measure Life	12	8	S168	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	Ice Self Contained	Measure Life	12	8	S168	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	Dishwasher - High Door Type	Measure Life	12	15	S168	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	Dishwasher - High Multi Tank Conv	Measure Life	12	20	S168	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	Dishwasher - High Pots and Pans	Measure Life	12	10	S168	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	Dishwasher - High Single Tank Conv.	Measure Life	12	20	S168	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	Dishwasher - High Under Counter	Measure Life	12	10	S168	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	Dishwasher - Low Door Type	Measure Life	12	15	S168	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	Dishwasher - Low Multi Tank Conv	Measure Life	12	20	S168	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	Dishwasher - Low Single Tank Conv.	Measure Life	12	20	S168	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	Dishwasher - Low Under Counter	Measure Life	12	10	S168	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	COMP AIR	Measure Life	15	15	S119	Updated during alignment of BCR and TRM
Electric	C&I	Large C&I Retrofit	COMP AIR	Measure Life	2	15	S119	Updated during alignment of BCR and TRM
Gas	C&I	Large C&I Retrofit	Low Pressure Steam Traps	Measure Life	3	6	S144	Updated during alignment of BCR and TRM
Electric	C&I	Large C&I Retrofit	Cooler Miser	Measure Life	10	5	S341	Updated during alignment of BCR and TRM
Electric	C&I	Large C&I Retrofit	Snack Miser	Measure Life	10	5	S341	Updated during alignment of BCR and TRM
Electric	C&I	Large Commercial New Construction	EvapAC_over20T	Measure Life	12	15	S336	Updated during alignment of BCR and TRM
Electric	C&I	Small Business Direct Install	TIMECLOCKS	Measure Life	6	9	S119	Updated during alignment of BCR and TRM
Gas	Residential	Energy Wise Multifamily	DHW, MF	Water: gallons	2165	1786	S269	Updated during alignment of BCR and TRM
Electric	Residential	Energy Wise Multifamily	TSV Showerhead	Water: gallons	2254	2130	S269	Updated during alignment of BCR and TRM

Electric	Income Eligible	Income Eligible Multifamily	TSV Showerhead	Water: gallons	2254	2130	S269	Updated during alignment of BCR and TRM
Electric	C&I	Large C&I New Construction	Commercial Electric Fryer - Standard	kWh/kW Savings/Baseline	2976	2,017	S365	Combined baseline increased to Cooking Efficiency of 78% and idle energy rate of 1.1 kW.
Electric	C&I	Large C&I New Construction	Commercial Electric Fryer - Large	kWh/kW Savings/Baseline	2841	2,438	S365	Combined baseline increased to Cooking Efficiency of 78% and idle energy rate of 1.1 kW.
Electric	C&I	Large C&I New Construction	Commercial Electric Convection Oven	kWh/kW Savings/Baseline	2787	1,796	S365	Combined baseline increased to Cooking Efficiency of 68% and idle energy rate of 1.8 kW.
Electric	C&I	Large C&I New Construction	Commercial Electric Combination Oven	kWh/kW Savings/Baseline	15095	8870	S365	Combined baseline increased for convection oven to cooking efficiency of 74% and idle energy rate of 1.31 kW. Steam oven cooking efficiency increased to 45% and idle energy rate to 8.0 kW
Electric	C&I	Large C&I New Construction	Commercial electric steamer	kWh/kW Savings/Baseline	30156	3,082	S365	Combined baseline increased to Cooking Efficiency of 38% and idle energy rate of 0.84 kW.
Electric	C&I	Large C&I New Construction	Dishwasher - High Temperature Under Counter	kWh/kW Savings/Baseline	1791	1,528	S365	Combined baseline increased to idle energy rate of 0.63 kW and water consumption of 0.98 GPR.
Electric	C&I	Large C&I New Construction	Dishwasher - High Temperature Door Type	kWh/kW Savings/Baseline	4151	1,558	S365	Combined baseline increased to idle energy rate of 0.79 kW and water consumption of 1.09 GPR.
Electric	C&I	Large C&I New Construction	Dishwasher - High Temperature Single Tank Conveyor	kWh/kW Savings/Baseline	4243	4,937	S365	Combined baseline increased to idle energy rate of 1.72 kW and water consumption of 0.79 GPR.
Electric	C&I	Large C&I New Construction	Dishwasher - High Temperature Multi Tank Conveyor	kWh/kW Savings/Baseline	9630	8,587	S365	Combined baseline increased to idle energy rate of 2.42 kW and water consumption of 0.76 GPR.
Electric	C&I	Large C&I New Construction	Dishwasher - High Temperature Pots and Pans	kWh/kW Savings/Baseline	1032	1,159	S365	Combined baseline increased to idle energy rate of 1.2 kW and water consumption of 0.64 GPR.
Electric	C&I	Large C&I New Construction	Dishwasher - Low Temperature Under Counter	kWh/kW Savings/Baseline	2178	1,650	S365	Combined baseline increased to idle energy rate of 0.5 kW and water consumption of 1.46 GPR.
Electric	C&I	Large C&I New Construction	Dishwasher - Low Temperature Door Type	kWh/kW Savings/Baseline	13851	2,082	S365	Combined baseline increased to idle energy rate of 0.6 kW and water consumption of 1.64 GPR.
Electric	C&I	Large C&I New Construction	Dishwasher - Low Temperature Single Tank Conveyor	kWh/kW Savings/Baseline	11685	5,709	S365	Combined baseline increased to idle energy rate of 1.55 kW and water consumption of 1.05 GPR.
Electric	C&I	Large C&I New Construction	Dishwasher - Low Temperature Multi Tank Conveyor	kWh/kW Savings/Baseline	16131	8,485	S365	Combined baseline increased to idle energy rate of 2.0 kW and water consumption of 0.79 GPR.
Electric	C&I	Large C&I New Construction	Hot Food Holding Cabinet - 3/4, Hot Food Holding Cabinet - Full, Hot Food Holding Cabinet - 1/2	kWh/kW Savings/Baseline	1095, 3737, 1095	498	S365	Combined baseline increased to idle energy rate of 0.65 kW. (43.3 W/Cu.ft for 15 Cu.ft. cabinet)
Gas	C&I	Large C&I New Construction	Fryer, Upstream	MMBtu Savings/Baseline	78.3	19	S365	Combined baseline increased to Cooking Efficiency of 43% and idle energy rate of 11,500 Btu/hr for a standard vat and Cooking Efficiency of 43% and idle energy rate of12,000 Btu/hr for large vat fryers.
Gas	C&I	Large C&I New Construction	Gas Oven Upstream - Convection Oven	MMBtu Savings/Baseline	35.7	23	S365	Combined baseline increased for convection oven to cooking efficiency of 54% and idle energy rate of 9,607 Btu/hr.
Gas	C&I	Large C&I New Construction	Gas Oven Upstream- Combination Oven	MMBtu Savings/Baseline	110.3	30	S365	Steam oven cooking efficiency increased to 38% and idle energy rate to 15,256 Btu/hr.
Gas	C&I	Large C&I New Construction	Gas Oven Upstream - Rack Oven	MMBtu Savings/Baseline	211.5	33	S365	Combined baseline increased for convection oven to cooking efficiency of 30% and idle energy rate of 65,000 Btu/hr.
Gas	C&I	Large C&I New Construction	Steamer, Upstream	MMBtu Savings/Baseline	370.7	24	S365	Combined baseline increased for convection oven to cooking efficiency of 38% and idle energy rate of 9,375 Btu/hr.
Gas	Residential	Residential HVAC	Indirect Water Heater	Removed measure			Measure no longer cost effective	Removal of measure after further review
Gas	C&I	Large C&I New Construction/Large C&I Retrofit	Custom measures, excludes custom prescriptive measures, CDA, CHP, codes and standards	Gas RR		84.40%	S367	Updatedd based on Gas Custom Study
Electric	C&I	Large C&I New Construction/Large C&I Retrofit	Custom measures - non-lighting excludes CHP, CDA	Energy RR, Summer kW RR, Winter kW RR, On-peak kWh RR	0.832/0.672/0.847	89.1% Energy RR, 73.8% Summer kW RR, 105.3% Winter kW RR, 78.0% % on-peak KWh RR	S366	Updated based on Electric Custom Study
Electric	Residential	Income Eligible Single Family	HP Water Heaters	kWh Savings/TRC/kW	814/1800/0.179	1712/2131/0.125	S316	Updated based on MA study
Electric	C&I	Large C&I New Construction	Ultra Low Temp Freezer	kW savings update	0.654	0.54	Energy Solutions	Updated based on Energy Solutions calculator and aligning with what is used
Electric	Residential	Energy Wise Single Family	Weatherization, Electric	kWh savings	840	765	S364	Update based on EWSF Study
Electric	Residential	Energy Wise Single Family	Weatherization, Oil	kWh savings/Oil	48/9.8	64/12.4	S364	Update based on EWSF Study
Electric	Residential	Energy Wise Single Family	Weatherization, Others	kWh savings/Propane	48/9.6	64/12.4	S364	Update based on EWSF Study
Gas	Residential	Energy Wise Single Family	Weatherization	kWh savings/gas	48/9.6	70/13.4	S364	Update based on EWSF Study
Electric	Residential	Residential New Construction	Codes and Standards	Measure Life	12	20	MA Common Assumption	Updated based on C-team review
Gas	Residential	Residential New Construction	Codes and Standards	Measure Life	11	20	MA Common Assumption	Updated based on C-team review
Electric	Residential	Residential Consumer Products	Dehumidifier Most Efficient	Added measure	NA	NA	IL TRM	Addition of most efficient measures
Electric	Residential	Residential Consumer Products	Room AC Most Efficient	Added measure	NA	NA	Energy Star Retail Products Platform	Addition of most efficient measures