The Rhode Island Energy Efficiency and Resource Management Council

December 22, 2016

VIA HAND-DELIVERY AND ELECTRONIC MAIL

Luly E. Massaro
Commission Clerk
Rhode Island Public Utilities Commission
89 Jefferson Boulevard
Warwick, RI 02888

RE: Energy Efficiency Savings Targets, 2018-2020

Dear Luly,

The Energy Efficiency and Resource Management Council ("EERMC") is pleased to submit this cover letter and attached memorandum for the Public Utility Commission's ("PUC") review and consideration. The EERMC conducted in-depth analysis, research and stakeholder engagement to establish achievable, cost-effective levels of energy efficiency to inform proposed energy savings targets ("Targets") to support development of a triennial energy efficiency plan. Similar processes were undertaken in 2010 and 2013, which proved to be a critical component in supporting planning and implementation consistent with Least Cost Procurement ("LCP") objectives. Concurrent with the energy savings Target effort, the EERMC also reviewed and proposes revised language to the Energy Efficiency Standards and the System Reliability Standards ("Standards"). The attached memorandum provides a discussion of high-level electric and natural gas energy efficiency savings Targets and proposed modifications to the Standards.

In the past two Targets and Standards cycles (2010 and 2013), the filing of the Targets has come first, usually in September of the year preceding the year in which the Three Year Plan is prepared and submitted, and the proposed edits to the Standards have been filed early in the year in which the Three Year Plan is developed. Both have, however, generally been addressed

in a consolidated Docket. For this cycle, the EERMC has combined these efforts, given their inter-related nature.

The proposed Targets and Standards, subject to the PUC's approval, will guide LCP for the 2018-2020 implementation period and will inform National Grid's Three-Year planning process, and the subsequent Annual Implementation plans. Both the Three Year Plan, and each Annual Plan will be submitted for review and approval to the PUC. These Plans will convert the Targets and Standards into increasingly detailed strategic documents with budgets, implementation strategies, cost-effectiveness analysis, and specified outcomes to guide the acquisition of least cost resources for Rhode Island customers.

The EERMC directed its Consultant Team to establish a process leading to the attached memorandum. The memorandum is formally addressed to the EERMC, and it has been approved unanimously by vote of the EERMC at its regularly scheduled December 8, 2016 meeting. The EERMC believes that the memorandum provides substantial documentation of the effort, approach, research and analysis that went into preparing the proposed Targets and Standards, and thus, will be an important part of the record in the ensuing Docket created by the PUC.

The memorandum provides discussion about emerging trends in energy efficiency markets, and provides a general update on trends in the opportunities for securing efficiency resources. It also discusses certain emerging dynamics in the energy markets that are not formally addressed in the Targets and Standards, but that are the subject of other proceedings (such as PUC Docket #4600) on which the PUC has taken a leading role. The EERMC recognizes that issues raised in Docket #4600 and other energy-related conversations at the national and state levels may arise in the context of reviewing these Targets and Standards. It has, however, been concerned in addressing Targets and Standards to build directly on the impressive LCP implementation experience that National Grid and Rhode Island have gained over the past decade.

The proposed Targets presented are for both Electric Energy Efficiency and Natural Gas Efficiency programs for annual saving in each of the three years, and are represented as a percentage of the electric and gas sales from a base year of 2015[1]. These are:

Targets	2018	2019	2020	2018-2020
Electric (MWh)	202,166	194,678	187,191	584,035
% of 2015 Sales	2.70%	2.60%	2.50%	2.60%
Natural Gas (MMBtu)	409,513	421,799	429,989	1,261,301
% of 2015 Sales	1.00%	1.03%	1.05%	1.03%

The proposed revisions to the Standards are included as Appendix A of the memorandum. They are the work, in large part, of the System Integration Rhode Island ("SIRI") group, which included National Grid, the EERMC Consultant Team, the Office of Energy Resources ("OER"), and Acadia Center, with input from Synapse Energy Economics, the consultant for the PUC's

[1] The 2015 year is the last complete year of actual sales, and is used as reference to consistently benchmark each of the three years covering 2018-2020. Similarly, the Targets set for the 2015-2017 derive the percentages from the 2012 actual sales.

Division of Public Utilities and Carriers (the "Division"). These revisions were also presented for review and input to the Collaborative.

The EERMC believes that the process discussed in the memorandum for inclusion of National Grid, OER, the Division, parties to the Collaborative, the SIRI subcommittee of the Collaborative, and other affected parties, has helped ensure essential input and a solid level of agreement among the key players in Rhode Island that these Targets and Standards will provide appropriate guidance to the implementation of LCP in Rhode Island in the 2018-2020 time period.

Respectfully submitted,
Rhode Island Energy Efficiency
Resource Management Council
By its Attorney

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CERTIFICATION

I hereby certify that I filed an original and nine (9) copies of the within memorandum and sent a true copy, via electronic mail, on this 22nd day of December, 2016, to Service List for Docket #4654 and to:

Luly.massaro@puc.ri.gov
Luly E. Massaro, Commission Clerk
Public Utilities Commission
89 Jefferson Blvd.
Warwick, RI 02888

EERMC CONSULTANT TEAM

Vermont Energy Investment Corporation || Optimal Energy Integrated Energy Resources

Recommended Targets for Electric and Natural Gas Energy Efficiency Programs & Proposed Amendments to the Least Cost Procurement Standards for the Years 2018-2020

Prepared for

STATE OF RHODE ISLAND
ENERGY EFFICIENCY & RESOURCE MANAGEMENT COUNCIL

Prepared by:

The Rhode Island Energy Efficiency and Resource Management Council Consultant Team

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December 8, 2016

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I. Introduction

This Memorandum presents proposed Three Year Savings Targets ("Targets") for Least Cost Procurement implementation by National Grid for the years 2018-2020 based on the process and analysis undertaken by the VEIC/Optimal Energy Consultant Team ("the Consultant Team") in support of the Energy Efficiency and Resource Management Council's ("EERMC") objective to submit these Targets to the Rhode Island Public Utilities Commission ("Commission" or "PUC") in December, 2016. The proposed Targets presented by the Consultant Team are for both Electric Energy Efficiency and Natural Gas Efficiency programs for annual saving in each of the three years, and are represented as a percentage of the electric and gas sales from a base year of 2015.[1]

In addition, the Memorandum presents proposed modifications to the Least Cost Procurement Standards ("the Standards" or "LCP Standards") which will guide utility planning, cost-effectiveness assessment, program design, and implementation strategy for that same three year period. The Standards revisions address both Energy Efficiency Standards ("EE Standards") and the System Reliability Procurement Standards ("SRP Standards") (collectively referred to as "Standards").

This is the first time that the presentation of the Targets and Standards has been formally combined in one filing. In the past two Targets and Standards cycles (2010 and 2013), the filing of the Targets has come first, usually in September of the year preceding the year in which the Three Year Plan is prepared and submitted, and the proposed edits to the Standards have been filed early in the year in which the Three Year Plan is developed. Both have, however, generally been addressed in a consolidated Docket.

The Targets

This memorandum presents for the EERMC the Consultant Team's recommendations for savings targets for National Grid's upcoming 2018-2020 Energy Efficiency Procurement Plan ("Three Year Plan"). These targets are presented by the Consultant Team for consideration by the EERMC in their deliberations regarding the savings targets they will recommend to the PUC. These proposed targets have been developed in conjunction with the Targets and Standards Sub-Committee and have been approved by them as a recommendation to the full EERMC.

Electric and natural gas distribution companies are required by R.I. Gen. Laws § 39-1-27.7 System Reliability and least-cost procurement, subsection (c)(4) to file Three-Year plans for system reliability and energy efficiency and conservation procurement with the Commission. Pursuant to subsection (c)(5), the Commission is to consider the EERMC's evaluation and approval of the distribution utility's plan in issuing its order of approval of the plan.

[1] The 2015 year is the last complete year of actual sales, and is used as reference to consistently benchmark each of the three years covering 2018-2020. Similarly, the Targets set for the 2015-2017 derive the percentages from the 2012 actual sales.

In 2010, the legislature adopted the ratemaking concept of revenue decoupling, in R.I. Gen. Laws § 39-1-27.7.1. Pursuant to § 39-1-27.7.1(f), the EERMC was required to submit proposed energy savings targets to the PUC by September 1, 2010. The purpose of these targets was to give the utility guidance on the potentially available cost-effective efficiency resources in the state that would feed into the normal Least Cost Procurement ("LCP") Three-Year and Annual efficiency program planning processes under § 39-1-27.7. During these normal planning processes required by Rhode Island law, the efficiency programs and budgets are developed by the utility and the cost-effectiveness of the budgets and programs is reviewed and approved by the EERMC before being filed with the Commission for their consideration and action. In addition, the process provides for crucial and substantial input and contributions from diverse stakeholders during the development of the Three Year efficiency procurement and Annual efficiency program plans ("Annual Plans").

While Rhode Island Law § 39-1-27.7.1(f) only required one specific filing date for targets (September 1, 2010), it is understood as a responsibility of the Commission, and by extension the EERMC, under § 39-1-27.7(e)(4), that "the commission shall review and approve with any necessary amendments performance-based energy savings targets developed and submitted by the Rhode Island energy efficiency and resources management council." The LCP process is legislatively mandated to continue through 2024, and the submittal of savings targets for approval has in the past served to support the LCP Three-Year planning process. Therefore, the EERMC decided (and National Grid and other members of the Collaborative agreed) to continue the development of proposed targets based on achievable potential to assist the distribution utility, the stakeholders, and the Commission in their development and evaluation of Three Year Plans, including for this period of 2018-2020.

It is important to re-iterate the purpose of these Targets. In the September 1, 2014 filing, and subsequent consideration of the targets in the previous cycle, the EERMC stated:

> *The EERMC and the parties understand that the efficiency savings targets are intended to serve as guideposts as the utility develops its Three-Year EE Procurement Plan and more detailed annual EE Program plans. As the parties described in a joint brief filed with the Commission in Docket 4202 on April 1, 2011:[2] "It is important to note that the energy efficiency savings targets are just that, targets of what the EERMC assessment estimates is potentially available for cost-effective efficiency…*
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> *...In summary, while the robust and detailed 3-Year Efficiency Procurement Plan and the related annual Efficiency Program Plans are subject to the cost-effectiveness standards of § 39-1-27.7(c) (5), the targets developed by the EERMC under R.I.G.L § 39-1-27.7.1(e)(4) and (f) are not subject to the cost-effectiveness standard, because as high level estimates, the purpose of the targets is simply to guide the development of those plans. The 2010 legislation recognizes that the energy savings targets themselves do not constitute a plan, but rather the targets are just high-level estimates of the potentially available cost-effective efficiency,*

[2] The joint brief is available at: http://www.ripuc.org/eventsactions/docket/4202-EEMRC-JointRR(4-1-11).pdf

whose function is to guide the development of actual Three-year LCP and annual efficiency plans."

While the Consultant Team has devoted considerable effort and worked with many parties to gain confidence that the recommended targets are reasonable, attainable, and consistent with Rhode Island law, we need to re-iterate that the language highlighted above also applies to these proposed targets for 2018-2020.

Further, to support consideration of the implications of this clarification, we acknowledge that while the 2018-2020 electric and natural gas savings targets have been developed using the best information and data available at this time, the annual savings targets should be reviewed each year during the development of the Annual Plan. Following this review, the target should either be confirmed or revised in light of new information, as described in the proposed Least Cost Procurement Standards for 2018-2020 to be filed with these Targets (pending their adoption).[3] The parties participating in the Annual Plan development should agree that revisions to the annual energy savings targets should be based only on clearly documented changes in cost-effective resource availability.

We also note that there is agreement in principle among the Targets and Standards Subcommittee that have worked on this set of proposed Targets and the revisions to the Standards, that it may be time to permit increased flexibility for National Grid in the transfer of funds across programs and sectors. Such transfers would be permitted if they allow for savings to be secured that would not otherwise occur, while avoiding a substantial shift over time away from securing savings in any given customer class.

The Standards

The proposed revisions to the Standards are included as Appendix A in this filing. They are the work in large part of the System Integration Rhode Island ("SIRI") group, which included National Grid, the EERMC Consultant Team, the Office of Energy Resources ("OER"), Acadia Center, with input from Synapse Energy Economics, consultant for the Division. These revisions have been presented for review and input to the Collaborative, and to the EERMC.

These proposed Standards, covering both Energy Efficiency and System Reliability (SRP), reflect the hard work of many parties, and the insight that has been gained over the last three years into the evolution of energy efficiency resource procurement, and the application of non-wires strategies, to provide an important new set of tools in planning the utility distribution system. Topics addressed in

[3] "The Utility shall include a preliminary budget for the Three-Year Plan covering the three-year period that identifies the projected costs, benefits, and initial energy saving targets of the portfolio for each year. The budget shall identify, at the portfolio level, the projected cost of efficiency resources in cents/ lifetime kWh or cents/lifetime MMBtu. The preliminary budget and initial energy saving targets may be updated, as necessary, in the Utility's Annual Energy Efficiency Plan." Section 1.3. B. iv. b.

these Standards are also very much under consideration in Docket #4600, and we recognize that progress in that Docket may inform the review of these proposed Standards by the Commission.

We believe the formal consideration of the Standards should accompany the consideration of proposed Targets and look forward to discussing the potential interactions between the Targets and the Standards as they undergo more formal review.

II. Savings Targets

Context and Industry Overview

The targets for the 2018-2020 Three Year planning cycle are based on very detailed analysis and research, grounded in years of program experience and performance, and on a working knowledge of the current state and potential of the existing market. Further, the industry's evolving markets, emerging trends and innovation were evaluated to support appropriate projections of achievable potential. The Consultant Team is confident that the proposed Targets appropriately balance the solid analysis of available information on current programs with the estimates of additional opportunities based on probable energy efficiency industry advancements that clearly indicate growing potential to supplement the base analysis. The following presents a few of the trends and dynamics we see in energy efficiency markets that are of increasing importance.

The business of securing cost-effective energy efficiency savings and transforming energy efficiency markets has always been in some measure, and now increasingly, dynamic. Just when we think we have it "figured out" customer perceptions change, new technologies emerge, and the markets evolve. Part of the challenge for LCP is not that we are "selling a product" but we are trying to figure out how to help customers "buy" products they should already find desirable, but which for a variety of reasons (called "market barriers") they do not select.

We want to emphasize that the last decade since the passage of the LCP Mandate in Rhode Island has had dramatic success:

- Rhode Island has become a national leader in both electric efficiency and natural gas efficiency savings.
- Loads for electricity have flattened and even declined in some years.
- One impact of this success is that there has been less need than anticipated for System Reliability Planning (SRP) as a "targeted" strategy for load-constrained areas.
- There is an increasing focus on SRP as part of managing the whole distribution system.
- On the other hand, new technologies that can provide significant cost and environmental benefits are emerging that may increase electric usage.

There are different markets and opportunities for efficiency.

There is not a bright line dividing the types of opportunities for efficiency. However, different types of efficiency require different levels of customer investment and engagement and consequently different strategies for resource acquisition. One way to identify a critical dividing line between efficiency opportunities, measures and programs is the level and complexity of investment required to adopt the new product or technology. Consider, for instance, whether you can go to the store and "buy one off the shelf or showroom floor" for products regularly replaced *or* you need to have a building or system assessment, and make a very substantial investment for complex measures and installations with multiple barriers and high cost. Increasingly, the ongoing management of complex systems to secure performance efficiency from the whole system is a part of this more sophisticated approach to securing efficiency savings.

Products Regularly/Easily Replaced

A great deal of the energy efficiency savings we have secured in Rhode Island, and throughout the country to date, have been in the category of new efficient products and appliances.

For instance, the rapid evolution of lighting from incandescent and old inefficient fluorescent technologies has brought us through compact fluorescent and far more efficient commercial fluorescent lighting, to LED lighting, which is moving very swiftly to become a versatile, affordable, and highly adaptable technology that yields even greater savings and other benefits. Costs are rapidly declining, and versatility and quality of the products is improving.

While this is an important and very positive evolution, it will have implications for the lighting savings that can be claimed through efficiency programs. We anticipate that utility program investment to support lighting efficiency, especially in the residential sector, will be reduced significantly in the near future and new efficient lighting will become by-in-large the norm in the marketplace. Although this will mean that efficiency programs may be able to predict and claim less savings, customers, markets, energy systems, utilities, and the environment will continue to realize enormous efficiency savings and benefits as these products become mainstream. Issues about who is a program "participant" and who is not will become irrelevant as all customers purchase the products and realize their benefits as part of normal market activity.

Some level of continued engagement with the markets by programs will be needed to ensure product quality, service for underserved market segments, and pressure for continued product innovation and evolution.

We need to emphasize again that this is success! In fact, when parts of the energy market are indeed "transformed" it is perhaps the biggest success of efficiency programs. This success has come about not by magic, but through deliberate strategies and program designs and investment by utilities. Successful programs typically contain the following elements:

- The incentives and education for consumers to believe that "this stuff works," saves money, and helps the environment, even though it might initially seem not obvious or different.
- Those same messages and investments are targeted to wholesalers and retailers to stock these new products and make room on shelves for them.
- "Upstream" programs that work directly with manufacturers, wholesalers, and distributors to make sure they carry these products and recognize their increased sales potential. Incentives are provided as a "buydown" for all products sold in the relevant area. These upstream efforts affect stocking practices, and accelerate acceptance of preferred products. Administrative hassles and expense for processing individual incentives are eliminated, removing a significant barrier for both buyers and suppliers.
- Direct install efforts, where lighting and other plug or screw-in measures are installed during energy audits, help increase market demand by increasing the volume of efficient product adoption and acceptance.
- New state and federal standards for efficiency that effectively make these new products the new "normal" products. Increased acceptance in the marketplace makes these efficiency standard updates politically possible.
- Increased visibility of efficiency. The creation of a "market" for efficiency more generally through the existence of utility programs has helped spur innovation and new, improved product development, encouraging R&D and new marketing approaches as well.

Though we talk about lighting in this example, most major household appliances and some commercial and industrial (C&I) products have gone, and will continue to go, through a very similar process of evolution to new levels of efficiency. On the residential side, these currently include televisions, heating and air conditioning units, refrigerators, and hot water heaters. In 2017, the list will include ECM pumps and pool pumps.

For C&I projects, the list includes:

- Lighting (TLEDs, screw in lamps + MR16, luminaires for stairways, 1x4 – 2x2 – 2x4 luminaires)
- Electric HVAC Equipment (unitary HVAC, heat pumps (water, air, ground) ductless mini split)
- ECM circulator pumps – (new in 2017)
- Electric and gas kitchen equipment (new in 2017)
- Gas Water heating equipment (Indirect, Storage, Tankless, Volume)

In each instance, traditional efficiency programs laid a foundation for an upstream program by discerning the opportunity for savings and promoting new technologies through education, incentives, and market support. New (mostly federal) efficiency standards have, over time, helped institutionalize these new savings levels. As a result the level of savings "claimed" by utility programs has appropriately diminished, but the level of benefit to customers, society, the economy and environment has continued to grow.

In general, financing strategies for many of these kinds of programs have not been as essential as direct utility incentives. This is in part because the costs—particularly the incremental costs—have been relatively small amounts of money, and the technologies themselves are on a declining cost curve as they improve in quality and as demand for them increases.

Financing strategies become much more important for the larger, more complex investments that represent the other category of efficiency opportunities (discussed in the next section) that may be involved with other energy and building quality and performance investments.

While we have become effective at calculating the costs and benefits of utility programs, we have—surprisingly—not been as effective at documenting and accounting for these greater benefits from transformed markets. It will be important to build on the experience with National Grid's codes and standards program[4] to define and specify the activities that can accelerate adoption and effective implementation of new codes and standards. This will require providing adequate attribution of benefits to utility efforts so we do not create a situation in which utilities are effectively "penalized for success" and no longer have funds to conduct the crucial efforts that support further opportunity identification and market transformation.

Over the past 8 years the federal government has been aggressive at setting new efficiency standards for a wide range of energy-consuming products. It appears that there continue to be enormous opportunities for savings from updates to existing standards and standards for new products. The Appliance Standards Awareness Project (ASAP) and the American Council for an Energy Efficient Economy (ACEEE) recently published a report entitled: *Next Generation Standards: How the National Energy Efficiency Standards Program Can Continue to Drive Energy, Economic, and Environmental Benefits*,[5] which explores the future savings potential for national efficiency standards. The report clearly documents significant amounts of added savings potential and includes specific recommendations to reach the potential.

These efficiency standards as they continue to go into effect and as new federal and state efficiency standards are issued can do four things:

- Provide enormous financial, comfort, economic, health, and environmental benefits.
- Increase and distribute the benefits of efficiency to all market players and customers.
- Reduce the level of investment in direct incentives and program activity needed in certain efficiency programs.
- Create new opportunities for investment in programs that accelerate adoption and early replacement, particularly for long-lived products.

[4] http://www.ripuc.org/eventsactions/docket/4654-NGrid-EEPP-2017(10-17-16).pdf pp. 25-27 of Attachment 2
[5] http://www.appliance-standards.org/sites/default/files/Next_Gen_Executive_Summary.pdf?utm_source=Issue+20&utm_campaign=Newsletter+Issue+20%2C+Octo+2016&utm_medium=email

Long-lived Measures, Complex Installations, Multiple Barriers, (Sometimes) High Cost

We offer that the line between easily replace products and more complex installations, while significant, is not precise or absolute.

Efficiency programs have, from their beginning, sought to address the market barriers to these high-investment, more complex opportunities for savings. This has been true in the residential markets (whole-house treatments including insulation, air sealing, and system replacements), the commercial/institutional sector (thermal, building shell, and heating/cooling system opportunities) and the industrial sector (industrial process opportunities). Much learning and significantly improved program designs and strategies have evolved over the years, including strategies that develop long-term partnerships among institutions, efficiency programs and the design, product development and installation communities. All these efforts have and should include a spectrum of savings opportunities that also include both "easy" product change outs, and more demanding installations.

Rhode Island has experimented with partnerships, financing strategies, and improved understandings of the many interactive dynamics that accompany these projects, i.e. the relationship between thermal integrity and cooling/heating system sizing, or the need for reliability and continuous operation in industrial processes and complex buildings or campuses.

With Rhode Island's creation of the Rhode Island Infrastructure Bank (RIIB) a new step has been taken toward facilitating the level of savings in this more difficult sector. The Consultant Team believes that there are several other dynamics at work that increase the potential for growth in this opportunity area for savings.

- Customers are increasingly recognizing that investment in their facilities can have a significant impact on the level and nature of their energy needs and costs. The RI Public Energy Partnership ("RIPEP") program demonstrated the openness of the Municipal sector to thinking this way about its facilities and helped create the significant response to the first round of RIIB's Efficient Building Fund offerings.
- The extreme example of this emerging trend is the evolution of the concept of "zero net energy" facilities that are very efficient, have high thermal integrity, operate "intelligently" and generate some of their own energy. A zero net energy working group is currently exploring the cost-effectiveness of this approach as a broader program opportunity.
- The dynamics of emerging on-site generation (solar, CHP), the potential for storage (passive and active), and even energy exchange systems, as well as active load management begin to create a new sense of what a "modern" building can be like. This creates a dynamic that could help overcome some of the resistance to "efficiency-only" investments.
- The opportunities for integrated approaches to investment may be enhanced by financing strategies that can include renewable energy and load management as well as traditionally-defined efficiency. Utility programs will need to partner with customers and other service providers in new ways. Grid's new SolarWise program may be an example of such a strategy.

- The development of long-term partnerships with industrial and large institutional and commercial customers via the Strategic Energy Management Program has demonstrated that efficiency efforts evolve into ongoing efforts to understand and improve the performance of buildings, complexes and campuses.

Growth in this sector of Rhode Island's energy efficiency economy has enormous potential. We need to be clear that the barriers to be overcome are significant and often somewhat different from the barriers to accepting new efficient products. They include:

- Addressing complexity and interactive effects that can be overwhelming for customers, and inadequately addressed by some designers and vendors.
- Addressing and making intelligent use of significantly increased data through operational and system-related "management and timing" strategies that actually use the data, often in real time, to improve building efficiency and performance.
- Coordinated working relationships with a new range of vendors.
- Increased importance of load management to derive multiple benefits in addition to managing system peaks.
- Increased importance of relatively stable, and non-punitive rate designs or other pricing mechanisms that send the right signals to customers, increase predictability of benefits, and reward utilities for continuing innovation in Demand Response and Load Management.
- Support the development of services and capabilities that consider all energy sources and strategies on a consistent basis.

Given these developments, challenges and opportunities, it is clear some promising developments are on the horizon, but the work of securing these efficiency resources requires innovative program design, and work with many partners. It is difficult to quantify the specific impact they all will have directly, or indirectly, on targets for 2018-2020, but on the other hand, the potential is significant, and needs to be acknowledged. Examples of the opportunities and questions we will face in the next Three Year planning and implementation cycles to help unlock this potential include:

- How can we ensure that utilities and financing entities like RIIB and new market players are working at a high level of coordination, not at cross-purposes?
- How can we get at very-difficult products like "rooftop HVAC units" where there is the potential for significant potential savings, but the technologies need improvement, the costs are high, replacements difficult, both electricity and combustion fuels are involved, and the other market barriers (stocking levels, nature of replacement timing) are problematic?
- How can we help the customer- and market-focused skills developed by National Grid and its vendors keep expanding to cover all fuels and the intelligent incorporation of customer-sited generation and storage?

- How can we select and promote new data acquisition and usage so that it will help solve real problems for customers and the utility?
    - What are the costs and benefits of AMI and could AMI (in some version) support better:
        - Diagnostics,
        - Real-time management,
        - Pay for Performance strategies,
        - Demand savings for customers and the utility,
        - Better integration of customer and grid-side resources?
- How will electrification in appropriate settings be incentivized and integrated into the system in ways that maximize customer, societal, and system benefits?
- Can we actually create new market-based partnerships for comprehensive treatment that use financing, utility incentives, and new market players?
- Can we create a new vision of "Smart Buildings" that will change the culture of investment?
- How can we do this in a way that maximizes climate change benefits for Rhode Island as these issues receive increased public, regulatory, and economic attention.

Summary of Electric Targets and Development Process

This section presents the Consultant Team's process to estimate the cost-effective efficiency potential that National Grid could achieve through ratepayer-funded efficiency programs in Rhode Island. This assessment provides the basis for setting savings targets for the state's next Three Year Plan, and is therefore focused on the years 2018 through 2020. As an exercise strictly aimed at quantifying savings potential, this assessment does not offer any program design or cost detail that would be required to achieve that potential. On the other hand, the assessment does include a rough assessment of potential costs and benefits sufficient to have confidence that the initiatives would be cost-effective.

Our estimate of gas and electric potential at the portfolio level was developed by assessing the savings potential for each of the current core programs, and associated measures and services, offered to Rhode Island customers, which we reference as the Base Potential. We also reviewed additional savings potential impacts outside of the current core program offerings that will result from policy and technology changes, which we reference as Evolving Potential. Data considered included:

- Completed EM&V studies for Rhode Island and neighboring states
- Recent and planned program performance in Rhode Island and neighboring states
- National Grid's savings forecasts for initiatives
- Other relevant information from other jurisdictions
- Assessment of evolving policies, technologies and services

Stakeholder Input

The Consultant Team has worked closely with a Targets and Standards Sub-Committee in the development of proposed Targets as it did for the 2015-2017 target setting process. In addition, National Grid staff was actively engaged in the analytical process, providing valuable input, feedback and perspective, drawing from knowledge and expertise of in-house staff as well as key vendors that are supporting program delivery. There were stakeholder meetings with a number of interested parties, including TEC-RI and the Environment Council of Rhode Island in the spring and early summer of 2016. Finally, the Collaborative has had these Targets (and the Standards) as an agenda item for multiple meetings in 2016.

Overview of Methodology and Results

The Achievable Potential, presented using a consistent metric of "annual savings as a percent of load" for the entire state, was derived from the following components:

- The *Base Potential Estimate* is the estimate of achievable potential identified through a bottom up analysis of potential savings from current efficiency programs offered in Rhode Island.
- *Evolving Potential* refers to those factors identified by the Consultant Team as having possibly significant impacts on savings potential, but are not currently being offered, or fully deployed, through Rhode Island's energy efficiency programs. These are specific items related to the evolving markets, emerging trends, and innovation that will impact potential, but that are more difficult to quantify than the Base Potential.
- The *Achievable Potential Estimate* represents the Base Potential estimate plus a reasonable high level quantification of Evolving Potential adjustments.

Base Potential Study Estimates

In previous planning cycles, the Consultant Team relied on the 2010 KEMA Opportunity Report ("the KEMA report"), supplemented with additional analysis, to determine the potential for cost-effective electric energy efficiency savings that are cheaper than the cost of supply. Although the KEMA report identified energy efficiency potential in Rhode Island through 2020, it was clear at the start of the 2018-2020 planning cycle that some of the assumptions made in the KEMA report no longer represented an accurate assessment of current and changing market conditions. Significantly, for instance, the report did not consider the drastic reduction in claimable potential residential lightings savings due to changes in codes and standards and market transformation.

Rather than try to account for and correct the inaccuracies in the KEMA forecast data, the Consultant Team, with input from National Grid, used an alternative method to develop a base level of savings potential for 2018-2020. This method included using a bottom-up approach to develop estimates of the savings potential for each of the current core residential and C&I programs offered to Rhode Island customers. For many of the programs, the bottom-up analysis to derive annual savings projections was done at the measure level. This entailed developing annual projections of unit

numbers and, for some measures, annual Net-to-Gross (NTG) estimates. However, in some instances, granular measure level data was unavailable. In other instances, the measures offered in certain programs were unlikely to change significantly from currently levels and were not analyzed individually. Data considered included actual program, end use, and measure level savings through 2015; planned savings for 2016 and 2017; as well as planning information gleaned from other jurisdictions. A similar approach was used to estimate the savings potential for both electric and natural gas programs. Estimated potential from each program was rolled up to arrive at portfolio level gas and electric savings estimates.

Appendix B provides tables with historical savings for 2009-2015, planned savings for 2016-2017 and base level, "business as usual" savings projections for 2018-2020 by each program for both electric and gas. To supplement these tables, subsets of the programs impacting portfolio target estimates are shown as trend charts with supporting descriptions and data. The electric program charts shown include: Small Business Direct Install, Large Commercial New Construction, Large Commercial Retrofit, Energy Star Lighting, EnergyWise Single Family, and Energy Star HVAC. These programs account for approximately 80% of the electric portfolio savings. The gas program charts shown include: Small Business Direct Install, Large C&I New Construction, Large C&I Retrofit, Income-Eligible Multifamily. These programs account for approximately 75% of the gas portfolio savings. Descriptions of the key factors impacting program savings trends and changes in projected savings are provided under each chart. Example measure level analysis for the Energy Star Lighting and Electric HVAC programs is provided to illustrate assumptions made for the purposes of the savings projections. Similar detailed measure-level analysis was conducted for many of the programs where data was available. C&I electric portfolio assumptions made by measure type are also provided.

Arriving at a base potential estimate was an intensive and iterative process involving many discussions and data exchanges between the Consultant Team and National Grid. For the C&I programs, many different assumptions were discussed over the course of the planning process with no one assumption having a disproportionally large impact on potential targets. Examples of some key topics of discussion included basing future projections on actual 2015 results vs planned 2015 savings levels, as well as opportunities from various HVAC and industrial process measures and markets in the retrofit and new construction programs. For the residential and income eligible programs, the Consultant Team and National Grid had several discussions to arrive at consensus unit numbers and NTG factors for retail lighting. Other examples of residential iterative changes include updating non-retail lighting and non-lighting savings estimates to reflect 2017 program activity and planning estimates. The parties also agreed to look at changes to the residential behavioral program model as part of the evolving potential.

The 2018-2020 assessment of base potential was a rigorous and nuanced process. It relied not only on past and planned data, but also on our most current understanding of the market and the professional judgement and experience of vendors in Rhode Island and other experts in the energy efficiency field. Ultimately, it was a collaborative effort between the Consultant Team and National

Grid. At the conclusion of the base potential analysis, there were still some assumptions on which the Consultant Team and National Grid differed. As a result, the base potential estimates also differed, though not significantly. To arrive at consensus, the base potential numbers listed in Tables 1 and 2 represent the average of the Consultant Team and National Grid's final base potential estimates.

Table 1 | Consultant Team Core Program Electric Base Potential Estimate

Potential Estimate (% of 2015 retail sales/Units)				
	2018	**2019**	**2020**	**Total**
Base Potential Estimate				
Residential	1.12%/ 84,065 MWh	0.88%/ 65,999 MWh	0.72%/ 53,929 MWh	0.91%/ 203,993 MWh
Income Eligible	0.09%/ 6,841 MWh	0.09%/ 6,484 MWh	0.08%/ 6,059 MWh	0.09%/ 19,384 MWh
C&I	1.44%/ 107,783 MWh	1.48%/ 110,718 MWh	1.51%/ 112,905 MWh	1.48% 331,406 MWh
Portfolio	**2.65%/ 198,689 MWh**	**2.45%/ 183,201 MWh**	**2.31%/ 172,893 MWh**	**2.47%/ 554,783 MWh**

Table 2 | Consultant Team Core Program Gas Base Potential Estimate

Potential Estimate (% of 2015 retail sales/Units)				
	2018	**2019**	**2020**	**Total**
Base Potential Estimate				
Residential	0.34%/ 139,960 MMBtu	0.36%/ 145,509 MMBtu	0.37%/ 151,475 MMBtu	0.36%/ 436,943 MMBtu
Income Eligible	0.07% 27,547 MMBtu	0.07%/ 28,433 MMBtu	0.07%/ 29,322 MMBtu	0.07%/ 85,301 MMBtu
C&I	0.53%/ 215,280 MMBtu	0.53%/ 216,365 MMBtu	0.53%/ 215,705 MMBtu	0.53%/ 647,351 MMBtu
Portfolio	**0.93%/ 382,787 MMBtu**	**0.95%/ 390,307 MMBtu**	**0.97% 396,502 MMBtu**	**0.95%/ 1,169,595 MMBtu**

Evolving Potential

Introduction

As detailed in the introductory sections, the energy efficiency industry is undergoing significant changes. Market transformation, codes and standards developments, technological advancement,

and implementation innovation represent issues that will absolutely impact the current base savings estimates that focused heavily on current conditions and highly probable market advancements. However, while the base potential had extensive data and clearly foreseeable advancements on the near horizon to reference, the evolving potential the Consultant Team identified is less well defined and more difficult to quantify. However, while identifying precise quantification is not easy, we feel that qualitatively there is high confidence that the impacts on achievable potential will be appreciable.

The effort to capture the impact of evolving potential was organized into three general categories: Codes & Standards; LCP Standards; and New Technologies and Program Enhancements. Of these, only the "New Technology" item included efforts to effectively quantify potential at this time. However, the inclusion of the other two items, even though listed as 0% impact, is important given the expected process of reviewing Targets as part of each Plan development. The Consultant Team believes that the Codes and Standards and LCP Standards will have the potential to appreciably impact achievable potential estimates in any of the years from 2018-2020. So even though an estimate of impact is premature, the intent is to assure that these are items that are clearly covered in future annual planning cycles to evaluate potential impact.

Codes and Standards

As indicated in the discussion of federal energy efficiency standards for energy-using products on page 9 of this memorandum, the setting of new energy efficiency standards is a powerful force for effecting market transformation to more energy efficient products. As discussed there, the Obama Administration has been aggressive in developing and instituting these standards. This has had the dramatic effect of improving the baseline efficiency of new products as they enter the market. This, in turn, has the effect of reducing the amount of "efficiency potential" that needs to be targeted through efficiency programs, while providing greatly expanded access to efficiency throughout the economy, and, in effect, increasing participation to all customers for those products. We have suggested that federal lighting standards are having precisely this effect on the "potential" for lighting savings, having the effect of creating declining program-related savings for the 2018-20 planning period. We referenced that a recent study produced by ASAP and ACEEE indicated a significant potential to secure even more savings through promulgating new product efficiency standards remains.

Early indications are that the new Trump Administration may be far less dedicated to promulgating efficiency standards, and might even support roll-back of standards just coming into effect. Such action would have the rather perverse effect of increasing the level of efficiency that might need to be secured by efficiency programs, since it would not be institutionalized and the markets would not be transformed by the adoption of standards. It might be appropriate for Rhode Island to increase its program offerings if standards are not in place to secure the savings effectively. We have not even attempted to quantify the impact of changes to federal policy relative to product efficiency

standards, but we do want to identify that the impact could be significant. It will be important to review developments on this front as the Three Year Plan and each Annual Plan processes proceed.

In a similar manner, potentially decreased federal support for updates to residential and commercial building codes could impact savings, though in these areas of regulation states have much greater opportunity for initiative.

Proposed Modifications to LCP Standards.

The proposed changes to the LCP Standards included in this filing could have an impact on determining the cost-effectiveness of certain measures and programs. The shift to a "Rhode Island Test" that might include more value for carbon emissions avoided, and a value for economic benefits from energy efficiency programs could, for instance—by recognizing a wider range of benefits—both increase claimed benefits and improve the cost-effectiveness of certain savings opportunities. This could result in more measures (especially "deeper saving" measures), new strategies, and new programs becoming cost-effective. This effect would, in turn, potentially change the scope of savings opportunities.

New Technologies & Program Enhancements

Forecasting energy savings from new technologies and program approaches is a challenging task. It requires significant assumptions to be made about market adoption, participant levels as well as, in some cases applicable regulatory or legislative action.

However, given the fast pace of innovation and new delivery methodologies that are already helping to drive market adoption today, it would be imprudent to assume that the potential savings attribution from both new technologies and program approaches is inconsequential to the overall portfolio savings potential given these uncertainties.

To support these general indications, the following provides an extensive list of specific technologies and/or services that could result in measureable attributable savings on top of the base potential. The first set is a "qualitative" list of characterization and current market status of items that are not easily quantifiable yet.

New Technologies and Program Enhancements (non-quantified)

- **Advanced RTU controls:**[6] A rooftop unit (RTU) is an air handler (a devise used to regulate and circulate air as part of a building's HVAC system) designed for outdoor use, typically on roofs. RTUs are estimated to be used in 46% of all commercial buildings and serve about 69%[7] of the cooled floor space in U.S. commercial buildings. Adding "controls" to existing rooftop units (retrofit "RF") optimizes the performance of the RTU by providing remote energy monitoring

[6] Oct 2015: Northeast/Mid-Atlantic Commercial Packaged HVAC ("Rooftop Unit") Market Transformation Strategy Report

[7] 2013 PNNL study of 66 RTUs -the advanced controllers reduced normalized annual RTU energy consumption between 22% and 90%, with the average being 57% for all RTUs.

and control as well as variable speed drives, demand-controlled ventilation, and other features.

- **Smart "electro chromatic" Glass:** Electrochromic glass, also known as smart glass or electronically switchable glass, is an innovative and modern building glass that can be used to create partitions, windows or skylights.
- **Energy Star data servers:** EPA Energy Star has developed a 1-to-100 energy performance rating for data centers. This focuses on a list of recommended efficiency actions including technologies, cooling, air management, IT equipment, power and other environmental conditions.
- **UPS systems:** Uninterruptible Power Supply - and other server technology uses power more energy-efficiently.

Additional items focused on program enhancements beyond Base potential assumptions

The following are all items that were to a degree and scale factored into the base potential analysis. They are included in the section also, on the potential for expansion of their application beyond the base assumptions.

Boiler reinstallations – Savings attributable to boiler installations was reduced by one third due to incorrect installation during 2015/16. If corrected savings could be retrieved through 2018, this could provide gas savings potential in the residential sector.

LED Street Lighting– Projected savings for LED street lighting in 2017, in addition to the state and municipal conversions expected to be completed through 2016, represent an estimate of largely transforming all streetlights in the state. This assumption leaves little potential for 2018-2020. However, if delays or other market conditions cause a delay in these projections, opportunities will spill over to 2018 and possibly beyond.

Upstream Programs– Upstream program delivery has the potential to deliver exponential growth in adoption of some measures and provide significantly increased gas and electric savings. National Grid already effectively uses this delivery model for a wide range of residential and C&I measures, and that is effectively captured in the base potential. However, more products have the potential to move upstream, which could expand even further the savings potential from this approach.

New Technologies and Program Enhancements (quantified)

The following items represent measures where reasonable calculations allow for estimates of potential MWh and MMBtu savings.

- **Laminar Flow Restrictor Devices—**This measure does not draw air from the surrounding room into the water stream and produces a non-aerated clear stream of water, inhibiting bacterial growth and transmission. While drawing air from the room around the faucet isn't a problem in residential and commercial facilities, it can be a concern in hospitals, urgent care, medical labs and other health-care related facilities. Room air can contain harmful bacteria

and when mixed with water it could potentially contaminant drinking water. Reduced flow rates can save money on water and energy costs.

- **Wi-Fi Thermostats—** While this measure is another that is to a degree and scale factored into the Base analysis, additional potential exists for wider application. In the residential sector, there is potential to increase Wi-Fi sales in future for both single-family and multi-family applications, providing gas savings.
- **Optimized ECM Pump controls—**ECM (Electronically Commutated Motor) technology helps to make circulators used for hydronic and radiant heating systems more energy efficient. The intelligent speed control these circulators provide can drastically reduce energy usage when compared to the conventional, static speed technology.
- **Indoor Agriculture—**RI has experienced exponential growth over last 6 years (~375%) of registered medical marijuana users. In RI registered users are allowed to grow a maximum of 12 plants/person. With each plant using an average of 100-250W minimum per plant (actual, not equivalent) and 1,746 light hours/growth cycle this equates with a very conservative approximation of 200kWh/plant/growth cycle. Bottom line, energy use by indoor agriculture such as cannabis production is intense and dedicated: 38% to lighting 21% to air conditioning (largely to handle waste heat from lighting), 11% to space heating, water movement, carbon dioxide injection and drying. Agricultural energy savings will not necessarily stem from existing LED lighting technology due to the required actual wattage vs. equivalent. Load reduction will require a comprehensive approach to managing the existing market and future growth.
- **Financing—**The EERMC directed its Financing Expert (Dunsky Energy Consultants) to develop an analysis and memo documenting the potential impact of financing on the 2018-2020 targets. The resulting product was covered in the determination of base potential through discussions with National Grid. National Grid staff represented that a significant portion of the estimated electric savings in the Dunsky report was part of their base assumptions. There remained, however, some additional potential, so those additional electric savings estimates are included as evolving potential. A proportional amount of additional gas saving was also included.
- **Behavior—**While the market for behavioral programs is dominated by a single vendor with a distinct approach, multiple jurisdictions are piloting and implementing new models nationally. The potential for a supplemental or parallel approach to the current behavioral program in Rhode Island will likely be an option at some point in the 2018-2020 timeframe.
- **Heat Pump Dryers (vented hybrid, ventless hybrid and ventless full heat pump)** are an environmentally friendly, energy efficient (typically reducing drying temperatures by 25% and overall energy consumption by 40%), cost effective and given their “ventless” design suitable for every home.

Potential impact of new technology approaches and program approaches.

The following calculations are examples of specific technologies that could create a positive impact on saving assumptions based on an extremely conservative consideration of market influences.

Table 3 | Evolving Potential Technology/Programs Potential Estimates

Technology/Program Expansion	Savings (Units/% of 2015 Sales)		
	2018	**2019**	**2020**
Electric			
ECM Pump technology (>3HP) new opportunity	1,500 MWh/ 0.02%	1,500 MWh/ 0.02%	1,500 MWh/ 0.02%
ECM Pump (<3HP) upstream expansion	255 MWh/ >0.00%	255 MWh/ >0.00%	255 MWh/ >0.00%
HP Dryers new opportunity	99 MWh/ >0.00%	99 MWh/ >0.00%	99 MWh/ >0.00%
Indoor Agriculture existing RF opportunity	3,560 MWh/ 0.05%	3,589 MWh/ 0.05%	3,618 MWh/ 0.05%
Behavior (residential) program expansion	8,552 MWh/ 0.11%	10,962 MWh/ 0.15%	13,396 MWh/ 0.18%
Financing	64 MWh/ >0.00%	2,694 MWh/ 0.04%	6,134 MWh/ 0.08%
Electric Total	**14,029 MWh/ 0.19%**	**19,100 MWh/ 0.22%**	**25,002 MWh/ 0.25%**
Gas			
Laminare Flow Restricter Devise new technology	36,000 MMBtu/ 0.09%	36,000 MMBtu/ 0.09%	40,000 MMBtu/ 0.10%
Wifi thermostats program expansion	3,417 MMBtu/ 0.01%	3,417 MMBtu/ 0.01%	3,417 MMBtu/ 0.01%
Financing	108 MMBtu/ >0.00%	4,184 MMBtu/ 0.01%	9.269 MMBtu/ 0.02%
Gas Total	**39,525 MMBtu/ 0.10%**	**43,601 MMBtu/ 0.11%**	**52,586 MMBtu/ 0.13%**

Conclusion and Recommended Efficiency Savings Targets

As discussed above, the Consultant Team engaged in an extensive process to identify the achievable potential of electric and natural gas energy efficiency savings in Rhode Island for the 2018-2020 period. The process was coordinated closely with the Targets and Standards Subcommittee. Additionally, the input of key stakeholders including the Collaborative and other interest groups helped steer the analysis and perspective of the undertaking.

While there is some level of uncertainty in forecasting the future, the Consultant Team has high confidence that the process undertaken effectively identifies an achievable potential. Tables 4 and 5

provide the summary of the base potential and the evolving potential that informed our estimate of achievable potential.

Table 4 | Consultant Team Revised Electric Potential Estimate

Potential Estimate (% of 2015 retail sales/Units)				
	2018	**2019**	**2020**	**Total**
Base Potential Estimate				
Residential	1.12%/ 84,065 MWh	0.88%/ 65,999 MWh	0.72%/ 53,929 MWh	0.91%/ 203,993 MWh
Income Eligible	0.09%/ 6,841 MWh	0.09%/ 6,484 MWh	0.08%/ 6,059 MWh	0.09%/ 19,384 MWh
C&I	1.44%/ 107,783 MWh	1.48%/ 110,718 MWh	1.51%/ 112,905 MWh	1.48% 331,406 MWh
Portfolio	**2.65%/ 198,689 MWh**	**2.45%/ 183,201 MWh**	**2.31%/ 172,893 MWh**	**2.47%/ 554,783 Mwh**
Evolving Potential				
Codes & Standards	-	-	-	-
LCP Standards Modifications	-	-	-	-
New Technologies/ Enhancements	0.19%/ 14,029 MWh	0.22%/ 19,100 MWh	0.25%/ 25,002 MWh	0.232% 58,131 MWh
Potential = Base + Evolving				
Total	**2.84%/ 212,718 MWh**	**2.67%/ 202,301 MWh**	**2.56%/ 197,895 MWh**	**2.69%/ 612,914 MWh**

Notes: Totals may not equal the sum of their respective pieces due to rounding.
2015 electric sales equaled 7,487,623 MWh.

Table 5 | Consultant Team Revised Gas Potential Estimate

Potential Estimate (% of 2015 retail sales/Units)				
	2018	**2019**	**2020**	**Total**
Base Potential Estimate				
Residential	0.34%/ 139,960 MMBtu	0.36% 145,509 MMBtu	0.37%/ 145,509 MMBtu	0.36%/ 436,943 MMBtu
Income Eligible	0.07% 27,547 MMBtu	0.07%/ 28,433 MMBtu	0.07%/ 29,322 MMBtu	0.07%/ 85,301 MMBtu
C&I	0.53%/ 215,280 MMBtu	0.53%/ 216,365 MMBtu	0.53%/ 215,705 MMBtu	0.53%/ 647,351 MMBtu
Portfolio	**0.93%/ 382,787 MMBtu**	**0.95%/ 390,307 MMBtu**	**0.97% 396,502 MMBtu**	**0.95%/ 1,169,595 MMBtu**
Evolving Potential				
Codes & Standards	-	-	-	-
LCP Standards Modifications	-	-	-	-
New Technologies/ Enhancements	0.1%/ 39,525 MMBtu	0.11%/ 43,601 MMBtu	0.13% 52,586 MMBtu	0.11% 135,712 MMBtu
Potential = Base + Evolving				
Total	**1.03%/ 422,312 MMBtu**	**1.06%/ 433,908 MMBtu**	**1.10%/ 449,088 MMBtu**	**1.06%/ 1,305,308 MMBtu**

Notes: Totals may not equal the sum of their respective pieces due to rounding.
2015 gas sales equaled 40,951,320 MMBtu.

Once the range of achievable potential savings from 2018-2020 had been established through intensive analysis, selecting the final proposed targets within that range moved to discussions among the Savings Targets Sub-committee. Based on those discussions, the C- Team recommends the following electric and natural gas savings targets that properly reflect the "prudent and reliable" approach identified as an important aspect of Least Cost Procurement, which will serve as effective guideposts to support upcoming Three Year Planning, as well as the ensuing Annual Plans:

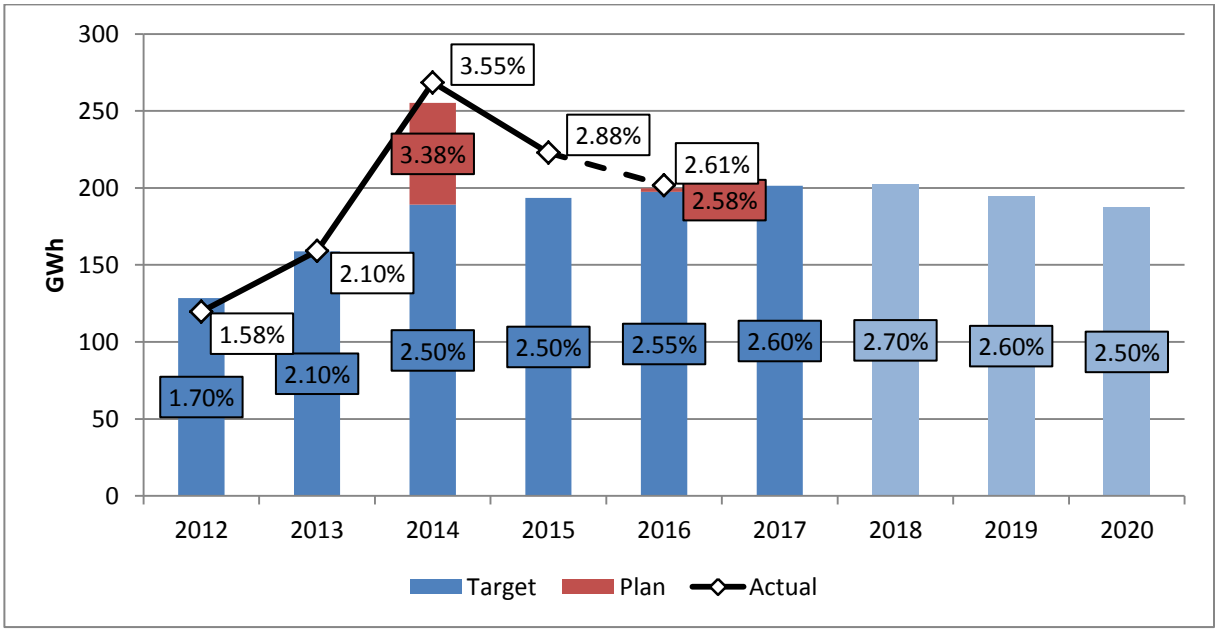
Table 6 | Proposed 2018-2020 Savings Targets

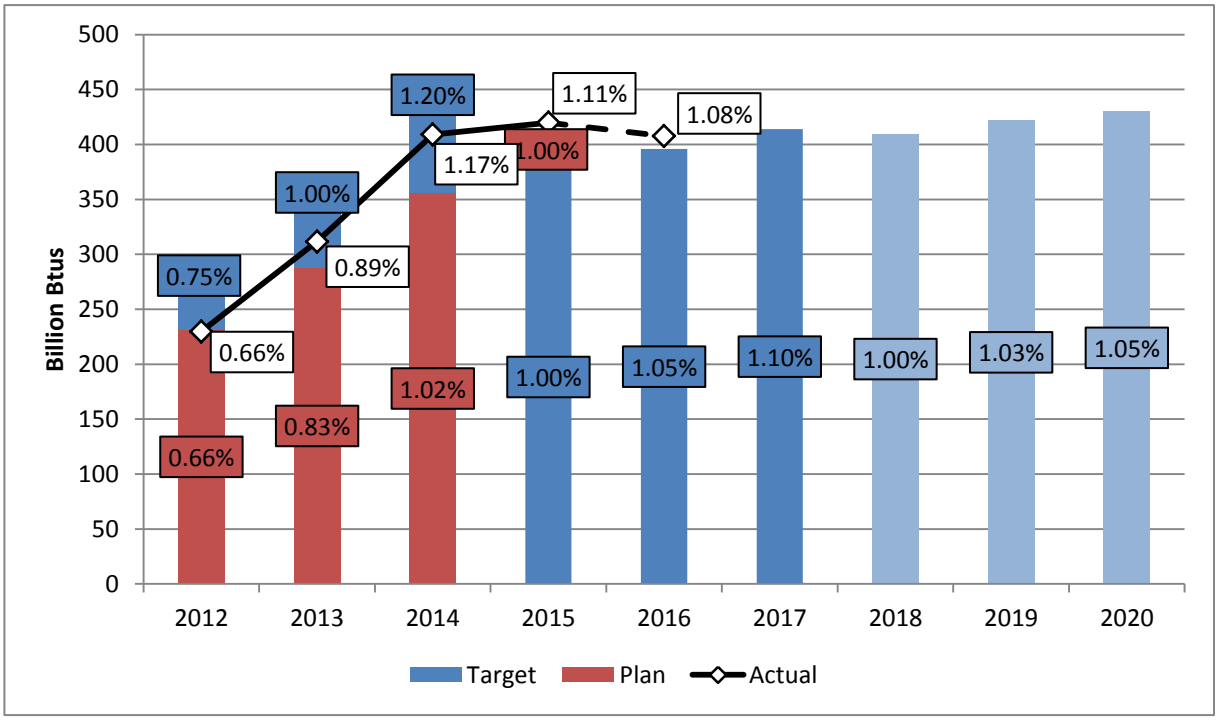
Targets	**2018**	**2019**	**2020**	**2018-2020**
Electric (MWh)	**202,166**	**194,678**	**187,191**	**584,035**
% of 2015 Sales	**2.70%**	**2.60%**	**2.50%**	**2.60%**
Natural Gas (MMBtu)	**409,513**	**421,799**	**429,989**	**1,261,301**
% of 2015 Sales	**1.00%**	**1.03%**	**1.05%**	**1.03%**

The electric savings targets, at the portfolio level, represent a slight downward trajectory year over year. This is largely due to the drop-off in residential and income eligible lighting savings previously discussed. Although it is possible that new technologies and opportunities may ultimately replace some of the loss of lighting savings, there is simply too much uncertainty and speculation at the present time to assume electric savings levels can remain at current levels through the 2018-2020 period.

Unlike the large impact of lighting on the electric portfolio, there was no single change in natural gas technologies or markets that resulted in a significant change in the trajectory of the savings targets in 2018-2020 compared to previous years. We note that although the savings as a percent of sales are lower than planned for 2017, the reference load forecast for natural gas has increased from the reference load used to set the 2015-2017 targets.

For context, the following two charts show the historical tracking of targets, associated annual plans and actual results.





III. Proposed Amendments to Least Cost Procurement Standards

As described in the Introduction, the proposed revisions to both the EE Standards and the SRP Standards included in Appendix A reflect a high level of Collaborative and "key partner" input and shared effort. The guidance for how to conduct the energy efficiency planning and procurement process established by the Least Cost Procurement Standards become increasingly important as we move into a new era of customer empowerment and interactive "distributed" resources.

In order to have clear guidance for all participants, a broader range of "costs and benefits" are proposed to be included in our EE and SRP decision-making processes. This is part of the reason why the EERMC has recommended linking the Targets recommendations and the "Standards Review" processes in this planning cycle.

It may well be that new benefits proposed for consideration in Rhode Island's cost-effectiveness screening process make some measures and programs that are now marginally cost-effective, more solidly cost-effective.

Summary of Revisions to EE Standard

The EE Standards were reformatted to follow the layout of the SRP standards and to provide more clarity. The standards now contain an introduction, definitions, and then the requirements of the three-year and annual plans.

The TRC Test was modified to include additional benefits such as economic development and potentially environmental externalities and is redefined as the Rhode Island ("RI") Test.

Detailed List of Changes

- Introduction Section - Added this section to reference statute and introduce purpose of standards.
- Definitions Section - This section was added to provide more clarity and to follow the layout of the revised SRP Standards. Most of this section is made up of items from the existing 2014 standards, simply grouped together as a definition (ex. innovation, comprehensiveness, equity).
    - Energy Efficiency:
        - Made a distinction between annual and 3-year plans. EE Program Plan now referred to as Annual Plan and EE Procurement Plan not referred to as Three Year Plan.
        - Definition of EE now includes "strategic and beneficial management of the time of energy use within a defined system. A system may be a residence, a place of business, a public accommodation, or an energy production, delivery, and end-use consumption network."
        - Clarifies that EE plans should be designed where possible to complement the objectives of RI's clean energy policies and be coordinated with other energy programs.
    - Cost-effectiveness
        - Replaces TRC Test with a Rhode Island Benefit Cost Test ("RI Test") to better reflect the policy objectives of the state with regard to energy, its costs, benefits, and environmental and societal impacts.
        - Similar to the original standards, the Utility, after consultation with the Council, will propose the specific benefits, costs, and other factors to use in the RI Test in its Three Year and Annual Plans, but they now should include economic development impacts.
        - The test may now also include the value of greenhouse gas reduction not embedded in any of the above. The test may also include the costs and benefits of other emissions and their generation or reduction through Least Cost Procurement.
    - Prudency and reliability were broken into two separate definitions. The items within those two definitions were taken from the original standards in the program plan description.
    - Added environmental responsibility under prudent.
- Program description section
    - Added in load management with demand responses, and integration with non-wires alternatives (NWAs).

Summary of Revisions to SRP Standard

The SRP Standards were originally developed to focus specifically on strategic use NWAs to defer or avoid the need for load-growth related grid upgrades. National Grid has been consistently following the SRP Standards as part of the distribution system planning process, but only the Tiverton/Little Compton DemandLink pilot has resulted. Many stakeholders view the Tiverton/Little Compton pilot as successful and compelling and would like to see additional NWA projects in RI.

The objective of the current effort to update the SRP Standards is to capture more potential uses of NWAs, including postponing or avoiding more expensive infrastructure projects, reducing the cost of grid improvements, and proactively deploying NWAs to avoid potential future grid problems.

Summary Highlights

- Expands on introductory language to contextualize SRP within the LCP, grid planning, and state energy policy context.
- Adds new Definitions Section to clarify existing definitions for NWA, prudency, and reliability, and adds new definitions for SRP, electric distribution system needs, environmental responsibility, and comparison of costs and benefits.
- Proposes new framework for comparing the costs and benefits of wires and NWA.
- Offers new flexibility for NWA screening criteria, including partial NWA and NWA in highly utilized grid areas.
- Provides additional detail regarding a Three Year SRP Plan and content of Annual Reports.
- Adds new language (borrowed from EE Standards) to allow the utility to propose an SRP performance incentive.

Detailed List of Changes

- Introduction Section
    - References purpose of SRP within the context of the LCP statute.
    - Clarifies that these guidelines for SRP seek to “enable the deployment of NWA to achieve state policy goals, optimize grid performance, enhance reliability and resiliency, and encourage optimal investment by the utility.”
    - Clarifies that SRP should be designed where possible to complement the objectives of RI’s clean energy programs and be coordinated with other energy processes.
- Definitions Section
    - Defines SRP as “an ongoing Company practice to maximize the prudent, reliable and environmentally responsible use of non-wires alternatives (NWA) to meet electric distribution system needs and optimize grid performance, subject to a system whereby wires solutions and NWA solutions can be fairly compared for both benefits and costs”.
    - Divides NWA into customer-side, grid-side, and combinations of both.

  - Adds a definition for different types of "electric distribution system needs" that SRP is intended to address.
  - Draws largely on language from previous Standards to define "optimization of grid performance", "prudency", and "reliability".
  - Adds a definition of "environmentally responsible".
  - Replaces TRC test with a new "comparison of benefits and costs" including a calculation of (1) NPV of project revenue requirement; (2) a calculation of the deferral value; and (3) CBA aligned with new proposed cost-effectiveness standards for EE.
- Assessment of Applicability of NWA
  - Adjusts NWA screening criteria by: (1) providing flexibility with the $1 million cost floor; (2) eliminating 20% relevant peak load requirement; (3) reducing start of wires project from 36 months to 30 months; and (4) adding flexibility for the utility to propose a project that does not meet the criteria if it has reason to believe a viable NWA exists.
  - Adds provision for consideration of "partial" or "hybrid" NWA.
  - Adds ability for utility to consider NWA in highly utilized areas of the distribution system.
  - Clarifies that NWA will be compared to wires based on the factors of prudency, reliability, environmental responsibility, and comparison of costs and benefits.
- Reporting Section
  - Provides additional information on the content in the 3-Year SRP Plan, including lessons learned from NWA implementation, trends in DER, and forward looking NWA opportunities.
  - Reorganizes and clarifies content of Annual Reports.
- Performance Incentive Section
  - Lifts language from EE Standards providing the utility an opportunity to propose a performance incentive for SRP.

Issues Not Addressed

There are three Issues that are not fully addressed in this version of the Standards and Targets. We observe that these issues are already under discussion in the SIRI process, and potentially in the Docket 4600 proceeding. They are:

- **Strategic Electrification:** How will the continuing evolution of very efficient and potentially environmentally beneficial "electrification" technologies such as heat pumps and electric vehicles be treated?
  - To the extent that these technologies are considered "already coming into the market," efficiency strategies and services can be (and are to some extent being) provided for them.

  - The parties have not reached a consensus on whether the LCP statute permits aggressive promotion of "conversion" strategies by the utility even if they could be considered environmentally and economically beneficial. (As noted below this issue has relevance to the discussion of efficiency services for "delivered fuels.")
- **Delivered fuels:** How will efficiency services be provided to "unregulated" or what we sometimes call "delivered fuels" customers? Interestingly, two of the major relevant sectors (non-natural gas home heating, and transportation) are the sectors identified above.
  - Traditionally it has been assumed that monopoly regulated ratepayers should not have SBC funds (intended for their fuel's efficiency) provided to offer efficiency services for another fuel (e.g. oil and propane). Massachusetts appears to be at least a partial exception to this practice.
  - On the other hand Rhode Island is proposing to use "a little" SBC funding for delivered fuel efficiency. It is nowhere near investing in "all cost-effective" delivered fuel efficiency. A significant policy challenge faces Rhode Island on this issue (as it does many other jurisdictions).
  - Some use of funds from other revenue streams (RGGI) has been targeted to this purpose. Proposals have been made (but not legislatively enacted) to have some kind of assessment to fund energy efficiency for other fuels in a manner comparable to the SBC for electric and gas.
  - Financing programs such as the RIIB and its products which are fuel neutral begin to offer options for these customers.
  - And finally, potential electrification of new portions of the economy may provide a rationale (and even an urgency) for treating new technologies under the framework of regulated fuel LCP.
- **Demand Response and Load management:** The growing importance of load management and demand response for a large and potentially growing number of purposes and benefits is an increasingly important issue. These strategies are clearly authorized in the LCP legislation, but have not received the attention and investment that traditional energy efficiency measures have.
  - National Grid is conducting pilots in Massachusetts and in New York, and also in Rhode Island through its Connected Solutions effort and its new Commercial and Industrial efforts in 2017.
  - Analytical work needs to be done to calculate the costs and benefits of demand response and load management measures.

We note that this capability is already clearly mandated as part of LCP, but we admit that it has not received the level of attention of "more traditional" energy efficiency.

- The EERMC through its Consultant Team has begun to investigate the potential for much more systematic and focused investment in the creation of this "capability" by utilities.
- It is our observation that the current practices are limited, and focused primarily in the large C&I and institutional sectors, but may be limited for them as well.
- We believe there is an increasingly urgent need to develop both demand response and load management capabilities and compensation mechanisms.
- We have not found or included in this set of Targets new targets for load management.
- We believe the Docket 4600 proceeding and the SIRI discussions provide opportunities to advance this discussion, and we believe the 2018-20 Three Year Plan should specifically address this opportunity.

IV. Economic Considerations

What has happened with energy efficiency in Rhode Island is remarkable. Rhode Island's 2006 Least Cost Procurement mandate has driven a level of effort, savings and benefit to RI customers that have put it at the forefront nationally.[8] This new approach allowed Rhode Island to gain this success by reversing the historical approach of setting spending levels first (i.e., budget caps) and then setting savings targets and program designs as a function of spending. While the 2018-20 proposed targets actually represent a "tilted plateau" in the downward direction, they still represent a strong challenge as targets start to recognize the pervasive (and societally beneficial) effects of standards improvement and deeper penetrations of savings technologies.

It is too early to set budgets related to the recommended savings targets

Stakeholders have discussed whether this recommendation and filing should include estimated budgets needed to achieve the proposed targets, and/or whether limitations on budgets should be recommended in conjunction with this filing. The Consultant Team recommends that the primary objective of this filing is to set energy savings targets based on our best research and analysis of the cost-effective energy efficiency available in Rhode Island. This approach is the same as the approach taken by the EERMC in 2010 and 2013. The Consultant Team's position is that it is not appropriate to suggest estimated budgets for the 2018-2020 time-period in this filing. The Consultant Team believes that the cost per unit of energy saved, cost-effectiveness and efficiency, and total budgets are critically important and must be developed through comprehensive analysis and research, and monitored rigorously. Nevertheless, there are many variables that drive costs up and/or down and the individual and overall impact of these variables in 2018-20 cannot be known with any reasonable degree of certainty today. For example, the total cost of a given year's energy efficiency investments is largely determined by the measure mix and strategies prescribed in the annual efficiency plan.

[8] See ranking for 2016 at: http://aceee.org/research-report/u1606

The Consultant Team's opinion is that cost and budget metrics should be developed and refined throughout the Three Year planning cycle. Initial budgets for each year (2018-2020) will be developed over the course of 2017 and proposed in the Three Year 2018-2020 Energy Efficiency Plan to be submitted to the Commission on September 1, 2017. Then, each subsequent Annual energy efficiency plan filing will include a more refined cost and budget proposal based on the best and current information. Through this process, the Commission and Collaborative stakeholders will have four opportunities to review and consider energy efficiency investment costs and budgets, as well as the Targets themselves.

We would also emphasize that as changes it the potential for savings emerge, the associated costs and benefits may well have a significant impact on actual implementation budgets.

Other factors may contribute to maximizing cost-efficiency and reducing ratepayer impacts

There are a number of potential strategies and opportunities for Rhode Island to increase gas and electric savings per dollar of ratepayer contribution. These include:

- **New Financing Strategies:** The creation of RIIB in 2015 has demonstrated Rhode Island's dedication to increasing the availability of affordable financing to advance energy efficiency investment in the state. This effort expanded the scope of an existing Rode Island financing entity with a great track record, and it built on the successful Department of Energy ("DOE") effort led by the OER that has helped leverage National Grid expenditures. The DOE grant that funded RIRIPEP brought $700,000 dollars of federal money into the state to help mobilize efficiency services to State buildings, schools and other municipal facilities. National Grid was an active and effective partner in that effort, and it leveraged and increased the cost-efficiency of National Grid's efforts by gaining new partners and participants.
- **Commercial PACE:** The RIIB is now offering a Commercial Property Assessed Clean Energy ("commercial PACE") program that holds great promise for increasing access to efficiency financing for commercial customers. The PACE financing effort could, in turn, help leverage more customer investment at lower program cost to National Grid. In both 2026 and in the proposed 2017 Annual Plan, funding is being made available from the System Benefit Charge to help leverage millions of dollars of funding for Municipal and public entities to invest in efficiency through the RIIB and in partnership with National Grid.
- **Additional new lending strategies -** National Grid is working to expand the scope of its small-commercial on-bill financing strategies and its offerings in the large customer sector of the market with loan products. Success on these fronts could help lower the utility's unit cost of savings and increase participation.

- **Rhode Island Lead by Example:** The Impressive initiative by the Raimondo Administration to pursue aggressive efficiency and renewable energy development in state facilities highlights the kind of effort that can be required to move efficiency to the forefront of attention in sectors of the economy that have not always been leaders in energy efficiency.
- **EERMC Input:** The EERMC has invested in additional consulting expertise from Finance Expert to work with the Consultant Team, National Grid, RIIB and other parties to ensure that the emergence of these new financing strategies follows best practices, and is supported by close cooperation and program coordination among all the parties.

V. 2018-2020 Savings Targets and LCP Standards Conclusion

The Consultant Team recommends that the EERMC adopt these proposed targets for electric and gas savings as its proposal to the Commission for savings targets that the National Grid energy efficiency programs should plan to achieve in the years 2018, 2019, and 2020.

The Consultant Team also recommends that the EERMC adopt the attached proposed revisions to the EE and SRP Standards as its proposal to the Commission for proposed modifications to the Standards for the 2018-2020 Three Year Planning period.

Appendix A: Proposed Revisions to the Standards

CHAPTER 1 – Energy Efficiency Procurement

1.1. Introduction

A. Energy Efficiency Procurement (EEP) as mandated by §39-1-27.7, is intended to complement system reliability and supply procurement as provided for in §39-1-27.8, with the common purpose of meeting electrical and natural gas energy needs in Rhode Island, in a manner that is optimally cost-effective, reliable, prudent and environmentally responsible.

B. In order to adhere to the principles set forth in §39-1-27.7 and to meet Rhode Island's energy system needs in a least cost manner, the EE Standards set forth guidelines for the development of least cost energy efficiency plans.

1.2. Definitions

A. Energy efficiency

Energy efficiency is defined as the reduction of energy consumption or strategic and beneficial management of the time of energy use within a defined system. A system may be a residence, a place of business, a public accommodation, or an energy production, delivery, and end-use consumption network.

Energy Efficiency Plans[9] should be designed where possible to complement the objectives of Rhode Island's energy efficiency, renewable energy, and clean energy programs, and describe their interaction with them, including, but not limited to the System Reliability Procurement Plan; Renewable Energy Standard; the Renewable Energy Growth Program; the Net Metering Program; and the Long-Term Contracting for Renewable Energy Standard. Energy Efficiency Plans should also be coordinated where possible with other applicable energy procurement, planning, and investment programs, including, but not limited to, Standard Offer Supply Procurement.

Innovation. Energy Efficiency Plans should address new and emerging issues as they relate to least cost procurement (e.g., CHP, strategic electrification, integration of grid modernization, gas service expansion, distributed generation and storage technologies, and energy efficiency services for non-regulated fuels, etc.), as appropriate, including how they may meet State policy objectives and provide system, customer, environmental, and societal benefits.

[9] Energy Efficiency Plans refers to both the EE Procurement Plan (or Three-Year Plan) and EE Program Plan (or Annual Plan), as applicable.

Comprehensiveness. The Utility should consistently design programs and strategies to ensure that all customers have an opportunity to benefit comprehensively through types of measures or depth of services, realizing both near-term and long-lived savings opportunities where appropriate, from expanded investments in this low-cost resource. The programs should be designed and implemented in a coordinated fashion by the Utility, in active and ongoing consultation with the Council.

i. Equity. The portfolio of programs proposed by the Utility should be designed to ensure that different sectors and all customers receive opportunities to participate in and secure efficiency resources lower cost than the cost of supply.

B. Cost-effectiveness

The Utility shall assess measure, program and portfolio cost-effectiveness according to a benefit-cost test that builds on the Total Resource Cost Test approved by the Commission in Docket 4443, but that more fully reflects the policy objectives of the state with regard to energy, its costs, benefits, and environmental and societal impacts. The Utility shall, after consultation with the Council, propose the specific benefits and costs to be reported, and factors to be included, in the Rhode Island Benefit Cost Test (RI Test) and include them in Energy Efficiency Plans. These benefits should include resource impacts, non-energy impacts, distribution system impacts, economic development impacts, and the value of greenhouse gas reductions, as described below. The accrual of specific non-energy impacts to only certain programs or technologies, such as income-eligible programs or combined heat and power, may be considered.

With respect to the value of greenhouse gas reductions, the RI Test shall include the costs of CO^2 mitigation as they are imposed and are projected to be imposed by the Regional Greenhouse Gas Initiative. The test shall also include any other utility system costs associated with reasonably anticipated future greenhouse gas reduction requirements at the state, regional, or federal level for both electric and gas programs. A comparable benefit for greenhouse gas reduction resulting from natural gas or delivered fuel energy efficiency or displacement may be considered. The test may include the value of greenhouse gas reduction not embedded in any of the above. The test may also include the costs and benefits of other emissions and their generation or reduction through Least Cost Procurement.

Benefits and costs that are projected to occur over the term of the Energy Efficiency Plans shall be stated in present value terms in the RI Test calculation, using a discount rate that appropriately reflects the risks of the investment of customer funds in energy efficiency; in other words, a discount rate that indicates that energy efficiency is a low-risk resource in terms of cost of capital risk, project risk, and portfolio risk. The discount

rate shall be reviewed and updated in the Energy Efficiency Plans, as appropriate, to ensure that the applied discount rate is based on the most recent information available.

The Utility shall provide a discussion of the carbon impacts efficiency and reliability investment plans will create, whether captured as benefits or not.

C. Reliable

Build on prior plans. Energy Efficiency Plans shall describe the recent energy efficiency programs offered by the Utility and highlight how the Energy Efficiency Plans supplement and expand upon these offerings at the appropriate level of detail, including but not limited to new measures, implementation strategies, measures specifically intended for demand or load management, and new programs as appropriate.

i. Build on prior programs. Utility program development shall proceed by building upon what has been learned to date in Utility program experience, systematically identifying new opportunities and pursuing comprehensiveness of measure implementation as appropriate and feasible.

D. Prudent

Plan based on potential assessments. The Utility shall use the Council's Opportunity Report as issued on July 15, 2008, or other assessments of potential, as resources in developing its Three-Year Plan. The Utility shall include in its Three-Year Plan an outline of proposed strategies to supplement and build upon these assessments of potential.

Unlocks capital and effectively uses funding sources. Energy Efficiency Plans shall include a section outlining and discussing new strategies to make available the capital needed to effectively overcome barriers to implement projects in addition to direct financial incentives provided in order to cost-effectively achieve the Least Cost Procurement mandate. Such proposed strategies shall move beyond traditional financing strategies and shall include new capital availability strategies and partnerships that effectively overcome market barriers in each market segment in which it is feasible to do so.

Integration. Energy Efficiency Plans shall address how the Utility plans to integrate gas and electric energy efficiency programs to optimize customer energy efficiency, and provide benefits from synergies between the two energy systems and their respective programs.

Three-Year Plans shall be developed to propose strategies to achieve the energy efficiency savings targets that shall be proposed by the EERMC and approved by the Commission for that three year period. Such strategies shall secure energy, capacity, and system benefits and also be designed to ensure the programs will be delivered successfully, cost-effectively, and

cost-efficiently over the long term. In addition to satisfying other provisions of these Standards, the Three-Year Plan shall contribute to a sustainable energy efficiency economy in Rhode Island, respond to and transform evolving market conditions, strive to increase participation, and provide widespread consumer benefits.

Energy Efficiency investments shall be made on behalf of all customers. This will ensure consistency with existing program structure under which all customers pay for and benefit from Rhode Island's efficiency programs.

i. Efficacy. All efforts to establish and maintain program capability shall be done in a manner that ensures quality delivery and is economical and efficient. The Utility shall include wherever possible and practical partnerships with existing educational and job training entities.

E. Environmentally Responsible.

Environmental responsibility is indicated by the procurement of energy savings, compliance with State environmental policies, and the proper valuation of greenhouse gas reduction benefits.

1.3. EE Procurement Plan

A. The Utility Energy Efficiency and Conservation Procurement Plan (The EE Procurement Plan or Three-Year Plan) submitted on September 1, 2008 and triennially thereafter on September 1, shall propose overall budgets and efficiency targets for the three years of implementation beginning with January 1 of the following year. These budgets and targets shall be illustrative and provisional[10] and shall guide annual energy efficiency program plans over the three year period.

B. The Three-Year Plan shall identify the strategies and an approach to planning and implementation of programs that will secure all cost-effective energy efficiency resources that are lower cost than supply and are prudent and reliable, consistent with the definitions provided herein. The Three-Year Plan shall contain sections which describe

i. Strategies and approaches to planning.

ii. Cost-effectiveness

iii. Prudency and Reliability

iv. Funding Plan and Initial Targets

a. The Utility shall develop a funding plan using, as necessary, the following sources of funding to meet the budget requirement of the

[10] As the Three-Year Plan is illustrative and provisional, variances between Annual Plans and Three-Year Plans due to changes in factors such as, but not limited to, sales forecasts, funding sources, avoided costs, and evaluation results may be acceptable, subject to Commission review of Utility explanation for those variances.

Three-Year Plan and fulfill the statutory mandate of Least Cost Procurement. The Utility shall utilize as necessary and available, the following sources of funding for the efficiency program investments:

(1) the existing System Benefits Charge (SBC);

(2) revenues resulting from the participation of energy efficiency resources in ISO-New England's forward capacity market (FCM);

(3) proceeds from the auction of Regional Greenhouse Gas Initiative (RGGI) allowances pursuant to § 23-82-6 of the General Laws;

(4) funds from any state, federal, or international climate or cap and trade legislation or regulation including but not limited to revenue or allowances allocated to expand energy efficiency programs;

(5) a fully reconciling funding mechanism, pursuant to R.I.G.L. § 39-1-27.7, which is a funding mechanism to be relied upon after the other sources as needed to fully fund cost-effective electric and gas energy efficiency programs to ensure the legislative mandate to procure all cost effective efficiency that is lower cost than supply is met; and

(6) other sources as may be identified by the EERMC, the OER, and the Utility.

b. The Utility shall include a preliminary budget for the Three-Year Plan covering the three-year period that identifies the projected costs, benefits, and initial energy saving targets of the portfolio for each year. The budget shall identify, at the portfolio level, the projected cost of efficiency resources in cents/ lifetime kWh or cents/lifetime MMBtu. The preliminary budget and initial energy saving targets may be updated, as necessary, in the Utility's Annual Energy Efficiency Plan.

Performance Incentive Plan Structure, pursuant to Section 1.5

1.4. EE Program Plan

A. The Utility shall prepare and file a supplemental filing containing details of implementation plans by program for the next program year (Energy Efficiency Annual Plan or Annual Plan). Beginning in 2014, the Annual Plan shall be filed on October 15 except in years in which a Three-Year Plan is filed; in those years, the Annual Plan filing shall be made on November 1. The Annual Plan filings shall also provide for adjustment, as necessary, to the remaining years of the Three-Year Plan based on experience, ramp-up, and assessment of the resources available.

B. Principles of Program Design. The Annual Plan shall identify and contain programs proposed for implementation by the Utility, pursuant to the Three-Year Plan, and which demonstrate consistency with the principles of program design described above in Section 1.2.

C. Cost-effectiveness. The Utility shall propose a portfolio of programs in the Annual Plan that is cost-effective. Any program with a benefit cost ratio greater than 1.0 (i.e., where benefits are greater than costs), should be considered cost-effective. The portfolio must be cost-effective and programs should be cost-effective, except as noted below.

The Utility shall be allowed to direct a portion of proposed funding to conduct research and development and pilot program initiatives. These efforts will not be subject to cost-effectiveness considerations. However, the costs of these initiatives shall be included in the assessment of portfolio level cost-effectiveness.

The Utility shall allocate funds to the Energy Efficiency and Resource Management Council and Office of Energy Resources as specified in R.I.G.L. § 39-2-1.2. These allocations will not be subject to cost-effectiveness considerations. However, these costs shall be included in the assessment of portfolio level cost-effectiveness.

D. Parity. While it is anticipated that rough parity among sectors can be maintained, as the limits of what is cost-effective are identified, there may be more efficiency opportunities identified in one sector than another. The Utility should design programs to capture all resources that are cost-effective and lower cost than supply. The Utility should consult with the Council to address ongoing issues of parity

E. Final Funding Plan and Budget Amounts, Cost-Effectiveness and Goals

i. The Utility shall include a detailed budget for the Annual Plan covering the annual period beginning the following January 1, that identifies the projected costs, benefits, and energy saving goals of the portfolio and of each program. The budget shall identify at the portfolio level the projected total resource cost of efficiency resources in cents/lifetime kWh or cents/lifetime MMBtu.

ii. The Annual Plans filed October 15 or November 1 will reflect program implementation experience and anticipated changes, shifts in customer demand, changing market costs, and other factors, including a discussion of market transformation impacts as noted in Section 1 above. The annual detailed budget update shall include the projected costs, benefits, and energy saving goals of each program as well as the total resource cost of efficiency resources in cents/lifetime kWh or cents/lifetime MMBtu.

iii. The EE Program Plan shall identify the energy cost savings and bill impacts that RI ratepayers will realize through its implementation.

F. Program Descriptions

i. The Utility shall, as part of its Annual Plan, describe each program, how it will reach its target market, and how it will be implemented. In these descriptions, the Utility shall demonstrate, as appropriate, how the Program is consistent with the principles of program design described above.

ii. In addition to these basic requirements, the plan shall address, where appropriate, the following elements:

a. Comprehensiveness of opportunities addressed at customer facilities;

b. Integration of electric and natural gas energy efficiency implementation and delivery (while still tracking the cost-effectiveness of programs by fuel); energy efficiency opportunities for delivered fuels customers should be addressed to the extent possible;

c. Integration of energy efficiency programs with renewables and other system reliability procurement plan elements;

d. Promotion of the effectiveness and efficiency levels of codes and standards and other market transforming strategies. If the Utility takes a proactive role in researching, developing and implementing such strategies, it may, after consultation with the Council, propose a mechanism to claim credit for a portion of the resulting savings;

e. Implementation, where cost-effective, of demand response and load management measures or other programs that are integrated into the electric and natural gas efficiency program offerings. Such measures/programs will be designed to supplement cost-effective procurement of long-term energy and capacity savings from efficiency measures; and

f. Integration with non-wires alternatives.

G. Monitoring & Evaluation (M&E) Plan

i. The Utility shall include a Monitoring and Evaluation ("M & E") component in its Annual Plan.

ii. This M & E component shall address at least the following:

a. savings verification including, where appropriate, analysis of customer usage; such savings verification should also facilitate participation in ISO-NE's forward capacity market;

b. issues of ongoing program design and effectiveness;

c. any other issues, for example, efforts related to market assessment and methodologies to claim savings from market effects, among others;

d. a discussion of regional and other cooperative M & E efforts the Utility is participating in or plans to participate in; and

e. longer-term studies as appropriate, to assess programs over time.

iii. The Utility shall include in its M & E component any changes it proposes to the frequency and level of detail of Utility program plan filing and subsequent reporting of results.

H. Reporting Requirements

i. The Utility, in consultation with the Council, will propose the content to be reported and a reporting format that is designed to communicate clearly and effectively the benefits of the efforts planned and implemented, with particular focus on energy cost savings and program participation levels across all sectors, to secure all EE resources that are lower cost than supply.

I. Performance Incentive Plan, pursuant to Section 1.5

1.5. Efficiency Performance Incentive Plan

A. Pursuant to R.I.G.L. § 39-1-27.7(e) and § 39-1-27.7.1, the Utility shall have an opportunity to earn a shareholder incentive that is dependent on its performance in implementing the approved Annual Plan.

The Utility, in consultation with the Council, will propose in its Three-Year Plan and subsequent Annual Plans, a Performance Incentive (PI) proposal that is designed to promote superior Utility performance in cost-effectively and efficiently securing for customers all efficiency resources lower cost than supply.

The Performance Incentive should be structured to reward program performance that makes significant progress in securing all cost-effective efficiency resources that are lower cost than supply while at the same time ensuring that those resources are secured as efficiently as possible.

The Utility PI model currently in place in RI should be reviewed by the Utility and the Council. The Utility and Council shall also review incentive programs and designs in other jurisdictions including those with penalties and increasing levels of incentives based on higher levels of performance.

The PI may provide incentives for other objectives that are consistent with the goals including, but not limited to, comprehensiveness, customer equity, lifetime net benefits, increased customer access to capital, and market transformation.

B. The PI should be sufficient to provide a high level of motivation for excellent Utility performance annually and over the three year period of the Three-Year Plan, but structured so that customers receive most of the benefit from energy efficiency implementation.

1.6. Role of the Council in Plan Development and Approval

A. The Council shall take a leadership role in ensuring that Rhode Island ratepayers receive excellent value from the Three-Year Plan being implemented on their behalf. The Council shall do this by collaborating closely with the Utility on design and implementation of the Monitoring and Evaluation efforts presented by the Utility under the terms of Section 1.4 D, and if necessary, provide recommendations for modification that will strengthen the assessment of Utility programs.

B. In addition to the other roles for the Council indicated in this filing, the Utility shall seek ongoing input from, and collaboration with the Council on development of the Three-Year Plan and Program Plans, and on development of annual updates, if any, to the Three-Year Plan. The Utility shall seek to receive the endorsement of the Plan by the Council prior to submission to the Commission.

C. The Utility and the Council shall report to the PUC a process for Council input and review of its 2008 EE Procurement Plan and EE Program Plan by July 15, 2008 and triennially thereafter.

D. The Council shall vote whether to endorse the Three-Year Plan by August 15, 2008 and triennially thereafter. If the Council does not endorse the Plan then the Council shall document the reasons and submit comments on the Plan to the PUC for their consideration in final review of the Plan.

E. The Utility shall, in consultation with the Council, propose a process for Council input and review of its Three-Year Plan and Annual Plan. This process is intended to build on the mutual expertise and interests of the Council and the Utility, as well as meet the oversight responsibilities of the Council.

F. The Utility shall submit a draft Annual Plan to the Council and the Division of Public Utilities and Carriers for their review and comment annually at least one week before the Council's scheduled meeting prior to the filing date that year.

G. The Council shall vote whether to endorse the Annual Plan prior to the prescribed filing date, annually. If the Council does not endorse the Annual Plan, the Council shall document its reasons and submit comments on the Plan to the PUC for its consideration in final review of the Plan.

H. The Council shall prepare memos on its assessment of the cost effectiveness of the Three-Year Plans and Annual Plans, pursuant to R.I.G.L. §39-1-27.7(c)(5), and submit them to the PUC no later than two weeks following the filing of the respective Plans with the Commission

CHAPTER 2 - System Reliability Procurement

2.1. Introduction

A. System Reliability Procurement (SRP) as mandated by §39-1-27.7, is intended to complement energy efficiency and conservation procurement, and supply procurement as provided for in §39-1-27.8, with the common purpose of meeting electrical and natural gas energy needs in Rhode Island, in a manner that is optimally cost-effective, reliable, prudent and environmentally responsible.[11]

B. In order to adhere to the principles set forth in §39-1-27.7 and to meet Rhode Island's energy system needs in a least cost manner, the SRP Standards set forth guidelines for the incorporation of energy efficiency, distributed generation, demand response, and other energy technologies (collectively referred to as "non-wires alternatives") into Utility distribution planning. These guidelines seek to enable the deployment of cost-effective non-wires alternatives to achieve state policy goals, optimize grid performance, enhance reliability and resiliency, and encourage optimal investment by the Utility.

C. SRP should be integrated with the Company's distribution planning process and be designed where possible to complement the objectives of Rhode Island's energy efficiency, renewable energy, and clean energy programs, and describe its interaction with them, including, but not limited to the programs described in in Section 1.2.ii. SRP should also be coordinated where possible with other applicable energy procurement, planning, and investment programs, including, but not limited to Standard Offer Supply Procurement and the Infrastructure, Safety and Reliability Plan.

2.2. System Reliability Procurement Definitions

A. In order to fulfill the intent of the statute, System Reliability Procurement (SRP) is interpreted to mean an ongoing Company practice to maximize the prudent, reliable and environmentally responsible use of non-wires alternatives (NWA) to meet electric distribution system needs and optimize grid performance, subject to a system whereby wires solutions and NWA solutions can be properly compared for both benefits and costs.

B. Non-wires alternatives (NWA) may be utilized through various approaches to advance the goals of SRP and optimize grid performance as described in 2.1.B. These approaches may include but are not limited to:

i. Strategic promotion of customer-side NWA through investment or outreach by the Company or a third party

[11] R.I.G.L §39-1-27.7 specifies that standards and guidelines for system reliability procurement may include, but not be limited to: (i) Procurement of energy supply from diverse sources, including, but not limited to, renewable energy resources as defined in chapter 26 of this title; (ii) Distributed generation, including, but not limited to, renewable energy resources and thermally leading combined heat and power systems, which is reliable and is cost-effective, with measurable, net system benefits; (iii) Demand response, including, but not limited to, distributed generation, back-up generation and on-demand usage reduction, which shall be designed to facilitate electric customer participation in regional demand response programs, including those administered by the independent service operator of New England ("ISO-NE") and/or are designed to provide local system reliability benefits through load control or using on-site generating capability.

a. Customer-Side NWA may include but are not limited to:

(1) Least Cost Procurement energy efficiency baseline services

(2) Peak demand and geographically-focused supplemental energy efficiency strategies

(3) Distributed generation[12] generally, including combined heat and power and renewable energy resources[13]

(4) Demand response

(5) Direct load control

(6) Energy storage

(7) Electric vehicles

(8) Controllable or dispatchable electric heat or cooling

(9) Alternative metering and tariff options, including time-varying rates

ii. Utility investment in grid-side tools and technologies

a. Grid-Side NWA may include but are not limited to:

(1) Energy storage

(2) Voltage management

(3) Communications systems

(4) Grid-optimization technologies[14]

(5) Generation to provide or in support of any or all of B(ii)(1)-(4), consistent with Rhode Island General Law.

iii. Combinations of NWA (both customer-side and grid-side) and combinations of NWAs with traditional infrastructure investments

C. Electric distribution system needs

i. Electric distribution system needs shall include, but are not limited to: system capacity (normal and emergency), voltage performance, reliability performance, protection coordination, fault current management, reactive power compensation, asset condition assessment, distributed generation constraints, and operational considerations. Note that not all system needs can be addressed by NWAs.

D. Optimization of grid performance

[12] In order to meet the statute's environmental goals, generation technologies must comply with all applicable general permitting regulations for smaller-scale electric generation facilities.
[13] As defined in the Renewable Energy Standard http://webserver.rilin.state.ri.us/Statutes/TITLE39/39-26/39-26-5.HTM
[14] "Grid-facing" investments may include technologies that automate grid operations and allow the distribution utility to monitor and control grid conditions in near real time. (Source: MA DPU Docket 12-76-A, pg. 2)

i. Optimizing grid performance refers to activities undertaken to improve the performance and efficiency of the electric distribution system by the Company. Performance improvements can include enhanced reliability, peak load reduction, and increased capacity utilization for more efficient use of assets. More efficient delivery of electricity can include optimization of operations and reduced system losses. Costs and data requirements associated with these optimization activities should be considered.

ii. In the longer term, optimizing grid performance can include a response to anticipated changes to the distribution system and the associated planning process.

E. Prudency
   i. Prudent planning under SRP will be assessed by:
      a. Risks associated with each alternative (ability to obtain licensing and permitting, significant risks of stranded investment, the potential risk reduction of a more incremental approach, sensitivity of alternatives to differences in load forecasts, emergence of new technologies);
      b. Potential for synergy savings based on alternatives that address multiple needs;
      c. Implementation issues; and
      d. Customer responsiveness and ability to potentially modify usage at certain times and seasons.

F. Reliability
   i. Reliability will be assessed by the solutions':
      a. Ability to meet the identified system needs;
      b. Review of anticipated reliability as compared to alternatives;
      c. Operational complexity and flexibility; and
      d. Resiliency of the system.

G. Environmental responsibility:
   i. Environmental responsibility will be assessed by the manner in which the solution advances the goals and objectives of the state energy plan and other environmental policies. Considerations of environmental responsibility may include impacts on greenhouse gas emissions, criteria air pollution, land use, water, and other resources.

H. Cost-effectiveness
   i. Cost-effectiveness will be assessed by a comparison of costs and benefits as described in 2.3.F.

2.3. Assessment of Applicability of Non-Wires Alternatives (SRP Planning)

A. Identified electric distribution system needs that meet the following criteria will be

evaluated for potential NWAs that could reduce, avoid or defer a T&D wires solution over an identified time period.

i. The need is not based on asset condition;

ii. The wires solution, based on engineering judgment, will likely cost more than approximately $1 million; the cost floors may vary across different project types and time frames;

iii. If load reductions are necessary, then they are expected to be less than 20 percent of the relevant peak load in the area, or sub area in the event of a partial solution, of the defined need;

iv. Start of wires alternative construction is at least 30 months in the future;

v. At its discretion, the Utility may consider and, if appropriate, propose a project that does not pass one or more of these criteria if it has reason to believe that a viable NWA solution exists, assuming the benefits of doing so justify the costs.

B. If the Company determines that an NWA cannot defer the entire T&D project, the Company is encouraged to examine the application of NWAs to avoid or defer part of the overall scope of the project. This shall be referred to as 'partial' or 'hybrid' NWA. The Utility will review reduction of the discrete portions of the entire T&D plan. Examples include: 1) reducing two new feeders to one new feeder; 2) reducing a new proposed fully build station (2 power transformers, 8 feeders) to a partial station (1 power transformer, 4 new feeders).[15]

C. To further incorporate NWAs into the Company's distribution planning process, the Company may investigate the application of NWAs to reduce or manage load in areas including, but not limited to, highly utilized distribution systems, where construction is physically constrained, and where demand growth is anticipated, to prolong the useful lifetime of existing systems. It is understood that an economic analysis framework for this type of NWA would need to be developed. With wider penetration, load reduction NWAs are expected to generally defer or reduce infrastructure investment in a similar manner to Energy Efficiency efforts.

D. A more detailed version of these criteria may be developed by the distribution utility and shared with the Council and other stakeholders.

E. Feasible NWAs will be compared to traditional solutions based on reliability, prudency, environmental responsibility, and the comparison of costs and benefits as defined below[16].

F. Comparison of benefits and costs

i. The analysis of costs and benefits for each solution shall include a full assessment of costs and benefits of the various technologies, measures, and/or strategies included in the NWA as guided, where applicable, by the cost-effectiveness test outlined in Section 1 of these Standards. The

[15] It is understood that reduction in the size of equipment (wire, transformers, etc.) offers little to no cost reduction to enable an economic NWA due to the discrete sizing of these components, and the Utility is not expected to pursue such analysis.

[16] It is recognized that individual attributes can be compared to each other, but the ability to compare all the attributes together may not be able to be done at this time and may be the subject of other proceedings.

following financial analysis should be conducted for each solution where an NWA is a viable option:

a. A calculation of the net present value benefit of deferring the traditional alternative over a set time period or eliminating the traditional alternative entirely as applicable.

b. A calculation of the net present value cost of the NWA over the same time period as the net present value calculation in (a).

c. A cost benefit analysis, which shall consist of a comparison of (a.) and (b.) plus any other estimated benefits

(1) Other estimated benefits[17] shall include but are not limited to: avoided capacity costs; avoided energy costs; avoided transmission costs; avoided ancillary service costs; market price suppression effect; improved reliability; revenues from grid resources; avoided greenhouse gas emissions; other environmental externalities; avoided environmental compliance costs; economic development benefits, and any site-specific, or option-specific benefits or costs directly attributable to the location of the project or the proposed alternatives, provided however that these benefits have not already been counted in the justification of any other underlying program (e.g. the Energy Efficiency Procurement Plan, the Renewable Energy Growth Program, the Net Metering Program, the Long-Term Contracting for Renewable Energy Standard, etc.) to avoid double-counting of benefits.

(2) Recognizing that quantification methods for some benefits are not yet defined, and may need further research, where benefits cannot be reasonably quantified, a qualitative impact analysis or description of potential benefits should be included.

ii. Where there is no wires solution yet identified consistent with Section 2.3.C, a traditional benefit/cost analysis (consistent with this section) for the NWA should be done, and if it is greater than 1 the NWA can be recommended for approval.

2.4. Three Year System Reliability Procurement Plan

A. The Utility System Reliability Procurement Plan ("The SRP Plan") submitted on September 1, 2017 and triennially thereafter on September 1, shall describe general planning principles and potential areas of focus for System Reliability Procurement for the three years of implementation beginning with January 1 of the following year. Such Plans shall include but are not limited to:

i. Proposed evolutions to definitions, identification, and assessment of non-wires alternatives which may include but are not limited to:

a. Observations and lessons learned from the most recent three year

[17] It is expected that site-specific avoided distribution costs and reduced operations and maintenance costs would be captured in the calculation of the net present value benefit of deferring or avoiding the traditional alternative.

period.

b. Trends in distributed energy resource technology and analytics, either grid-side or customer-side, that may influence NWA planning over the three year period.

ii. Anticipated scope of NWA deployment in coming three year period.

a. In-progress NWA projects projected to continue, and a high-level timeline.

b. Projected areas of focus[18] for distribution planning review that may result in the identification of new NWA projects.

iii. Description of how the SRP Plan complements the objectives of Rhode Island's energy efficiency, renewable energy, and clean energy programs listed in 2.1.C.

iv. Proposed shareholder incentive framework.

2.5. Annual System Reliability Procurement Report

A. The Utility shall prepare and file a supplemental filing on November 1, 2017 and annually thereafter on November 1, containing details of implementation of the SRP Plan for the next program year ("The SRP Report"). Such reports will include but are not limited to:

i. Identification and NWA viability determination of needs which passed the initial screening in Section 2.3;

ii. Identification of needs where an NWA project was selected as a solution including:

a. A summary of the comparative analysis following the criteria outlined in Section 2.3 above;

b. Characterization of the transmission or distribution need including:

(1) The magnitude (daily and annual load shape curves, voltage improvement, etc.) if applicable, the projected year and season by which a solution is needed, and other relevant timing issues;

(2) Description of the traditional wires solution and how it is impacted by the NWA[19];

(3) Description of the sensitivity of the need and T&D investment to load forecast assumptions.

iii. Description of how the NWA projects complement the objectives of Rhode Island's energy efficiency, renewable energy, and clean energy programs listed in 2.1.C;

iv. Implementation plans for the newly selected NWA projects and any

[18] It is not anticipated that this will include project specifics, which are dependent on needs and screening; those are expected in Annual SRP Reports. In the absence of project specifics or budgets, this section is intended to give a picture of the expected size and scope of NWA efforts during the three year period and a sense of whether it is expected to grow relative to current activities.

[19] Description should include technology proposed, net present value, costs (capital and O&M), revenue requirements, and timeline for the upgrade

previously approved projects being proposed for continuation, which should include:

a. A description of the NWA solution, including technology, customer engagement, cost (capital and O&M), net present value, and timing;

b. The ability of affected customers to participate in the proposed project;

c. A description and results of any competitive bid (Request for Proposals) processes that were conducted to inform the description in 2.5.A.iv.a;

d. The proposed NWA investment scenario(s);

e. The proposed technology ownership and contracting considerations or options;

f. The proposed evaluation plans.

v. Funding plans for the selected NWA projects and any previously approved projects being proposed for continuation. The Utility may propose to utilize funding from the following sources for system reliability investments:

a. Capital funds that would otherwise be applied towards traditional wires based alternatives, where the costs for the NWA are properly capitalized under generally accepted accounting principles and can be properly placed in rate base for recovery in rates along with other ordinary infrastructure investments;

b. Existing Utility EE investments as required in Section I of these Standards and the resulting Annual Plans;

c. Additional energy efficiency funds to the extent that the energy efficiency-related NWA can be shown to pass the cost benefit test as outlined in Section 1 of these Standards and such additional funding is approved;

d. Utility operating expenses to the extent that recovery of such funding is explicitly allowed;

e. Identification of customer contribution or third party investment that may be part of a NWA based on benefits that are expected to accrue to the specific customers or third parties;

f. Any other funding sources that might be required and available to complete the NWA.

vi. Status of any previously selected and approved projects and pilots;

vii. Identification of any methodological or analytical tools to be developed in the year;

viii. Total SRP Plan budget, including administrative and evaluation costs;

ix. Proposed shareholder incentive;

B. To the extent the implementation of a NWA may contribute to an outage event that is beyond the control of the Company, the Company may apply to the Commission for an exclusion of such event in the determination of Service Quality performance.

2.6. SRP Performance Incentive Plan

A. Utility shall have an opportunity to earn a shareholder incentive that is dependent on its performance in implementing the approved SRP Plan.
B. The Utility, in consultation with the Council, will propose in its SRP Plan a Performance Incentive (PI) proposal that is designed to promote superior Utility performance in cost-effectively and efficiently delivering least cost and reliable non-wires alternatives projects.
C. The Performance Incentive should be structured to reward program performance that makes significant progress in securing least cost and reliable non-wires alternatives projects while at the same time ensuring that those resources are secured as efficiently as possible.
D. The PI may provide incentives for other objectives that are consistent with the goals including but not limited to resiliency, connectivity, and operability.
E. The PI should be sufficient to provide a high level of motivation for excellent Utility performance annually and over the three year period of the SRP Plan, but structured so that customers receive most of the benefit from SRP implementation.

Appendix B: Historical and Projected Core Program Savings

The following two tables were used to derive Trend lines that reflect *Actual* savings through 2015; *Planned* savings filed for 2016 and 2017; and *Core Program* projections from these "business as usual" trends for 2018-2020. The 2018- 2020 projected savings numbers are not the full projected targets as they do not include factors of Evolving Potential expected through industry innovation and evolution.

Electric Program Savings (MWh) -- Annual

	Actual							Planned		Core Program Projections			
Program	2009	2010	2011	2012	2013	2014*	2015	2016	2017	2018	2019	2020	3-yr % of portfolio
Small Business Direct Install	9,220	12,741	16,871	19,008	21,358	18,089	15,876	12,165	12,136	10,000	10,000	10,000	5.4%
Large Commercial New Construction	8,304	7,678	11,561	20,898	30,613	34,236	37,205	15,728	14,270	14,891	15,761	16,641	8.5%
Large Commercial Retrofit	32,557	32,019	30,848	38,398	41,707	36,460	59,921	67,030	77,611	82,892	84,957	86,264	45.8%
C&I Total	**50,081**	**52,438**	**59,280**	**78,304**	**93,678**	**88,785**	**113,002**	**94,923**	**104,017**	**107,783**	**110,718**	**112,905**	**59.7%**
Single Family - Income Eligible Services	1,713	2,205	2,243	3,404	3,735	4,911	4,010	4,061	4,350	4,084	3,785	3,399	2.0%
Income Eligible Multifamily					2,570	3,276	3,249	2,830	2,726	2,757	2,699	2,661	1.5%
Income Eligible Total	**1,713**	**2,205**	**2,243**	**3,404**	**6,305**	**8,187**	**7,259**	**6,891**	**7,076**	**6,841**	**6,484**	**6,059**	**3.5%**
Residential New Construction	636	782	613	671	753	813	1,263	1,213	1,065	1,013	1,009	1,020	0.5%
ENERGY STAR HVAC	324	421	680	895	1,664	1,639	1,040	1,011	1,376	1,245	1,479	1,764	0.8%
Energy*Wise*	4,000	6,614	9,696	8,361	11,434	13,242	19,484	11,729	6,545	5,253	4,052	3,190	2.3%
Energy*Wise* Multifamily					1,733	3,559	4,592	4,061	3,519	2,950	2,763	2,617	1.5%
Home Energy Reports					10,002	36,307	31,177	32,186	26,184	24,795	23,555	22,377	12.7%
ENERGY STAR Lighting	19,871	14,292	17,460	22,533	28,376	30,668	41,245	43,098	48,856	45,119	29,396	19,134	16.9%
Residential Consumer Products	4,918	4,523	6,037	5,499	5,090	5,269	3,760	4,647	4,708	3,690	3,745	3,826	2.0%
Residential Total	**29,749**	**26,632**	**34,486**	**37,959**	**59,052**	**91,497**	**102,561**	**97,945**	**92,253**	**84,065**	**65,999**	**53,929**	**36.8%**
Portfolio Total	**81,543**	**81,275**	**96,009**	**119,667**	**159,035**	**188,469**	**222,822**	**199,759**	**203,346**	**198,689**	**183,201**	**172,893**	

*2014 results exclude the approximately 80,000 MWh Toray Combined Heat and Power project that was completed in that year.

Gas Program Savings (MMBtu) -- Annual

	Actual							Planned		Core Program Projections			
Program	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**3 yr % of Portfolio**
Small Business Direct Install			5,346	4,853	4,599	8,171	4,758	3,667	3,639	4,000	4,000	4,000	1%
Large Commercial New Construction			54,721	27,668	32,968	51,958	36,459	43,424	53,516	44,003	44,003	44,003	11%
Large Commercial Retrofit	117,420	88,696	31,009	95,485	117,284	129,434	136,547	133,613	187,938	160,638	161,722	161,063	41%
C&I Multifamily					5,785	6,121	12,878	9,490	4,434	6,640	6,640	6,640	2%
Total C&I	**117,420**	**88,696**	**91,076**	**128,006**	**160,636**	**195,684**	**190,642**	**190,194**	**249,527**	**215,280**	**216,365**	**215,705**	**55%**
Single Family - Income Eligible Services	12,599	1,544	2,572	5,516	5,743	8,039	10,990	9,368	11,032	9,802	10,087	10,371	3%
Income Eligible Multifamily					18,477	21,532	21,061	19,915	15,810	17,745	18,346	18,951	5%
Total Income Eligible	**12,599**	**1,544**	**2,572**	**5,516**	**24,220**	**29,571**	**32,051**	**29,283**	**26,842**	**27,547**	**28,433**	**29,321**	**7%**
Energy*Wise*	15,866	8,985	11,943	39,659	55,251	69,335	67,891	68,117	28,587	27,789	28,621	29,591	7%
ENERGY STAR HVAC	49,315	40,872	14,023	56,631	41,638	33,962	31,023	26,064	27,393	29,464	31,955	34,645	8%
Energy*Wise* Multifamily					8,879	16,668	18,558	17,208	11,518	12,267	12,733	13,204	3%
Home Energy Reports					15,248	56,694	66,882	53,989	59,164	59,343	60,832	62,394	16%
Residential New Construction					5,713	7,115	12,732	10,907	11,575	11,096	11,369	11,641	3%
Total Residential	**65,181**	**49,857**	**25,966**	**96,290**	**126,729**	**183,774**	**197,086**	**176,285**	**138,237**	**139,960**	**145,509**	**151,475**	**37%**
Portfolio Total	**195,200**	**140,097**	**119,614**	**229,812**	**311,585**	**409,029**	**419,779**	**395,762**	**414,606**	**382,787**	**390,307**	**396,502**	

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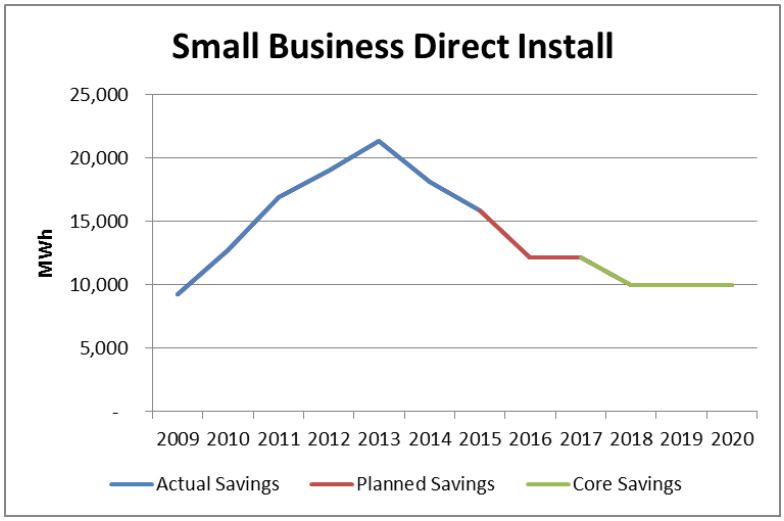
The charts and tables below provide trends and examples of historic and projected savings for select core programs.

Electric Programs

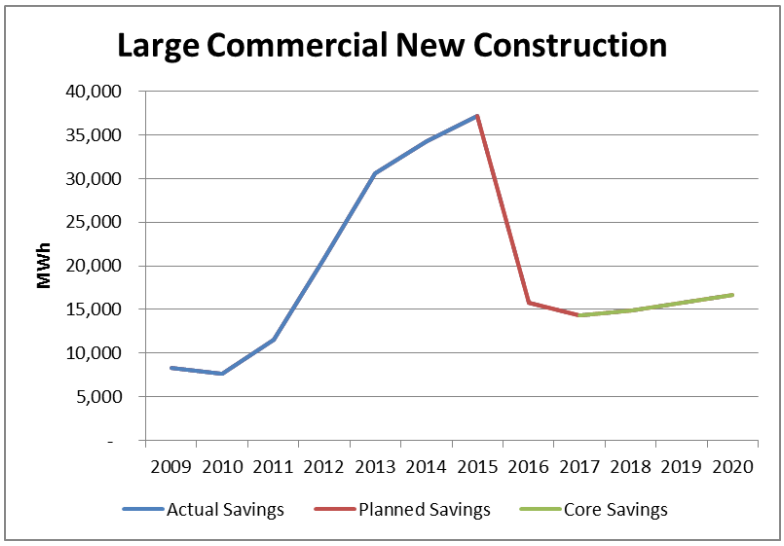
Commercial and Industrial

1. Small Business Direct Install program – provides turnkey services to C&I customers with an average monthly demand of less than or equal to 200 kW.



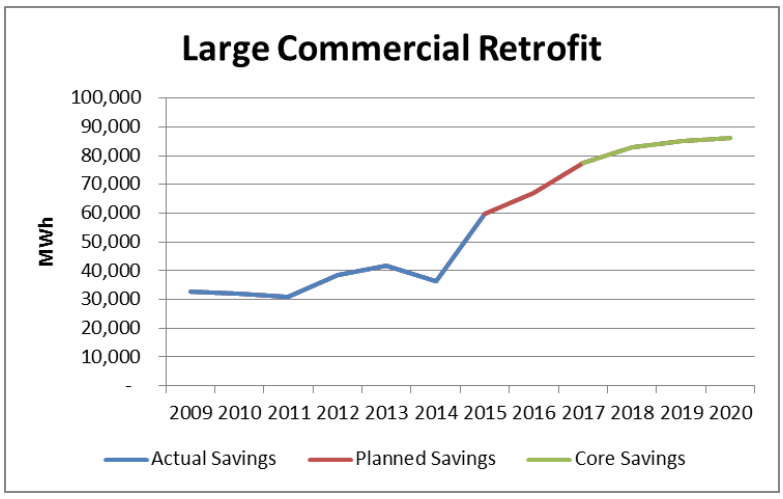
Savings from the Small Business program have been declining since 2013. This is partly due to the success of the upstream lighting initiative, which is offered through the Large Commercial Retrofit program. Because much of the savings from small business customers come from lighting, the Small Business program and upstream lighting initiative compete for much of the same savings in this market. While the drop in participation in Small Business means there is some lost opportunity to implement other measures offered through this program, the upstream lighting initiative is ultimately more cost-effective than offering lighting measures through the Small Business program. We anticipate the downward trend in savings from the Small Business program to level off over the next three year plan, partly due to increased financing opportunities, which should help to counteract the competition for savings from upstream lighting.

2. Large C&I New Construction program – provides services, financing and incentives for new buildings, major renovations and tenant fit-ups, as well as for projects involving "end-of-life replacement" of measures.



The New Construction program saw a significant increase from 2011 to 2015. This was largely driven by the success of upstream lighting. Upstream lighting was moved to the Retrofit program as of the beginning of 2016, which accounts for the drop in savings from the New Construction program in 2016. We anticipate an upward savings trend over the next three year plan, despite increasing efficiency requirements in building codes. This is due to increased opportunities for savings from LED lighting and controls where the technology increasing at a faster rate than codes are raising baselines.

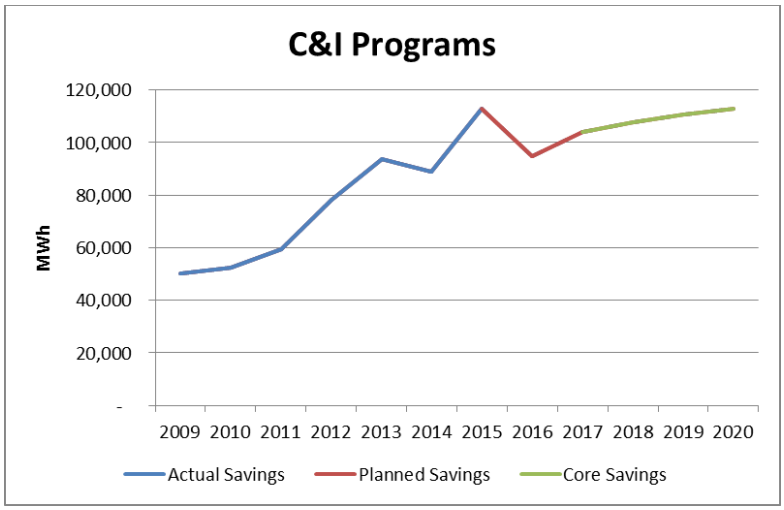
3. Large C&I Retrofit program – serves the needs of existing buildings looking to lower energy consumption by providing prescriptive incentives for individual measures or through a custom path involving technical assessments and packaged measures.



Large Commercial Retrofit shows a significant increase over the next three years for several reasons. First, savings from upstream lighting were moved from the New Construction program to the Retrofit

program in 2016. Savings from the retrofit of linear fluorescent lighting should also continue to increase in the coming years. Lastly, savings from industrial process are expected to increase as well. The increases will be tempered by a reduction in the amount of savings from streetlights, which are expected to decrease after 2017 when most retrofits in the state will be complete. Note that the 80,000 MWh savings from the Toray CHP project in 2014 have been removed from the results in the Large Commercial Retrofit chart, leaving a slight dip in savings rather than a large spike if the savings from this project were included.

4. C&I portfolio – While the charts above represent historic and projected savings for each individual C&I electric program, the chart below represents savings trends for the C&I electric portfolio as a whole. Also, 4a identifies the various sub-components under each of the three program areas, and 4b further breaks down one of those program sub-components to illustrate the types of factors considered when analyzing potential savings for each sub-component.



4a. C&I program sub-components. The Small Business Direct Install program is highlighted in blue, the Large Commercial New Construction program is highlighted in purple, and the Large Commercial Retrofit program is highlighted in green.

Consultant Team Electric Savings Projections (MWh)

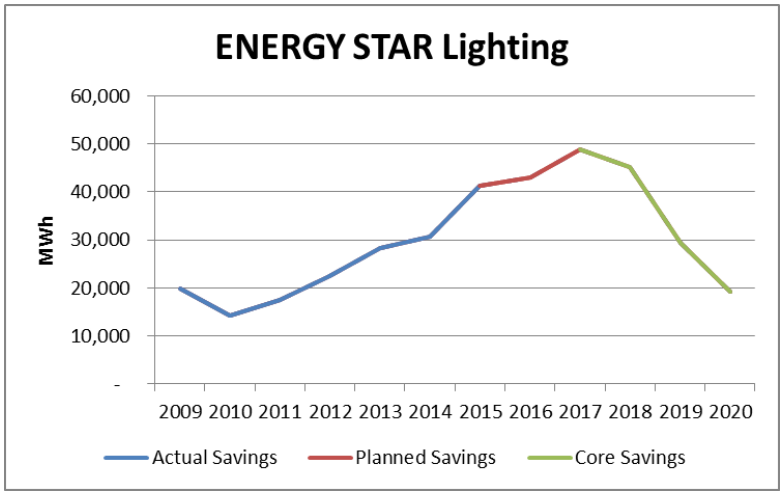
Program	Measure Type	2018	2019	2020
Small Business	Small Business	10,000	10,000	10,000
Large Commercial New Construction	D2 CAIR	1,100	1,200	1,300
	D2 Cool Choice	0	0	0
	D2 Custom Lighting	500	500	500
	D2 Custom Non-lighting	7,700	8,470	9,250
	D2 Lights (Prescriptive New)	1,860	1,860	1,860
	D2 VSD	586	586	586
	C&I Codes	3,145	3,145	3,145
Large Commercial Retrofit	Street Lighting	9,317	1,491	1,491
	EI Custom Non-lighting	21,550	25,350	24,050
	EI Custom Lighting	10,914	11,242	11,579
	EI Light (Prescriptive)	10,525	10,788	11,058
	EI HVAC	1,086	1,086	1,086
	EI VSDs	2,500	2,500	2,500
	CHP	2,000	5,000	5,000
	Upstream Lighting	24,000	25,000	26,000
	SEM	1000	2500	3500
	Total	**107,783**	**110,718**	**112,905**

4b. D2 Custom non-lighting – This refers to a group of measures offered through the Large Commercial New Construction program for which incentives and savings claims are based on a custom engineering calculation or on measured savings after the measure has been installed. These measures (all custom measures other than lighting) are tracked separately from custom lighting measures because lighting makes up such a large portion of the savings. For analytical purposes, it is helpful to see the share of custom savings that are not lighting.

	Actuals MWh			Planned	Proposed MWh			
D2 Custom Non-Lighting	2013	2014	2015	2017	2018	2019	2020	**Assumptions**
Comprehensive Design	653	1,943	816	900	1,000	1,100	1,200	The Integrated Design Express pathway will continue the upward savings trend for D2 Custom
Compressed Air	369	861	965	1,000	1,200	1,300	1,400	The compressed air training initiative will drive more prescriptive compressed air projects
Drives & Motors	2	48	264	400	500	550	600	
HVAC	173	261	416	600	800	1,000	1,200	Additional savings from efficient circulator pumps and rooftop controllers.
HVAC - Chiller	0	0	48	100	100	100	100	
Other	207	0	0	300	400	500	600	A focus on data centers and EStar rated equipment will yield savings
Process	341	1,208	1,824	1,800	1,800	1,800	1,800	The Leidos initiative should be expanded, and smaller manufacturers could be engaged through other partners
Refrigeration	335	335	0	1,000	1,300	1,400	1,500	Put Q Sync and other ECM evap. motors upstream
Miscellaneous Prescriptive								
BOC		67	67		100	100	100	Add one additional class per year
Kitchen Equipment			31		100	120	150	Kitchen equipment will see increases from increased attention and going upstream (focus on schools?)
Pay for Performance		8	200		400	500	600	More training for RCx professionals and a redesign of the program will pay off in savings in the future
Total D2 Custom Non-Lighting					7,700	8,470	9,250	

Residential

5. Energy Star Lighting – promotes the purchase of qualifying lighting products, primarily at the retail level through buydowns, markdowns and discounts.



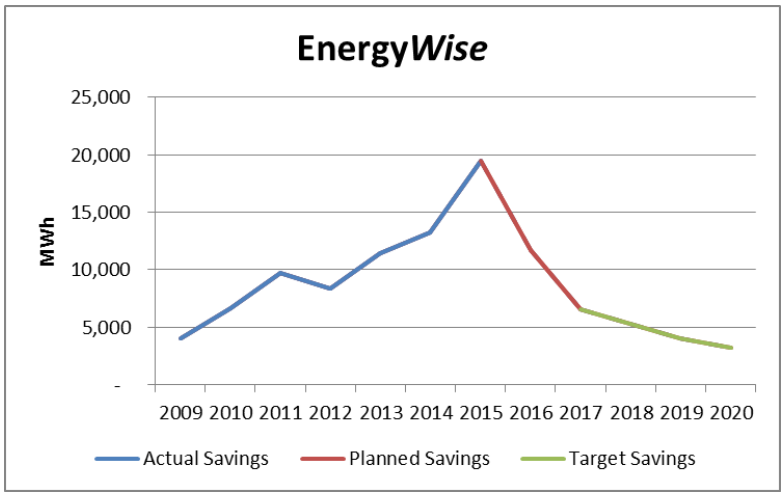
ENERGY STAR (ES) Lighting shows a sharp drop in savings from 2017 and continuing through the 2018-2020 Plan period. ES Lighting savings are projected to decline by 61% from 2017 to 2020. In 2017 ES Lighting represents a projected 49% of sector savings. This falls to 32% of sector savings in 2020.

There are several factors contributing to the decline in ES Lighting savings.

- Decline in unit numbers reflecting fewer available sockets to fill and competition with low cost, non-program value line LEDs.
- Declining net to gross (NTG) ratios as LED prices continue to fall and the effects of program incentives are diminished and free ridership increases.
- Lower gross savings for A-lamp LEDs due to increasingly efficient baselines.

Retail Lighting Estimates	Units			Net Annual kWh		
	2018	2019	2020	2018	2019	2020
LED A Lamps	850,000	600,000	500,000	26,154,534	14,341,320	8,110,480
LED Bulbs (EISA Exempt)	160,000	150,000	140,000	4,928,851	3,850,665	2,875,163
LED Fixtures	130,000	120,000	100,000	5,960,791	4,273,584	2,534,280
LED Outdoor Fixture	900	1,500	2,000	88,250	138,432	173,040
LED School Program Bulb	11,000	9,000	7,000	301,921	216,720	134,027
LED Reflector	160,000	155,000	150,000	5,376,672	4,340,543	3,360,420
LED Bulb (Hard to Reach)	50,000	55,000	60,000	2,307,753	2,234,856	1,946,515
	1,361,900	**1,090,500**	**959,000**	**45,118,773**	**29,396,119**	**19,133,926**

6. EnergyWise single-family program -- provides home energy audits for buildings with 1-4 residential units, including direct install of energy saving measures such as Energy Star lighting, as well as specifications of weatherization opportunities (insulation and air-sealing) and associated incentives.

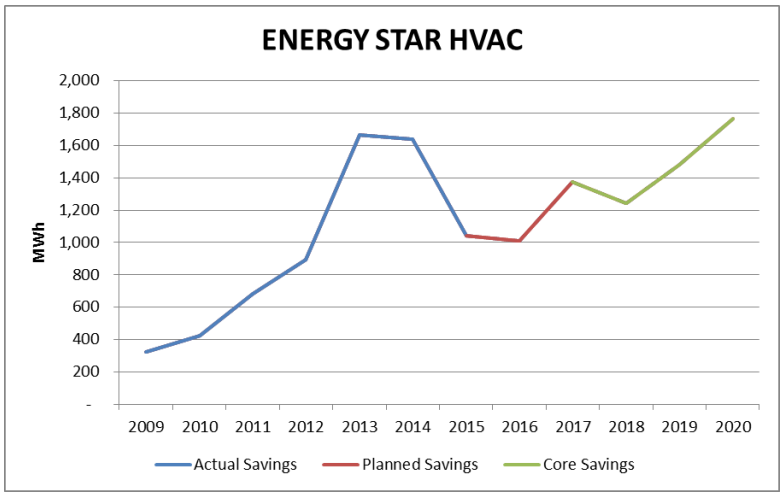


EnergyWise, National Grid's single family retrofit program, also shows a sharp drop in savings from 2017 through 2020 (a 51% reduction). In 2017 EnergyWise represents a projected 7% of Residential sector savings. This falls to 5% of sector savings in 2020.

Much of the decline in EnergyWise savings is due to lower savings from direct install (DI) lighting efforts. For 2017 DI lighting (all LEDs) represents 88% of projected Program savings. EnergyWise lighting savings are expected to decline for largely the same reasons as for ENERGY STAR lighting: fewer lamps and fixtures installed in each year, declining NTG ratios, and lower per lamp gross savings.

For the small, non-lighting portion of EnergyWise Program savings it was assumed that these savings will increase over 2017; 10% in 2018, 15% in 2019, and 2020 in 2020. These increases assume a combination of higher program participation, increased conversion rates for key measures like insulation and air sealing, and possible new measures like Tier 2 advanced power strips.

7. Energy Star Water Heating and Heating, Ventilation and Air-conditioning (HVAC) program – provides prescriptive incentives for qualifying equipment, as well as contractor training and support.



The ENERGY STAR HVAC (ES HVAC) Program, which also includes water heaters, shows a fairly steady increase in savings over the 2018-2020 Plan timeframe. ES HVAC savings are projected to increase by 28% from 2017 to 2020. In 2017, HVAC represents a projected 1% of sector savings. This increases to 3% of sector savings in 2020.

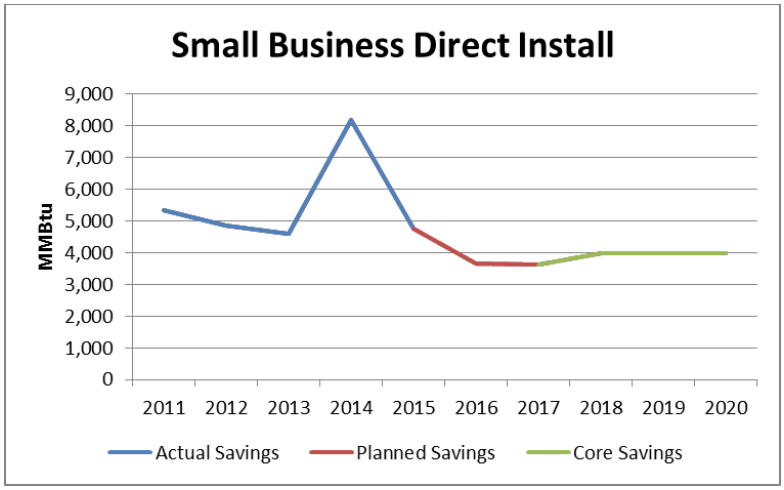
For each of the key ES HVAC Program measures – heat pump water heaters, ductless split heat pumps, and ECM pumps - significant growth in unit numbers is assumed. This growth in unit numbers counteracts the lower NTG ratios that are also assumed, which put a downward pressure on savings. The effects of these two drivers on energy savings lead to a net increase in savings over the 2018-2020 timeframe.

2018-2020 Electric HVAC	2016 Quantity	2018 Quantity	2019 Quantity	2020 Quantity	Kwh/ Unit	2018 Net MWh	2019 Net MWh	2020 Net MWh
Central Air QIV	198	218	240	264	45.0	8.9	9.8	10.8
Central Air SEER 16.0 EER 13	142	156	172	189	198.8	26.7	29.4	32.3
Central Air SEER 18.0 EER 13	100	110	165	248	276.8	28.3	42.5	63.7
Central Air Digital Check-up/Tune-Up	100	110	121	133	64.8	6.1	6.7	7.3
Down Size 1/2 Ton	20	22	24	27	203.0	3.8	4.2	4.6
Duct Sealing	570	627	690	759	212.0	113.0	124.3	136.7
Early Retirement Central Air (Retire)	9	10	11	12	259.0	2.2	2.4	2.6
Early Retirement Heat Pump (Retire)	9	10	11	12	1,189.0	10.0	11.0	12.1
Circulator Pump	75	400	600	900	142.3	45.6	68.3	102.5
Furnace ECM	0	0	0	0	168.0	0.0	0.0	0.0
QI w/ Duct modifications	0	0	0	0	513.0	0.0	0.0	0.0
Heat Pump Quality Installation and Ver	15	17	17	18	308.0	4.6	4.9	5.1
Heat Pump SEER 16.0 EER 12 HSPF	62	78	85	94	450.3	32.5	35.7	39.3
Mini Split HP SEER 18.0 HSPF 9	130	228	303	404	286.0	40.3	53.8	71.7
Heat Pump SEER 18.0 HSPF 9.6	10	18	23	31	1,077.8	17.5	23.4	31.2
Mini Split HP SEER 20.0 HSPF 11	130	228	303	404	330.0	78.8	105.1	140.1
Mini Split Heat Pump QIV	35	44	55	68	113.0	4.9	6.2	7.7
Central Air Digital Check-up/Tune-Up	22	24	27	29	373.4	7.7	8.4	9.3
Heat Pump Water Heater <55 gallon, E	404	606	758	947	1,654.0	751.7	877.0	1,018.0
WiFi Enabled Thermostat with Cooling	25	100	133	178	104.0	7.8	9.7	12.0
WiFi Enabled Thermostat with Cooling	180	700	770	847	104.0	54.6	56.1	57.3
TOTAL						**1,245**	**1,479**	**1,764**

Gas Programs

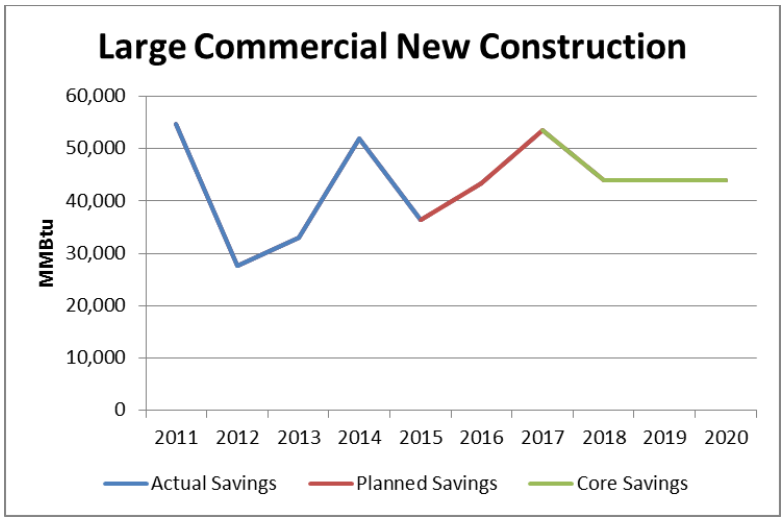
Commercial and Industrial

8. Small Business Direct Install program – provides turnkey services to C&I customers with an average monthly demand of less than or equal to 200 kW, but there is no upper limit of gas consumption that disqualifies a customer from receiving gas measures.



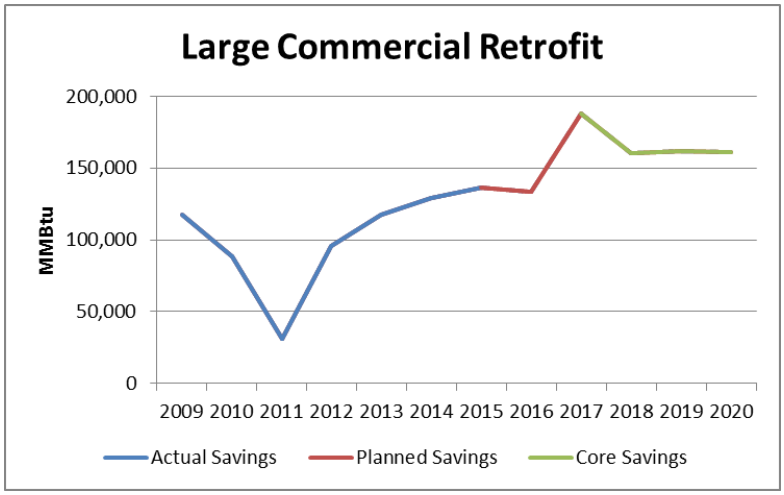
The Small Business program saw a large peak in 2014 that was driven by National Grid's focus on spray nozzles. This measure is near saturation, and low gas costs are inhibiting gas measures overall, thus the expectation is for the savings trend to stay near flat at 2016 levels.

9. Large C&I New Construction program – provides services, financing and incentives for new buildings, major renovations and tenant fit-ups, as well as for projects involving "end-of-life replacement" of measures.



Since 2011, Large Commercial New Construction has shown swings in savings from year to year. Because there are a relatively small number of projects completed through this program each year, a couple of large projects can really have an impact on the savings in that year. Due to increasing efficiency levels in building codes, there is a bit of a drop from 2017 to 2018, and then the planned savings are expected to remain relatively flat from 2018-2020.

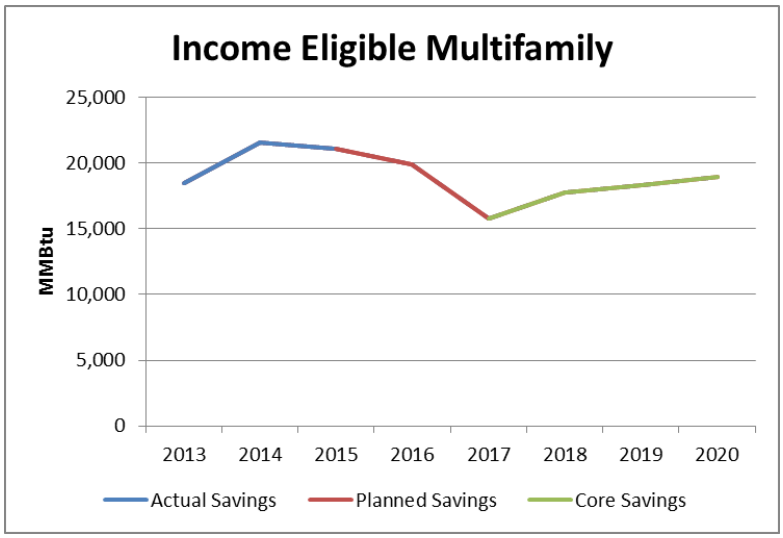
10. Large C&I Retrofit program – serves the needs of existing buildings looking to lower energy consumption by providing prescriptive incentives for individual measures or through a custom path involving technical assessments and packaged measures.



Large Commercial Retrofit has shown increased savings since 2011. However, the rate of increase is flattening in part due to low gas prices, which make the payback period for energy efficient projects longer and therefore less attractive. The bump in 2017 is expected from a new measure, laminar flow faucet restrictors, which are expected to have a one year impact due to quick saturation of the market.

Residential

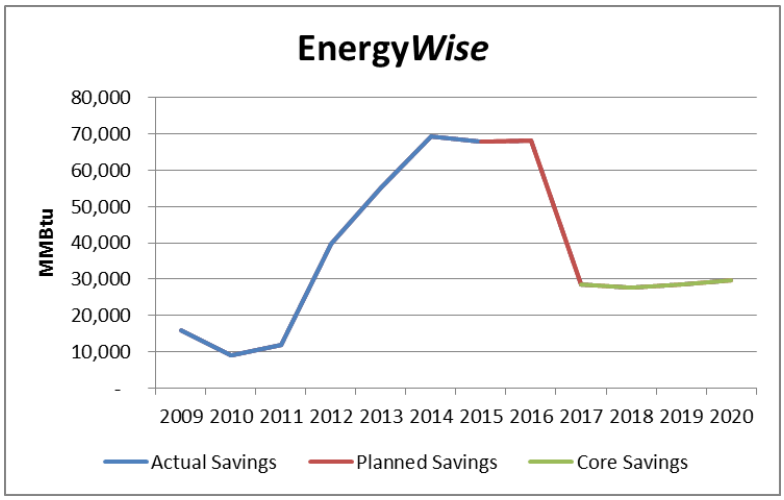
11. Income Eligible Multifamily program – provides energy audits, direct install measures and weatherization for 5+-unit buildings, and 1-4 unit buildings connected or neighboring under single ownership group, if at least half the occupants are qualified as income eligible (receive utility service on A-60 rate and/or have incomes less than 60% of Area Median Income).



Grid's Income Eligible Multifamily (IE MF) Program shows an increase in savings from 2017 through 2020. Income Eligible Multifamily savings are projected to grow by 20% from 2017 to 2020. In 2017 IE MF represents a projected 10% of Residential sector savings; which remains unchanged in 2020.

The projected increases in Income Eligible Multifamily savings are from an expected combination of higher program participation, increased conversion rates for key measures like air sealing, programmable thermostats, and custom measures, and from new or underutilized measures like duct sealing.

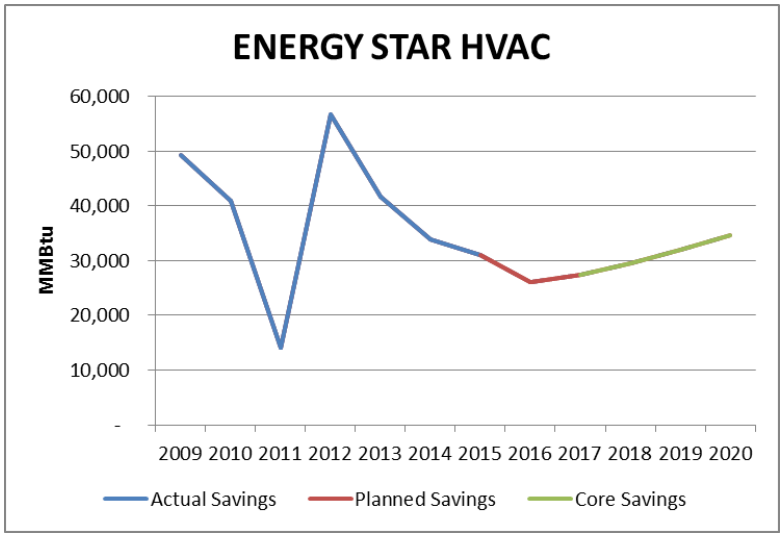
12. EnergyWise single-family program -- provides home energy audits for buildings with 1-4 residential units, including direct install of energy saving measures such as low-flow water devices, as well as specifications of weatherization opportunities (insulation and air-sealing) and associated incentives.



EnergyWise, Grid's single family retrofit program, shows a small increase in savings from 2017 through 2020. EnergyWise savings are projected to increase by 4% from 2017 to 2020. In 2017 EnergyWise represents a projected 17% of Residential sector savings. This falls slightly to 16% of sector savings in 2020.

The modest increases in EnergyWise savings are from an expected combination of higher program participation, increased conversion rates for key measures like weatherization, and new or underutilized measures like Wifi thermostats and duct sealing.

13. Energy Star Water Heating and Heating, Ventilation and Air-conditioning (HVAC) program – provides prescriptive incentives for qualifying equipment, as well as contractor training and support.



The Gas ENERGY STAR HVAC (ES HVAC) Program, which also includes water heaters, shows a moderate increase in savings over the 2018-2020 Plan timeframe. ES HVAC savings are projected to increase from by 26% from 2017 to 2020. In 2017 ES HVAC represents a projected 17% of Residential sector savings. This increases to 19% of sector savings in 2020.

The ES HVAC savings projections are driven by steadily increasing unit numbers for most key Program measures. Over the three years, projected Program savings are dominated by efficient boilers and combination boiler/hot water systems (44% of savings) and by Wifi thermostats (35% of savings).