conservation law foundation

For a thriving New England

CLF Rhode Island
235 Promenade Street
Suite 560, Mailbox 28
Providence, RI 02908
P: 401.351.1102
F: 401.351.1130
www.clf.org

March 4, 2021

By Electronic Mail

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

Re: Docket 5099 - The Narragansett Electric Co. d/b/a National Grid's FY 2022 Gas Infrastructure, Safety and Reliability (ISR) Plan

Dear Ms. Massaro:

For filing in the above-referenced docket enclosed please find the comments of Conservation Law Foundation.

Thank you for your attention to this matter.

Sincerely,

JAMES CROWLEY
Staff Attorney
(401) 228-1905
jcrowley@clf.org

STATE OF RHODE ISLAND
PUBLIC UTILITIES COMMISSION

In re: The Narragansett Electric Company d/b/a National Grid Gas Infrastructure, Safety & Reliability Plan	Docket 5099

COMMENTS OF CONSERVATION LAW FOUNDATION

The Conservation Law Foundation ("CLF") appreciates this opportunity to provide comment to the Public Utilities Commission (the "Commission") on the Narragansett Electric Company d/b/a National Grid's ("National Grid" or the "Company") FY 2022 Gas Infrastructure, Safety & Reliability ("ISR") Plan.

Founded in 1966, CLF is a nonprofit, member-supported, regional environmental organization working to conserve natural resources, protect public health, and promote thriving communities for all in the New England region. CLF protects New England's environment for the benefit of all people. We use the law, science, and the market to create solutions that preserve our natural resources, build healthy communities, and sustain a vibrant economy. We are working to cut emissions from the heating sector and promote affordable and equitable heating policies across New England.

CLF offers the following comments on National Grid's FY 2022 Gas ISR Plan.

Also attached is a whitepaper commissioned by CLF and authored by David G. Hill and Chris Neme of Energy Futures Group. It discusses the importance of depreciation and other key issues related to the planning and regulatory review of investments in Rhode Island's gas infrastructure. We hope that the whitepaper will be useful to the Commission in its consideration of these topics, now and in future proceedings including the upcoming rate case.

1. **CLF supports spending to repair and replace leak-prone gas pipes.**

National Grid's FY 22 Gas ISR Plan includes spending for proactive replacement of leak-prone pipe, as well as for responding to emergency leak situations. The Company is proposing FY 2022 spending of $75.03 million for the Proactive Main Replacement program, which includes the elimination or rehabilitation of a total of approximately 71.40 miles of leak-prone pipe.[1] While Rhode Island must transition away from reliance on gas and gas infrastructure in the

[1] Direct Joint Testimony of Amy Smith and Nathan Kocon at 19-20.

medium and long term, the greenhouse gas ("GHG") impacts of gas leaks make strategically repairing or replacing leak-prone pipes essential in the short term.

Gas leaks are a major and unavoidable consequence of reliance on gas for heating and electricity production. Natural gas is approximately 90% methane, and natural gas leaks are the main source of methane emissions in Rhode Island. Methane is an extremely potent GHG, with a Global Warming Potential 86 times that of carbon dioxide per unit mass in the short term.[2]

The heating sector is a major contributor to Rhode Island's carbon emissions. Rhode Island's most recent GHG emissions inventory attributes 17% of the state's GHG emissions to residential heating, 8% to commercial heating, and another 10% to industrial heating and processes.[3] Gas leaks are counted separately as part the energy sector, and it is likely that they are very significantly undercounted. A report from the Stockholm Environmental Institute and Brown University estimates that incorporating more accurate accounting of gas leakage leads to a 45% increase in <u>overall</u> estimated statewide emissions.[4]

In addition to their enormous contribution to state GHG emissions, gas leaks damage and kill trees—reducing the ability of trees to be natural carbon sinks that offset fossil fuel emissions. Gas leak repair and replacement work must continue for health and safety reasons, as well as to reduce emissions from the gas system, for as long as utilities are allowed to deliver gas through those pipes. Given the cost to replace pipes—and that the majority of leaked methane emissions come from a small percentage of existing leaks—strategic identification and sequencing of leaks for repair or replacement is essential.[5]

2. **Use of a portable LNG facility on Aquidneck Island may be necessary in the short term, but only as part of a transition to cleaner, more reliable sources of heat.**

National Grid's FY 22 Gas ISR Plan includes $4.90 million for site assessments, preparation for a main extension, and other project development activities related to three liquefied natural gas ("LNG") options on Aquidneck Island.[6]

CLF understands that it may be necessary to utilize portable LNG in the short term to ensure that Aquidneck Island residents have reliable service, but any such facility must be utilized strategically as part of a transition to cleaner, more reliable sources of heat. It must also be sited and operated to ensure that its use is safe for those who live and work nearby, and cost-effective

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[2] *See* Intergovernmental Panel on Climate Change, *Climate Change 2013: The Physical Science Basics* 714 (2013), available at https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_all_final.pdf.

[3] R.I. Dep't of Envtl. Mgmt., *2016 Rhode Island Greenhouse Gas Emissions Inventory* 7 (2019), *available at* http://www.dem.ri.gov/programs/air/documents/ghg-emissions-inventory-16.pdf.

[4] *See* Stockholm Envtl. Inst. & Brown Univ. Climate and Dev. Lab, *Deeper Decarbonization in the Ocean State: The 2019 Rhode Island Greenhouse Gas Reduction Study* 20–23 (2019), *available at* https://www.sei.org/wp-content/uploads/2019/09/deeper-decarbonization-in-the-ocean-state.pdf.

[5] *See* Conservation Law Foundation, *Getting Off Gas: Transforming Home Heating in Massachusetts* (2020), *available at* https://www.clf.org/wp-content/uploads/2020/12/CLF_GasWhitepaper_GettingOffGas.pdf.

[6] Direct Joint Testimony of Amy Smith and Nathan Kocon at 17-19.

for ratepayers. Any assessment of impacts from an LNG facility must consider a range of factors like safety, public health, and noise.

3. **Rhode Island's planning and investments in gas infrastructure and resources must include consideration of the state's GHG emissions reduction targets.**

Emerging science tells us that we need to do everything possible to achieve net zero emissions by 2050 to avoid warming beyond 1.5°C and the irreversible climate change and widespread harm that would cause to people and the environment.[7] The State of Rhode Island has established emissions reduction targets through the Resilient Rhode Island Act,[8] and National Grid has set out its own climate goals through its Net Zero by 2050 Plan.[9]

Rhode Island cannot meet its decarbonization goals under the Resilient Rhode Island Act without addressing its reliance on gas and other dirty fossil fuels for heating.[10] It is therefore necessary to consider how our decisions related to gas infrastructure contribute to, or possibly hinder, achievement of the state's GHG emissions reduction goals.

Attached is a whitepaper authored by David G. Hill and Chris Neme of Energy Futures Group. It discusses the importance of the depreciation period and other key issues related to the planning and regulatory review of investments in Rhode Island's gas infrastructure, reviewing factors including current and historic gas use by sector; gas ISR plans; Rhode Island's statewide GHG goals; pathways for a decarbonized energy economy; the resource base and costs for "renewable natural gas" ("RNG") production; other issues with reliance on RNG; and analysis and comparison of alternatives to gas infrastructure investments, including strategic retirement and "pruning" of system assets.

Based on review of these policy, market, and resource conditions, the report authors urge utilities commissions to bring special rigor to their review of gas infrastructure depreciation schedules and to estimations of the useful life of such assets. They further recommend that given the likelihood of more rigorous climate regulation, utilities commissions should apply shorter depreciation periods for gas infrastructure investments, in no case longer than 20 years.

We hope that the whitepaper will be useful to the Commission in its oversight of planning and investments in gas infrastructure and resources, now and in future proceedings including the upcoming rate case.

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[7] The most recent analysis from the Intergovernmental Panel on Climate Change indicates that we must achieve net zero emissions by 2050 to avoid warming beyond 1.5°C. *See* Intergovernmental Panel on Climate Change, *Global Warming of 1.5°C: Summary for Policymakers* (2018), *available at* https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15_SPM_version_stand_alone_LR.pdf.

[8] R.I. Gen Laws § 42-6.2-1 *et seq.*

[9] *See* National Grid, *Net Zero by 2050 Plan* (2020), *available at* https://www.nationalgridus.com/media/pdfs/our-company/netzeroby2050plan.pdf.

[10] Recognizing this challenge, the state recently commissioned a report on pathways to decarbonizing the heating sector. *See* Brattle Group, *Heating Sector Transformation in Rhode Island* (2020), *available at* http://www.energy.ri.gov/documents/HST/RI%20HST%20Final%20Pathways%20Report%205-27-20.pdf.

Thank you very much for your consideration of these comments.

Respectfully submitted,

CONSERVATION LAW FOUNDATION

By its attorney,

James Crowley
Conservation Law Foundation
235 Promenade Street
Suite 560, Mailbox 28
Providence, RI 02908
(401) 228-1905
jcrowley@clf.org

Rhode Island's Investments in Gas Infrastructure

A Review of Critical Issues

Conducted by:

David G. Hill, Ph.D., Energy Futures Group

Chris Neme, Energy Futures Group

Prepared for:

Conservation Law Foundation Rhode Island

February 26, 2021

This whitepaper was prepared by David Hill of Energy Futures Group with review and support from Chris Neme of EFG, and James Crowley of CLF Rhode Island. Any omissions or errors are the responsibility of the primary author. Questions for the author should be directed to dhill@energyfuturesgroup.com.

Table of Contents

EXECUTIVE SUMMARY

Rhode Island's planning and investments in future energy infrastructure and resources must include consideration of how each decision contributes to, or possibly hinders, meeting of the state's greenhouse gas emissions reduction targets. Capital investments with long-lasting impacts deserve scrutiny to make sure they serve the public's best interests and that they are compatible with policy and legislated goals.

To meet their regulatory obligation to serve customers, gas utilities invest in capital assets, such as pipelines, meters, and compression stations, and recover the just and reasonable costs of those investments from gas consumers over time. The utility will typically recover such costs from gas consumers over a time horizon, established by the utilities commission, that is intended to be the time period over which the asset will be used and useful. If an asset becomes obsolete and no longer provides useful service, before the costs of that asset have been fully recovered, those remaining costs are said to be a "stranded cost". Stranded costs may be borne by gas customers, if they are asked to continue paying for an asset even though it is no longer being used, or they may be borne by utility shareholders if the recovery of the stranded costs is not permitted by the utilities commission. Stranded costs reflect an inefficient use of utility and consumer resources and are sought to be avoided by ensuring that the period of cost recovery for an asset is aligned as closely as possible with the lifetime over which an asset will be used and useful. Stranded costs are of particular concern at a time when states are developing and implementing plans to transition away from fossil fuels to mitigate climate damage, as the stranded costs risk slowing the transition and burdening consumers with additional costs.

This whitepaper discusses the importance of the depreciation period and other key issues related to the planning and regulatory review of investments in Rhode Island's gas infrastructure. Factors we review at a high level in the whitepaper include:

- Current and historic gas use by sector.
- Gas Infrastructure, Safety and Reliability plans.
- Rhode Island's statewide and corporate greenhouse gas goals.
- Pathways for a decarbonized energy economy.

- The resource base and costs for “renewable natural gas” (RNG) production.
- Other issues with reliance on RNG.
- Analysis and comparison of alternatives to gas infrastructure investments, including strategic retirement and “pruning” of system assets; and
- The highest-value future uses for RNG.

Based on our review of these policy, market, and resource conditions, and particularly in a state and region in which climate change policy and regulation are fast evolving, we urge utilities commissions to bring especial rigor to their review of gas infrastructure depreciation schedules and to estimations of the useful life of such assets. We further recommend that given the likelihood of more rigorous climate regulation utilities commissions should apply shorter depreciation periods for gas infrastructure investments, in no case longer than 20 years. A shorter depreciation period reduces the risk of stranded costs to gas consumers and shareholders, better ensures a lower-cost transition to clean heating, and provides a better basis for comparing gas infrastructure investments with other alternatives.

Figure ES-1 illustrates the impact of a 20-year versus a 33-year depreciation period, using a declining balance method and based on an investment of $180 million and a 10% salvage value. At the end of 20 years the shorter depreciation schedule (blue bars) will have recovered all costs. To do so, it has higher annual cost recovery for each of the first ten years in comparison to the 33-year deprecation period (orange bars). At the end of 20 years, the case with the longer (33 years) depreciation period has $26.7 million of unrecovered costs equivalent to 15% of the initial investment.

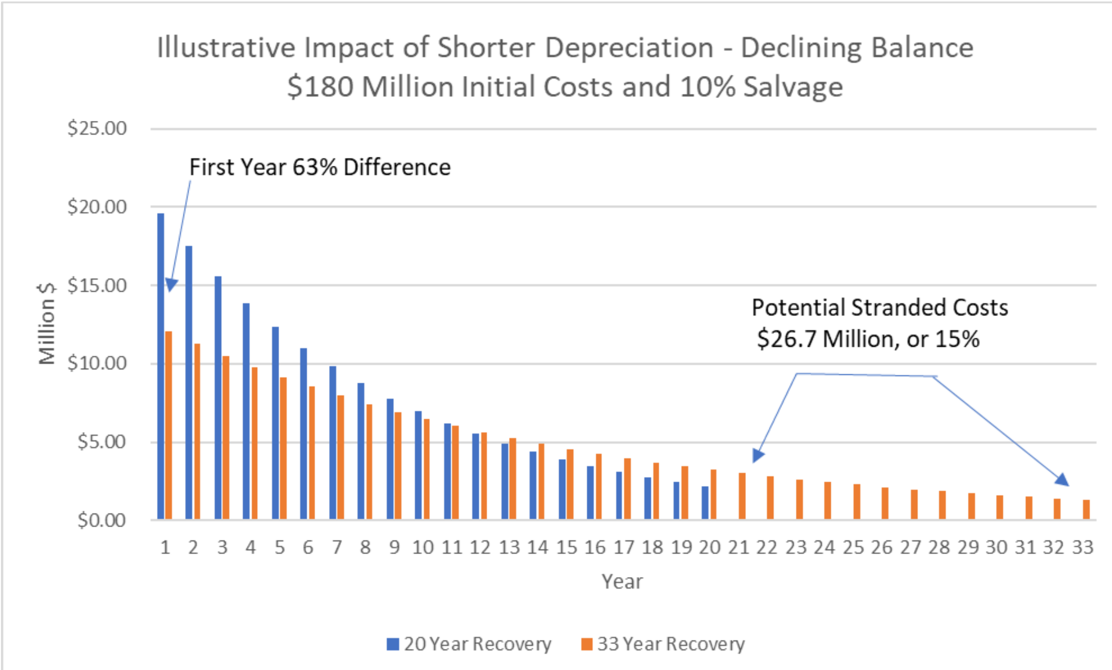

Figure ES-1: Comparison of 20- and 33-Year Depreciation Periods

The longer depreciation period spreads costs over a longer time, but it also inherently carries more risk of stranded costs if the asset is retired or becomes obsolete. In this whitepaper we discuss how meeting Rhode Island's greenhouse gas targets, the cost and resource potentials for RNG, and the benefit of targeting any future RNG use to the highest value applications all point towards reduced reliance on gas infrastructure. We therefore recommend depreciation periods of no more than 20 years be used to help reduce the risk of stranded costs, and to more accurately reflect the near-term rate impacts of investments that are undertaken.

The future of gas and electric infrastructure planning and investment is complicated. Its scale and associated economic and environmental impacts are significant, and it deserves thoughtful and inclusive planning processes and analyses. We support emerging and ongoing efforts along these lines. The shorter depreciation period we recommend in this whitepaper is just one of the steps that will help improve decision making and planning on gas infrastructure investments to better align them with climate change policy and objectives in Rhode Island.

Introduction

Utilities regularly make capital investments in assets required to provide services for their customers. They recover the costs for such investments from their customers over time. A depreciation period defines the length of time over which the utility recovers capital investment costs from consumers. There are many details and variations making the accounting and rate design for cost recovery a complex, interesting, and sometimes contentious field for regulators, utilities, consumer advocates, and other stakeholders.

At the risk of simplifying some of this complexity, depreciation periods are fundamentally based on how long an asset is expected to be used and useful. A longer depreciation period spreads the cost recovery over more years. In comparison to a shorter depreciation period, the longer horizon will result in lower initial amounts of cost recovery (since costs are being recovered over a longer time). This can be favorable if the asset remains used and useful for the anticipated depreciation period, and future ratepayers receive services from the asset for which they are paying. However, there are risks if a depreciation period extends cost recovery too far into the future. If the asset becomes technically obsolete, unusable, or uneconomic before the end of the depreciation period, there are likely to be stranded costs to be borne either by ratepayers or by utility shareholders.

This whitepaper examines critical issues related to investment and planning decisions for gas infrastructure in Rhode Island. The first section gives a brief overview of the large role that gas has played in meeting Rhode Island's energy needs. Looking forward, the future of gas and gas infrastructure in Rhode Island needs to be considered in relationship to many factors. These include greenhouse gas emissions reduction targets, potential pathways for decarbonization, the potential costs and resource base for RNG, and the alternatives to investments in gas infrastructure. We provide a high-level analysis and discussion of the implications for each with respect to determining an appropriate depreciation period for gas infrastructure investments. Finally, we present our recommendation that shorter depreciation periods (at most 20 years) are prudent and give an illustrative comparison to depreciation over 33 years.

Gas Consumption in Rhode Island

Gas is an important energy resource for Rhode Island. Figure 1 illustrates historic consumption in trillion British Thermal Units (Tbtu) per year. In 2018, the last year in this data series, Energy Information Administration (EIA) data indicate gas accounted for more than 53% of Rhode Island's total energy consumption across all sectors of 195 TBtu. EIA estimates Rhode Island's 2019 gas consumption to be 97.6 TBtu, a decline of almost 7% from 2018.

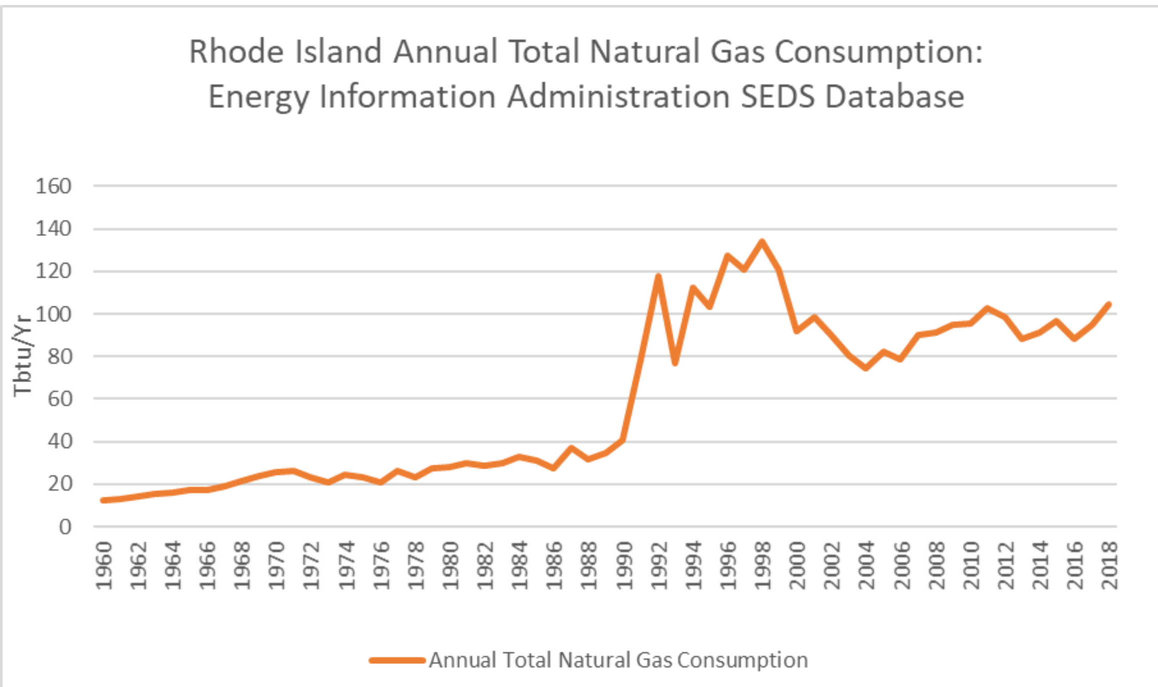

Figure 1: Historic Gas Consumption

The electric power sector is the largest consumer of gas in Rhode Island, accounting for more than half of the gas consumption in the state.[1] More than half of all Rhode Island households use gas as their primary heating fuel and residential heating accounts for roughly 20% of the total gas consumption. Commercial heating is the third largest consumer of gas accounting for about 13% of the total. Together, electricity generation, residential heating, and commercial heating account for 90% of total gas use. Figure 2 presents EIA data illustrating the shares of gas delivered

[1] U.S. Energy Information Administration, Rhode Island State Profile and Energy Estimates, *available at* https://www.eia.gov/state/analysis.php?sid=RI.

to the electric power industry (green), residential consumers (blue), commercial consumers (orange), and total deliveries (yellow).

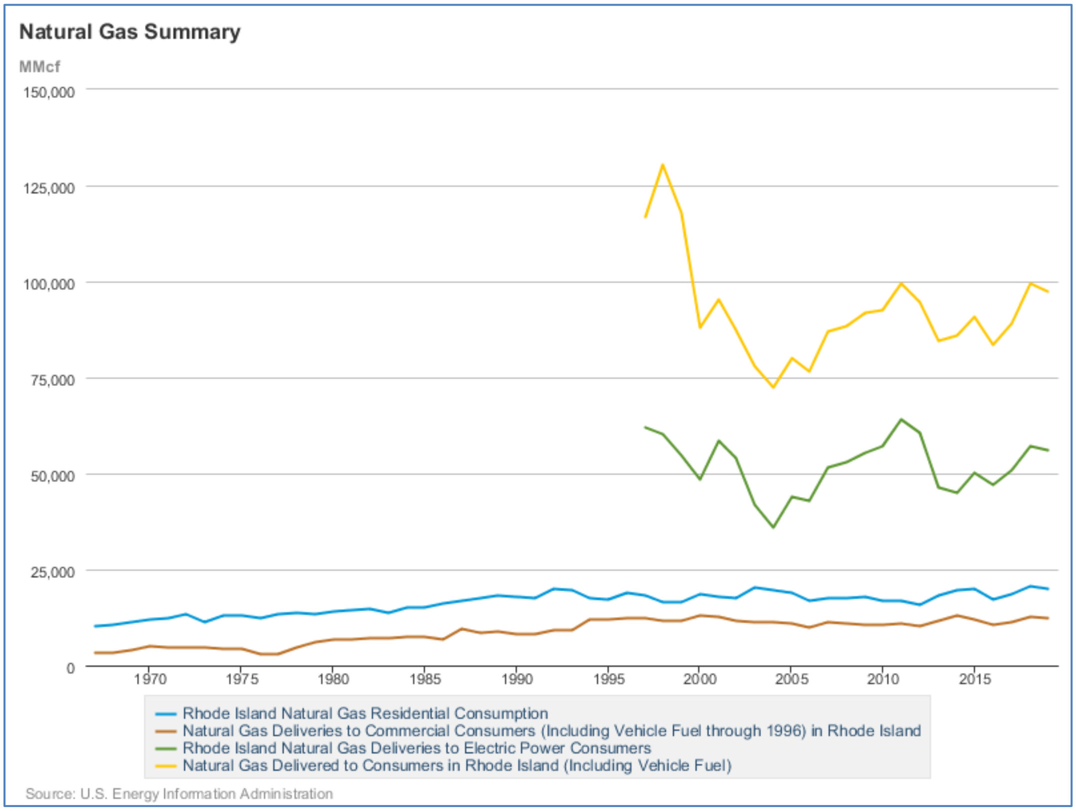

Figure 2: Rhode Island Gas Consumption by Sector

Gas Infrastructure, Safety and Reliability Plans

In December 2021 National Grid submitted its proposed FY 2022 Gas Infrastructure, Safety and Reliability Plan (ISR Plan) to the Rhode Island Public Utilities Commission, in Docket No. 5099. The ISR Plan is designed to protect and improve the gas delivery system. It proposes a total of $180.15 million in discretionary and non-discretionary investments in the proactive replacement of leak-prone pipe, upgrading of system components, addressing emergency leak situations, and coordination of infrastructure investment with other construction projects.

Maintaining and improving the safety and reliability of the gas infrastructure system is unquestionably important. The National Association of Regulatory Utility Commissioners

(NARUC), and the U.S. Department of Energy have issued recent whitepapers reviewing current activity, plans, and cost-recovery issues related to maintenance and upgrading of gas infrastructure.[2] [3] Planning and potential investments in gas infrastructure need to consider the scale and span of future gas system needs, and the appropriate length of time for recovery of costs from ratepayers.

As detailed further below, meeting Rhode Island's greenhouse gas reduction targets will require drastic shifts in the volumes and uses of gas. The review and approval of proposed ISR plan investments should proceed based on careful consideration of the future gas system, and how this may be very different from the legacy infrastructure. Addressing factors such as the depreciation period for new gas infrastructure investments and considering strategic alternatives to infrastructure upgrades including the strategic retirement and pruning of system elements from the gas system will help reduce the risks of potentially redundant investments and stranded costs.

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[2] National Association of Regulatory Utility Commissioners, *Natural Gas Distribution Infrastructure Replacement and Modernization: A Review of State Programs* (2020).

[3] U.S. Department of Energy, Office of Energy Policy and Systems Analysis, *Natural Gas Infrastructure Modernization Programs at Local Distribution Companies: Key Issues and Considerations* (2017).

Rhode Island's Greenhouse Gas Emissions Reduction Goals

The Resilient Rhode Island Act of 2014 established the Executive Climate Change Coordinating Council (EC4). It also set specific greenhouse gas emissions reduction targets; established an advisory board and a science and technical advisory board to assist the Council; and incorporated consideration of climate change impacts into the powers and duties of all state agencies. The emissions reduction targets that the EC4 is charged with developing and tracking the implementation of a plan to achieve are represented in Figure 3.

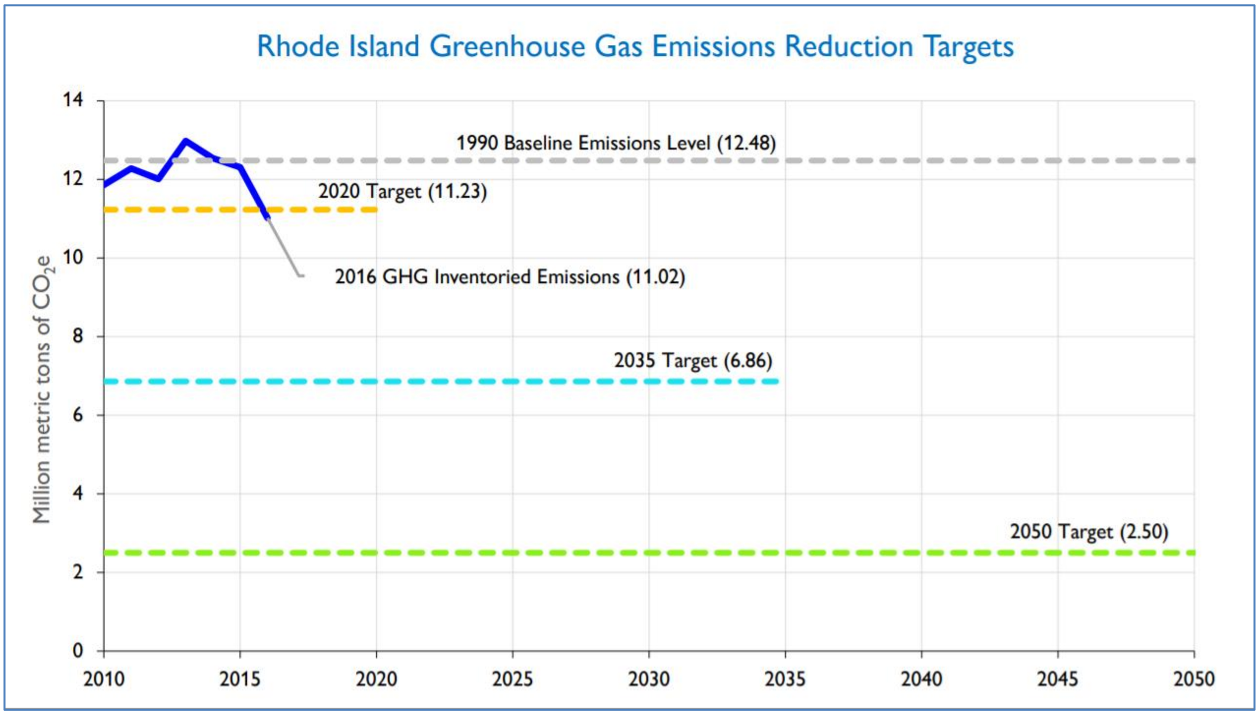

Figure 3: Resilient Rhode Island Greenhouse Gas Emissions Reduction Targets[4]

The 2016 Greenhouse Gas Emissions Inventory indicates emissions from the four largest gas-consuming sectors to be:

- Electric Generation - 2.84 MMTCO2e
- Residential Heating - 1.84 MMTCO2e

[4] R.I. Department of Environmental Management, *2016 Greenhouse Gas Emissions Inventory* (2019), available at http://www.dem.ri.gov/programs/air/documents/ghg-emissions-inventory-16.pdf.

- Industrial Heating and Processes – 1.14 MMTCO2e
- Commercial Heating - 0.86 MMTCO2e

While these sectoral emissions are not exclusively from gas it is the predominant fuel source for each one. The combined 2016 emissions from these three sectors—6.68 MMTCO2e—is nearly 60% of Rhode Island's total greenhouse gas emissions of 11.2 MMTCO2e. They are also nearly 100% of the 2035 target (which is only 14 years away), and they are more than two times higher than the 2050 target (which is 29 years away). These figures do not include gas leakage, which one study estimates could raise total state emissions by 45% if properly accounted for.[5] This brief overview makes it clear that strategies for reducing emissions from gas are essential elements for meeting Rhode Island's current GHG emissions reduction targets.

Furthermore, the best available science indicates that we need to achieve net zero emissions by 2050 to prevent warming beyond 1.5 degrees Celsius and avoid the worst impacts of the climate crisis.[6] With that in mind, legislation to increase the emissions reduction target to net zero by 2050 has been introduced in Rhode Island.[7] At the corporate level, National Grid, which owns and operates most of the gas and electric distribution infrastructure in Rhode Island, also has its own zero by 2050 goal.[8]

Decarbonization Pathways

Meeting the already established Resilient Rhode Island Act greenhouse gas reduction targets for 2035 (only 14 years away) or for 2050 (29 years from now) will require significant shifts in the use of gas compared to the historic and current figures presented in Figures 1 and 2 above. Significant increases in electricity produced by renewable electric generation including solar, on-

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[5] Stockholm Environment Institute and Brown University Climate & Development Lab, *Deeper Decarbonization in the Ocean State: The 2019 Rhode Island Greenhouse Gas Reduction Study* (2019).

[6] Intergovernmental Panel on Climate Change, *Global Warming of 1.5°C: Summary for Policymakers* (2018), *available at* https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15_SPM_version_stand_alone_LR.pdf.

[7] 2021 Act on Climate, Rhode Island Senate Bill No. 78, *available at* http://webserver.rilin.state.ri.us/BillText/BillText21/SenateText21/S0078.pdf.

[8] National Grid, *Net Zero by 2050 Plan* (2020), *available at* https://www.nationalgridus.com/media/pdfs/our-company/netzeroby2050plan.pdf.

and offshore wind, imported hydropower, and other resources will result in a substantially decreased role and production from gas-fired electric generation, likely limiting their role to, at most, helping to balance intermittent renewable generation.

Emissions reductions in the space and water heating realm will likely be most cost-effectively achieved through electrification, using air and ground source heat pumps (ASHP and GSHP). Important analysis and planning undertaken in Rhode Island includes the "Heating Sector Transformation in Rhode Island" (HST) report.[9] Figure 4, from the Executive Summary of the HST report illustrates estimates of annual space heating costs for a single-family residence, comparing projected costs in 2050 for fossil fuels with the 2050 decarbonized alternatives that will be required to meet GHG emissions reduction targets.

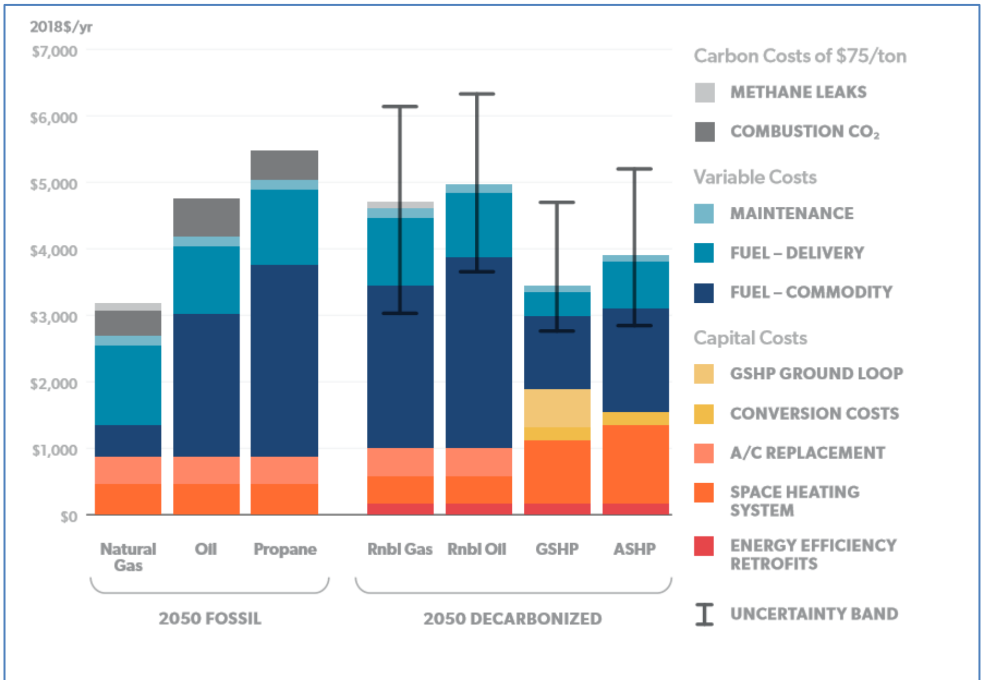

FIGURE ES 1: ANNUALIZED COST OF SPACE HEATING IN 2050, REPRESENTATIVE SINGLE-FAMILY HOME, BOOKEND SCENARIOS, 2018$

Figure 4: Economics of Residential Space Heating Decarbonization Options[10]

[9] The Brattle Group, *Heating Sector Transformation in Rhode Island* (2020), *available at* http://www.energy.ri.gov/documents/HST/RI%20HST%20Final%20Pathways%20Report%205-27-20.pdf.

[10] *Id.* at ii.

While there is some potential overlap in the estimated cost ranges, when considering the uncertainty bands, we observe the central cost estimates for the electrification options (GSHP and ASHP) are significantly lower than the renewable gas and oil options. The electrification options also have somewhat narrower uncertainty bands. The HST analysis and findings are consistent with other studies. In this light, planning and investment anticipating that RNG will be the sole, or even the dominant, pathway for decarbonization of space heating is not prudent.

Future heating shares by fuel type in 2050 as estimated by the HST report are further illustrated in Figure 5. Note that only the "Fuel Bookend" scenario results in an expansion of the share for renewable gas in comparison to the current share (54%) of fossil gas. In the bookend GSHP and ASHP scenarios the share of heating provided by renewable gas drops to zero, and in the mixed scenario, the share of heating provided by gas drops to one half of the current share. Gas infrastructure planning and investment decision making should be informed by and account for these potential declines in the share of space heating provided by gas.

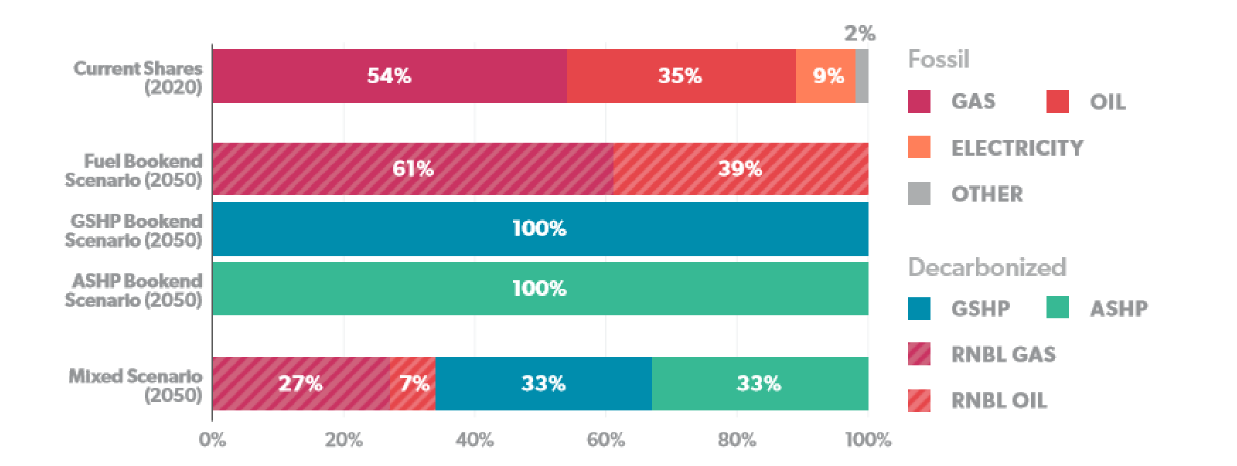

FIGURE 22: HEATING SHARES BY FUEL (NUMBER OF BUILDINGS) CURRENT SHARES VS MIXED SCENARIO (2050)

Figure 5: Economics of Residential Space Heating Decarbonization Options[11]

The next section provides additional detail related to the resource base, and estimated costs for RNG.

[11] *Id.* at iii.

Resource and Costs for RNG

A 2019 Study conducted by ICF International for the American Gas Foundation includes national and state-level estimates of RNG potential by 2040 under low and high development scenarios.[12] Table 1 summarizes Rhode Island's estimated 2040 potential as presented in Appendix A of the study.

Table 1: Estimated Rhode Island RNG Achievable Potential 2040

	Anaerobic Digestion				Thermal Gasification				
	LFG	**Manure**	**WRRF**	**Food Waste**	**Ag Res**	**Forest Res**	**Energy Crops**	**MSW**	**Total**
2040 Low	1.447	0.008	0.103	0.128	0.001	0.126	0.007	1.037	2.857
2040 High	2.357	0.016	0.15	0.224	0.003	0.251	0.007	2.337	5.345

The values in Table 1 do not represent economic potential. They are technical achievable potential estimates accounting for resource base, adoption rates, and conversion technologies. It is notable that Rhode Island's technically achievable potential is heavily concentrated in two resource categories, with more than 85 percent of the identified potential in both the high and low cases coming from the combination of landfill gas and thermal gasification of municipal solid waste.

The high and low scenario results in the AGF study also indicate that thermal gasification is only expected to make meaningful contributions to the RNG potential after 2030. Some further concerns with the pursuit of gasification are addressed in the next section of this whitepaper. In any case, Rhode Island's estimated technical achievable potential by 2040 for RNG from anaerobic digestion and thermal gasification is only a small fraction (2.9% low, and 5.5% high) of 2019 statewide gas demand as illustrated in Figure 6.

[12] American Gas Foundation, *Renewable Sources of Natural Gas: Supply and Emissions Reduction Assessment* (2019).

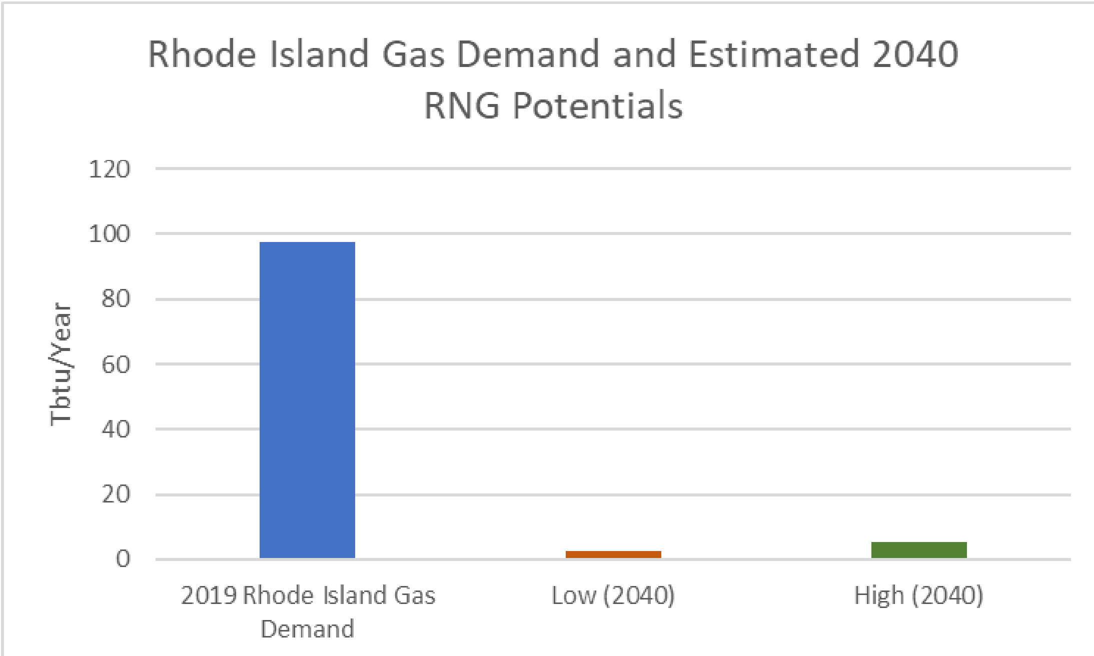

Figure 6: Rhode Island Gas Consumption and Estimated RNG Potential by 2040

These scenario results, coming from a study sponsored by the gas industry, indicate that the RNG technical resource potential from anaerobic digestion and thermal gasification is very limited, and even by 2040 it only has the potential to replace a small fraction (2.9% to 5.5%) of current gas volumes.

Cost estimates for RNG production are summarized in Figure 7, taken from the HST report.[13] These include estimates from the AGF sponsored study, including costs for anaerobic digestion and thermal gasification processes, as well as for Power to Gas. The latter uses renewable electricity and electrolysis to create hydrogen which can then be used directly as an industrial process fuel or be processed via methanation to produce pipeline decarbonized gas.

[13] HST Report at 36, fig. 21.

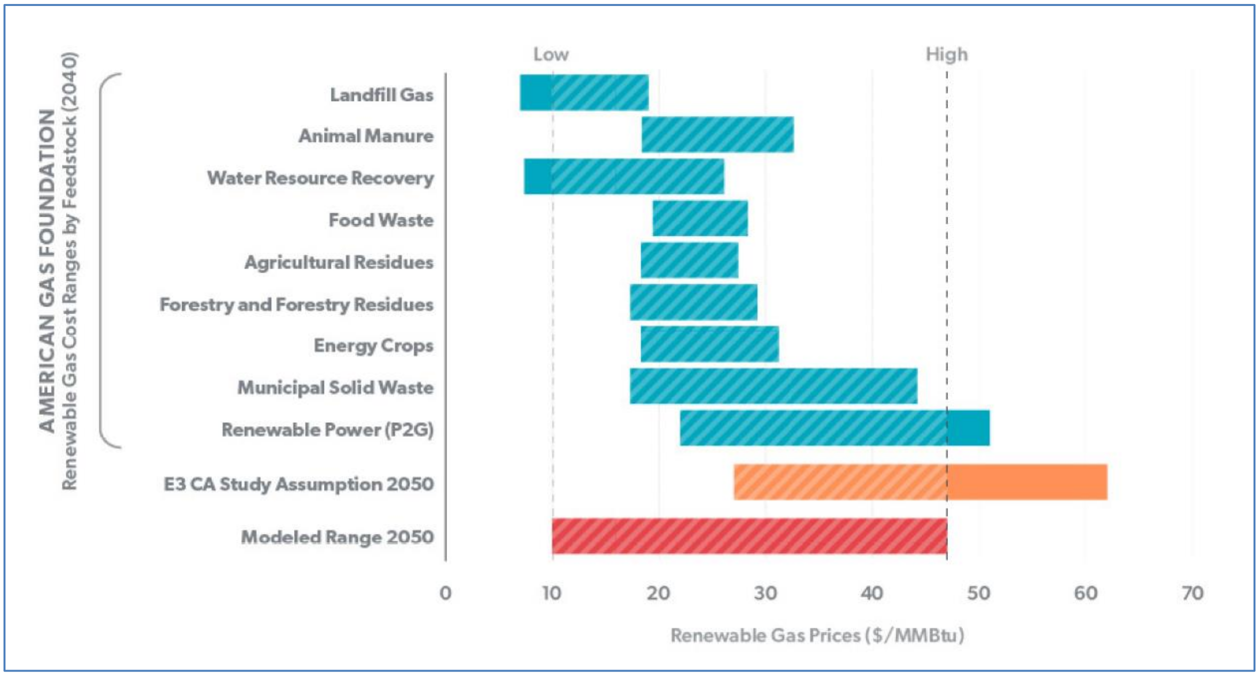

Figure 7: Cost Estimates for Decarbonized Gas Production

Ranging above $20 per MMBtu for most options and with top ends exceeding $50 per MMBtu for Power to Gas, these estimates, again mostly from a study sponsored by the gas industry, make it clear that decarbonized gas options are expensive, both in comparison to conventional gas costs, but also in comparison to alternatives such as electrification and efficiency. This further underscores the importance of careful comparison of alternatives when evaluating proposals for investments in gas infrastructure, and for considering shorter depreciation periods for the cost recovery associated with any such investments.

Additional Concerns on Methanation

National Grid's FY 2022 ISR Plan is only a portion of the longer-term 20-year proactive main replacement program, the latter of which addresses the eventual replacement of leak prone elements of the gas distribution system.[14]

[14] National Grid FY 2022 Gas ISR Plan at 30, lines 10-18.

The integrity and safety of gas infrastructure is important for safety, environmental, and economic reasons. Fugitive emissions of methane have a high global warming potential, particularly over near-term horizons, and they contribute to harmful local air pollution including the formation of ground level ozone.[15] The need for a 20-year plan to address the existing "leak prone" distribution infrastructure indicates that even if RNG were to become more readily available, it would still be prone to leakage, and would not avoid fugitive emissions and the associated problems. As noted above, more accurate accounting of gas leakage may, by itself, increase the state's total estimated GHG emissions by 45%.

Increasing research and advocacy suggests that rather than investing in or supporting new resource streams of methane, for example from the gasification of agricultural residues, efforts to reduce or contain existing sources of methane through alternative management practices may be more prudent.[16]

Targeting Applications for RNG

The HST report cited earlier provides some discussion of decarbonization options for process heat. Rhode Island has limited heavy industry with highly intensive process heat needs, and much of the industrial energy consumption may be used for lower temperature space and water heating. However, where there are industrial processes requiring higher temperatures, these can be good strategic targets for the use of decarbonized gas or liquid fuels. Heat pump technologies, while they are capable of meeting space and water heating loads, are not able to meet higher temperature process heat needs. Recognizing that solutions for industrial processes will be highly specific to a given facility and process, the use of decarbonized liquid or gas fuels for process heating—as a

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[15] Stockholm Environment Institute and Brown University Climate & Development Lab, *Deeper Decarbonization in the Ocean State: The 2019 Rhode Island Greenhouse Gas Reduction Study* 20-22 (2019) (discussing the implications of updated methane leakage rates and consideration of 20-year global warming potential for methane emissions).

[16] *See* Earth Justice and Sierra Club, *Rhetoric Vs. Reality: The Myth of "Renewable Natural Gas" for Building Decarbonization* (2020), available at *https://earthjustice.org/sites/default/files/feature/2020/report-decarb/Report_Building-Decarbonization-2020.pdf*; *see also* Rocky Mountain Institute, *A New Approach to America's Rapidly Aging Gas Infrastructure* (2020), *available at* https://rmi.org/a-new-approach-to-americas-rapidly-aging-gas-infrastructure/.

“drop-in” fuel replacement for conventional fossil-based fuels—may avoid the need for new capital investments to retool production processes. Industrial process heat conversions to use RNG or Power to Gas are likely to be site-specific, may not require pipeline distribution service, and may be phased in over a period of decades.

As discussed above the resource potential, and therefore the volume, of RNG is expected to be significantly less than conventional fossil gas supplies, and to be much more expensive. Matching these limited and more expensive supplies with industrial applications for which there are not viable alternatives will help to maximize the value of any decarbonized fuels, and this may in turn support their higher production costs. Conversely, planning and investing in infrastructure so the more limited and more expensive supplies of RNG are used broadly for lower temperature space and water heating requirements is less likely to contribute to meeting GHG reduction goals and less likely to maximize the value of any decarbonized fuels.

Targeted high-value industrial uses may also be more geographically concentrated than general space and water heating loads, permitting more targeted ISR-type planning for strategic replacement, and pruning, of gas infrastructure. Using RNG for electric generation to help balance and support an increasingly renewable grid is another potential high-value application. Electric generation use would also be likely to be geographically concentrated and help to limit and prioritize gas infrastructure system upgrades.

Targeting and Coordinating Gas Infrastructure Investments

There is a need to consider ISR plans and other gas infrastructure investments in the context of the issues above and compared to alternatives. The alternatives should include selective targeting and pruning of gas infrastructure to support high-value uses. For example, investments in upgrading a pipeline for a branch with loads dominated by space and water heating might be avoided through a strategic electrification program. If branches that can be retired are identified the amount of the pipeline needing safety and reliability upgrades may be reduced.

There is a potential dynamic relationship between investments in the gas and electric systems. A reduction in gas infrastructure investments may require increasing investment in the electric distribution system, say for example, to meet the needs of building and transportation electrification. Specific gas ISR investments may be prudent and necessary, but they are best considered within this type of more holistic framework.

The potential for coordinating distribution system planning and investment in Rhode Island is enhanced by National Grid being responsible for both gas and electric distribution. The strategies outlined in this whitepaper may help to avoid uncoordinated or redundant investments.

Depreciation Periods for Gas Infrastructure Investments

Depreciation periods, for gas infrastructure or other investments, should match the anticipated lifetime over which the assets will be used and useful. This reduces the risk of stranded costs and provides an appropriate estimate of the rate impacts required to recover costs from ratepayers. In general, longer depreciation periods reduce near-term rate impacts by stretching out the cost recovery, so an investment with a longer depreciation period may appear to be more palatable to gas customers.

In this whitepaper we have reviewed factors likely to limit the future use of gas infrastructure. Meeting Rhode Island's greenhouse gas emissions reduction targets, the cost and resource potentials for renewable or decarbonized gas, and the benefit of targeting any future such gas use to highest value applications all point towards reduced reliance on gas infrastructure. We therefore recommend utilities commissions should apply shorter depreciation periods for gas infrastructure investments, in no case longer than 20 years. This reduces the risk of stranded costs, and more accurately reflects the near-term rate impacts of investments under consideration.

As an example, Figure 8 illustrates a 20-year versus a 33-year depreciation period for an investment of $180 million, the same size as that proposed by the FY 2022 ISR plan, using a declining balance method and a 10% salvage value.

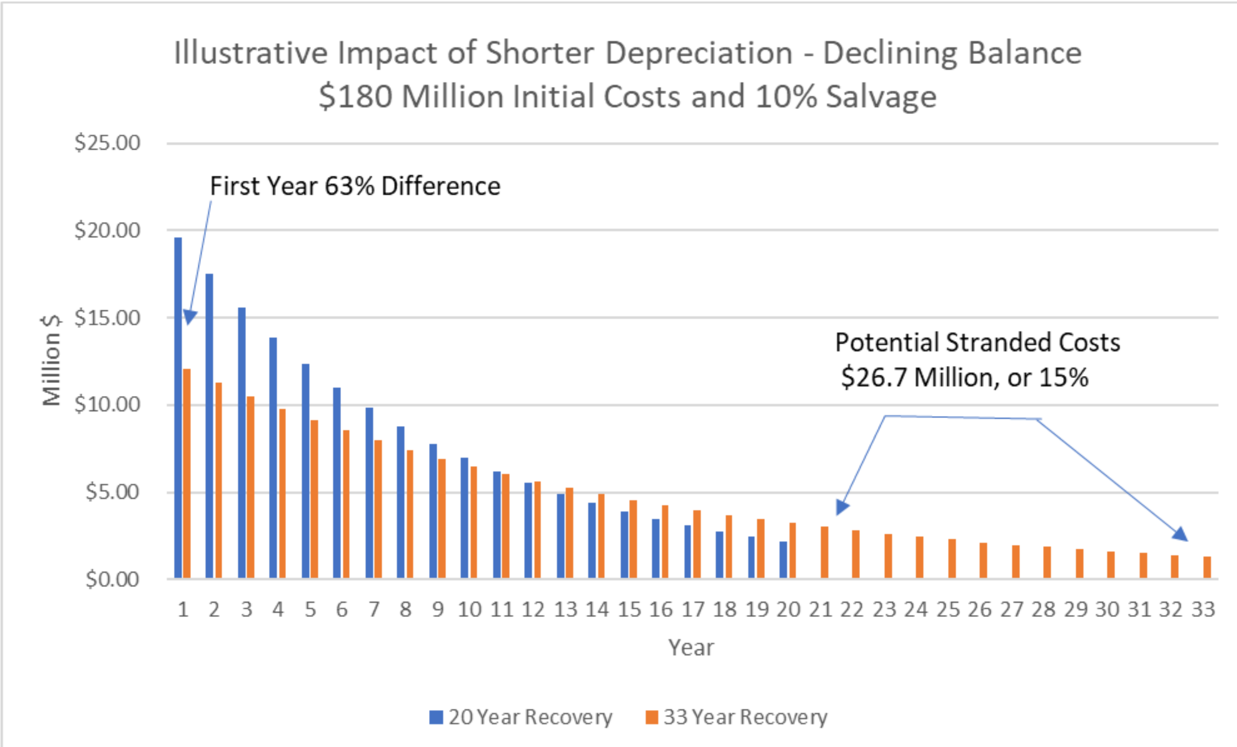

Figure 8: Cost Recovery Comparison for Twenty- and Thirty-Three-Year Depreciation Periods

At the end of 20 years the shorter depreciation schedule (blue bars) will have recovered all costs. To do so, it has higher annual cost recovery for each of the first ten years in comparison to the 33-year deprecation period (orange bars). In the first year, the required cost recovery is 63% higher for the 20-year depreciation period. At the end of 20 years, the case with the longer (33 years) depreciation period has $26.7 million of costs yet to be recovered, equivalent to 15% of the initial investment.

We suggest that the appropriate depreciation period needs to be carefully assessed by commissions in each case as the climate landscape continues to change, and that 20 years should be a cap for new gas infrastructure investments. Shorter deprecation periods and more comparative analysis of alternatives and coordinated strategic planning for both gas and electric infrastructure investments are important steps to help Rhode Island meet future GHG emissions reduction targets, to protect ratepayers and shareholders, and provide greatest benefits to the state's economy.

Conclusions and Recommendations

- Continued broad-based reliance on gas infrastructure beyond 2050 is incompatible with achievement of the state's GHG emissions reduction goals.
- RNG has limited resource potential, and high costs. It doesn't make sense to maintain gas infrastructure on the assumption that we will switch to RNG at scale in the future.
- We should therefore not be amortizing costs of new gas infrastructure over periods that extend beyond 20 years.
- Targeted high-value applications of RNG may be justified, but they are likely to require a much smaller gas distribution infrastructure.
- Options to target and limit the amount of gas infrastructure investment should focus on highest value uses. These may result in concentrated geographic replacement and upgrades.
- Opportunities for greater coordination in planning and investment for gas and electric distribution system should be pursued.