

**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
PUBLIC UTILITIES COMMISSION**

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**In Re: The Narragansett Electric Company  
d/b/a National Grid  
Annual Energy Efficiency Plan for 2019**

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**Docket No. 4888**

**ANNUAL ENERGY EFFICIENCY PLAN FOR 2019**

**SETTLEMENT OF THE PARTIES**

**October 15, 2018**



October 15, 2018

**BY HAND DELIVERY AND ELECTRONIC MAIL**

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

**RE: Docket 4888 – The Narragansett Electric Company d/b/a National Grid  
2019 Energy Efficiency Program Plan**

Dear Ms. Massaro:

I have enclosed eleven copies of National Grid's<sup>1</sup> proposed Energy Efficiency Program Plan for 2019 (the Plan).<sup>2</sup> The Plan is a Stipulation and Settlement between National Grid, the Rhode Island Division of Public Utilities and Carriers (Division), the Rhode Island Office of Energy Resources (OER), the Energy Efficiency Resources Management Council (EERMC), Acadia Center, and the Green Energy Consumers Alliance (collectively, the Parties).

The Company submits the Plan pursuant to the System Reliability and Least Cost Procurement statute, R.I. Gen. Laws § 39-1-27.7 and the Least Cost Procurement Standards (Standards), as approved by the PUC at an Open Meeting on September 6, 2018 in Docket 4684. The basis for least cost procurement in Rhode Island is the Comprehensive Energy Conservation, Efficiency, and Affordability Act of 2006 (R.I. Gen. Laws § 39-2-1.2), which encourages the investment in cost-effective energy efficiency. Section 1.1 of the Standards requires the Company to file annually a program plan with implementation details by program for the following program year. The Plan is consistent with the framework and savings goals established in the Three-Year Energy Efficiency Procurement Plan (Three-Year Plan), which the PUC approved in Docket 4684. Below is a summary of the implementation details for the 2019 program year as set forth in the Plan.

The Plan proposes total budgets of \$107.5 million and \$31.6 million for electric and gas, respectively. The Company estimates that these expenditures could create substantial annual and lifetime savings for Rhode Island customers. Notably, the 2019 Plan will save 1,694,194 MWh over the lifetime of installed energy efficiency measures and 4,426,644 MMBtu over the lifetime of the natural gas measures. Investments made in energy efficiency to achieve these savings will add \$85.6 million to Rhode Island's state gross domestic product (GDP) and create more than 1,256 job-years of employment. Rhode Island customers realize \$4.00 in benefits for every \$1.00

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<sup>1</sup> The Narragansett Electric Company d/b/a National Grid (National Grid or Company).

<sup>2</sup> The Company is filing the 2019 Technical Reference Manual referenced in the Plan under separate cover.

invested in the Plan's electric programs and \$2.70 in benefits for every \$1.00 invested in the Plan's natural gas programs.

The Plan builds upon the implementation strategies set forth in the Three-Year Plan and offers a suite of measures, programs, and initiatives to provide customers with the tools needed to save energy at a cost lower than purchasing electricity and natural gas supply. The Plan also offers new ways for customers to manage their energy usage through its new Connected Solutions Demand Response programs for residential and commercial customers. The Company has also increased its commitment to beneficial electrification of heat in 2019 by increasing the number of cold climate mini-split heat pumps offered to customers heating with delivered fuels in its electric HVAC program and expanding the offering to income-eligible and multifamily programs consistent with Power Sector Transformation as detailed in the Docket Nos. 4770/4780 Amended Settlement Agreement.

In addition to lowering costs to customers that participate in the Company's energy efficiency programs, energy savings from the Plan will help to displace fossil fuel based electricity generation and avoid investments in the installation, upgrade, or replacement of transmission and distribution infrastructure, which in turn provides cost savings to all customers, even those that do not directly participate in these programs. The 2019 Bill Impact analysis included in Attachment 7 of this Plan finds that over the lifetime of the 2019 programs, the average Rhode Island customer's bill will be less than if there were no energy efficiency programs.

In accordance with the requirements of Least Cost Procurement statute, R.I. Gen. Laws § 39-1-27.7, to achieve the energy efficiency goals, the Plan proposes a fully reconciling funding mechanism that would increase the current \$0.00972 per kWh Energy Efficiency Program (EEP) Charge by \$0.00142 per kWh, resulting in a total EEP charge of \$0.01114 per kWh, for effect January 1, 2019. The Plan proposes a fully reconciling funding mechanism that would decrease the current residential \$0.869 per dekatherm charge by \$0.141 per dekatherm, resulting in a total \$0.728 per dekatherm EEP Charge for residential gas programs. The plan also proposes a fully reconciling funding mechanism that would decrease the current commercial and industrial \$0.671 Charge by \$0.177 per dekatherm, resulting in a total \$0.494 per dekatherm EEP Charge for commercial and industrial gas programs.<sup>3</sup> To ensure that the 2019 EEP Charge reflects the most current fund balance projections possible, the Company proposes to update these Charges by submitting revised Tables E-1 and G-1 on December 3, 2018 to include several additional months of actual expenses and revenues in the calculation of the Charge while still providing time for the PUC to review the revised tables prior to a hearing on the Plan.<sup>4</sup>

Subsection (c)(5) of the Least Cost Procurement statute provides the EERMC with the specific responsibility of reviewing and approving the cost-effectiveness of the Plan. Therefore, in accordance with the Least Cost Procurement statute, the EERMC has reviewed and approved

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<sup>3</sup> These calculations are based on a January 1, 2019 effective date.

<sup>4</sup> A full description of the proposal is found in Section 6(i) of the Plan.

Luly E. Massaro, Commission Clerk  
Docket 4888 – 2019 Energy Efficiency Plan  
October 15, 2018  
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the Plan, which complies with all aspects of the Least Cost Procurement statute. Accordingly, the Company respectfully requests that the PUC approve the Plan so the Company can deliver on its expected benefits and energy saving goals.

Thank you for your attention to this filing. If you have any questions, please contact me at 781-907-2121.

Sincerely,

A handwritten signature in blue ink, appearing to read "Raquel Webster", with a stylized flourish at the end.

Raquel J. Webster

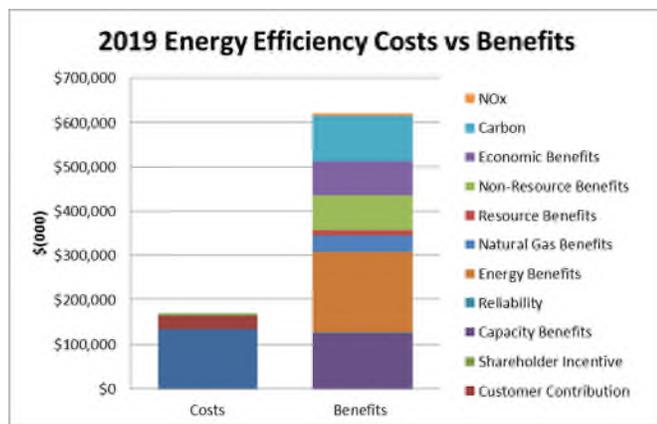
cc: Jon Hagopian, Esq.  
John Bell, Division



## Executive Summary

National Grid's 2019 Annual Energy Efficiency Plan (2019 Plan or Plan) includes a suite of services to provide all customers with the tools needed to take control of their energy usage and lower their bills. In addition to lowering costs to customers that participate in the Company's energy efficiency programs, energy savings from the Plan will help to displace fossil fuel based electricity generation and avoid investments in the installation, upgrade, or replacement of transmission and distribution infrastructure, which in turn provides cost savings to all customers, even those that do not directly participate in these programs. The 2019 Bill Impact analysis included in Attachment 7 of this Plan finds that over the lifetime of the 2019 programs, the average Rhode Island customer's bill will be less than if there were no energy efficiency programs.

The Plan will create significant benefits to Rhode Island. The Plan will save 194,677 MWh over the lifetime of installed energy efficiency measures and 432,708 MMBtu over the lifetime of the natural gas measures. Investments made in energy efficiency to achieve these savings will add \$85.6 million to Rhode Island's state gross domestic product (GDP) and create more than 1,256 job-years of employment.



The projected lifetime energy savings from this Plan will also avoid 1.1 million tons of carbon, the equivalent of removing 216,118 passenger vehicles from the road for one year. In total, the 2019 Plan is expected to create over \$620 million in benefits over the life of the installed electric, demand response, and natural gas energy efficiency measures. Energy savings and benefits are measured and verified by third-party evaluation firms.

The Plan represents the second year of the 2018-2020 Three-Year Plan. In this context, the Plan includes several enhancements over previous years, while also continuing proven, nation-leading customer services.

One enhancement in the 2019 Plan is the increased opportunity for customer and stakeholder feedback and public comment in the 2019 planning process. As the facilitator of the Energy Efficiency Collaborative (Collaborative), the Company began soliciting Collaborative member feedback early in the planning process. Beginning in March 2018, members of the Collaborative gave presentations on their priorities for the

2019 Plan, and the Company provided a preliminary Plan outlook in June. In addition, the Company hosted a Customer Listening Forum on August 1, 2018 to obtain feedback from residential customers, businesses, community representatives, and other members of the public to help inform deployment of current programs and the 2019 Plan. The Company believes that its commitment to stakeholder engagement in 2018 has aided in the creation of a holistic and innovative 2019 Plan that is responsive to customer needs.

The Plan also offers new ways for customers to manage their energy usage through its new ConnectedSolutions Demand Response programs for residential and commercial customers. These programs incent customers to reduce their energy use during peak periods in the summer that will in turn help lower infrastructure costs and utility prices to all electric customers in Rhode Island.

The Company has also increased its commitment to beneficial electrification of heat in 2019 by increasing the number of cold climate mini-split heat pumps offered to customers heating with delivered fuels in its electric HVAC program and expanding the offering to income-eligible and multifamily programs consistent with Power Sector Transformation as detailed in the Docket Nos. 4770/4780 Amended Settlement Agreement.

Specific to the residential sector, the Plan addresses market barriers to renters by providing landlords with 100% incentives, provides incentive parity for delivered fuels customers, and increases investments in Rhode Island income eligible community.

The commercial and industrial sector includes expansion of the Industrial Initiative, improving barriers to entry for small business customers and increasing program participation, Commercial Property Assessed Clean Energy (C-PACE) for commercial real estate owners and developers, and Strategic Energy Management (SEM) for business energy management.

The last enhancement is a proposal to begin testing how to best track and report on additional attributes of energy efficiency programs including, carbon emission reductions, cost of saved energy, lifetime savings, and customer satisfaction. These new metrics will provide additional insight regarding how energy efficiency is aligned with the energy policy goals of Rhode Island.

The Plan demonstrates National Grid's commitment to energy efficiency and customer energy management and has sought to balance pursuing energy and cost savings from current technologies and programs while also seeking to identify new technologies and programs to continue delivering savings to Rhode Island customers for years to come.

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## **ATTACHMENTS**

1. 2019 Residential Energy Efficiency Solutions and Programs
2. 2019 Commercial and Industrial (C&I) Energy Efficiency Solutions and Programs
3. 2019 Measurement and Verification Plan
4. Rhode Island Benefit Cost Test Description
5. 2019 Electric Energy Efficiency Program Tables
6. 2019 Gas Energy Efficiency Program Tables
7. 2019 Energy Efficiency Program Plan Bill Impacts
8. 2019 Energy Efficiency Pilots Summary
9. National Grid Customer Listening Forum Summary Report



## 1. Introduction and Summary

The Narragansett Electric Company d/b/a National Grid (National Grid or Company) is pleased to submit this 2019 Annual Energy Efficiency Plan (Annual Plan or Plan) to the Rhode Island Public Utilities Commission (PUC). This Plan has been developed by National Grid in collaboration with the Energy Efficiency Collaborative (Collaborative) and has been endorsed by the Energy Efficiency and Resource Management Council (EERMC).<sup>1</sup>

This Plan is submitted in accordance with the Least Cost Procurement law, R.I. Gen. Laws § 39-1-27.7, the basis for which is the Comprehensive Energy Conservation, Efficiency, and Affordability Act of 2006, R.I. Gen. Laws § 39-2-1.2, and the Least Cost Procurement Standards (Standards), as approved by the PUC at an Open Meeting on September 6, 2018 in Docket 4684. This Plan is being jointly submitted as a Stipulation and Settlement, entered into by the Rhode Island Division of Public Utilities and Carriers (Division), the Office of Energy Resources (OER), the EERMC, Acadia Center, Green Energy Consumers Alliance, and National Grid (collectively, the Parties), and addresses issues raised by members of the public, members of the Collaborative, and the EERMC concerning the Company's electric and natural gas energy efficiency (EE) programs for calendar year 2019.

The Plan satisfies the statutory requirements for Least Cost Procurement and is consistent with the Three-Year Energy Efficiency Procurement Plan (Three-Year Plan) for 2018-2020.<sup>2</sup> The Annual Plan is cost-effective and has a cost that is lower than the cost of energy supply for both electricity and natural gas, satisfying the requirements prescribed in R.I. Gen. Laws § 39-1-27.7 (a)(2) and the Standards. The Plan also satisfies PUC Order No. 22851 by demonstrating how it advances the Docket 4600 principles and goals for the electric system detailed in Section 11.<sup>3</sup>

The primary goal of the Annual Plan is to create energy and economic cost savings for Rhode Island consumers through energy efficiency, as required by R.I. Gen. Laws § 39-1-

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<sup>1</sup> Since 1991, a collaborative group (Collaborative) has been meeting regularly to analyze and inform the Company's electric and gas energy efficiency programs. Presently, members of the Collaborative include: the Company, the Division and the Division's consultant, Synapse Energy Economics (Synapse), Green Energy Consumers Alliance, TEC-RI, and Acadia Center. In addition, the OER, the Rhode Island Infrastructure Bank (RIIB), the City of Providence, and several EERMC members and representatives from the EERMC's Consulting Team participate in the Collaborative. Since 1991, membership in the Collaborative has varied because some organizations have withdrawn and others have joined. Further information available at: <https://rieermc.ri.gov/thecollaborative/>

<sup>2</sup> The Company submitted the Three-Year Plan to the PUC on August 30, 2017 in Docket 4684.

<sup>3</sup> PUC Report and Order No. 22851 accepting the Stakeholder Report. Written Order issued July 31, 2017.

27.7. To that end, the Plan will create annual savings of 194,677 MWh and 432,708 MMBtu and lifetime savings of 1,694,194 MWh and 4,426,644 MMBtu. The Plan will generate benefits of more than \$620 million over the life of the measures (with \$505 million in benefits coming from electric efficiency and demand response, and \$115 million in benefits from natural gas efficiency), which represents a large and urgently needed benefit for Rhode Island’s residential, commercial, industrial, and income eligible energy customers. Table 1 provides a high level summary of the Plan.

**Table 1: 2019 Energy Efficiency Program Plan Summary**

Electric Programs by Sector	Implementation Spending (\$000)	Customer Contribution (\$000)	Annual Savings (MWh)	Lifetime Savings (MWh)	¢/lifetime kWh	Summer Annual Demand Savings (kW)	Demand Response (kW)	Total Benefits (\$000)	RI Test B/C Ratio	Participants
Non-Income Eligible Residential	\$43,383	\$4,138	91,677	429,965	11.1	13,898	1,564	\$146,902	2.96	558,305
Income Eligible Residential	\$15,078	\$0	6,961	73,530	20.5	1,039		\$42,534	2.69	8,000
Commercial and Industrial	\$42,368	\$14,616	96,038	1,190,699	4.8	15,180	34,300	\$316,126	5.36	3,311
Regulatory	\$1,773									
<b>Subtotal</b>	<b>\$102,601</b>	<b>\$18,754</b>	<b>194,677</b>	<b>1,694,194</b>	<b>7.2</b>	<b>30,117</b>	<b>35,864</b>	<b>\$505,562</b>	<b>4.00</b>	<b>569,615</b>
Gas Programs by Sector	Implementation Spending (\$000)	Customer Contribution (\$000)	Annual Savings (MMBtu)	Lifetime Savings (MMBtu)	\$/lifetime MMBtu			Total Benefits (\$000)	RI Test B/C Ratio	Participants
Non-Income Eligible Residential	\$13,607	\$6,397	192,069	1,612,528	12.41			\$43,426	2.10	115,858
Income Eligible Residential	\$7,946	\$0	29,665	543,171	14.63			\$26,043	3.12	4,320
Commercial and Industrial	\$8,040	\$4,593	210,974	2,270,945	5.56			\$45,372	3.49	2,611
Regulatory	\$540									
<b>Subtotal</b>	<b>\$30,132</b>	<b>\$10,990</b>	<b>432,708</b>	<b>4,426,644</b>	<b>9.29</b>			<b>\$114,841</b>	<b>2.70</b>	<b>122,789</b>
<b>Total for Plan</b>	<b>\$132,734</b>	<b>\$29,744</b>						<b>\$620,403</b>	<b>3.71</b>	<b>692,404</b>

(1) Implementation spending does not include customer contributions, shareholder incentive, or commitments.  
(2) Regulatory Includes contributions to OER and EERMC

The energy savings that will result from this Plan will provide a meaningful contribution to the Resilient Rhode Island Act (the Act). Under the Act, the State of Rhode Island set forth the goal to reduce greenhouse gas (GHG) emissions to 80% below 1990 levels by 2050.<sup>4</sup> The Rhode Island Greenhouse Gas Emissions Reduction Plan (GHG Plan) identifies energy efficiency as an important component for achieving the GHG targets set forth in the Act.<sup>5</sup> The electric, gas, and oil energy efficiency measures proposed in this Plan will

<sup>4</sup> R.I. Gen. Laws § 42-6.2.

<sup>5</sup> Rhode Island Greenhouse Gas Emissions Reduction Plan, December 2016.

avoid over 1.1 million tons of carbon over the lifetime of the installed measures.<sup>6</sup> This is the equivalent of removing 216,118 passenger vehicles from the road for one year.<sup>7</sup>

In addition to providing customers with cost-savings and contributing to the state's carbon reduction goals, the Plan will also create significant economic benefits in Rhode Island. The Company expects that investments made in energy efficiency under this Plan will add \$85.6 million to Rhode Island's state gross domestic product (GDP) and support more than 1,256 job-years of employment.<sup>8</sup> The vast majority of jobs created as a result of energy efficiency investments are local because they are tied to the installation of equipment and other materials. An analysis of National Grid's 2017 energy efficiency programs found that 79% of companies involved in the Company's energy efficiency programs were located in Rhode Island.<sup>9</sup> These findings confirm that job creation is an additional significant benefit that National Grid's investments in energy efficiency contribute to Rhode Island's economy overall and directly to the business owners and their employees who deliver these programs and services.

The savings in the Plan meet the requirements for cost-effectiveness. As defined by the Standards in Docket 4684, the Plan's RI Test benefit-cost ratio - the ratio of Total Benefits to Total Costs - must be greater than 1.0.<sup>10</sup> The overall electric EE Program RI Test ratio is 4.00, and the overall natural gas EE Program RI Test ratio is 2.70. This means that for each \$1 spent on energy efficiency, electric programs will create \$4.00 of benefits over the lifetime of the investment, and natural gas programs will create \$2.70 in benefits over the lifetime of the investments.

The Standards further require the Company to show a comparison between the RI Test and the Total Resource Cost (TRC) Test. The overall electric EE Program TRC Test ratio is 2.94, and the overall natural gas EE Program TRC Test ratio is 1.53. The TRC Test comparison is included in Table E-5A and G-5A. Graph 1 details the 2019 costs and benefits for the electric and gas portfolios. A detailed summary of the benefits and costs included in the RI Test is included in Attachment 4.

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<sup>6</sup> Takes into account the net impact of EE measures on carbon emissions. The marginal carbon emission rates are from "Avoided Energy Supply Components in New England: 2018 Report" Appendix K. pages 368-370.

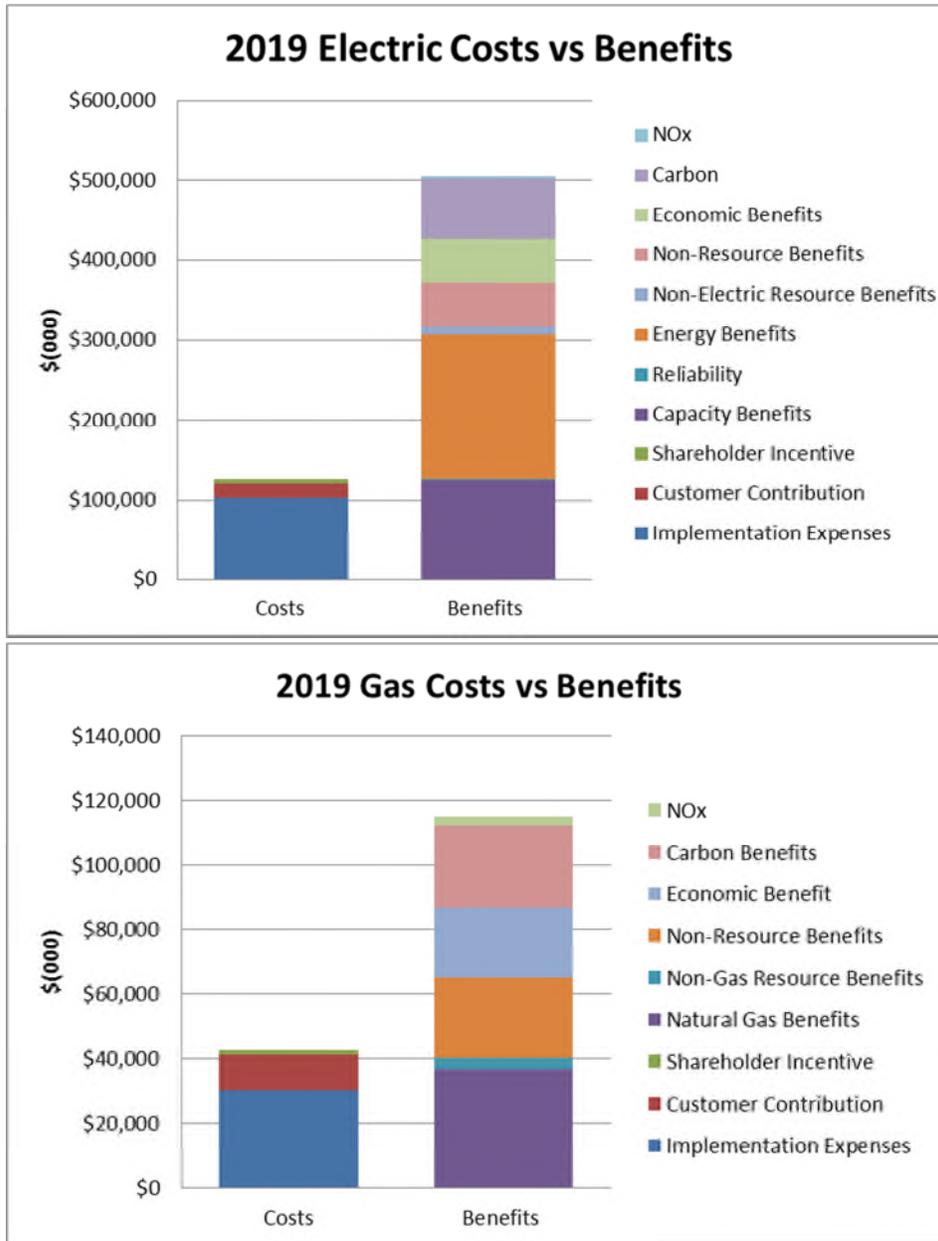
<sup>7</sup> <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

<sup>8</sup> Macroeconomic multipliers for the economic growth and job creation benefits of investing in cost-effective energy efficiency from National Grid's 2014 Regional Economic Model (REMI) Analysis as presented by the Company to the Collaborative on May 29, 2014. Job-year is the equivalent of a full-time job for 12 months. To maintain consistency with RI Test economic benefits multiplier, the Company is only including construction phase impacts to GDP and job-years to account for only direct and indirect impacts.

<sup>9</sup> Peregrine Energy, "Analysis of Job Creation from 2017 Expenditures for Energy Efficiency in Rhode Island by National Grid", April 25, 2017 (filed as part of National Grid's 2017 Year-End Report).

<sup>10</sup> Standards, Section 1.4(C).

**Graph 1. Annual Plan Total Benefits and Total Costs (RI Test)**



In addition to satisfying the primary statutory requirement of cost-effectiveness, the Plan satisfies the additional requirement that the cost of energy efficiency procured be less expensive than the cost of supply as detailed in Section 3. The cost of procuring 1,694,194 MWh lifetime electric energy efficiency savings through the Plan is \$289.0 million less than if that electric load was met by purchasing additional electric supply. The cost of procuring 4,426,644 MMBtu lifetime natural gas energy efficiency savings through the Plan is \$25.1 million less than if that natural gas load was met by purchasing additional natural gas supply.

Over time, the benefits of procuring energy efficiency at a cost less than supply accrue to customers. From 2009 to projected year-end 2018, electric energy efficiency programs will have saved an estimated 7.25 million MWh. This number represents the cumulative energy savings for just those energy efficiency measures installed since 2009 (the first year of programs implemented under Least Cost Procurement). Because the average measure life of energy efficiency measures is 10 years, the Company expects that measures installed in 2009 are still providing the same level of energy savings through 2018. This is also true for those measures installed after 2009.<sup>11</sup> The only exception is the savings from Home Energy Reports. This program only has a one-year measure life, and is counted as such, because it connects with customers annually to prompt them to continue taking energy saving actions. The cumulative 7.25 million MWh in savings were procured at a cost lower than the cost of supply. Without these energy savings, Rhode Island customers would have had to purchase 17% more energy at a higher cost.

This cost-effective Plan includes an investment of \$107.5 million for the electric energy efficiency portfolio in 2019. If approved, this will be funded by proceeds from the ISO New England (ISO-NE) Forward Capacity Market (FCM), the existing energy efficiency program charge of \$0.00972 per kWh, plus a fully reconciling mechanism of \$0.00142 per kWh pursuant to R.I. Gen. Laws § 39-1-27.7(c)(5) to fully fund the cost-effective electric energy efficiency programs for 2019.<sup>12</sup>

This Plan also includes a \$31.6 million investment in cost-effective natural gas energy efficiency. If approved, this investment will be funded by the existing energy efficiency program charge of \$0.869 per dekatherm for residential customers and \$0.671 per dekatherm for non-residential customers minus a fully reconciling mechanism of \$0.141 per dekatherm for residential customers and minus \$0.177 per dekatherm for non-residential customers pursuant to R.I. Gen. Laws § 39-1-27.7(c)(5) to fully fund the cost-effective natural gas energy efficiency programs for 2019.<sup>13</sup>

All Rhode Island electric and gas customers will benefit from lower costs due to investments in energy efficiency whether they participate or not. The Company determines these savings through the Bill Impact analysis that is detailed in Attachment 7. The savings that customers will realize from participating in the energy efficiency programs will offset the energy efficiency program charge. The Bill Impact analyses of the gas and electric programs show that the average participant will save more than

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<sup>11</sup> Actual lifetime varies by measure but is not included in Graph 3 for ease of illustration. When the Company reports out on savings to ISO-NE it takes into account impact of each measure's life.

<sup>12</sup> See Attachment 5, Table E-1 for list of funding sources and calculation of the charge.

<sup>13</sup> See Attachment 6, Table G-1 for list of funding sources and calculation of the charge.

they invest in the energy efficiency program charge. As detailed in Attachment 7, the average participant will see the following annual reductions in their combined electric and gas bills over the lifetime of the installed measures when compared to not having the 2019 energy efficiency program charge: Residential (0.89%, \$22.53); Low Income (2.40%, \$58.24); Small C&I (17.50%, \$1,439.17); Medium C&I (10.59%, \$2,532.16); Large C&I (3.05%, \$17,091.45). In addition to environmental and economic benefits not reflected on customers' bills, non-participants also benefit from energy efficiency due to reductions in capacity demand and avoided investment in infrastructure that is reflected in rates. When the impacts on both participants and non-participants are averaged, the analysis shows that, on average, the typical Rhode Island customer sees bill savings from energy efficiency. One of National Grid's objectives is to reach as many customers as possible to increase the participant and overall bill savings in Rhode Island.

## **2. Cost of Annual Plan Compared to the Cost of Energy Supply**

In accordance with the Standards approved by the PUC at the Open Meeting on September 6, 2018, the Company has made a good faith effort to assess the cost of energy supply and the cost of energy efficiency using all applicable costs enumerated in the Rhode Island Benefit Cost Framework (Framework) approved by the PUC in Docket No. 4600A and the Rhode Island Test as described in Attachment 4 of the Plan.

The RI Test is an appropriate starting point to determine which costs to include in this assessment. The RI Test, as detailed in Attachment 4, captures the aspects of the Framework that pertain to energy efficiency programs. The source for many of these values is the "Avoided Energy Supply Components in New England: 2018 Report" (2018 AESC Study) prepared by Synapse Energy Economics for the AESC 2018 Study Group, June 1, 2018. The benefits in the RI Test are associated with the cost savings to Rhode Island from investing in energy efficiency instead of investing in additional energy supply. For the purpose of the RI Test, these values are described as a benefit of energy efficiency in the form of avoided costs. It is reasonable to assume that these avoided cost values can also be applied as the costs of procuring additional energy supply for the purpose of this assessment. The RI Test also details what is considered a cost of energy efficiency. These are costs incurred by the utility to implement the Plan and the expense borne by the customer for its share of the energy efficiency measure cost.

The Company proposes to use the costs described in Table 2 to compare the cost of energy efficiency to the cost of energy supply. The categories listed in this table are all used in the RI Test, as proposed in Attachment 4 of the Plan. As directed by the Standards, the Company provides an explanation for why cost categories are either

appropriate or not appropriate for inclusion in the assessment of the cost of energy supply compared to the cost of energy efficiency.

**Table 2. List of the Costs of Energy Efficiency and Costs of Energy Supply**

<b>Cost of Energy Efficiency</b>		
<b>Cost</b>	<b>Included</b>	<b>Explanation</b>
Utility Costs	Yes	These costs are incurred to achieve implementation of energy efficiency measures and programs. Includes all costs in Tables E-2 and G-2.
Participant Costs	Yes	Customer contribution to the installation cost of the efficient measure. Customer costs included in Tables E-5 and G-5.
<b>Cost of Energy Supply</b>		
<b>Cost</b>	<b>Included</b>	<b>Explanation</b>
Electric Energy Costs	Yes	Represents the cost of purchasing electric energy supply.
Electric Generation Costs	Yes	Represents cost of generation capacity in ISO-NE.
Electric Transmission Capacity Costs	Yes	Represents Pool Transmission Facilities (PTF) cost.
Electric Distribution Capacity Costs	Yes	Represents the cost of distribution capacity related to increased load.
Natural Gas Costs	Yes	Represents the cost of purchasing natural gas supply.
Fuel Costs	Yes	Non-regulated delivered fuels are an energy supply cost to customers that utilize these fuels for heating. The fuel costs in this category are separate from those embedded in the cost of the electric market. While not a direct cost of electric energy supply, National Grid includes incentives for delivered fuel energy efficiency measures in its electric portfolio. Therefore, to achieve

		symmetry with costs associated with electric energy efficiency, delivered fuels costs should be included in this comparison.
Water and Sewer Costs	No	While avoided water and sewer costs are a benefit of installing certain energy efficiency measures, they are not a direct cost of energy supply.
Non-Energy Impact Costs	No*	*Unless listed below. While non-energy impacts are a benefit of installing certain energy efficiency measures, they are not a direct cost of energy supply.
a) Income Eligible Rate Discount	Yes	Costs associated with energy being sold at the low income rate.
b) Arrearages	Yes	Costs associated with arrearage carrying costs as a result of customers not being able to pay their energy bills.
Price Effects	Yes	Represents costs associated with the impact of demand reduction on ISO-NE energy and capacity markets.
Non-embedded Greenhouse Gas Reduction Costs	Yes	Represents the social cost of carbon. The social cost of carbon is the cost associated with meeting the Resilient Rhode Island Act. Carbon emissions come from the production of energy and should be considered a cost of supplying that energy.
Economic Development	No	While economic development is a benefit of investment in energy efficiency measures it is not a direct cost of energy supply.
Non-embedded NOx Costs	Yes	NOx emissions come from the production of energy and therefore the health impacts of NOx emissions should be considered part of the cost of supplying that energy.

Reliability Costs	Yes	Increased energy demand can lead to declining reserve margins and decrease reliability so should be associated with the cost of energy.
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For the assessment, the Company applies the above costs of supply to the lifetime energy, demand, and natural gas savings for each measure included in the Plan in present value terms. The costs of energy efficiency occur in the first year of the Plan and are therefore not discounted.

Applying this methodology, based on the Company’s calculation, the total cost of energy efficiency for the electric portfolio is \$126.3 million and the total cost of electric supply is \$415.2 million. This is a total savings of \$289.0 over the life of the installed energy efficiency measures from investing in energy efficiency instead of electric supply. The total cost of energy efficiency for the natural gas portfolio is \$42.6 million and the total cost of natural gas supply is \$67.7 million. This is a total savings of \$25.1 million over the life of the installed energy efficiency measures from investing in energy efficiency instead of natural gas supply.

### **3. Annual Plan Compared to Three-Year Plan for Year 2019**

The energy and cost savings for the 2019 program year are consistent with the objectives and requirements of Least Cost Procurement and meet the savings targets proposed in the Three-Year Plan in Docket 4684. The electric savings goal proposed for 2019 is 194,677 MWh, or 2.60% of the referenced 2015 load. The natural gas savings goal for 2018 is 432,708 MMBtu, or 1.05% of 2015 natural gas load. Proposing electric savings equal to the Three-Year Plan goal and a higher natural gas goal compared to the Three-Year Plan, demonstrates National Grid’s continued commitment to a data-driven process whereby goals will be set at the most aggressive and nation-leading levels that are achievable in practice, a principle described in the Three-Year Plan.

The following table compares the Annual Plan components to the Three-Year Plan.

**Table 3: Annual Plan compared to Three-Year Plan for Year 2019**

<b>Electric Programs</b>	<b>2019 3 Year Plan</b>	<b>2019 Annual Plan</b>	<b>% Change</b>
Annual Savings (MWh)	194,677	194,677	0%
Lifetime Savings (MWh)	1,904,592	1,694,194	-11%
Annual Summer Demand Savings (kW)	35,188	30,117	-14%
Total Benefits	\$ 438,942,301	\$ 505,561,654	15%
Total Spending	\$ 124,932,991	\$ 107,506,497	-14%
Benefit Cost Ratio (RI Test)	2.88	4.00	39%
Cost/Lifetime kWh	\$ 0.077	\$ 0.072	-7%
EE Program Charge per kWh	\$ 0.01390	\$ 0.01114	-20%

<b>Gas Programs</b>	<b>2019 3 Year Plan</b>	<b>2019 Annual Plan</b>	<b>% Change</b>
Annual Savings (MMBtu)	408,100	432,708	6%
Lifetime Savings (MMBtu)	4,709,195	4,426,644	-6%
Cost/Lifetime MMBtu	\$ 8.33	\$ 9.29	12%
Total Benefits	\$ 101,369,221	\$ 114,841,151	13%
Total Spending	\$ 30,776,029	\$ 31,592,799	3%
Benefit Cost Ratio (RI Test)	2.49	2.70	8%
C&I EE Program Charge per Dth	\$ 0.739	\$ 0.494	-33%
Residential EE Program Charge per Dth	\$ 0.903	\$ 0.728	-19%

As noted in previous PUC dockets, Annual Plans may contain budgets and energy efficiency program charges that vary from those contained in the Three-Year Plan.<sup>14</sup> The Three-Year Plan creates savings targets and illustrative budgets to guide the Company in the development and long-term strategy of its Annual Plans over the upcoming three-year period. After the Company files the Three-Year Plan, there are numerous factors that may lead to changes in funding needs and savings availability. These factors include: updates to the avoided cost study, electric and gas sales, available fund balance, ISO-NE's FCM auction proceeds, evaluation results, market conditions, customer preferences, and changes in legislation.

For the Annual Plan, the electric and natural gas energy efficiency portfolio savings, benefits, budgets, and energy efficiency program charges differ compared to the

<sup>14</sup> PUC Order No. 21781 approving National Grid's September 2, 2014 Energy Efficiency and System Reliability Procurement Plan for three-year period 2015-2017. Written Order issued 12/19/14.

illustration presented in the Three-Year Plan. There are several factors contributing to this difference.

A. Evaluation Results

Evaluation results impact the portion of gross savings that the Company can claim as attributable to its energy efficiency programs.

The evaluation of several programs (i.e. C&I Upstream HVAC and C&I Upstream Lighting impact and net-to-gross studies, Residential Lighting and Products net-to-gross studies, and Income Eligible Services Single Family Program Impact Evaluation) showed that programs generated lower electric savings for participants than initially anticipated. The application of these evaluation findings results in lowered annual and lifetime electric savings that can be attributed to the energy efficiency programs in the Annual Plan compared to the Three-Year Plan. As a result of these studies, the Company estimates it will claim 38,061 annual MWh less in 2019 than it would have in 2018 and 264,760 lifetime MWh less in 2019 than it would have in 2018.

For gas, C&I Custom impact studies and the C&I Free Ridership and Spillover Study showed that programs generated higher gas savings for participants than originally estimated. The application of these evaluation findings resulted in the Company setting higher annual and lifetime gas savings goals in the Annual Plan than in the Three-Year Plan.

B. Future Innovation

The Company included an adder of approximately 25,500 Annual MWh for future innovation and additional program enhancements in the Three-Year Plan to demonstrate its commitment to achieving the approved 2019 electric targets in Docket 4684. The electric savings associated with future innovation was equal to the difference between what the Company thought was achievable in 2019 at the time of the Three-Year Plan filing and the approved 2019 electric targets.

Since the Company filed the Three-Year Plan with the PUC, there have been developments that have led to the Company being able to close the gap between its original savings projections and the approved 2019 electric targets.

Since the Three-Year Plan was filed, evaluations resulted in some programs claiming higher electric savings for participants than originally estimated.<sup>15</sup> The application of these evaluation findings contributes to the Company claiming more savings to help meet the 25,500 MWh adder in 2019. In contrast, since the Three-Year Plan filing, other recent evaluation studies indicate that the net-to-gross ratio for EnergyStar Lighting is lower in 2019 than estimated previously and that makes meeting the savings targets for 2019 that much more difficult.

In addition, the 2018 budget cap requirement set forth in House Bill 5175 Sub A contributed to creating a pent up demand in the residential lighting sector in 2018. This in turn creates an opportunity in 2019 to serve the additional customer demand and achieve more savings. The EnergyStar Lighting program plans to incent over 1.6 million lighting products by year-end 2018, and based on unserved customer demand, will incent over 3.0 million in 2019, an 88% increase. Even with a lower net-to-gross ratio than predicted, an increase in the volume of lighting products will lead to higher projected savings in 2019 compared to the Three Year Plan (see Attachment 1, pg.23).

In other areas the Company has challenged and stretched itself by adding new measures, broadening existing programs to serve more customers, and increasing volumes where feasible. The 25,500 MWh gap has not been met by any specific technological innovation but instead this has been addressed by expanding program access, additional demand for lighting, and offering new measures and services to customers when data pointed to tangible savings opportunities.

For example, additional contributions to the savings gap include the new 4th Tier in the Residential New Construction program for High Efficiency Homes (see Attachment 1, pg. 21) and an increase in planned quantities for power strips in 2019 due to the strong success of this offering in 2018 (see Attachment 1, pg. 28).

The Company also identified enhancements to the C&I Sector. The Company updated the requirements for who can participate in the small business program from under 200 kW to under 1,000,000 MWh, which will expand the number of eligible customers (see Attachment 2, pg. 80). For mid-size customers, the Company is expanding the industrial initiative to serve 200-400 kW customers

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<sup>15</sup> The evaluations include C&I Custom Realization Rate studies, C&I Free Ridership and Spillover Study, and the C&I Upstream Lighting Study. See pg. 10 of the Main Text of the Annual Energy Efficiency Plan for 2018 for reference.

(see Attachment 2, pg. 16). The Company also expects additional savings to come from increased awareness surrounding the Commercial Property Assessed Clean Energy (C-PACE) finance mechanism (see Attachment 2, pg. 28). Lastly, additional savings will be achieved through the new Strategic Energy Management (SEM) initiative for business energy management (see Attachment 2, pg. 59).

Table 4 below broadly identifies the areas which contribute to meeting the 25,500 adder in the 2019 Annual Plan.

**Table 4: Future Innovation**

<b>Three-Year Plan (2019)</b>	<b>Electric Savings (MWh)</b>
Future Innovation	25,500
<b>Annual Plan 2019</b>	
	<b>Electric Savings (MWh)</b>
Increasing planned quantities for EnergyStar Lighting	15,680
Increasing planned quantities of power strips	1,100
Adding a 4 <sup>th</sup> tier for High Efficiency Homes	120
Expanding the C&I Small Business program to serve customers under 1,000,000 kWh	4,500
Expanding the Industrial Initiative to serve 200-400kW customers	1,500
Increasing marketing surrounding the C-PACE initiative	1,000
Offering a new Strategic Energy Management initiative	1,600
<b>Total</b>	<b>25,500</b>

C. Updated Sales and Fund Balance Projections

The energy efficiency program charge for electric and gas customers varies from the Three-Year Plan to the Annual Plan for several reasons, including updates to the sales projections, fund balance projections, and program budgets, which are all factors in the calculation of the charge. These values could change further when the Company files an updated fund balance on December 3, 2018 as proposed in Section 6(a).

The natural gas energy efficiency program charge decreased from \$0.903 per Dth in the Three-Year Plan to \$0.728 per Dth in the Annual Plan for residential customers and from \$0.739 per Dth to \$0.494 per Dth for C&I customers. The

reduction in these charges is primarily driven by a positive projected 2018 year-end fund balance of \$7.4 million.

Although the electric sector sales forecast decreased since the Three-Year Plan was filed, the lower electric budget, higher revenue from the ISO-NE Forward Capacity Market, and a positive projected year-end 2018 fund balance of \$3.9 million have reduced the electric energy efficiency program charge from \$0.01390 per kWh in the Three-Year Plan to \$0.01114 per kWh in the Annual Plan.

#### D. Lifetime Savings and Benefits

Electric lifetime savings are lower than in the Three-Year Plan due to the reduction of the portion of gross savings attributed to the programs as detailed in section A above. In addition, more of the annual electric savings are coming from the residential sector, specifically EnergyStar lighting, than was anticipated at the time of the Three-Year Plan filing. This shift was necessary to meet the 2019 savings goals. Residential measures on average have fewer lifetime savings than C&I measures and lighting lifetimes savings across all residential programs are impacted due to the federal Energy Independence and Security Act (EISA) lighting standards. Gas lifetime savings are lower due to changes in measure mix, principally driven by an increase in savings coming from residential measures compared to C&I measures in order to meet the annual savings targets. Residential measures on average have fewer lifetime savings than C&I measures.

Total benefits increased in the electric and gas sectors due to the application of updated avoided cost values from the "Avoided Energy Supply Components in New England: 2018 Report" (2018 AESC Study). The 2018 AESC Study found higher avoided costs for fuel oil and values for electric capacity demand reduction induced price effect (DRIPE) and oil DRIPE, which were estimated to be non-existent or were not calculated in AESC 2015 Study shown in Table 5 below shown in 2018 dollars.

<b>Table 5. 2018 AESC Study DRIPE Values Relative to 2015 AESC Study<sup>16</sup></b>			
	AESC 2015 cents/kWh	AESC 2018 cents/kWh	% Difference
Capacity DRIPE	0.00	0.91	-
Energy DRIPE	1.24	1.91	54%
<b>Subtotal: DRIPE</b>	<b>1.24</b>	<b>2.81</b>	<b>128%</b>

The study also quantified new benefits for non-embedded NOx reduction benefits, value of improved reliability, and avoided pool transmission facilities (PTF) costs. Due to all these factors the avoided costs benefits have increased in 2019 compared to 2018.

#### **4. Strategies to Achieve Goals**

The primary goal of the Annual Plan is to create cost-effective energy savings for Rhode Island electric and gas customers through energy efficiency. This Plan has sought to balance pursuing energy and financial savings from current technologies and programs while also seeking to identify new technologies, finance channels, and programs to continue delivering savings to Rhode Island customers for years to come. The Plan achieves the goals laid out above by implementing the following key priorities, introduced in Docket 4684:

- 1. Customers** - Deliver comprehensive services that encompass all market segments and customers. Such services will enable customers to control their energy use, manage their peak energy use, reduce their bills, and help support their financial well-being.
- 2. Least Cost** - Deliver energy efficiency services as cost-effectively as possible through optimizing finance and promoting upstream initiatives. Continuing to deliver cost-effective energy savings under Least-Cost Procurement will create cost savings to all customers, while creating economic benefits that create and maintain local jobs and businesses.
- 3. Environment** - Provide solutions that minimize greenhouse gas emissions and contribute to Rhode Island’s clean energy policy goals, including the Resilient Rhode Island Act.

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<sup>16</sup> Values from 2018 Avoided Cost Study ES-Table 1.

- 4. Future** - Innovate to capture savings from new technologies and strategies to position energy efficiency programs for the future including the integration of energy efficiency with demand response, renewable energy, and smart grid technologies. This includes incorporating outcomes from the Rhode Island Power Sector Transformation Initiative and Docket 4600.

The application of these priorities is more fully described in the detailed program and marketing descriptions in Attachments 1 and 2.

## **5. Delivering 2019 Goals**

National Grid will build on its almost thirty years of experience to deliver the energy and cost savings goals in this Plan.<sup>17</sup>

- i. Innovating for a Sustainable and Efficient Energy Future - A Rhode Island Customer Listening Forum**

On August 1, 2018, National Grid convened a customer outreach event “Innovating for a Sustainable and Efficient Energy Future, A Customer Listening Forum” in Providence, Rhode Island that was independently facilitated by the Lighthouse Consulting Group. The goal of the workshop was to create an environment to solicit feedback from Rhode Island electric and natural gas customers and stakeholders regarding energy efficiency, electric vehicles, and renewable energy programs. Several themes for how National Grid can improve its services to its customers were identified from the feedback of Forum participants. The Company is working to incorporate this feedback into its programs. A summary report prepared by the Lighthouse Consulting Group is included in Appendix 9 of the Plan.

- ii. Residential Programs**

In 2019, the Parties agree to continue the residential programs offered in 2018. The Parties also agree to offer new programs and demonstrate the development of new technologies for potential inclusion in programs in future years. The programs are summarized below and described in further detail in Attachment 1. The description of

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<sup>17</sup> Throughout the program year, the Parties may consider additional enhancements beyond those identified in this Plan as more information becomes available to support an informed review of those potential changes. As part of this process of identifying additional enhancements, in addition to continuing to meet with the Collaborative, the Company will continue its work sessions with the EERMC’s consultants.

each program includes proposed changes from 2018 that are intended to help meet the savings targets for 2019.

<b>Table 6. Residential Energy Efficiency Programs</b>	
<p><b>EnergyWise Program</b> (Funded by Electric and Gas)</p>	<p>EnergyWise offers single-family customers home energy assessments and information regarding their actual energy usage. Participants in this program receive recommendations and technical assistance as well as financial incentives to replace inefficient lighting fixtures, appliances, thermostats, and insulation levels with models that are more energy efficient. The program addresses base load electric use and heating and cooling energy loads in all residential buildings. The program recommends efficient products that are delivered through National Grid’s various programs as well as solar opportunities provided through statewide solar initiatives. The program will continue to deliver finance opportunities to customers such as the Heat Loan and the Rhode Island Infrastructure Bank’s residential financing opportunities, when available. Starting in 2019, EnergyWise will implement an online home energy assessment to educate customers on where household opportunities for greater comfort and energy savings exist. In addition, a 100% landlord incentive will be offered to address the split incentive barrier.</p>
<p><b>Multifamily Programs</b> Income Eligible, Residential and Commercial sectors (Funded by Electric and Gas)</p>	<p>Comprehensive energy services for multifamily customers include energy assessments, incentives for heating and domestic hot water systems, cooling equipment, lighting, and appliances. Coordinated services will be offered for all types of multifamily properties. An approach tailored for multifamily properties designates a primary point-of-contact to manage and coordinate services offered through the Company’s existing portfolio, including EnergyWise, C&amp;I Retrofit, Residential New Construction, Income Eligible, and the ENERGY STAR® HVAC programs. Beginning in 2019, the Company’s lead vendor for the multifamily retrofit program will begin serving individual condo-unit owners and utilize the time on-site as an opportunity for face-to-face recruitment of the other units at the facility. Additionally, increased coordination with Rhode Island’s Community Development Corporations (CDC) and alignment with 15 year refinance cycles will be a focus for the program in 2019.</p>
<p><b>Income Eligible Single Family</b> (Funded by Electric and Gas)</p>	<p>Income Eligible Single (IES) Family Services are delivered by local Community Action Program (CAP) agencies with oversight provided by a Lead Industry Partner. Three levels of home energy assessments are offered: (1) lighting and appliance, (2)</p>

	<p>heating and weatherization, and (3) comprehensive. Customers who qualify for LIHEAP are eligible to receive all services and equipment upgrades at no cost. In 2019, National Grid will begin to offer cold-climate mini-split heat pumps through the IES Program. This new offering will provide clarity on up-front “installed cost” as well as customer satisfaction and ease of use.</p>
<p><b>Residential New Construction</b> (Funded by Electric and Gas)</p>	<p>The Residential New Construction (RNC) program promotes the construction of high-performing energy efficient single family, multifamily, and low income homes, as well as the education of builders, tradesmen, designers, and code officials. In 2019, the RNC program will launch a new energy efficiency incentive called the “Path to Zero Energy Ready”, which will include additional incentives for areas including: project certification, RI Residential Stretch Code, PV and EV ready, and fossil fuel free.</p>
<p><b>Residential Home Energy Report Program</b> (Funded by Electric and Gas)</p>	<p>The Home Energy Reports (HER) program is the Company’s key program to achieve energy savings through changes in customer behavior by presenting personalized energy usage data and encouraging desired behaviors to reduce energy consumption. The Company will continue to deliver Home Energy Reports that offer enhanced feedback tools to inspire customers to take actions that reduce their energy consumption and also increase their participation in other energy efficiency programs. In 2019, emails the Company will send to customers will begin to include annual or bill-level disaggregation pie charts of customers’ individual energy usage, which will help customers identify drivers of high bills. The Company will also continue sending High Bill Alerts to customers who are trending to exceed the prior month’s usage by a predetermined amount.</p>
<p><b>ENERGY STAR® Lighting</b> (Funded by Electric Only)</p>	<p>This initiative is implemented jointly with other regional utilities. It provides discounts to customers for the purchase of ENERGY STAR® lighting through instant rebates, special promotions at retail stores, pop-up retailer, and social marketing campaigns. In 2019, the EnergyStar Lighting program will continue to drive market transformation and reach new retailers that have not yet participated in the program.</p>
<p><b>Residential Consumer Products</b> (Funded by Electric Only)</p>	<p>This program is run in collaboration with other regional utilities to promote the purchase of high efficiency household appliances, including kitchen appliances and electronics. These appliances carry an ENERGY STAR® label. The program also offers refrigerator recycling, which promotes more efficient refrigerators while removing non-efficient units from the market. In 2019, the Residential Consumer Products program will add an additional customer offering of low-e storm windows to provide an additional 50% energy savings over traditional windows.</p>

<p><b>ENERGY STAR® HVAC Program</b> (Funded by Electric and Gas)</p>	<p>This program promotes the installation of high efficiency central air conditioners for electric customers and new energy efficient natural gas related equipment including boilers, furnaces, water heating equipment, thermostats, boiler reset controls, and furnaces equipped with high efficiency fans. The program provides training of contractors to increase accurate installation practices, testing of the high efficiency systems, tiered rebates for new ENERGY STAR® systems, and incentives for checking new and existing systems. The program also includes oil and propane heating equipment rebates. In 2019, the HVAC program will include several new offerings including: cold climate mini-split heat pumps, replacement of central air conditioners, and the reintroduction of indirect hot water heaters.</p>
<p><b>Community Based Initiatives (C&amp;I and Residential, Funded by Electric and Gas)</b></p>	<p>The initiative is designed to leverage trusted community partnerships and develop targeted marketing strategies in order to promote all energy efficiency programs, residential and commercial, in specific targeted communities or businesses. In 2019 the Company will focus on promoting expanded technology offerings within communities such as mini-split heat pumps, Wi-Fi Thermostats, and demand response offerings.</p>
<p><b>Residential ConnectedSolutions (Demand Response)</b> (Funded by Electric)</p>	<p>Residential ConnectedSolutions will move from a pilot in 2017 and 2018 to a program in 2019. The focus of the program will continue to be reducing peak load through the use of wi-fi thermostats and other eligible technologies which may include batteries, lighting, water heaters, pool pumps, electric vehicles, and other devices.</p>
<p><b>Residential Pilots</b> (Funded by Electric and Gas)</p>	<p>In 2019, the Company will continue the Zero Energy Home pilot to help accelerate the zero energy home market in Rhode Island. In 2019 the pilot will focus on four main areas: Education and Awareness, Workforce Development, Project Incentives, and Marketing.</p>
<p><b>Education Programs</b> (Funded by Electric Only)</p>	<p>The Company promotes energy education to private and public schools and youth groups through the National Energy Education Development (N.E.E.D) Program. This program provides curriculum materials and training to students and teachers in grades K-12.</p>

iii. **Residential Income Eligible Programs**

The Company and the Parties want customers who have a high energy burden and/or difficulty paying their electric bills to participate in, and benefit from, the Company's energy efficiency programs. Therefore, this segment of the customer base is designated as a unique sector, and funding for this sector will be subsidized by both non-low-income residential customers and commercial and industrial customers using 14% of

total implementation funding for the electric programs, and 26% for natural gas programs.

In addition to the Income Eligible Single Family and Multifamily programs, the Residential New Construction Program also works with housing authorities and developers to build energy-efficient multifamily properties. Additional details about the services offered to economically disadvantaged customers are described in the residential programs in Attachment 1.

iv. **Commercial and Industrial Programs**

In 2019, the Parties agree to continue the commercial and industrial programs offered in 2018 and assess new technologies for potential inclusion in programs in future years. These programs are summarized in Table 4 below.

<b>Table 7. Commercial and Industrial Energy Efficiency Programs</b>	
<b>Large Commercial New Construction and Building Energy Code and Appliance Standards</b> (Funded by Electric and Gas)	<p>This program promotes energy efficient design and construction practices in new and renovated commercial, industrial, and institutional buildings. The program promotes and incentivizes the installation of high efficiency equipment in existing facilities during building remodeling and at the time of equipment failure and replacement. Large Commercial New Construction aims to prevent or mitigate lost opportunities because a customer who does not install energy efficient equipment at the time of new construction or equipment replacement will likely never make the investment for that equipment or will make the investment at a much greater cost at a later time. The program also promotes energy efficient building design for new construction projects and for major renovations. The program provides both technical and design assistance to help customers identify efficiency opportunities in their new building designs and to help them refine their designs to pursue these opportunities. Incentives are also offered to owner’s design teams for their time and effort to meet program requirements. Operations Verification or quality assurance is also offered to ensure that the equipment and systems operate as intended.</p> <p>The program also promotes compliance with the building energy code and increased use of the Stretch Code to support the State’s goals and objectives. In addition, it provides technical assistance in advancing the development and adoption of minimum efficiency standards for appliances and equipment. Finally, the program supports the States Zero Energy Building (ZEB) goals through engagement and development of ZEB programs in the future.</p>

<p><b>Large Commercial Retrofit</b> (Funded by Electric and Gas)</p>	<p>Large Commercial Retrofit is a comprehensive retrofit program designed to promote the installation of energy efficient equipment such as lighting, motors, and heating, ventilation and air conditioning (HVAC) systems, thermal envelope measures, and custom measures in existing buildings. All commercial, industrial, and institutional customers are eligible to participate. The Company offers technical assistance to customers to help them identify cost-effective efficiency opportunities, and pays incentives to assist in defraying part of the material and labor costs associated with the energy efficient measures. The Company also offers education and training, such as the building operator certification (BOC) training, to support the implementation and adoption of energy efficiency.</p>
<p><b>Small Business Direct Install</b> (Funded by Electric and Gas)</p>	<p>The Small Business Direct Install Program provides direct installation of energy efficient lighting, non-lighting retrofit measures, and gas efficiency measures. Electric customers who consume less than 1,000,000 kWh per year are eligible to participate. There is no eligibility criterion for gas consumption. The program’s lighting and non-refrigeration measures are delivered through one labor and one product vendor selected through a competitive bidding process. The Customer share of the total project cost of a retrofit is discounted 15% for a lump sum payment or the customer has the option of spreading the payments over a two-year period, interest free.</p>
<p><b>Commercial Pilots</b> (Funded by Electric and Gas)</p>	<p>In 2019, the Company will continue the Commercial and Industrial Demand Response gas pilot to address grid constraints and help provide reliable service to our customers. In addition, the Company will continue the Pathway to Zero Energy Buildings pilot in 2019 and focus on such areas as: training and education for the building industry, benchmarking and building energy labeling effort. The Company will also look to partner with building owners and developers on potential Zero Energy Building projects in 2019.</p>
<p><b>C&amp;I Connected Solutions (Demand Response)</b> (Funded by Electric)</p>	<p>C&amp;I Connected Solutions will move from a pilot in 2017 and 2018 to a program in 2019. The program is technology agnostic and provides an incentive to C&amp;I customers for verifiable shedding of load in response to a signal or communication from the Company. In 2019 the program has a goal of enrolling 34 MW.</p>

Attachment 2 includes descriptions of these programs. Included in the description of each program are proposed changes from 2018 that are intended to help meet the savings targets for 2019.

v. **Participation**

Each program described in this Plan seeks to drive customer participation to deliver the benefits of energy efficiency to customers throughout Rhode Island. The Plan is designed to provide equitable access to savings and programs across sectors and market segments. For 2019, the Company will continue to plan and report participation in ‘net’ terms, which takes into account free-ridership and spillover, which are commonly referred to as net-to-gross factors. This method of accounting for participants aligns participation numbers with energy savings numbers, which are already recorded in net terms. This approach provides a more accurate connection between energy savings and the number of customers who benefit from efficiency programs. Planned participation estimates are included in Attachment 5, Table E-7 and Attachment 6, Table G-7.

The following table describes the definitions for how National Grid projects, tracks, and reports participation in the efficiency programs.

**Table 8: Participation Definitions**

Fuel	Sector	Program	Participation Unit
Gas	Commercial & Industrial	Large Commercial New Construction	Unique Billing Account
		Large Commercial Retrofit	Unique Billing Account
		Small Business Direct Install	Unique Billing Account
		C&I Multifamily	Housing Units
	Income Eligible Residential	Single Family – Income Eligible Services	Unique Billing Account
		Income Eligible Multifamily	Housing Units
	Residential	Energy Star® HVAC	Unique Billing Account
		EnergyWise	Unique Billing Account
		EnergyWise Multifamily	Housing Units
		Home Energy Reports	Adjusted Unique Billing Account
Residential New Construction		Housing Units	
Electric	Commercial & Industrial	Large Commercial New Construction	Unique Billing Account
		Large Commercial Retrofit	Unique Billing Account + Unique Customer names

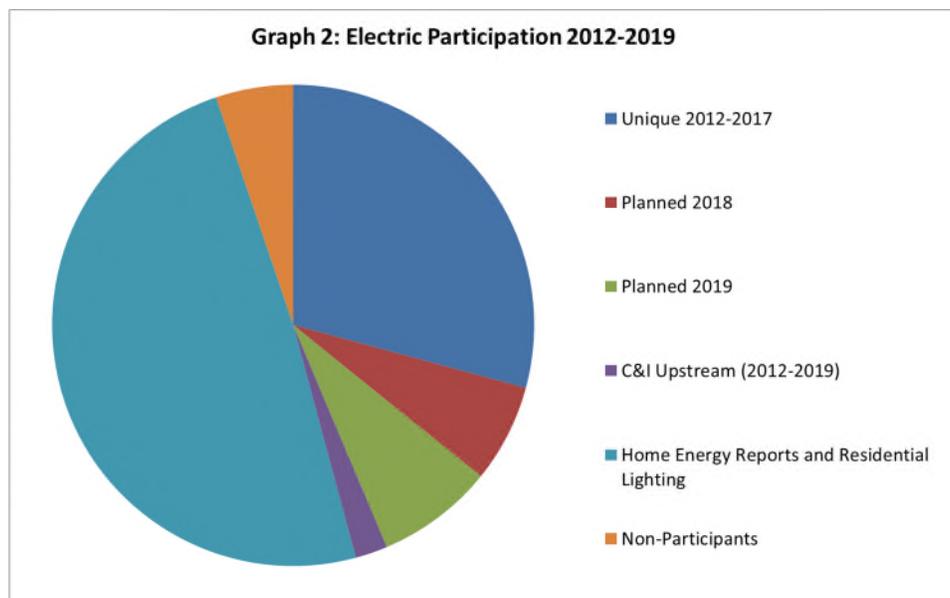
Fuel	Sector	Program	Participation Unit
			from Upstream Lighting
		Small Business Direct Install	Unique Billing Account
	Income Eligible Residential	Single Family – Income Eligible Services	Unique Billing Account
		Income Eligible Multifamily	Housing Units
	Residential	Energy Star® HVAC	Unique Billing Account
		EnergyWise	Unique Billing Account
		EnergyWise Multifamily	Housing Units
		Home Energy Reports	Adjusted Unique Billing Account
		Residential New Construction	Housing Units
		ENERGY STAR® Lighting	Estimated Housing Units
		ENERGY STAR® Products	Number of Rebates

The Company will estimate the number of unique participants for each program. For some programs such as ENERGY STAR® Lighting and ENERGY STAR® HVAC, one measure does not necessarily equal one participant. This is because a customer can purchase more than one measure. Therefore, the Company also considers the previous year’s unique accounts to savings ratio in order to estimate the planned unique participants in 2019. This method allows for a better estimation of unique participants but can make it more difficult to compare planned numbers across years.

In 2019, the Company will continue to drive participation through two main pathways – targeted programs and broad based programs. Targeted programs include the Company’s retrofit, new construction, product rebate, and direct install initiatives. These programs serve to drive deeper savings to targeted customer segments and offer a wide array of energy efficiency measures. The Company also reaches broad participation by promoting products upstream and Home Energy Reports. These broader based programs provide value by reaching a wide and diverse set of customers, helping to provide more customers with access to energy savings, as well as acting as a gateway to drive participation in other National Grid energy efficiency programs.

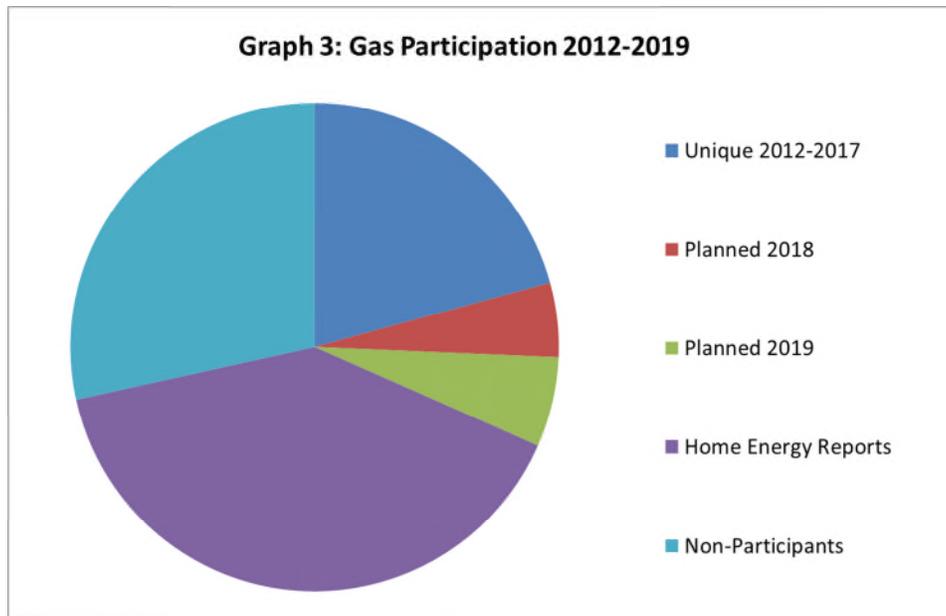
An analysis of unique participation since 2012 is detailed in Graphs 2 and 3 below. These graphs highlight that the Company has made steady progress with reaching new participants each year. From 2012-2017 the Company served approximately 29% of its

electric customers and 21% of its gas customers from its targeted programs at least once (these graphs have removed duplicate participation across programs and across years from 2012-2017). When Home Energy Reports and C&I upstream lighting participation are added to these counts, a total of 80% of electric customers and 61% of gas customers participated over this period.<sup>18</sup> Home Energy Reports are included here because the program offers significant savings and benefits to customers as well as drives customers to participate in other energy efficiency programs.<sup>19</sup> Planned 2018 and 2019 participants are also included in these graphs for illustrative purposes. Importantly, planned participants in 2018 and 2019 may have participated in prior years. In the 2018 Year-End report, the Company will remove any participation overlap to report unique 2018 participants.



<sup>18</sup> It is not possible to track residential lighting participation by customer account but it is assumed that there is overlap between Home Energy Report participants and residential lighting participants. Therefore, for the purpose of estimating unique participation for illustration in these graphs, only include Home Energy Report participation is included in the 80%.

<sup>19</sup> The full participation analysis can be found in Docket 4654 - National Grid Electric and Gas Energy Efficiency Programs 2017 Year-End Report, filed May 1, 2018.



In 2019, the Company will continue its efforts to reach customers that have never participated in its energy efficiency programs, and customers that have previously participated that can still benefit from the installation of additional energy efficiency measures. Many of the unique participants captured above are still eligible for additional programs, for example a participant in the EnergyWise Single Family program may participate in the HVAC program. In 2019, the Company will enhance the Customer Call Service experience to promote energy efficiency programs to customers.

The Company will continue to deliver innovative strategies to increase customer participation and reach customer segments that are historically underrepresented. The Plan highlights some changes to program delivery to remove barriers that preclude customers from participating in the energy efficiency programs. Each program section in Attachments 1 and 2 of the Plan provides details on strategies to reach customers. The Company will continue to track participation trends and will again provide a detailed analysis in its 2018 Year-End Report showing additive and cumulative portfolio participation.

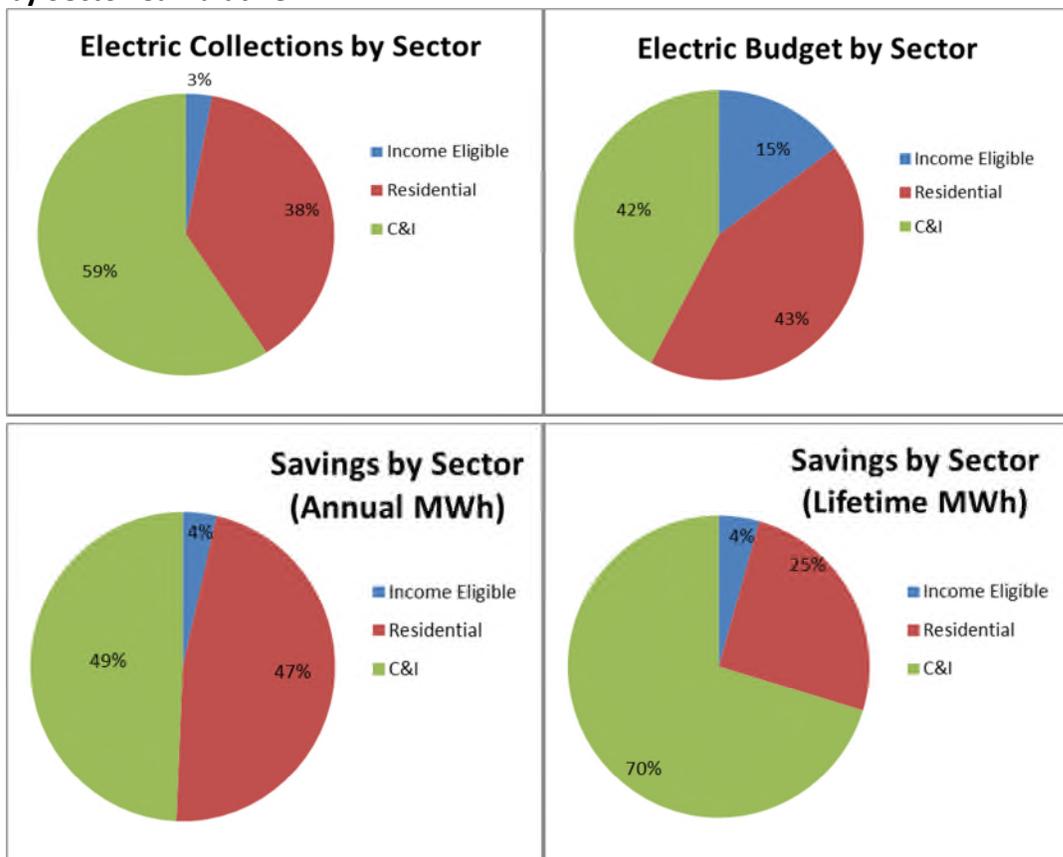
vi. **Equity**

The Annual Plan is designed to reach as many customers as possible and to provide energy efficiency services to all customer classes. Since each customer pays into the energy efficiency programs, the Company designs programs to allow for all customers to participate and receive benefits. All customers, regardless of participation, benefit from energy efficiency because of lower future costs of energy, as demonstrated through the bill impact analysis as described in detail in Attachment 7.

The pie charts below are a graphical representation of Attachments 5 and 6, Tables E-1 and G-1. The Company first provided these charts at the 2017 Annual Plan hearing and has since included them in Annual Plans to better display the difference between customer class rates, budgets, and savings.

As shown in Graph 4, there is approximate parity between the collections by a customer class and its resulting budget and savings in the electric portfolio. The only exception is the income-eligible sector where there is an established agreement amongst the Parties that the residential and C&I customer classes use part of its collections to help cover the income-eligible sector funding needs. The income-eligible budget is higher compared to its savings due to several factors: incentives are 100% of the cost, the programs are more expensive because they are delivered in-home (compared to at retail sites or via rebates) which requires more labor and management, and the programs have fewer economies of scale (compared to C&I).

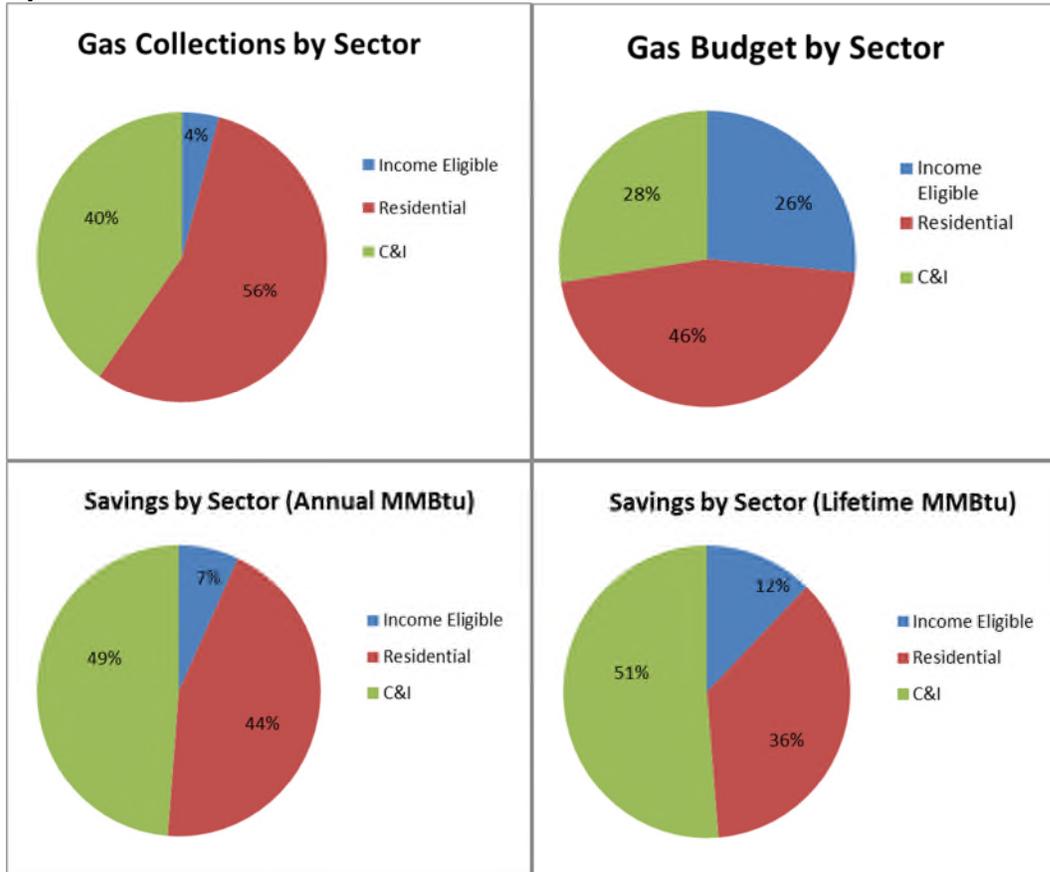
**Graph 4: Graphical representation of Attachment 5 Table E-1 and total Electric Savings by Sector Cumulative**



For the gas portfolio, there is also parity between the collections by a customer class and the resulting savings. There is less parity between budgets and savings. This is due to several factors. First, the energy efficiency program charge varies by customer

segment, which changes collections. Second, C&I projects tend to create more savings per dollar. This is due to larger economies of scale, larger projects, different delivery channels that require less labor or management and are more cost-effective, evaluation factors such as free-ridership and spillover, and different customer opportunities.

**Graph 5: Graphical representation of Attachment 6 Table G-1 and total Electric Savings by Sector Cumulative**



**vii. Creating and Sustaining Energy Jobs**

One of the most evident economic benefits that energy efficiency creates in Rhode Island is the number of jobs created or sustained in the energy sector. Each year, National Grid reports on the number of jobs supported by its energy efficiency programs in Rhode Island. The report is included in National Grid’s Year-End Report, which is submitted to the PUC, and available on the Council’s website. The 2017 report found that the energy efficiency programs supported 726 full-time equivalent (FTE) workers across 917 different firms, 79% of which were located in Rhode Island.

National Grid has conducted a number of workforce development activities throughout the state that it will continue in 2019. To help our contractors develop the skills needed to effectively deliver our programs, the Company conducts code training for residential

new construction; in-field technical training for residential new construction; weatherization training for our Community Action Partners and their weatherization staff; and technical training for HVAC contractors. Additionally, the Company offers professional certifications for facility managers through a Building Operator Certification course, which teaches energy efficient techniques for optimizing energy management. Additional details of these offerings are included in Attachments 1 and 2.

viii. **System Reliability Procurement**

In a contemporaneous filing, the Company is submitting its System Reliability Procurement (SRP) Annual Report for 2019 for the PUC's review and consideration. The SRP Annual Report describes the strategies, goals, and funding request for SRP in 2019. The SRP Factor is included as part of the total energy efficiency program charge shown on line 14 of Table E-1 in Attachment 5. For 2019, the charge is negative \$0.00001 due to a positive SRP fund balance.

The Company recognizes the need for coordination between the SRP Report and the Annual Plan and will continue efforts to coordinate internally and externally during the year. Specifically, the Company will coordinate energy efficiency and demand response marketing with the SRP Marketing and Engagement Plan to ensure that customer messaging is harmonized and leveraged across the multiple platforms. In addition, the Company will apply any lessons learned from the proposed SRP Customer-Facing Program Enhancement Study to improve future energy efficiency and demand response offerings.

ix. **Pilots**

In accordance with Docket No. 4600-A PUC Guidance Document, the Plan includes a description of pilots in Attachment 9. The Company is proposing the following new definitions to provide clarity around the terms pilot, demonstration, and assessment used in this Plan.

Pilot: As defined in the Docket 4600-A Guidance Document, "A pilot is a small scale, targeted program that is limited in scope, time, and spending and is designed to test the feasibility of a future program or rate design. It is incumbent upon the proponent of a pilot to define these limits in a proposal for PUC review. Ideally, a pilot can provide net benefits and achieve goals, but the primary design and value of a pilot is to test rather than to achieve."<sup>20</sup>

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<sup>20</sup> Docket No. 4600-A PUC Guidance Document, October 27, 2017. Section V. Pilots.

For actions in the Plan that do not fall under the Docket 4600-A definition of pilots, the Company proposes the following definitions for demonstrations and assessments.

- **Demonstration:** A demonstration tests a new technology or solution that is delivered as part of an existing program where a technical assessment has estimated the savings and determined that the measure is likely to be cost effective. An example of a demonstration was beneficial electrification of heat in the HVAC program in 2018.
- **Assessment:** An assessment tests a measure, a bundle of measures, or a solution, that can be delivered as part of existing program where the savings are not known but will be explored as part of the assessment. An example of an assessment is automated window shades in the C&I retrofit program.

The Company expects that demonstrations and assessments will contribute savings to the programs in which they are offered. These categories are therefore included as part of a program's total planned costs, benefits, and savings. These categories are included in the overall cost-benefit ratio of the Plan and they are included in the calculation of the shareholder incentive.

Names for pilots and demonstrations may differ from prior Annual Plans in order to adhere to the new definitions to provide more clarity around different actions and their anticipated outcomes.

## **6. Funding and Budgets**

Funding, budgets, goals, and cost-effectiveness information is provided in Attachment 5 for the proposed electric energy efficiency programs and in Attachment 6 for the proposed natural gas energy efficiency programs.

### **i. Annual Plan Funding Sources**

The sources of funding and the amounts of the funding proposed for the cost-effective 2019 EE Programs are shown in Table E-1 for electric programs and Table G-1 for natural gas programs.

The sources of funding for the 2019 electric programs are shown in Attachment 5, Table E-1. To collect these funding sources for the 2019 cost-effective programs, the Company proposes: (1) one line on the customers' bill labeled "Energy Efficiency Charge" at \$0.01114 per kWh, as calculated in Attachment 5, Table E-1 (composed of the existing energy efficiency program charge of \$0.00972 per kWh plus a fully reconciling funding mechanism charge of \$0.00142 per kWh in accordance with the requirements of R.I.

Gen. Laws § 39-1-27.7); (2) projected Large C&I commitments from 2018, if any; (3) projected carryover of the year-end 2018 fund balance, as applicable, including interest at the rate in effect for customer deposits; (4) forecast revenue generated by ISO-NE's Forward Capacity Market (FCM); and (5) anticipated revenues generated through RGGI permit auctions. Funding sources do not include revolving loan funds.

The sources of funding for the 2019 natural gas programs are shown in Attachment 6, Table G-1. The Company proposes that the 2019 budget should be funded from the following sources: (1) one line on the customers' bill labeled "Energy Efficiency Charge" at \$0.728 per dekatherm for residential customers and \$0.494 per dekatherm for non-residential customers as calculated in Attachment 6, Table G-1 (composed of the existing energy efficiency program charge of \$0.869 per dekatherm minus a fully reconciling funding mechanism of \$0.141 per dekatherm for residential customers and the existing energy efficiency program charge of \$0.671 per dekatherm minus a fully reconciling funding mechanism of \$0.177 for non-residential customers in accordance with the requirements of R.I. Gen. Laws § 39-1-27.7); (2) projected carryovers or under-recoveries of the year-end 2018 fund balance, including interest at the rate in effect for customer deposits; and (3) low income weatherization funding in base rates. Funding sources do not include revolving loan funds.

The 2019 budgets for cost-effective electric and natural gas efficiency investments are dependent on a number of projections that inform the amount of funding, including projections of electricity and natural gas sales, year-end 2018 large C&I program commitments, capacity payments received from ISO-NE (electric only), and year-end 2018 spending. The Company estimates that the electric projected fund balance at year-end 2018 will be \$3.9 million, as shown in Attachment 5, Table E-1; the gas fund balance at year-end 2018 is estimated to be \$7.4 million, as shown in Attachment 6, Table G-1.

It is likely that the actual year-end 2018 fund balance will be higher or lower than the dollar amounts projected in this Plan. To ensure that the 2019 Energy Efficiency Charge reflects the most current fund balance projections possible, the Company proposes to submit revised Tables E-1 and G-1 on December 3, 2018 to include several additional months of actual expenses and revenues in the calculation of the Charge. The Company proposes to submit revised tables on December 3, 2018 and not at the end of the year to provide the PUC with time to review the Company's proposed charges in advance of the Annual Plan hearing. This would allow the charges, if approved, to have an effective date of January 1, 2019. This will allow the Company to begin collecting the most accurate charge possible at the start of the program year and avoid any market confusion surrounding the status and implementation of the 2019 energy efficiency programs. If the actual year-end 2018 fund balance as filed in the Year-End Report on

May 1, 2019 is higher or lower than that amount projected in the December 3, 2018 revised Tables E-1 and G-1, any deviation will be fully reconciled in the next program year in accordance with the requirements of R.I. Gen. Laws § 39-1-27.7.

Other considerations regarding funding sources include:

**i. ISO-NE Capacity Market Revenue**

Consistent with the PUC's Standards, Annual Plan, and PUC decisions regarding Annual Plans since 2008, the Company and the Parties agree that kW-demand savings achieved via the electric energy efficiency and Combined Heat and Power programs continue to participate in the FCM as Passive On-Peak Demand Resources. The Company will manage and direct the revenues by bidding the demand savings attributed to energy efficiency measures and Combined Heat and Power facilities in the FCM and managing the associated capacity resources to maximize the resulting FCM revenue. The revenues from measures installed through this Plan, as well as all previous Plans, will continue to be reinvested in energy savings for the life of the measure.

The Parties fully agree that the Company should recover all prudently incurred FCM expenses from ISO-NE capacity-payment revenue generated by the demand savings from efficiency programs represented by the Company. The Company expects that capacity payments received from the ISO-NE will exceed its administrative and Measurement and Verification (M&V) compliance costs of participation in the FCM, and will result in additional funds being made available to fund efficiency programs for customers. If these participation costs exceed the capacity payments, the Parties agree that the Company may recover its prudently incurred costs from the energy efficiency program fund. The Parties reserve the right to examine the actions and expenses of the Company to ensure that only prudently incurred expenses are deducted from ISO-NE capacity payments or the energy efficiency program fund.

In addition, as part of the FCM, all qualified auction participants are required to post Financial Assurance to provide security that the promised resource will deliver the promised MW at the promised time. If, as a result of circumstances beyond the Company's control,<sup>21</sup> the Company is unable to provide all or a portion of the megawatts of capacity proposed in its qualification packages and capacity auction bids, some or all of the financial assurance monies would be forfeited.

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<sup>21</sup> Such circumstances may include legislative action to alter the EE Program Charge or discontinue the Company's authority to implement the energy efficiency programs underlying the Qualifications Package or a PUC decision limiting the Company's role in bidding the demand savings acquired through program efforts into the FCM.

## **ii. Exceptions to the Natural Gas Energy Efficiency Program Charge**

All natural gas used for distributed generation projects approved since 2014 will be subject to the natural gas energy efficiency surcharge.<sup>22</sup>

The 2006 Act allows the PUC to exempt natural gas used for manufacturing processes from the energy efficiency surcharge where the customer has established a self-directed program to invest in and achieve best effective energy efficiency in accordance with a plan approved by the PUC and subject to periodic review and approval by the PUC. Consistent with prior PUC decisions, the Parties have developed recommendations for a process under which a manufacturer may submit its self-directed program and the required annual reports for approval. The Parties recognize that this process may need to be reviewed and modified after the PUC has accumulated sufficient experience with these programs. Any customer that receives this exemption from the natural gas energy efficiency program charge will not be eligible to receive natural gas energy efficiency program services.

### **b. Budgets**

The Parties agree that the portfolio of energy efficiency programs and services for 2019 will have an overall budget of approximately \$107.5 million for electric programs and \$31.6 million for natural gas programs. The Parties agree to segment the budget into three sectors: residential income eligible, residential non-income eligible, and commercial and industrial (C&I). Proposed sector and program budgets are provided in Attachment 5, Table E-2 and Attachment 6, Table G-2. The derivations of the spending budget and implementation expenses are illustrated in Attachment 5, Table E-3 and Attachment 6, Table G-3. A comparison of these proposed budgets to the 2018 budget is provided in Attachment 5, Table E-4 and Attachment 6, Table G-4.

The Parties agree to review the status of budgets regularly to assess whether they are likely to come to a successful completion. If not, the Parties agree to review the advisability of transferring funds to other programs where the money could be more effectively used. Fund transfer guidelines are presented in Section C, below.

The Company proposes to continue the practice of funding commitments that were established in the 2014 Plan, Docket 4451. Namely, the Company will continue to make

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<sup>22</sup> Natural gas used for distributed generation (excluding natural gas used by emergency generators) for distributed generation projects approved under the energy efficiency programs in 2013 and prior years - independent of the date those facilities become commercially operable – are not subject to the energy efficiency surcharge when natural gas used for that purpose can be clearly identified through uniquely metered use and when so requested in writing by the customer.

commitments for projects with a projected incentive in excess of \$3 million.<sup>23</sup> For all other projects, except those with incentives greater than \$3 million, there would be no commitment budget and the Company will fund and pay all incentives in the year in which they are completed. There are no commitments in the 2019 Plan. However, the Company will examine the CHP process for customers, the notification process, and incentive levels for large projects with the OER, EERMC, Division and all members of the Collaborative with a focus on enhancements for 2020.

### **c. Transferring Funds**

The Parties will regularly review the amount of funds needed and available for each program (as well as any changes to the overall fund balance, as discussed in Section III.A above) and will transfer monies as needed. Transfers during the program year may occur as follows:

1. Transfers within a Sector: For transfers of less than 20% of the originating program's budget, the Company can transfer funds from one program to another program in the same sector. For transfers of 20% or more of the originating program's budget, the Company can transfer funds from one program to another program in the same sector with the Division's prior approval. Upon seeking the Division's approval, the Company shall simultaneously notify the EERMC and OER. For all transfers in a sector, the Company will reflect changes in the quarterly report(s) following the transfer and the year-end report.
2. Transfers between Sectors. The Company can transfer funds from one sector to another sector with the Division's prior approval. Upon seeking the Division's approval, the Company shall simultaneously notify the EERMC and OER. If a transfer reduces the originating sector's budget by more than 20% in aggregate over the course of the program year, the transfer will also require PUC approval. For all transfers between sectors, the Company will reflect changes in the quarterly report(s) following the transfer and the year-end report.
3. Transfers among residential retrofit programs. The Company can transfer among EnergyWise, EnergyWise Multifamily, Income Eligible Multifamily, and C&I Multifamily (which are in different sectors) programs in order to achieve the overall savings goals of all programs. Although these are listed as separate lines in the program tables, they are essentially one program from an implementation

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<sup>23</sup> As noted below in Section D, the Company will be required to notify the PUC of all incentive offers in excess of \$3 million. Such notifications will also include a description of how the Company intends to fund the incentive.

standpoint. For all transfers between residential retrofit programs, the Company will reflect changes in the quarterly report(s) following the transfer and the year-end report.

4. For transfers requiring Division and/or EERMC, but not PUC approval, the Parties will inform the PUC of the transfers, both between sectors and within sectors, in a timely fashion.
5. The Company will not be permitted to adjust its goals or incentive target calculations as a result of any transfers between sector budgets. However, after any budget transfers between sectors are made, the sector spending budgets will be recalculated for the purposes of the shareholder incentive calculation.

#### **d. Budget Management**

It is possible that there could be deviations from the planned budget for 2019 that could occur during the program year. The Parties contemplate three scenarios, and have agreed to address them as follows:

1. The Company's expenditures and commitments for 2019 may exceed the total budget by up to 15% so long as a written explanation is provided to the EERMC and the PUC for any deviation and the expenditures and commitments are reasonably consistent with the original Annual Plan.
2. The Company agrees that, during 2019, if the Company anticipates that continued operation of its programs is likely to result in actual expenditures and commitments exceeding the total budget by more than 15%, the Company will seek a vote of approval from the EERMC at its next meeting. Following EERMC action, the Company will be required to obtain approval from the PUC for expenditures in excess of 15% higher than the total budget, which would be collected through reconciliation in the next year's energy efficiency program charge.
3. During a program year, if the Company did not anticipate that its actual expenditures and commitments would exceed the total budget by more than 15%, but actual expenditures and commitments do exceed such threshold, the Company will bear the burden of demonstrating the reasonableness of its actions, including an explanation of why the over-spending occurred and how the expenditures and commitments are reasonably consistent with the original plan. Such demonstration would be required to be part of the 2019 Year-End Report, if not sooner.

In each of these three instances, the PUC retains its traditional ratemaking authority to review the prudence and reasonableness of the Company's actions.

In addition, the Company will file a written notification with the PUC of any energy efficiency incentive annual offer in excess of \$3 million. The notification will occur after the cost benefit screening and may occur before the offer letter is finalized. The project, the incentive, and any other related proposals will be authorized to proceed after thirty days from the notice filing unless the PUC suspends the filing and/or issues an order within such 30-day period to extend the time for purposes of further review.

If the dollar value of a proposed incentive for a single project is such that it would cause a program to exceed the overall energy efficiency plan budget for the current program year, the Company will follow the provisions related to overspending, per the rules established above.

## **7. Goals and Cost-Effectiveness**

The Company has projected cost-effectiveness for the proposed 2019 programs using the RI Test as required by the Standards. The RI Test requires that the total lifetime savings from the efficiency measures will exceed the total costs of the measures (i.e., program and customers' costs).

As provided for under the Standards, benefits include primary fuel energy savings (electricity and natural gas), the value of other resource (fuel and water) benefits, price effects, non-embedded greenhouse gas reduction benefits, economic development benefits, non-embedded NO<sub>x</sub> reduction benefits, value of improved reliability and non-energy impacts (NEIs). Costs include all projects costs, program planning and administration, sales, technical assistance and training, evaluation, and the shareholder incentive. To illustrate the detailed components of the RI Test as well as the sources of the values, the Company has provided Attachment 4.

Two key supporting documents for cost effectiveness are the Technical Reference Manual and the Avoided Cost Study. For the Annual Plan, the Company developed the 2019 Rhode Island Technical Reference Manual (TRM), which documents the savings or savings algorithms and costs for measures proposed to be offered through its programs in 2019. The TRM identifies the sources for the savings estimates: evaluation studies, engineering analyses, and/or other research. This TRM is a public document and was provided to the EERMC and its consultants to support and facilitate the determination of the Plan's cost-effectiveness. The TRM is reviewed and updated annually to reflect changes in technology, baselines, and evaluation results.

The cost-effectiveness analyses of the proposed programs use avoided energy supply costs that were developed by Synapse Energy Economics as part of the “Avoided Energy Supply Components in New England: 2018 Report” (2018 AESC Study) that was sponsored by all the electric and gas efficiency program administrators in New England and was designed to be used for cost effectiveness screening in 2019 through 2021.<sup>24</sup> The avoided costs reflect current and expected market conditions and are highly influenced by the cost of fossil fuels and expectations about ISO-NE’s forward capacity market. Company-specific transmission and distribution capacity values are also included. The avoided costs from the report used for 2019 are shown in Attachment 5, Table E-8 and Attachment 6, Table G-8. There were several noted changes to the avoided costs in the 2018 AESC Study (Study).

The Study found lower avoided costs of energy due to sustained low natural gas prices at national hubs and lower estimated costs of complying with the Regional Greenhouse Gas Initiative (RGGI). Avoided capacity costs were also lower due to changes in market rules and a lower estimate for the cost of new entry. Avoided costs of natural gas were lower based on shale gas breakeven prices. Avoided costs for fuel oil and other fuels increased. There was also an increase in the values for electric capacity demand reduction induced price effects (DRIPE) and oil DRIPE, where these were estimated to be non-existent or were not calculated in AESC 2015 Study. The Study also quantified new benefits for non-embedded NO<sub>x</sub> reduction benefits, value of improved reliability, and avoided pool transmission facilities (PTF) costs. Due to all these factors, the avoided costs benefits have increased in 2019 compared to 2018.

Attachment 5, Table E-5 and Attachment 6, Table G-5 provide the calculations of 2019 program year cost-effectiveness. Attachment 5, Table E-6 and Attachment 6, Table G-6 show the energy savings goals based on the proposed budgets. Attachment 5, Table E-7 and Attachment 6, Table G-7 show a comparison of the goals with the approved program goals from 2018. Attachment 5, Table E-5 shows that the proposed portfolio of electric programs, including demand response, is expected to have a benefit/cost ratio of 4.00, which means that approximately \$4.00 in benefits is expected to be created for each \$1 spent on the programs. Attachment 6, Table G-5 shows that the proposed portfolio of gas programs is expected to have a benefit/cost ratio of 2.70, which means that \$2.70 in benefits is expected to be created for each \$1 spent on the programs. This increase in efficiency investment continues the progress of acquiring all energy efficiency resources that are cost-effective and lower cost than supply.

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<sup>24</sup> The report is available online at: <http://ma-eeac.org/studies/special-cross-sector-studies/>. This study forecasts avoided costs for three years, compared to prior studies which developed avoided costs applicable to a two-year period.

## **8. Bill Impacts**

In addition to energy efficiency being a cost effective investment for Rhode Island, an analysis of bill impacts from the proposed investment in energy efficiency indicates that the average Rhode Islander who participates in the electric programs will realize an annual bill reduction of 1.69% to 22.85% over the lifetime of the measure mix, depending on rate class. The average Rhode Islander who participates in the gas programs will realize a bill reduction of 1.12% to 23.70% over the lifetime of the measure mix depending on rate class.<sup>25</sup> The average Rhode Island consumer (blending participants and non-participants) will see an average annual bill reduction of 1.60% to 3.46% for electricity over the lifetime of the installed energy efficiency measures, compared to no investment. For gas bills, the average Rhode Island consumer will realize a 0.02% to 5.14% bill reduction over the lifetime of the measure mix, depending on rate class. The bill impacts analysis uses models that were first used in the 2015 Plan and considers bill savings to participants compared to the incremental cost to all consumers of investing in energy efficiency in 2019. It also factors in that non-participants will benefit through avoided infrastructure investments as well as market effects. The full bill impacts analyses for electric and gas programs may be found in Attachment 7.

## **9. Measurement and Verification Plan**

To verify the impacts that programs are having on energy savings, the Company hires independent consulting firms to regularly conduct evaluation studies as part of its measurement and verification process. These evaluations incorporate industry standard methods such as engineering analysis, metering analysis, billing analysis, site visits, surveys, and market studies to realize the actual energy savings that particular measures are having. Every year, the results of the surveys are used to update the benefit-cost calculations during planning. Attachment 3 lists the evaluations that have occurred since 2007, that are still being used, and their influence on program planning.<sup>26</sup> The executive summaries of recently completed evaluations are submitted electronically to the PUC; executive summaries of evaluations completed in prior years are available in the dockets for previous years, or upon request.

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<sup>25</sup> Due to differences in the electric and gas Bill Impacts models, electric bill reductions indicate average annual bill savings over the lifetime of the measure mix, while gas bill reductions are the overall lifetime bill savings converted to 2019 present value and shown as a percentage reduction of the 2019 bill.

<sup>26</sup> The information in the Attachment is also intended to meet the specific requirement from the 2016 EE Program Plan to provide “a summary of evaluation results obtained since October 1, 2015, together with an attachment summarizing the impact of those results in planning the Company’s 2019 programs.”

Additionally, the M&V Plan for 2019 is presented in Attachment 3, and includes brief descriptions of each of the proposed studies. The areas proposed for study in 2019 have been chosen based on a number of factors: the relative amount of savings in that program or end use, the vintage of the most recent evaluation study, the relative precision of the recent evaluation study, and the available evaluation budget. In addition, some new program areas are designated for both impact and process evaluations. This list may be added to as the year progresses and different evaluation priorities are identified. In particular, the parties will consider the value of using evaluations from other jurisdictions as well as adding Rhode Island-specific impact or process evaluations, as appropriate, that will help inform the Company's efforts towards achieving the goals of least cost procurement.

The M&V Plan includes funding for a study conducted by the Office of Energy Resources to review and confirm reported energy savings. This study was legislated in Senate Bill 2500, enacted in June 2018.<sup>27</sup> The purpose of this study is to independently verify the energy savings of National Grid's energy efficiency programs and to review the evaluation, measurement, and verification (EM&V) process to ensure quality data, rigorous methods, and appropriate assumptions are being used. The legislation states that "The office of energy resources [*sic*], in consultation with the electric and gas distribution company and representatives referenced in §39-1-27.7(f)(2) shall be authorized to hire an energy consulting company or firm to carry out the energy efficiency verification study. The costs associated with this study, including, but not limited to, those associated with the consultant or firm contract and reasonable administrative costs incurred by the office in the execution of subsection (f) of this section, shall be recoverable through the system benefit charge subject to commission approval. Funding shall be transferred from the electric and gas distribution utility to the office of energy resources upon request by the office."<sup>28</sup>

## **10. Coordination with Power Sector Transformation**

There will be coordination between the Plan and the Company's Power Sector Transformation (PST) Vision and Implementation Plan (PST Plan), as detailed in the Docket Nos. 4770/4780 Amended Settlement Agreement, approved by the PUC at its August 24, 2018 Open Meeting (the Amended Settlement Agreement). The Company is committed to coordination across dockets to ensure transparency and to create streamlined programs to its customers. Areas that will involve such coordination include the following:

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<sup>27</sup> <http://webserver.rilin.state.ri.us/PublicLaws/law18/law18079.htm>

<sup>28</sup> <http://webserver.rilin.state.ri.us/PublicLaws/law18/law18079.htm>

i. Demand Response

The Plan includes residential and C&I Demand Response programs. The Amended Settlement Agreement includes Demand Response as one of the eligible resources with which to meet the System Efficiency: Annual MW Capacity Savings metric.

The Company will implement and fund Demand Response programs through its Annual Plan. All associated budgets, benefits, and savings are detailed in Attachment 5, 2019 Electric Energy Efficiency Program Tables.

The Company will report progress on this metric in its energy efficiency quarterly and Annual Reports, as well as in the annual March 1 performance incentive report and the September 1 mid-year update required under the Amended Settlement Agreement. In accordance with the Amended Settlement Agreement, the Annual MW capacity savings from Demand Response Programs will be tracked and reported as follows:

a. Residential Demand Response:

The number of participating customers (Wi-Fi thermostats) in Demand Response events multiplied by the approved deemed kW savings value per thermostat.

b. Commercial Demand Response:

The average observed demand savings during called Demand Response events.

As described in Section 11, the Company will not earn a shareholder incentive on Demand Response through the Plan. The shareholder incentive will be earned through the Annual MW Capacity Savings Performance-Based Incentive Mechanism in Docket Nos. 4770/4780.

ii. Electric Heat

At the Open Meeting on August 3, 2018 regarding Docket Nos. 4770/4780, the PUC directed the Company to include the heat pump rebates proposed in these dockets to be funded through the Company's energy efficiency programs.

In accordance with this directive, the Company increased the amount of beneficial electrification of heating to be funded through the Plan. This includes increasing the number of cold climate mini-split heat pumps offered to customers heating with delivered fuels in its electric HVAC program, and

expanding this offering to income-eligible and multifamily programs. Further details of these program offerings are included in Attachment 1.

The Company will continue coordination between its energy efficiency programs and PST Plan through internal processes and as part of the PST Advisory Group, established through the Amended Settlement Agreement.

## 11. Advancing Docket 4600 Principles and Goals

Along with the quantitative benefits detailed in the Plan, as measured by the RI Test, the energy efficiency investments and innovation planned for 2019 also advance the Docket 4600 principles and goals.<sup>29</sup>

The Docket 4600-A Guidance Document directed that “the proposing party must provide accompanying evidence that addresses how the proposal advances, detracts from, or is neutral to each of the stated goals of the electric system.”<sup>30</sup>

To meet this directive, the Company describes how the Plan either advances, detracts, or remains neutral on achieving the Docket 4600 goals for the electric system in Table 9.

**Table 9: Docket 4600 Goals for the Electric System**

<b>4600 Goals for Electric System</b>	<b>Advances/Detracts/Neutral</b>
Provide reliable, safe, clean, and affordable energy to Rhode Island customers over the long term.	Advances: The Plan gives customers tools to reduce their energy consumption. The safest, most reliable, most affordable energy, is energy that is never used. Lowering energy consumption avoids investments in the installation, upgrade, or replacement of transmission and distribution infrastructure, and reduces strain on the system.
Strengthen the Rhode Island economy, support economic competitiveness, retain and create jobs by optimizing the benefits of a modern grid and attaining appropriate rate design structures.	Advances: The Plan will create significant economic benefits in Rhode Island. The Company expects that investments made in energy efficiency under this Plan will add \$85.6 million to Rhode Island’s state gross domestic product (GDP) and support more than 1,256 job-years of employment.
Address the challenge of climate change	Advances: The Plan will avoid over 1.1

<sup>29</sup> PUC Report and Order No. 22851 accepting the Stakeholder Report. Written Order issued July 31, 2017.

<sup>30</sup> Approved final clean version of Guidance Document 10/27/17.

and other forms of pollution.	million tons of carbon over the lifetime of the installed measures as well as reduce other pollutants associated with the generation and combustion of electricity, natural gas, and delivered fuels.
Prioritize and facilitate increasing customer investment in their facilities (efficiency, distributed generation, storage, responsive demand, and the electrification of vehicles and heating) where that investment provides recognizable net benefits.	Advances: The Plan provides incentives for customers to invest in cost-effective energy efficiency measures in their facilities and participate in demand response programs.
Appropriately compensate distributed energy resources for the value they provide to the electricity system, customers, and society.	Neutral
Appropriately charge customers for the cost they impose on the grid.	Neutral
Appropriately compensate the distribution utility for the services it provides.	Advances: The shareholder incentive contained in this Plan compensates the Company for achieving the energy savings goals through delivering cost-effective energy efficiency programs to customers.
Align distribution utility, customer, and policy objectives and interests through the regulatory framework, including rate design, cost recovery, and incentive.	Advances: The Plan aligns Company, customer, and policy objectives and interests by incentivizing energy savings measures that enable customers to manage and reduce their energy consumption, which in turn contributes to the greenhouse gas reduction goals of the Resilient Rhode Island Act of 2014, and Power Sector Transformation goals, while allowing the Company to earn a shareholder incentive.

## 12. Reporting Obligations

- i. In 2019, the Company will provide quarterly reports to the EERMC, the Division, OER, the Collaborative, and the PUC on the most currently available program performance for both natural gas and electric efficiency programs. These reports will include a comparison of budgets and goals by program to actual expenses and savings on a year-to-date basis, and a status report on revolving loan funds. The Company will also coordinate reporting of loan funds with the Rhode Island Infrastructure Bank. The reports will also include a brief summary

of program progress and will highlight issues by sector for EERMC, Division, OER, and Collaborative attention. Within the C&I sector, there will be separate highlighting of large and small customer program progress and issues. Beginning in the second quarter, the quarterly reports also include a forecast of expected results.

- ii. In 2019, for months during which quarterly reports are not produced, the Company will provide to the EERMC, the Division, and the Collaborative monthly summaries of year-to-date spending and savings and results by sector.
- iii. The Company will provide to the Parties and file with the PUC its 2019 Year-End Report no later than May 1, 2020. This report will include achieved natural gas and electric energy savings in 2019 and earned incentives for 2019.
- iv. The Company will provide the Parties with a summary of evaluation results obtained since October 1, 2016, including a description of the impact of those results in planning the Company's 2019 programs, in the Plan to be filed by October 15, 2018.

### **13. Incentive**

Consistent with the Three-Year Plan, the proposed shareholder incentive mechanism for 2018 will be based on the same metric applicable to the 2018 Plan. Under the current incentive structure, the Company can earn a target based-incentive rate equal to 5.0% of the eligible spending budget in a program year for achieving electric and gas energy savings goals.

- For electric savings, the Company can earn a target-based incentive rate equal to 3.5% of the eligible annual spending budget for achieving MWh savings goals and 1.5% of the annual spending budget for achieving MW savings goals.
- For gas, where there is no demand savings component, the Company can earn a target-based incentive rate equal to 5.0% of the eligible annual spending budget for achieving MMBtu savings goals.

As in 2018, the proposed incentive mechanism establishes an incentive of 1.25% of the annual spending budget for achieving 75% of the savings goals in a sector. This would increase linearly to 5% of the annual spending budget for achieving 100% and increase linearly from that point to 6.25% of the annual spending budget for achieving 125% of the savings goals.

Expressed mathematically, the shareholder incentive would be calculated as follows for both energy and demand savings, where SB is the Annual Spending Budget in the sector:

- From 75% of savings to 100% of savings:
  - Incentive = SB x (0.15 x % of savings achieved – 0.10)
    - x 0.7 for electric energy savings
    - x 0.3 for electric demand savings
    - x 1.0 for natural gas savings
- From 100% of savings to 125% of savings:
  - Incentive = SB x (0.05 x % of savings achieved)

The Company believes that this structure will incent the Company to achieve savings that approach or exceed 100% of the annual goals. It does so by setting the threshold for savings required to earn an incentive at 75% of the annual savings goals, by creating a steep slope to earn a greater incentive in the range of 75% of savings to 100% of savings, by establishing the target incentive at 5.0% of the annual spending budget, and by offering a higher incentive for exceeding 100% of the annual goals.

The threshold performance level for energy savings by sector will be set at 75% of the annual energy and demand savings goal for the sector. The Company must attain at least this threshold level of savings in the sector before it can earn an incentive. The Company will have the ability to earn an incentive for each MWh, MW or MMBtu saved, once threshold savings for the sector are achieved. The cap for the target incentive amount of energy savings will remain at 125%.

The ability to earn up to 125% of the target incentive is worthwhile because Rhode Island customers will realize additional energy and cost savings if the Company achieves a high level of energy savings performance. Given budget control requirements, this feature will provide the Company with an incentive to improve the efficiency of its program implementation efforts while providing Rhode Island customers with value in excess of the incremental incentive that may be earned by the Company. That is, the Company will have an incentive to increase customers' savings and customers will realize an overwhelming majority of the savings.

The savings goals are based on a set of assumptions of savings per measure and other impact factors in each program as well as the proposed budget. The determination of achieved savings will be based on the same set of savings and impact assumptions as is used to develop the savings goal in this Annual Plan. These assumptions have been reviewed and accepted by the Parties.

Attachment 5, Tables E-3 and Attachment 6, Table G-3 provide the derivations of the eligible electric spending budget that are used to determine the incentive amounts that the Company may earn if it is successful in achieving its goals for energy savings.

Attachment 5, Table E-9 and Attachment 6, Table G-9 provide a summary of the incentives related to annual energy-savings goals by sector. These goals by sector reflect the expected cost of savings in each sector informed by evaluation studies, and these goals have been adjusted to take into account changing rebate policies and the changing market being served. As described above, these goals have been carefully reviewed by the Collaborative and EERMC representatives to ensure that they represent reasonable and challenging goals for the year.

For electric energy efficiency programs, the proposed target base-incentive rate in 2019 is equal to 5.0% of the eligible spending budget for 2019. In accordance with the PUC order at the Open Meeting on December 20, 2017, Pilot budgets are excluded from the eligible spending budget. The projected electric eligible spending budget for 2019 is approximately \$98.1 million (see Attachment 5, Table E-3). The total electric target incentive for 2019 is 5.0% of the proposed spending budget, or approximately \$4.91 million (see Attachment 5, Table E-9). In accordance with the Amended Settlement Agreement in Docket Nos. 4770 and 4780 filed with the PUC on August 10, 2018, the Company is not eligible to earn an energy efficiency incentive on its Energy Efficiency Demand Response Programs. To comply with this requirement, the Company excluded spending on Demand Response Programs from the eligible spending budget as shown in Table E-3.

For natural gas efficiency programs, the proposed target base incentive is equal to 5.0% of the eligible budget. The projected natural gas eligible spending budget for 2019 is approximately \$29.2 million (see Attachment 6, Table G-3). The total natural gas target incentive for 2019 is 5.0% of the proposed spending budget, or approximately \$1.46 million (see Attachment 6, Table G-9).

In addition, to promote cost efficiency in spending in the achievement of the energy savings goals, an adjustment will be made under certain circumstances to MWh and MMBtu savings goals in the shareholder incentive calculation. If the actual implementation expenses in a sector at year-end are less than the planned implementation expenses for that sector by more than five percent, and if achieved savings in the sector exceed 100% of the target savings goal, the savings goal for that sector will be adjusted by the ratio of actual implementation expenses to the planned implementation expenses. Conversely, if the actual implementation expenses<sup>31</sup> in a sector at year-end are greater than the planned implementation expenses by more than five percent, and if achieved savings in the sector are less than 100% of the target

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<sup>31</sup> Expenses related to overspending for deliverable fuels will be excluded from implementation expenses in this calculation.

savings goal, the savings goal for that sector will be adjusted by the ratio of actual implementation expenses to the planned implementation expenses.

The Company will report final program results and earned incentive in its Year-End Report regarding 2019 Energy Efficiency Program efforts.

## **14. Testing Performance Metrics**

As indicated in the 2018-2020 Three-Year Plan and in the 2018 Annual Plan, the Company agreed to work with the OER, the DPUC, the EERMC, and the Collaborative during program year 2018 to consider new performance metrics for future Annual Plans that would better align the plans with Rhode Island's goals for Power Sector Transformation and greenhouse gas emissions reduction.

Energy efficiency measures and initiatives have evolved over time due in part to state policy objectives, customer preferences, and technological advancements. In recent years it has become clear to the Company that the annual energy and demand savings goals denominated in kWh, kW, and MMBtu, may not capture the full benefits of all energy efficiency measures. Although all energy efficiency measures comply with Least Cost Procurement, contribute to State policy goals, reduce overall energy usage, and provide net benefits to customers, many do not provide significant contributions to annual savings goals. An example is the suite of measures that reduce consumption of delivered fuels. High-efficiency oil heating measures, oil weatherization, and beneficial electrification of heating only provide a small contribution to electric savings goals, but create a significant contribution to the State's greenhouse gas reduction goal.

The goals in Annual Plans should send an appropriate signal for investment in all forms of cost-saving measures, not just those that save annual electric energy, electric demand, and natural gas. In 2019, the Company is proposing to test new performance metrics to gain experience tracking and reporting on progress towards defined goals that are not tied to a financial reward.

Throughout program year 2019, the Company will work towards implementing the test metrics defined below to determine if any are viable to become part of an annual goal in future Annual Plans. The Company will provide updates on progress, challenges, and lessons learned with the Collaborative and the EERMC during 2019. While Company performance against a test metric may help inform future goals, it will not predetermine these goals. At the end of 2019, the Company, in consultation with the Division, OER, EERMC Consultants, the Collaborative, and the PST Advisory Group may determine that a metric is not appropriate for use in the future. Likewise, it may be determined that a metric has the merit to become an annual goal tied to a financial award in future Annual

Plans. The Company will work with the Division, OER, EERMC Consultants, and the Collaborative in the development of future baselines and financial rewards for any new annual goals resulting from these test metrics.

**i. Carbon Reductions**

The Company proposes to track annual and lifetime carbon reductions resulting from investments in the electrification of heating and delivered fuels measures. This approach mirrors what was proposed in the Company’s Power Sector Transformation Vision and Implementation Plan (PST Plan), as detailed in the Docket Nos. 4770/4780 Settlement Agreement. The carbon reductions will be calculated using emission rates from the 2018 AESC Study shown in the table below, multiplied by the resulting annual and lifetime avoided oil or propane from this suite of measures.

<b>2018 AESC Study Emission Rates</b>		
#2 Fuel Oil	0.081	CO2 (tons/MMBtu)
Propane	0.070	CO2 (tons/MMBtu)

The carbon metric will provide additional visibility on this suite of measures that do not significantly contribute to existing electric and demand savings goals but contribute to Rhode Island’s greenhouse gas reduction goals.<sup>32</sup>

The Company appreciates the direction given by the PUC at the Open Meeting on Docket Nos. 4770/4780 held on August 3, 2018 indicating that the Company could propose a shareholder incentive for achieving carbon reductions from the electrification of heating in future energy efficiency Annual Plans. For 2019, the Company proposes to only test a performance metric for carbon. The Company believes it is prudent to track this metric for a year to help inform the development of an annual goal and appropriate shareholder incentive level.

In addition to tracking carbon reductions for the purpose of this metric, the Company will strive to track greenhouse gas equivalent savings (in carbon dioxide equivalents) resulting from all electric and natural gas measures in the Plan. The Company will report out on any issues it encounters in striving to report in terms of carbon dioxide equivalents.

**ii. Lifetime MWh and MMBtu Savings**

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<sup>32</sup> Rhode Island Greenhouse Gas Emissions Reduction Plan, December 2016.

National Grid currently includes lifetime electric and gas savings in its Annual Plans. These values are based on the lifetime savings associated with the measures in the Plan. Year-End Reports currently show achieved lifetime savings but do not show it against the planned goal. The Company will edit quarterly and Year-End Reports to include planned lifetime savings to better understand performance in the realization of lifetime savings and to consider program adjustments in the future.

**iii. Program costs per energy savings**

The Company currently includes the projected costs of lifetime electric and gas savings in its Annual Plans. The Company recently began including the actual costs of lifetime savings compared to planned values in its quarterly reports. In 2019, the Company will continue this reporting in its quarterly reports and will add this metric to its Year-End Report.

The Company will also report out on the cost of saved peak demand for the residential and C&I demand response programs. This metric will be important to track as these new program offerings scale up.

**iv. Customer Satisfaction**

The Company proposes to track a Customer Satisfaction metric in 2019. Initially the metric will be applied to whole house programs with the potential to expand to other residential programs over time.

The Company proposes to utilize a third party vendor to conduct the customer survey. The metric would be based off customer responses to the following questions:

1. Would you recommend this program to a friend or family member?
2. How satisfied are you with the energy efficiency services received?

The Company will track customer responses and report out on the average satisfaction across.

The Company will detail progress on the above proposed metrics in its quarterly reports as well as a detailed summary of the results, lessons learned, and any needed improvements in its 2019 Year-End Report to the PUC.

## 15. Miscellaneous Provisions

- i. Other than as expressly stated herein, this Settlement establishes no principles and shall not be deemed to foreclose any party from making any contention in any future proceeding or investigation before the PUC.
- ii. This Settlement is the product of settlement negotiations. The content of those negotiations is privileged and all offers of settlement shall be without prejudice to the position of any party.
- iii. Other than as expressly stated herein, the approval of this Settlement by the PUC shall not in any way constitute a determination as to the merits of any issue in any other PUC proceeding.
- iv. The Parties agree that the Collaborative shall meet no less than six times in 2019 to review the status and performance of the Company's 2019 energy efficiency programs and advise the Company on potential energy efficiency programs for 2020.

The Parties respectfully request that the PUC approve this Stipulation and Settlement as a final resolution of all issues in this proceeding.

Respectfully submitted,  
THE NARRAGANSETT ELECTRIC COMPANY  
D/B/A NATIONAL GRID



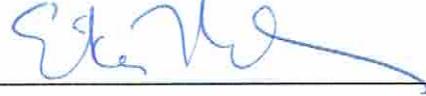
10/12/2018

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By its Attorney,  
Raquel J. Webster

Date

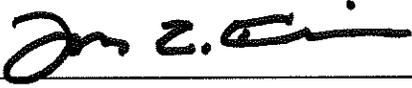
ACADIA CENTER



10/10/18

By its Rhode Island Director and Policy Advocate, Date  
Erika Niedowski

RHODE ISLAND DIVISION OF PUBLIC UTILITIES AND CARRIERS

 10/10/19

By its Deputy Chief Legal Counsel, Date  
Jon Hagopian

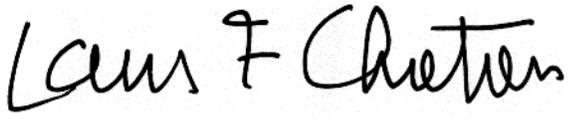
THE RHODE ISLAND ENERGY EFFICIENCY AND RESOURCES  
MANAGEMENT COUNCIL



By its Attorney,  
Marisa Desautel

Date 10.10.18

GREEN ENERGY CONSUMERS ALLIANCE, INC.

  
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By its Executive Director,      Date October 9, 2018  
Larry Chretien

OFFICE OF ENERGY RESOURCES



10/10/2018

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By its Commissioner,  
Carol J. Grant

Date



# 2019 Residential Energy Efficiency Solutions and Programs

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The Narragansett Electric Company  
d/b/a National Grid  
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## **1. Introduction**

Rhode Island residential customers rely on – and place trust in – National Grid to keep their homes comfortable, their lights on, be there in moments of crisis, and continue to innovate with consumer technologies.

As such, the Company continues to implement its nationally recognized energy efficiency program with a focus on developing new services that give customers control of their energy, help reduce their bills, ensure financial well-being, and provide equity for all. In 2019, energy efficiency will be coordinating with the Company’s Customer Service so offers are promoted when appropriate. More direct and ongoing communications between program managers and National Grid’s Customer Contact Centers will ensure that programs are promoted when customers contact the Company.

National Grid’s Residential Energy Efficiency portfolio of solutions provides customers with incentives and support for their every-day energy choices. For the customer building a new home, the Company will model and test the home for energy efficiency. For the tech-savvy customer, the Company will work with retail and wholesale channels that sell the “latest and greatest”, as well as the “tried and true” energy saving products to integrate new technologies into their existing residence. For the customer working two jobs to put their children through school, the Company can help to reduce energy bills and increase comfort in the home through its retrofit programs.

The following sections cover these residential energy solutions, the energy saving goals the Company has set for 2019, and how the Company plans to achieve these goals in an ever-changing energy landscape.

For 2019, the Company will build on the transformations identified in the 2018-2020 Three-Year plan and programs implemented beginning in last year’s 2018 Annual Plan. Smarter products will increasingly continue to make their way into the programs, products will be offered mid-stream or upstream, program designs overall will begin a shift towards increasingly customer-centric models (e.g. Revising Multifamily participation guidelines and processes to serve more customers), and new ideas will continue to be tested to better understand how customers interact with their products and energy. As the energy efficiency market continues to evolve, the Company will pursue workforce related studies related to such changes. These studies will be developed in coordination with the Jobs Study and Potential Study as outlined in the

“2019 Evaluation, Measurement and Verification Plan” section. The Company will also communicate other efficiency or energy savings opportunities provided by the Company or external parties that benefit the customer.

The 2018-2020 Three-Year Plan details four central principles that encompass an advanced and innovative approach to serving all residential customers. The Company finds that these four principles are apparent in all aspects of the 2019 Plan and incorporates the planning process, which included many brainstorming sessions from internal teams to external stakeholders. In addition, each of the Company’s strategies, programs, and initiatives are focused on meeting the needs of customers, the environment, and preparing for the future. Below are the four key priorities the Company has identified for the 2018-2020 Plan.

**Customers** - Deliver comprehensive services encompassing all market segments and customers. Such services will enable customers to control their energy use, reduce their bills, and help support their financial well-being.

**Least Cost** - Deliver energy efficiency services as cost-effectively as possible through optimizing finance and promoting upstream initiatives. Continuing to deliver cost effective energy saving under Least Cost Procurement will create cost savings to all customers, while creating economic benefits that create and maintain local jobs and businesses. Demand Response efforts will also contribute to cost savings to all customers.

**Environment** - Provide solutions that minimize greenhouse gas emissions and contribute to Rhode Island’s clean energy policy goals, including the Resilient Rhode Island Act.

**Future** – Innovate to capture savings from new technologies and strategies to position energy efficiency programs for the future, including the integration of energy efficiency with demand response, renewable energy, and smart grid technologies. This includes incorporating outcomes from the Rhode Island Power Sector Transformation Initiative and Docket 4600.

## 2. Solutions and Programs Featured in Attachment 1

**Table 1: Solutions, Programs - New for 2019**

Solutions	Programs Highlighted	New for 2019
<p><b>Whole Home Programs</b></p>	<p><b>Single Family and Multifamily retrofit</b> programs where customers experience no-cost assessments and comprehensive upgrades. Also included are the <b>Residential New Construction</b> program, and the <b>Income Eligible Services</b> program.</p>	<p>Increased participation goals</p> <p>Revised Multifamily participation guidelines to remove barriers and serve more customers</p> <p>Expanded Single-Family and Multifamily cold climate heat pump installations</p> <p>Parity of delivered fuel incentives</p> <p>Path to Zero Energy Ready Homes – an enhancement to the RNC project to incentivize zero energy ready homes</p> <p>Online scheduling of EnergyWise assessments</p> <p>100% landlord incentive for market rate, single family residences</p>
<p><b>Behavior and Products Programs</b></p>	<p><b>Home Energy Reports (HER), ENERGY STAR Lighting, Residential Consumer Products, and High-Efficiency Heating, Cooling and Hot Water</b></p>	<p>More personalized HER behavior tips and product promotions</p> <p>Heat Pump Initiative within HVAC Electric Program and offered across Residential portfolio.</p>

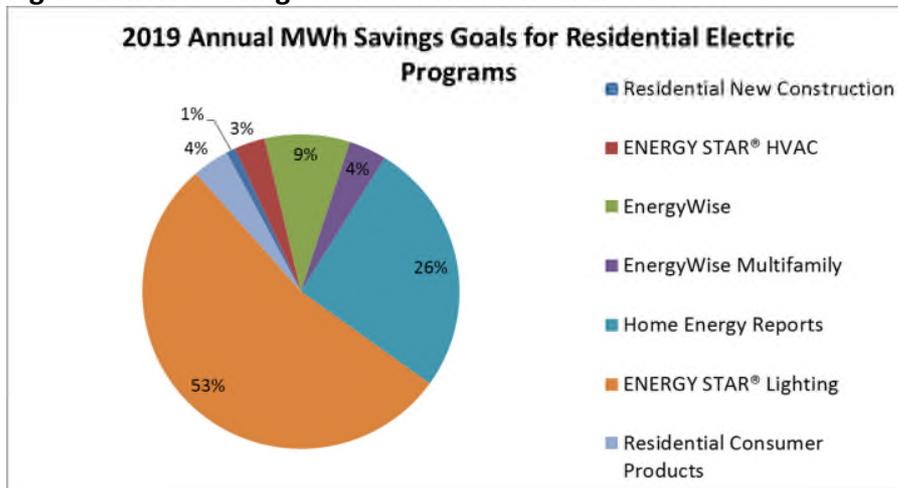
	(HVAC) programs.	Upstream Heat Pump Water Heater incentive  Low-e storm windows
<b>Initiatives</b>	The <b>Community-Based Energy Efficiency initiative</b> to educate customers and increase program participation.	New Website landing page for community recruitment  Expanding new goal-based program model to four communities  Including workforce trainings and new metrics such as demand response participation

**Table 2: Non-Income Eligible Electric and Gas Goals by Program**

Program	Demand Reduction (Annual kW)	Energy Savings (Annual MWh)	Electric Customer Participation	Gas Savings (Annual MMBtu)	Gas Customer Participation
EnergyStar Lighting	6,681	48,381	236,810	N/A	N/A
Home Energy Reports	4,278	24,130	291,149	115,520	107,414
EnergyWise	1,287	8,182	10,250	27,806	2,300
EnergyWise Multifamily	283	3,593	4,000	16,043	4,000
Residential Consumer Products	668	3,925	13,359	N/A	N/A
Energy Star	590	2,710	2,187	27,960	1,830

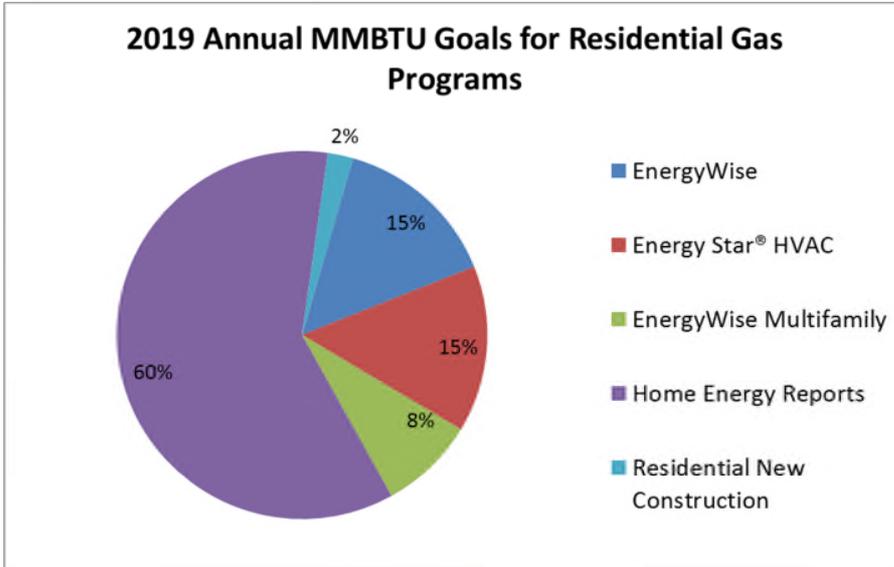
HVAC					
Residential New Construction	112	756	550	4,741	313
Residential Codes <sup>1</sup>	N/A	202	N/A	1,176	N/A

**Figure 1: MWh Savings Goals for Residential Electric Sector**



<sup>1</sup> Included in the Residential New Construction goals listed above in Table 2

**Figure 2: MMBTU Savings Goals for Residential Gas Sector**



**Table 3: Income Eligible Electric and Gas Goals by Program**

Program	Demand Reduction (Annual kW)	Energy Savings (Annual MWh)	Electric Customer Participation	Gas Savings (Annual MMBtu)	Gas Customer Participation
Income Eligible Services – Single Family	815	3,742	3,000	9,178	820
Income Eligible Multifamily	223	3,219	5,000	20,487	3,500

**Figure 3: MWh Savings Goals for Income Eligible Electric Sector**

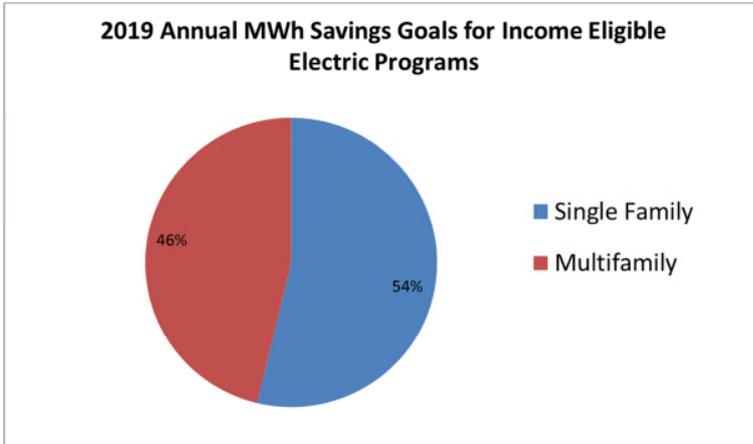
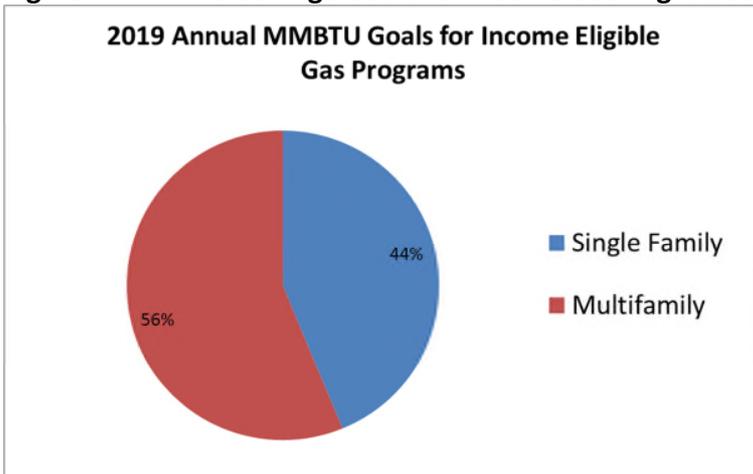


Figure 4: MMBTU Savings Goals for Income Gas Eligible Sector



### 3. Whole Home Programs and Solutions

Whole Home Solutions provide the most comprehensive level of energy and cost savings for both single family and multifamily customers. For existing homes, the home energy assessment is the first step to identify how much energy the home uses as well as any structural or mechanical problems, that when corrected, save significant amounts of money over time.

The home energy assessment for a single family customer connects energy specialists at a customer's residence to both educate the resident on where the home may be losing energy through air leaks and inefficient energy systems, and to also provide solutions that reduce the energy losses. These solutions require a commitment by the customer in both time and money and may require multiple visits by an energy specialist to the

home. The end result of implementing all the energy solutions will be a home that is more comfortable and energy efficient.

An initial home energy assessment can take several hours, starting with an energy specialist acquiring information from the homeowner about heating, cooling, and ventilation concerns. Next, the energy specialist conducts a diagnostic assessment of the attic, walls, basement, doors, windows, mechanical systems and appliances to assess existing levels of insulation and air sealing and equipment safety and efficiency. During the initial visit the energy specialist will install no-cost instant savings measures (ISMs) energy saving upgrades including lighting upgrades, pipe insulation, water aerators, and advanced power strips for electronic systems.

If the customer decides to move forward with recommended energy efficiency solutions identified in the above-described assessment (e.g. insulation, sealing air leaks or heating/cooling system or appliance replacement) additional savings will be realized. Energy efficiency solutions require subsequent visits from a respective home performance contracting service or product provider, and could take several days to complete. While the home energy assessment and instant savings measures are at no-cost to the customer, the subsequent energy savings measures may require a financial investment by the home owner. The Company provides financing opportunities and substantial incentives to help the customer move forward with these higher cost measures.

For those customers who reside in multifamily facilities, the no-cost assessment experience is still comprehensive, yet the process is a bit different. The Company's Multifamily Coordinator will work directly with property managers, facility owners and/or condominium associations to coordinate the audit and subsequent upgrades. The first on-site assessment is a comprehensive review of common areas, offices, mechanical systems, and a representative sample of dwelling units to build a plan for retrofit opportunities. The owners and/or tenants are then provided with a list of measures that could be installed in their units and common areas. Incentives are available for weatherization (air sealing, insulation), heating and domestic hot water, cooling, lighting, and appliances.

Residential New Construction offers both technical services and incentives to help customers design and construct new energy-efficient homes. Beginning with a review of plans, the Company's lead vendor can advise a customer how changes in the design can

improve efficiency. During construction, the lead vendor works directly with the builder to provide on-site technical support for incorporating best practices and techniques. The program provides the Home Energy Rating System (HERs) rating of the home to determine the energy efficiency upon completion of the project. Incentives for the project are provided based on the HERs rating as well as additional incentives for high-efficiency heating, cooling and hot water systems.

With a wide variety of customer and site-specific needs, National Grid approaches the whole house solutions market through channels that address the housing structure by number of housing units in the building as well as by income eligibility to ensure as many customers as possible can participate in the program and receive the benefits of energy savings at discounted, low or no cost.

Whole Home Programs and Solutions provide an important entry point into the customer's home and introduction to energy management. Steps taken during the initial visit will ideally lead to additional, ongoing interactions with the customer for future home improvements when needed. Information to upgrade to efficient heating systems, including cold climate heat pumps, will be provided if a system is near end-of-life or if it is cost effective to upgrade.

The Energy Efficiency marketing team will continue to collaborate on marketing efforts with complimentary programs, including renewable energy and electrification programs that support energy efficiency. Currently the Renewable Energy Growth (RE Growth, [www.ngrid.com/regrowth](http://www.ngrid.com/regrowth)) Solar Marketplace provides cross-marketing and encourages customers to do an energy assessment prior to adding renewable energy. The RI Office of Energy Resources (OER) and CommerceRI's Renewable Energy Fund (REF, <https://commerceri.com/financing/renewable-energy-fund>) program requires an energy efficiency assessment in order to receive the REF renewable energy incentive.

## **4. EnergyWise Single Family (Electric and Gas)**

### **a. Overview**

EnergyWise consistently captures energy savings at customer homes (1-4 units in one building) while educating them about all energy management opportunities. In 2018, EnergyWise was awarded the ENERGY STAR Partner of the Year Sustained Excellence in Energy Efficiency Program Delivery. This honor is presented by the United States Environmental Protection Agency and Department of Energy recognizing continued

excellence in program delivery to customers. The Rhode Island EnergyWise program in 2017, on average, installed over twenty-five lighting products during home energy assessments. These savings support continued delivery of no-cost first visits to the customer. The combination of instant savings and a no-cost initial visit is a very powerful tool to engage customers in whole home services.

Since 2009, the Company has provided home energy assessments to over 15% of single family, market rate customers in Rhode Island. Customers that have participated in the program learn how their home functions from an energy perspective and are provided solutions to improve energy performance when opportunities exist. EnergyWise leverages customer touch points to present solutions that make sense for the household. As more offerings are available, they will also be bundled in and presented with the program offerings.

An evaluation completed in 2018 supports the continued success of zero-percent financing through the HEAT loan in facilitating program adoption. The financing reduces the upfront customer cost associated with upgrades to home's insulation levels, heating system, or water heating systems. At the August customer listening forum as well as the energy expo, residential customers expressed an interest in financing solar improvements as well as upgraded windows. In 2019, National Grid will investigate financing options available to residential customers and look for ways to reduce costs.

#### **b. New for 2019**

In 2019 EnergyWise will focus on the following strategies to achieve the aggressive targets:

##### **i. Customer engagement and convenience**

EnergyWise will implement an online assessment to educate customers on where household opportunities for greater comfort and energy savings exist. This component will allow customers to learn about energy management offerings at their own convenience and receive information about specific improvements and available incentives. For customers interested in an in-person home energy assessment, online scheduling will be available in 2019 allowing for transparent scheduling at a convenient time for the customer.

## **ii. Deeper savings and overcoming barriers**

There are numerous in-home attributes that can prevent installation of weatherization due to health and safety concerns. The presence of asbestos, vermiculite, knob-and-tube wiring, heating systems not drafting flue gasses correctly, and a home that is “too tight”, meaning not enough air exchanges per hour for optimal health, are examples of health and safety issues that will result in a recommendation to resolve the issue before weatherization can proceed. Currently the program provides an incentive towards verification that health and safety barriers have been resolved by the homeowner so weatherization work can proceed. The only health and safety concern that falls specifically within the program, and can be resolved with program funds, is the number of air exchanges per hour. EnergyWise follows the American Society of Heating, Refrigerating and Air-Conditioning Engineers residential ventilation standard (ASHRAE 62.2) for acceptable indoor air quality using spot ventilation when appropriate. The program has been testing a method to reduce the cost of the “too tight” issue by putting in mechanical ventilation that controls the exchange of air while using minimal energy. By outlining a procedure to use a few standard configurations for mechanical ventilation, the program can minimize costs to the customer while optimizing the success of the installation. This methodology will be deployed fully in 2019. Contractors can select to use a lower cost, spot ventilation fan or depending on customer preferences a bath fan can be used as a substitute.

The program will also be testing a duct sealing initiative in 2019. Leaky ducts can result in a loss of 20% of the heating and cooling system efficiency. While large leaks can be addressed with exterior duct sealing tapes and paste, many smaller gaps can be more difficult to address from the exterior of the ducts. A new initiative will investigate the success of airborne, spray sealants that can be applied within the duct work that can reduce overall system leakage.

The Company will also complete the implementation of and assess the results from its 150 customer initiative of the Department of Energy’s Home Energy Score, which began in 2018.

## **iii. Serving all customers**

Making sure that all Rhode Islanders are participating in the energy efficiency offerings is of growing concern for many energy efficiency stakeholders. One area that has brought increasing interest is with customers with an area median income (AMI) of 60%

- 100%. Looking at participation information from 2014 – 2017, the Company finds that for customers where income can be determined, those falling into the 60% - 100% AMI range have completed weatherization after receiving home energy assessments at a slightly higher rate than customers whose income are above 100% AMI. The number of customers in the 60-100% AMI range participating in EnergyWise home energy assessments is proportional to the number of households in that income bracket within RI. This data demonstrates that the program is attractive to a range of customers across all income levels and for moderate income customers, they are both participating and taking advantage of weatherization services at or above their population within the state.

In 2019, the program is redesigning the approach to serve renters and landlords in single-family (1-4 unit) homes that participate in the program. In order to encourage landlord participation in the weatherization component of the program, the Company will remove the customer co-pay portion of the program, up to the program maximum of \$4,000. This redesign will remove the classic “split incentive” where investments in upgrading the insulation levels of the home may not be returned to the landlord, but may in fact go to the tenants that pay the heating bills. The split incentive has been one component that may deter an investment in rental property, as renters are frequently unable to change the building structure without landlord permission.

Another area of stakeholder interest has been in the area of deliverable fuels. Customers that heat their homes with deliverable fuels have participated in the no-cost home energy assessment portion of the program, but have continued to undergo weatherization installations at a lower rate than customers that heat with electricity or natural gas. The program has increased incentive levels for deliverable fuel customers to the same level as other heating fuels since Q3 of 2018 and is planning to continue these levels through 2019.

## **5. Multifamily (Electric and Gas)**

### **a. Overview**

The Rhode Island Market Rate and Income Eligible Multifamily programs continue to innovate and refine techniques to serve more customers with more measures. The 2018 program saw the introduction of cold climate mini-split heat pumps for customers with electric resistance heat, the use of customized condo website portals, and the creation

of new relationships to offer more finance opportunities to customers. For 2019, the company looks to grow these efforts, with a special emphasis on the deployment of cold climate mini-split heat pumps, and remains committed to offering a comprehensive program that is both cost effective yet thorough in treating this diverse segment of the population. The Rhode Island Multifamily program has a single lead vendor that utilizes a network of Rhode Island sub-contractors to serve all customers, including income eligible.

Eligible Multifamily program participants are defined as the following:<sup>2</sup>

- Buildings with 5 or more units
- Properties consisting of four or more 1-4 unit buildings that meet both of the following requirements:
  - Are within a reasonable geographical distance<sup>3</sup> from each other, or to a 5+ unit building, and
  - Are owned by the same individual or firm.

Both market-rate and income-eligible multifamily properties are subject to the above-outlined multifamily eligibility requirements for coordinated services. For the income-eligible properties, co-payments for energy efficiency services and measures may be waived.

The income-eligible multifamily sector is defined by properties that meet one of the following criteria:

- Owned by public housing authorities or community development corporations
- Receive affordable housing tax credits or any type of low-income funds/subsidies from the state or federal government
- Consist of building units where a majority of customers qualify as income-eligible customers (receive utility service on the A-60 Low-Income rate and/or have a household income of less than 60% of the Area Median Income)

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<sup>2</sup> Stand-alone 1-4 unit buildings that do not meet these requirements are considered “single-family” and are served traditionally through *EnergyWise* Single Family or Income Eligible Services Single Family programs, as appropriate.

<sup>3</sup> “Reasonable geographical distance” is determined at the discretion of the vendor. The prior program guidelines required buildings to be neighboring each other. This revised guideline will allow the vendor to treat more units for a single owner where those units may be located down the street from each other.

Furthermore, a multifamily property may be eligible for services and incentives under both residential and commercial programs. As an example, a building with 20 units that is electrically sub-metered (20 residential accounts) with a commercial electric account for common areas and one commercial gas account serving a central heating/hot water system will likely qualify for incentives through both Multifamily and the Commercial & Industrial Multifamily programs. While this adds a layer of complexity for the Company, it is critical that the Company maintain accounting via these various program budgets in order to ensure equity for all customers funding energy efficiency through the energy efficiency program charge. In contrast, the customer will not need to deal with this added layer of complexity, and will instead receive a consolidated incentive for all efficiency work completed at the site.<sup>4</sup>

## **b. New for 2019**

### **i. Removing barriers to participation through refined program design**

A key theme for the 2019 multifamily retrofit program is to remove barriers that prevent customers from participating in the programs. In order to do so, the Company will make several changes to the program in order to serve more customers. Beginning in January, the Company's lead vendor for the multifamily retrofit program will begin serving individual condo-unit owners and utilize the time on-site as an opportunity for face-to-face recruitment of the other units at the facility. This not only has the benefit of ensuring each customer who wants to participate is served, but also helps increase condo unit participation which has traditionally been challenging. Further, the Company will target facilities that did not move forward with retrofits in years past due to low on-site participation. The Company may also remove the 5-year waiting period between assessments where savings potential is identified during the intake phone interview. This will allow individual customers to participate at a site where the prior tenant may not have taken advantage of the offer during the prior site assessment and will make available to customers new technologies that have been added to the program within the last few years.

For the customer who may not know what program best suits their needs, the Residential New Construction, Multifamily Retrofit, and the Small Business Direct Install

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<sup>4</sup> For the past four years National Grid has offered a Multifamily Coordinator for RI customers looking to participate in the multifamily program to reduce any confusion and ensure a smooth enrollment process.

programs have built channels of communication for 2019 to streamline customer intake processes and serve sites that did not fit into one of the traditional program structures. For example, a non-profit group home that serves at-risk children may now be served by the income eligible multifamily retrofit program if the offerings within that program are better suited to the needs of the customer. In all cases, the experience should be seamless.

**ii. Continued Focus on Finance Opportunities**

During 2018 the Company's lead vendor for multifamily services partnered with Ascentium Capital, LLC to offer financing to cover the customer co-payment portion of larger multifamily market-rate projects. As in years past, the Company will work with partners such as the Rhode Island Infrastructure Bank (RIIB), RI Housing, and other key stakeholders to explore new sources of capital and potential financial products and mechanisms such as on-bill repayment for residential customers. Additionally, the company will coordinate with housing authorities and developers as they undergo 15-year refinance cycles to ensure that energy efficiency upgrades and program incentives are considered during this important time.

## **6. Income Eligible Services (Electric and Gas)**

### **a. Overview**

National Grid's Income Eligible Services Program (IES) assists low-income customers in addressing energy affordability burdens by providing energy education, home energy assessments, insulation, air sealing, and replacement of inefficient heating systems, appliances, and lighting to reduce household energy burdens and improve overall comfort for occupants.

IES is a fuel neutral program (electric, gas, oil and propane) and is available for customers who live in 1-4 unit residences and who qualify for the National Grid discount utility rates (A-60 and or 1301 rates).<sup>5</sup>

The success of the Program can be attributed to several key elements of the program design:

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<sup>5</sup> These eligibility requirements are subject to change as a result of any regulatory directives, or as deemed necessary by the Company to enhance participation and/or savings.

- Streamlined contracting process between the Lead Vendor and the RI Community Action Programs (“CAPs”)
- Processes for leveraging funds, providing ongoing contractor training, and engaging with the six RI CAPs quarterly to ensure consistent implementation of best practices.
- On-going customer feedback and communication.

IES is administered through a lead vendor that is responsible for managing the implementation of IES work through the six Rhode Island geographically-based CAPs. The CAPs provide customer intake/eligibility qualification services, energy assessments, instant savings measures, and coordination of home performance contractors that install all weatherization measures and quality assurance/quality control.

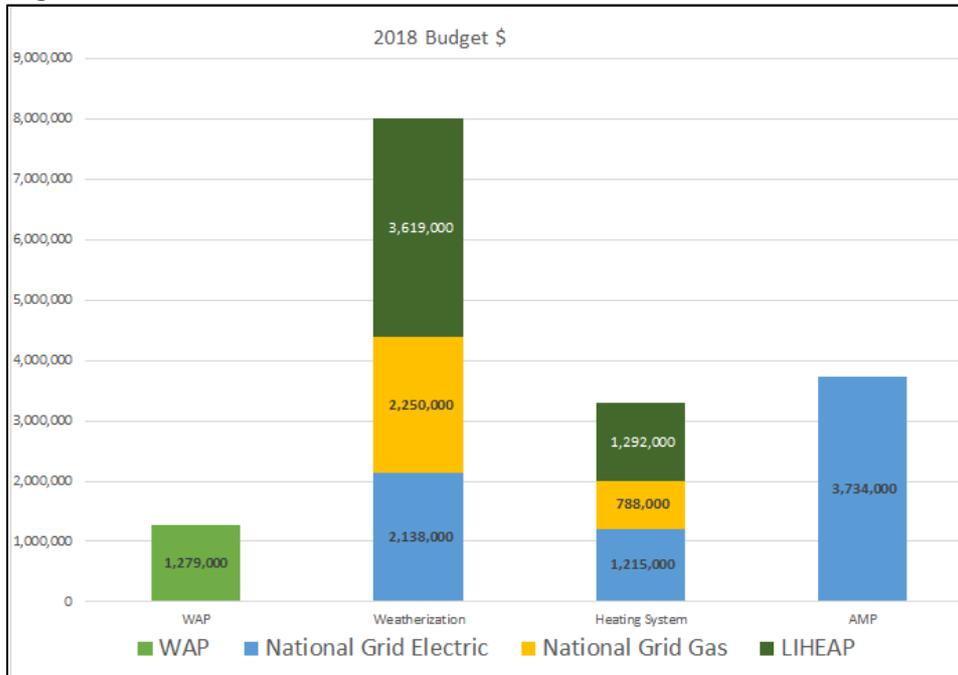
The program benefits from leveraging complimentary funds managed by the State of Rhode Island Department of Human Services (DHS) Weatherization Assistance Program (WAP)<sup>6</sup> and the Low Income Home Energy Assistance Program (LIHEAP)<sup>7</sup>. These leveraged funds amount to approximately 35% of total customer incentive benefits for weatherization and heating system replacements. These funds also allow customers to receive non-energy related health and safety improvements that would not be possible with rate payer dollars only. See Figure 5 below for an illustrative example representing 2018 funding.

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6 overseen by the U.S. Department of Energy

7 overseen by the U.S. Department of Health and Human Services

**Figure 5: 2018 Funding Sources that Provide EE Services for the Single Family Income Eligible Market**



**Table 4: Services Provided – IES Program and WAP/LIHEAP**

Single-Family Income Eligible Services (IES) Program*	Federally-funded Weatherization Assistance Program (WAP/LIHEAD)*
<ul style="list-style-type: none"> <li>• Conduct whole house Energy Assessment and provide customer education <ul style="list-style-type: none"> <li>○ Lighting and appliance (AMP) Assessment</li> <li>○ Heating and Weatherization Assessment</li> <li>○ Comprehensive Assessment</li> </ul> </li> <li>• Review utility bills</li> <li>• Replace incandescent and halogen light bulbs with LED light bulbs</li> <li>• Install smart power strips and domestic hot water measures</li> <li>• Talk with homeowner about</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct whole house audit/ energy efficiency evaluation (not appliances)</li> <li>• Install weatherization measures (insulation, air sealing, duct sealing)</li> <li>• Replace inefficient heating equipment if deemed inefficient or unsafe</li> <li>• Improve minor health and safety issues that are barriers to energy efficiency measures</li> <li>• Conduct field inspections and testing (quality assurance/quality control)</li> </ul>

<p>opportunities to save energy and money through weatherization and upgrading appliances and mechanical equipment.</p> <ul style="list-style-type: none"> <li>• Install weatherization measures if needed</li> <li>• Replace eligible appliances and heating, cooling and hot water systems (HPWH)</li> <li>• Conduct field inspections and testing, i.e., quality control and quality assurance</li> </ul>	
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\*Both the IES and the WAP/LIHEAP offer all services and products at no-cost to the customer.

In 2018, the IES Program added clothes washers and dehumidifiers to the list of no-cost measures. These products have been very well received and will continue in 2019.

**b. New for 2019**

**Researching the feasibility to add new measures including:**

**i. Cold climate mini-split heat pumps for electric resistance and delivered fuel heat customers**

The main objective of the IES Program is to provide comprehensive energy efficiency solutions that help to reduce energy costs and consumption and improve thermal comfort. As such, National Grid will install approximately thirty heat pump projects through the IES Program with the goal of gaining clarity on savings, customer acceptance, ease of use, added electric load (customers with/without a/c) as well as the up-front installation costs.

Eligibility criteria to take advantage of this offering are as follows:

- Completion of IES energy assessment and weatherization
- Existing electric resistance heat or delivered fuels
  - Generally paired with a/c to reduce the increase in load.
  - Eligibility of customers without existing a/c will be reviewed in 2019

This program will be implemented in coordination with the HVAC Electric program offering. HVAC contractors working solely on the IES will need to complete the HVAC

Electric Program's "Quality Installation Verification" training process to ensure that cold climate mini-split heat pump systems are sized and installed in accordance with manufacturer specifications, and that customers will be properly educated about appropriate use of the systems.

**ii. Increasing participation through coordination of multiple Income Eligible touch points**

In 2019, the IES Program will work with the Company's call center to provide targeted information to help Income Eligible customers to quickly understand the opportunity to participate in the IES program. The Company's call center is the customer service center that responds to inquiries about bills, services, energy efficiency, and other energy related questions. In 2019, call center representatives will answer a customer's initial question and then be able to see if a customer is on an income eligible rate and would be able to notify customers of upgrades that would be relevant to their specific situation (e.g. promoting cold climate mini split heat pumps to customers heating with oil heat and electric resistance heat).

In addition, the IES Program will work with organizations that work with the low-income market including Housing Authorities, Community Development Corporations, and cities and towns to continue to increase participation in this program.

**iii. Exploring Mutual Benefits for Improved Health and Utility-Run Energy Efficiency**

In 2019, the company will engage with local and national stakeholders and thought-leaders to discuss the interplay of benefits between the healthcare and energy industries. Recently, there has been increased focus across the country by thought leaders, such as the American Council for an Energy-Efficient Economy (ACEEE), on the health benefits associated with certain housing energy retrofit and rehabilitation measures that are offered through utility-run energy efficiency programs, with a special emphasis on opportunities within the income eligible population. The company will work with local and national stakeholders such as the Office of Energy Resources (OER), Rhode Island Department of Health, income eligible advocates and health care providers to consider issues such as, the monetary value of health benefits from energy efficiency measures, delivery models for measures that drive both health and energy savings, and possible co-funding opportunities where appropriate.

## 7. Residential New Construction (Electric and Gas)

### a. Overview

The Residential New Construction (RNC) Program utilizes the following resources to assist builders, developers, and owners to design and build energy-efficient single family and multifamily homes with lower operating costs and increased durability, comfort and safety:

- Code compliance and technical trainings
- Energy modeling and design assistance
- In-field inspections
- HERS Rating
- Optional ENERGY STAR® Homes verification for projects seeking the EPA label
- Complimentary ENERGY STAR bulbs and WaterSense® showerheads
- Financial incentives based on the level of the energy efficiency of the structure<sup>8</sup> and equipment.

In 2018 the RNC program continued to see strong enrollment, higher levels of energy efficiency, more electrically heated homes, and more multifamily developments. The Company also engaged the building community via a Zero Energy Marketing Forum, a Passive House Design Forum and an Energy Efficiency Listening Forum to assess the needs for building professionals to design and build zero energy and Passive House certified projects.

In 2019, the Company will incorporate the feedback from the three forums and will continue to offer technical training and envelope and equipment incentives and will add program elements and incentives to help the building community build zero energy or Passive House projects. In addition the RNC program will continue to seek adaptive reuse projects such as mill conversions. The Company will continue to work closely with the Rhode Island Builders Association to further refine program offering and promote program developments to the RI building community.

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<sup>8</sup> Compared to the energy baseline of the average energy performance of a home built in RI, referred to as the 2017 User Defined Reference Home (UDRH).

**b. New for 2019**

The RNC program’s baseline for efficiency is derived from the average energy performance of a home built in RI, referred to as the User Defined Reference Home (UDRH). The RNC program has a tiered energy-efficiency incentive structure that compares a home’s energy performance against the UDRH. In 2017, the RI UDRH was updated based on current industry practice, which resulted in a substantial increase in the efficiency level of this baseline. In 2018, the new UDRH presented a challenge for developers and builders to achieve incremental improvements above the RNC program baseline. As a result the RNC Tiers have been modified to accommodate the challenges while continuing to incentivize the projects that achieve very high energy efficiency.

The 2019 tiered incentive structure will be as follows:

<b>Tier Level</b>	<b>2017</b> % More Energy Efficient Than 2011 Baseline*	<b>2018</b> % More Energy Efficient Than 2017 Baseline**	<b>2019</b> % More Energy Efficient Than 2017 Baseline**
Tier I	15% - 30%	15% - 30%	15-24%
Tier II	31% - 44%	31% - 44%	25-34%
Tier III	45% or more	45% or more	35-44%
Tier IV			45%+

\*Based on the 2011 User Defined Reference Home

\*\*Based on the 2017 User Defined Reference Home

**i. Path to Zero Energy Ready**

The building community, and the outcomes of the following documents, [Rhode Island Residential Stretch Code](#), the [“Zero Energy Building Pathway to 2035, Whitepaper Report of the Rhode Island”](#), and the [“Energy 2035: Rhode Island State Energy Plan”](#) have helped to influence the need for – and development of – an energy efficiency incentive called the “Path to Zero Energy Ready” demonstration project that was launched in 2018 and will be continued in 2019 under the Residential New Construction Program (see Attachment 8, “Pilots”). This new path for incentives will use the existing

tiered energy efficiency performance levels offered in RNC (with the new adjusted tiers) as a prerequisite and will include additional incentives, that are offered through the Zero Energy Pilot Program, for reaching the following goals:

- All electric homes
- Photovoltaic (PV) ready and Electric Vehicle (EV) ready + building certification Department of Energy (DOE Zero Energy Ready Homes, the Passivhaus Institut (PHI)/Passive House Institute U.S. (PHIUS), Leadership in Energy and Environmental Design Homes LEED-H, and Living Building Challenge or ENERGY STAR Certified Home as a minimum)
- Compliance with the [Rhode Island Residential Stretch Code](#)<sup>9</sup>
- Other considerations for this pathway: demand response, smart home technologies, battery storage and energy monitoring systems.

The Path to Zero Energy Ready will also include education and awareness, training, professional certification, project certification and marketing and a model home that will be used as a demonstration for a set period of time.

The Company will continue working with Rhode Island Housing (RIH) and Rhode Island OER on issuing an RFP to solicit a team to design and construct a Zero Energy Building (ZEB) housing unit(s) to serve moderate income/income eligible residents in Rhode Island. The project will be required to employ solar PV and air-source or ground source cold climate heat pump technologies to achieve ZEB status which will be funded by OER. In 2019 the Company and OER may pursue a similar demonstration project, but targeted at the market-rate community.

## ii. **Shifting toward all electric homes**

A significant number of projects that are already in the RNC pipeline for both single family and multifamily have electric heat pump heat and hot water and more are expected to enroll in 2019. This shift will require the need for more up-front design and technical assistance for project-teams, for contractors to be properly trained to accurately size the equipment and homeowners to be educated on the use and performance of the equipment.

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<sup>9</sup> <http://www.energy.ri.gov/policies-programs/lead-by-example/rhode-island-stretch-codes.php>

### iii. **Open Home Energy Rater Market**

National Grid will continue to support the expansion of the local network of trained energy efficiency professionals by providing HERS training and encouraging certified HERS trainers to participate in the RNC Program. The goal is to have a model in which Rhode Island HERS Raters can compete effectively with other HERS Raters from surrounding states.

#### **c. Codes and Standards**

Since there remains an opportunity to realize energy savings through increased code compliance, the RNC program continues to support code trainings and engage stakeholders. The 2017 residential baseline study showed that, while compliance rates have increased since the start of this initiative, many projects still fail to meet all aspects of the state's building energy code. The savings potential of this program would increase in 2019 and beyond if the state were to complete its delayed energy code update.

*See the Commercial & Industrial plan filing for additional detail regarding the Company's Energy Codes and Appliance Standards support initiative.*

## **8. Behavior and Products Programs**

Behavior and Products Programs serve customers in a different way and at a different point-in-time than Whole Home Solutions. With the Whole Home Solutions, a customer may not be familiar with all aspects of energy efficiency but can rest assured they are learning more about their home from trusted energy professionals. Products Programs generally work with the customer during the point-of-purchase either in a retail environment or by energy professionals assessing heating and water heating systems whereas behavior programs target and influence "how" a customer interacts with those products.

For example, a customer may replace a household energy item upon failure and may not have spent much time researching varying options since the last time a similar product was purchased. Replacing light bulbs twenty-years ago required considering size and overall wattage. With today's lighting purchase, a customer could consider how bright they would like the light to be (lumens), the wattage, type of color, the number of lifetime hours, and the integration of smart technologies. Moreover, while switching to an efficient product is a great step, customers who leave lights running all day, or wash

clothes on the hottest setting, are not fully realizing the benefits of living an efficient lifestyle.

The above example highlights the need to educate customers about efficient products prior to the purchase period and the need to continue working with customers on how they interact with these products through the years. The education process can be a complicated endeavor since the challenge is to engage customers when they are not in the market for a new item, when a bad usage habit has already formed, and National Grid's messaging is competing against other life demands. In 2019, to reach a wider range of customers, the Company will consider how it could present efficiency solutions alongside renewable energy measures a customer may be considering.

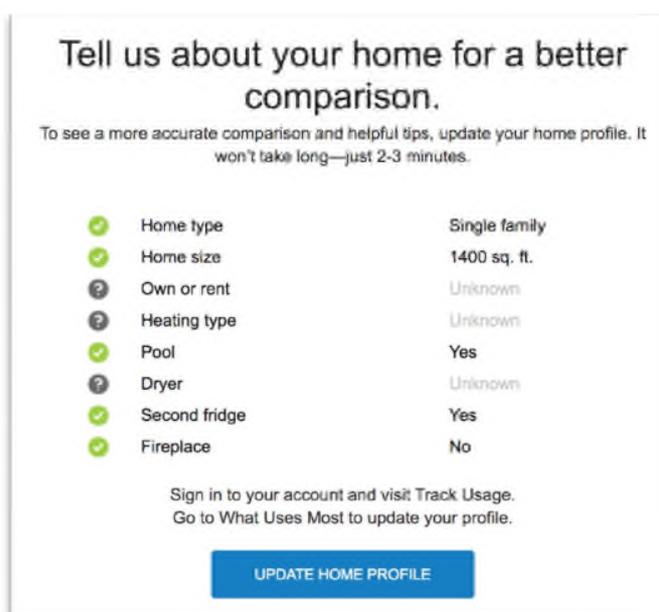
## **9. Home Energy Reports (Electric and Gas)**

### **a. Overview**

The Home Energy Reports (HER) program is the Company's key program to achieve energy savings through changes in customer behavior. This is achieved by presenting personalized energy usage data and encouraging desired behaviors to reduce energy consumption. Globally, over 15 million homes receive HERs from more than 100 utilities serviced by the Company's vendor. Since its launch in Rhode Island in April 2013, the HER program has helped the Company to achieve portfolio-wide savings goals while also maintaining cost efficiency.

The HER program is a territory-wide energy efficiency program that provides benefits for all Rhode Island residential customers. While over 288,000 customers receive HERs (i.e., the treatment group) by way of direct mail and/or e-mail, all account holders have access to insight into their energy consumption via the web tools located on the National Grid website. The program has evolved since 2013 from offering only mailed insights to now being integrated into the Company's website with online assessment tools, sending Non-Advanced Metering Infrastructure (AMI) High Usage Alerts, and utilizing segmentation to target different populations with relevant messaging.

**Figure 6: Invitation email for home profile update**



Program savings are derived from sending hardcopy or electronic HERs (eHER) with personalized energy insights, normative messages, efficiency tips and recommendations, and promotional messages for efficiency programs in the Company's wider portfolio. The program measures energy savings by comparing on-bill energy usage between a treatment group (customers who receive the HER) and control group (customers who do not receive the HER), using both pre

and post-treatment data (i.e. A Randomized Control Trial or RCT).

Since the country's first HER programs began in 2008, there have been numerous evaluations that validate the savings generated from these behavioral programs. Furthermore, while customers may move forward with taking an action such as changing their lighting to LED or purchasing a new piece of energy efficient equipment, the simple act of receiving the report alone may create habitual energy saving behaviors that account for the majority of savings attributed to the program<sup>10</sup>. The frequency or persistence of these habitual actions, such as turning off lights or adjusting the thermostat, is directly correlated to the cadence and even medium (i.e. print or digital version) of the reports.

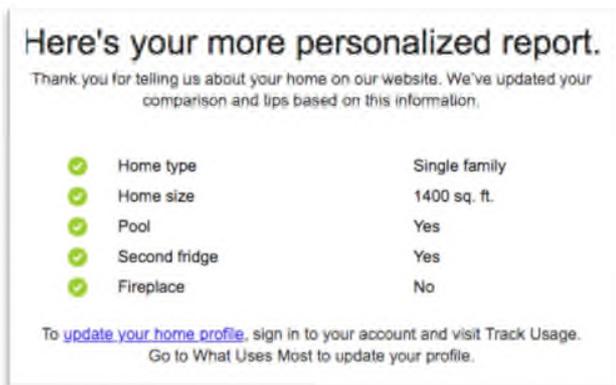
The program is administered by a Lead Vendor that developed and launched the first HERs in the country. Since 2013, the Company has employed the Lead Vendor to implement the HERs in all three of its jurisdictions (Massachusetts, New York, and Rhode Island). The Lead Vendor is responsible for maintaining HER distribution groups, tracking data, managing the Web Portal, and documenting energy savings. The Lead

<sup>10</sup> Khawaja, M. Sami and J. Stewart 2014. "Long-Run Savings and Cost-Effectiveness of Home Energy Reports Programs" Cadmus Group Inc. Winter 2014/15

Vendor works with the Company to craft the messaging and delivery of the HERs, and also works with the Company to introduce additional program enhancements, aligning with the Company’s state-wide comprehensive marketing efforts.

**b. New for 2019**

**Figure 7: Applied profile updates with personalized report**



**i. Improved Tip Targeting and Personalization**

Improvements to the tip targeting algorithm will be a focus of the 2019 program in order to include better “cross-channel smartness”, which avoids sending the same tip too often to customers, and an expanded set of recommendations with the most current technologies, like virtual assistant devices. Using device

detection algorithms, customer input from the Home Energy Analysis survey online, and utility-sourced data, electric vehicle and solar tips can be targeted towards customers that are most likely to benefit from and participate in these programs.

Electronic Home Energy Reports will begin to include annual or bill-level disaggregation pie charts of customers’ individual energy usage, helping them identify drivers of high bills. The reports will also pair these insights with specific tips to address the high-use categories. Additionally, customers who are consistently using more than their neighbors will receive an experience that tracks their progress towards reaching an attainable “neighbor rank goal”.

Further, the Company in 2019 is committed to identifying more customer attributes such as those who are disengaged, would benefit from income eligible offerings, or have the potential for solar or other renewable energy installations etc. The company will then send highly personalized reports based on the customers most important attributes.

## **10. ENERGY STAR® Lighting (Electric)**

### **a. Overview**

National Grid has offered residential lighting incentives since the mid 1990's and the savings from this program has consistently contributed to the overall residential portfolio. During the intervening decades, lighting technologies have changed for the better and combined with supporting legislation (Energy Independence and Security Act or EISA), a nearly, full market transformation of residential lighting is anticipated by the end of this decade. An energy efficient light bulb has become so synonymous with energy efficiency that it is frequently used to represent the "green" concept and National and Regional campaigns have revolved around challenging consumers to take the first step with installing an energy efficient lamp. Another nice aspect of lighting leading the efficiency charge was the low purchase cost and simplicity of installation and operation.

National Grid has been a leader in lighting market transformation through the early application of upstream and midstream lighting incentives thereby influencing more lighting products at retail shelves and encouraging retailers to stock more ENERGY STAR lighting products. This continuous program influence still impacts the overall marketplace today when compared to program states that have discontinued direct lighting support. A lighting evaluation completed this year in RI confirms the contributing impact that the program has achieved in transforming the RI lighting market. Another key strategy that has made the lighting program successful and created consumer engagement is quick, online flash sales. Customer response over the past several years to these short-term offerings has been robust. Finally, the use of a pop-up retailer that communicates the benefits of efficient lighting while selling the product at non-traditional retail locations supports education as well as energy savings.

### **b. New for 2019**

In 2019, the ENERGY STAR Lighting program will continue its market transformation including working with retailers to plan for the lighting market when LEDs are the standard for lighting. The most recent program year has concluded with the program exceeding the planned goal which limited some program activity. This year there will be a concerted effort to provide a robust budget and reach new retailers that have not yet participated in the program. A few external drivers that present uncertainty to the program include tariffs applied to Chinese made products, where the majority of light

emitting diode lamps (LED) are manufactured. There is also some discussion at the Federal level about rolling back the Energy Independence and Security Act (EISA) of 2007 in Washington D.C. which continues to increase lighting baselines through 2020. Both of these external factors have the potential to increase the prices of LEDs which will reinforce the value of the ENERGY STAR Lighting program.

## **11. Residential Consumer Products (Electric)**

### **a. Overview**

Residential Consumer Products incorporates both the federal Department of Energy and Environmental Protection Agency ENERGY STAR categories of consumer appliances and electronics as well as some energy savings items not included by the federal agencies. The largest savings element of the Consumer Products program comes from recycling older refrigerators, freezers, dehumidifiers, and low emissivity (low-e) storm windows. By removing these energy inefficient products from use, consumers can reduce household energy bills. The program also supports a combination of upstream and midstream incentives as well as post purchase consumer incentives. The upstream and midstream incentives encourage retailers and manufacturers to support ENERGY STAR with production and availability of products. Consumer incentives are designed to bring efficient products costs in line with less efficient equipment, thereby encouraging the adoption of the more efficient item.

In 2019, the program will support dehumidifiers, dehumidifier recycling, dryers, including heat pump dryers, refrigerator and freezer recycling, room air cleaners, room air conditioners, advanced power strips, efficient shower heads, and low-emissivity storm windows. Historically, the program has been most successful when there is continuity in product lines as well as incentive levels to reduce both retailer and consumer confusion. The rapidly evolving consumer marketplace has made continuous support challenging due to overall improvement of appliance and consumer electronics standards.

### **b. New for 2019**

In RI there are still numerous homes with single-pane glass windows. By installing lower cost storm windows, a homeowner can find increased comfort and energy savings. The low-e storm windows are priced at 20% over a clear storm window while providing an additional 50% of energy savings. The low-e storm window initiative will be designed

and tested in 2019. Considerations include the trade-off between reaching the largest number of purchasers versus getting specific information about the heating fuels used where windows are installed.

National Grid will also be looking for opportunities to incorporate new items as well as continuing to support consumer products that are cost effective.

## **12. High-Efficiency Heating, Cooling and Hot Water (Electric and Gas)**

### **a. Overview**

The electric and gas High-Efficiency Heating, Ventilation, Air Conditioning and Hot Water Programs (HVAC Programs) promote and incentivize the installation of high efficiency equipment through customer rebates and contractor incentives. Contractors are provided training opportunities and incentives to improve accuracy of equipment sizing, installation verification and distribution system improvements.

In the fall of 2018, the HVAC Electric Program added heat pump water heaters (HPWH) in a mid-stream delivery model in collaboration with Home Depot in Rhode Island. This model is designed to provide an instant rebate at point-of-purchase thus eliminating the time a customer waits for a rebate check. If this model is successful, the Program will see a significant increase in the quantities of products and corresponding budgets, and it could open the door to other products being offered in a mid-stream model and other points of sale in addition to Home Depot. At the time of writing this 2019 Energy Efficiency Plan, this initiative has not been launched, therefore it is unknown how the 2019 offer will be received in the market. However in 2019, the Company anticipates an increase in the quantity of HPWHs due to the mid-stream model.

In the fall of 2018, a new heat pump initiative will be launched. The program will provide incentives for 45 mini-split heat pump (MSHP) projects to replace electric resistance heating systems or displace/replace delivered fuel heating systems. At the time of writing this 2019 Energy Efficiency Plan, this initiative has not been launched, therefore it is unknown how the offer will be received in the market. However, with support from stakeholders and regulators, in 2019 the quantity of MSHP projects will nearly double in the HVAC program to support RI's greenhouse gas emissions reduction goals and Power Sector Transformation goals. If customers demonstrate strong participation in the heat pump initiative, the program will be considered for any

underspent funds that may become available when budgets are realigned during the year. The heat pump initiative will be promoted via targeted marketing to customers who have completed their home energy assessment and weatherization (market rate, multifamily and income eligible), contractor training, and community outreach.

A combination furnace (Combi-Furnace) also called Natural Gas Furnace w/electronically commutated motor (ECM) and On-Demand Domestic Hot Water was added to the HVAC Gas Program in response to customer and contractor request.

In 2019, the Program will work with stakeholders to focus on opportunities to add quality/verified installation programs. The program will focus on providing superior duct sealing incentives, correcting airflow and charge and using technology to monitor system performance.

In 2019, the Company will continue coordination between the High Efficiency Gas Program and the Gas Sales Program to promote high efficiency heating systems during the gas conversion process. This seamless integration will provide the maximum value for the customer at the time of conversion – when energy efficiency improvements make the most sense.

## **b. New for 2019**

### **i. Heat Pump Initiative**

At the Open Meeting on August 3, 2018 regarding Docket Nos. 4770/4780, the PUC directed the Company to include the heat pump rebates, proposed in these dockets as the Electric Heat Initiative, to be funded through the Company's energy efficiency programs.

In accordance with this directive, and in-depth conversations with RI stakeholders, the Company has further increased the planned heat pump installations in this Plan, expanding the program scope significantly in 2019. The HVAC electric program will include:

- Nearly double the quantity of heat pump projects offered in 2019 compared to 2018.

<b>Electric Heat Opportunity</b>	<b>2018</b>	<b>2019</b>
Oil/propane displacement	15	40
Oil/propane replace on failure (ROF)	5	5
Electric resistance	25	40

- Oil/propane dealer training and technical support
- Community challenge to complete electric heat installations in four communities.

Eligible customers will need to have completed their energy assessment and weatherization. The EnergyWise, Multi-Family and Income Eligible Services Programs will promote the heat pump initiative through their respective retrofit programs. And the residential new construction program will work with project teams to develop all-electric homes.

The overall heat pump initiative will be run through the HVAC electric program and will entail the following:

- Assessing and refining equipment incentives for market rate, multifamily and income eligible customers
  - The Company seeks to reduce and standardize installation costs and will work with stakeholders to establish equitable costs and incentives.
- Community-based marketing
  - The four towns that will be part of the 2019 Community Initiative will have heat pumps as one of the performance metrics in their program. The Company will work with the towns to provide marketing materials and education about the program. Programs such as the MA HeatSmart program will be considered as a possible model.
- Oil/propane dealer and HVAC contractor training and support for the installation of heat pumps. The training program will work with heat pump manufacturers and other stakeholders to support accurate sizing, installation and sales training

for oil dealers and HVAC contractors. The training will align with the MassSave program in order to encourage consistency. The program team will engage stakeholders including the Energy Efficiency Resource Management Council (EERMC) Consultant team to develop and implement any needed contractor installation guidelines, consumer education and materials.

The heat pump initiative team will participate in regional heat pump/strategic electrification working groups such as NEEPs Cold Climate Air Source Heat Pump Working Group. Other NEEP engagement will include contributing to a study that is aimed at demonstrating integrated control strategies to maximize usage of ductless mini-split heat pumps and identify additional savings. In addition, the Team will work closely with OER, the Collaborative, EERMC, contractors and customers to obtain feedback for implementing and/or improving the program.

**ii. Central Air Conditioners**

Because central air conditioners (CAC) place a large demand on the grid, the HVAC Electric program will launch an Early Retirement HVAC program in 2019. The HVAC Electric team will work closely with the RI EnergyWise team and RI HVAC contractors to identify customers that could be eligible for early replacement of their CAC. In addition the Company will review possibility of pairing with solar PV promotion to offset coincident demand.

**iii. Gas Equipment and Marketplace**

In 2019, the Gas Program will re-introduce the Indirect Hot Water Heater to provide customers another high efficiency water heating option. In addition, the Online Marketplace will be updated to provide customers online access to instant incentives on programmable and wireless thermostats and other small measures that align with customer self-install products such as showerheads.

## **13. Community-Based Initiatives**

**a. Overview**

The Rhode Island Community-Based Initiative is the Company's energy efficiency awareness campaign that drives program participation by deep municipal engagement through the advocacy of local officials and town residents. The Company provides goals for efficiency measure increases and small business program projects to municipalities. These municipalities, in turn, work to achieve the goals with the help of volunteers and

promotions at local events. Small businesses are invited to workshops organized in conjunction with the local chamber of commerce or other local business organizations. These workshops will inform customers about the National Grid Small Business Direct Install Program, Commercial Property Assessed Clean Energy (C-PACE) financing, and demand response.

Start-up funding is provided to the municipality, along with comprehensive marketing toolkits and training to have a discussion about energy efficiency with their residents and small businesses. Frequent check-in calls allow the communities to speak with the Company regarding progress and share tactics and ideas with other participating municipalities. At the end of the year, municipalities earn grant monies directly correlated to the increase in volume of the identified goal. These funds are then utilized for energy saving projects on a municipal property, or on educational energy programs for community members.

#### **b. New for 2019**

In the first quarter of the year, the Company will recruit<sup>11</sup> four (4) Rhode Island municipalities based on past program participation and possible demand response opportunities. The initiative will coordinate with the System Reliability Procurement (SRP) team to determine if the RI System Data Portal (Portal) which was developed in 2018 could be a valuable tool for the use of educating towns. The Company will provide goals to these municipalities based on increases in energy efficiency measure adoption, demand response program enrollment, small business projects, and more.

A major focus for 2019 will be the promotion of new technologies within the communities such as cold climate mini-split heat pumps, Wi-Fi Thermostats, and demand response offerings. The Company will also create case studies highlighting the efforts of the municipality and the energy saving projects that were installed as a result of the program, thus informing all residents of the contribution they made to the betterment of their community.

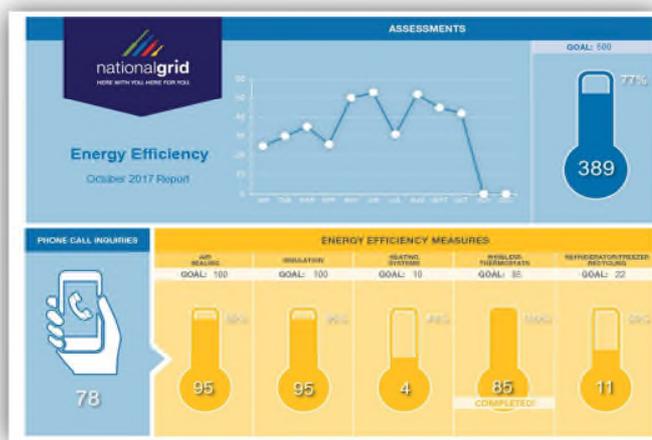
In 2019 the Community Initiative will expand to include large commercial and industrial customers as well as the municipal buildings themselves. By bringing awareness and

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<sup>11</sup> In addition to the company actively recruiting participants, a new landing page on the Company website is currently being created through which all interested communities or residents may contact the program manager and express interest in participation.

recognition of energy efficiency efforts at the corporate and municipal levels to employees, the Company can broaden its reach to these sectors.

**Figure 8: Sample community report card**



Additionally, the Company commits to promoting workforce development through the creation of customized materials which municipalities may distribute as part of the program. Where appropriate, the Company will

also promote the hosting of workforce and code trainings within the communities.

## 14. Residential Connected Solutions

National Grid will implement an active demand reduction program based on the recent evaluated demonstration efforts. National Grid ran residential active demand reduction demonstrations in the summers of 2016, 2017, and 2018 targeting summer cooling loads. The Company believes the modifications made to the demand response program due to lessons learned during the demonstration will allow the program to reach scale and operate cost-effectively.

In 2019, the core model remains focused on reducing cooling demand during summer peak events, typically targeting twenty hours per summer. National Grid may have to consider more hours to ensure the peak hour(s) achieve demand reduction. The design is a bring-your-own-device (BYOD) model, starting first with communicating thermostats (typically Wi-Fi) controlling central air units. Additional eligible connected /communicating devices may include batteries, lighting, water heaters, pool pumps, electric vehicles, and other devices. Incorporation of additional devices will depend on device saturation, manufacturer concentration, and the costs associated with integrating and enabling load control on each type of device. Customers with eligible technology will be offered the opportunity to enroll in the active demand offering and

given financial incentives to participate in demand reduction during summer peak events. Connected Solutions will seek to enroll both customers with devices already installed and customers installing devices through the energy efficiency delivery pathways.

Eligible customers' devices will be connected to a platform through an application programming interface (API), a mechanism that allows two different electronic systems to exchange core data and interact in a common language. Program Administrators will send a signal to the device during an event that causes the controller to reduce the demand of the connected device. Events will be called in advance, primarily in the months of June, July, August, and September.

## **15. Marketing**

### **a. Overview**

The goals of the Company's marketing efforts are to build awareness, educate customers, provide a positive customer experience, and drive participation in the Company's efficiency offerings and services. The Company uses an integrated approach with general awareness tactics (i.e. print ads and radio) as well as digital and direct one-to-one tactics (such as e-mail and direct mail) at the program level to generate interest, in addition to face-to-face interactions at events to educate customers at a personal level.

The Company promotes energy education to private and public schools and youth groups through the National Energy Education Development (N.E.E.D) Program. This program provides curriculum materials and training to students and teachers in grades K-12.

### **b. Delivery and 2018 Success**

Rhode Island continues to see strong residential customer familiarity levels of energy efficiency, up nearly 5 percentage-points year-to-date (as of July, 2018). In support of growing familiarity with energy efficiency programs, the Company launched a broad-based, offline energy efficiency awareness campaign inclusive of broadcast and cable TV, radio, and print. This combination of offline channels has shown significant impact on online metrics, tying broad-based, high-frequency awareness channels to consumer interest and intent to participate. Year to date, the Company has seen a 10% increase in website visits, and 71% increase in on-site conversion related actions.

In addition, the Company set several key strategic marketing approaches to meet 2018 goals. These approaches were included as part of an overarching strategic marketing plan and were developed based on residential customer research, propensity modeling, media habits research and understanding behavior data. One key strategy incorporated in 2018 was to re-orient the marketing approach to better support customers during their decision journey. Recognizing that consumer purchasing behaviors are continually changing, the 2018 business to consumer (B2C) marketing effort sought to adapt to these habits, shifting the strategic approach to be more considerate of the customers experience in their daily lives. Four stages of the customer journey were identified as key insertion points to connect to the consumer: Awareness, Desire, Consideration, and Conversion.

B2C programs and products were grouped into two categories (Whole Home Solutions & Home Products) to better align with the customer behavior. Whole Home Solutions products and programs were classified as those that required a more long-term decision-making process, research, planning, and greater monetary investment (ex. a heating system replacement). Home Products were classified as a purchase driven by need or promotion with a lower cost investment (ex. LED bulbs).

Whole Home Solutions and Home Products each supported specific stages of the customer journey with corresponding media tactics to align with micro-moments within the customer journey. For Whole Home Solutions, large canvas channels such as native and print as well as digital channels across devices were utilized. Home Products were supported in large part by the ecommerce promotions with special offers as well as Facebook and Paid Search to drive online sales.

### **c. Energy Innovation Hub**

The Rhode Island Energy Innovation Hub (Hub), located in the southwest corner of the Dunkin' Donuts Center, Providence, RI, is a community engagement destination designed to expand customer education and outreach and enrich the customer's understanding of energy. The space and exhibits reflect energy solutions accessible to all customers, innovative solutions for system reliability and provide visitors with a vision of a sustainable future. Exhibits present technologies available to create smart, energy-efficient homes, information about demand response programs, examples of renewable technologies, information on electric vehicles, storm management and core utility services. The exhibits are designed to encourage customers to take action and

sign up for the many services and incentives offered to help reduce energy consumption. The Hub also serves as a convening space for gatherings to discuss, and elevate, energy-related issues.

The three main goals of the Hub are to educate customers about energy topics, empower customers to take action to sign up for ways to reduce their energy consumption, and to provide a convening space for organizations to discuss the clean energy future.

The Hub is available on Thursdays for organizations to hold private meetings and events. The Company continues to reach out to organizations that have a role in the RI energy market to encourage them to visit the Hub as well as reserve the space for meetings:

- State and local government
- Non-Profit organizations
- Businesses (owners, developers, tenants)
- Residents
- Energy Thought Leaders
- Universities and Colleges, Technical/Vocational Schools, Schools K – 12
- Trades
- Employees and Executives

By partnering with local colleges and universities the Company envisions the Hub as a multi-faceted nexus thriving with innovation, excitement and passion. The Company employs local college students to work as interns and encourages the students to invite faculty and classmates to translate their traditional course work in ways that could benefit the energy market. The Company hopes that by engaging many levels of expertise that the Hub will serve as a platform to bring the topic of energy to everyday studies and elevate the conversation around creating clean energy solutions for the future.

## **16. Residential Measures and Incentives**

The following tables list the groups of measures offered in the residential programs, their planned quantities and incentives. Each group may be comprised of many measures.

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Electric Programs			
Program	Measure	Units	Incentive
EnergyWise Single Family	ACTIMER1	13	Average Incentive based on measure mix
	AERATOR - Dual Fuel Only	12	
	Air Sealing Kit (Oil)	83	
	LED Bulbs	205,000	
	LED Outdoor Fixture	3,481	
	Pre-Wx	513	
	Refrig rebate	91	
	Refrigerator Brush	8,486	
	SHOWERHEAD	237	
	Smart Strip	15,375	
	THERMOSTAT - Elec Heat only	864	
	THERMOSTAT - Oil Only	55	
	LED TORCHIERE1	2	
	VENTILATION - OTHER	41,072	
	WiFi Thermostat	372	
	Wx - GAS	2,049	
	Wx - OIL	1,538	
	Wx Elec - Elec Heat only	392	
Pipe Insulation	1,978		
Participant	10,250		
EnergyWise Multifamily	Participant	4,000	Average Incentive based on measure mix
	AERATOR	500	
	AERATOR OIL	40	
	AIR SEALING ELEC WITH AC	1,461	
	AIR SEALING OIL	51	
	Common Ext LED Fixture	1,200	
	Common Ext Reflector	200	
	Common Int LED Fixture	2,000	
	Common Int Reflector	400	
	Dwelling Ext LED Fixture	50	
	Dwelling Ext Reflector	3	
	Dwelling Int EISA Exempt	2,500	
	Dwelling Int Reflector	2,630	
	INSULATION ELEC WITH AC	1,100	
	INSULATION OIL	117	
	Pipe Wrap DHW Oil	65	
	Pipe Wrap Heating Oil	14	
	Refrig rebate	19	
	SHOWERHEAD Elec	220	
	SHOWERHEAD Oil	66	
	Smart Strip	4,000	
	THERMOSTAT Elec with AC	1,600	
	THERMOSTAT OIL	37	
	TSV Showerhead Elec	65	
	TSV Showerhead Oil	39	
	Common Ext LED Bulbs	1,310	
	Common Int LED Bulbs	4,370	
	Dwelling Int LED Bulbs	15,850	
Custom	17		
Vending Miser	9		

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Residential New Construction	CODES AND STANDARDS	1		
	CP Home	30		
	CWASHER	60		
	DISHWASH	495		
	FIXTURES	300		
	LED Bulbs	2,000		
	Renovation Rehab CP	50		
	Refrig rebate	614		
	Renovation Rehab Tier 1 Home	30	Average Incentive based on measure mix	
	Renovation Rehab Tier 2 Home	5		
	Renovation Rehab Tier 3 Home	1		
	Renovation Rehab Tier 4 Home	7		
	SHOWERHEAD	10		
	Tier 1 Home	65		
	Tier 2 Home	35		
	Tier 3 Home	7		
Tier 4 Home	7			
Adaptive Reuse	225			
ENERGY STAR®HVAC	ACQIVES	65		\$ 175
	ACS16SEER13EER	385		\$ 250
	DOWNSIZE	49		\$ 250
	DUCTSEAL1	5		\$ 100
	Early Replacement AC - SEER 16 (EE)	12		\$ -
	Early Replacement AC - SEER 16 (Retire)	12		\$ 750
	Early Replacement HP - SEER 16 (EE)	3	\$ 750	
	Early Replacement HP - SEER 16 (Retire)	3	\$ -	
	Early Replacement HP - SEER 18 (EE)	3	\$ 1,000	
	Early Replacement HP - SEER 18 (Retire)	3	\$ -	
	ECM Pumps	5,000	\$ 100	
	HP Mini-split QIV	75	\$ 175	
	HPS16SEER8.5HSPF	24	\$ 250	
	HPS18SEER9.6HSPF	15	\$ 300	
	HPS18SEER9HSPF Mini-Split	385	\$ 250	
	HPS20SEER11HSPF Mini-split	501	\$ 500	
	WiFi Thermostat - cooling and oil htg	121	\$ 75	
	WiFi Thermostat - cooling and gas htg	1,140	\$ 75	
	Oil Fuel Switching	40	\$ 2,400	
	Oil Fuel Switching ROF	5	\$ 2,400	
Electric Resistance Fuel Switching	40	\$ 2,400		
Water Heater, Heat Pump <55 gallon	800	\$ 750		
Water Heater, Heat Pump >55 gallon, UEF 2.70	15	\$ 150		
ENERGY STAR® Products	Dehumidifier Rebate	1,093	\$ 30	
	Dehumidifier Recycling	516	\$ 30	
	Energy Star Dryer	792	\$ 50	
	Freezer Recycling	518	\$ 50	
	Ladybug Electric	60	\$ -	
	Ladybug Gas	5	\$ -	
	Ladybug Other	5	\$ -	
	Pool Pump - variable	250	\$ 500	
	REFRIG RECYCLING	2,435	\$ 50	
	Refrigerator Recycling (Primary)	2,258	\$ 50	
	Roadrunner Gas	7	\$ 15	
	Roadrunner II Electric	72	\$ 15	
	Room Air Cleaners	300	\$ 40	
	Smart Strip	7,411	\$ 10	
	Tier 2 APS	4,294	\$ 35	
	Room Air Conditioners	346	\$ 40	
	Storm Windows	100	\$ 25	
	Storm Windows Electric	100	\$ 25	
Storm Windows Others	100	\$ 25		

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ENERGY STAR® Lighting	LED Bulb	1,195,100	\$ 2.60
	LED Bulb (Specialty)	237,987	\$ 3.40
	LED Bulb (Hard to Reach)	547,700	\$ 3.50
	LED Bulb (Food Pantries)	120,000	\$ 6.00
	LED Bulb (School Fundraiser)	8,183	\$ 6.00
	LED Bulb (Reflectors)	411,778	\$ 5.00
	LED Bulb (Fixture)	518,593	\$ 9.00
Home Energy Reports	New Mover electric	27,705	\$ 8.68
	New movers dual fuel	16,065	\$ 8.68
	Opt-out dual fuel	100,468	\$ 8.68
	Opt-Out electric	146,911	\$ 8.68
Single Family - Income Eligible Services	ACREPLACE	1,290	Average Incentive based on measure mix
	APREMOV	5	
	Dehumidifier Rebate	600	
	Early Retirement CW Elec DHW & Elec Dryer	168	
	Early Retirement CW Gas DHW & Elec Dryer	468	
	Early Retirement CW Elec DHW & Gas Dryer	11	
	Early Retirement CW Oil DHW & Elec Dryer	372	
	Early Retirement CW Gas DHW & Gas Dryer	168	
	Early Retirement CW Propane DHW & Elec Dryer	9	
	DHWELEC	20	
	DHWGAS	20	
	DHWOIL	20	
	EDUC - TLC	3,000	
	FREEZER	210	
	HEATSYSTEM	360	
	LED Bulbs	60,000	
Programmable Thermostat, Gas	10		
Programmable Thermostat, Oil	10		
Programmable Thermostat, Other	10		
EnergyWise Income Eligible Multifamily Retrofit	Refrig rebate	1,950	Average Incentive based on measure mix
	Smart Strip	3,900	
	WATERBED	3	
	Wx DelFuel	510	
	Wx Elec	24	
	Minisplit Heat Pumps - Electric Resistance	15	
	Minisplit Heat Pumps - Oil Fuel Switching	15	
	AERATOR Oil	400	
	AIR SEALING OIL	196	
	Common Ext LED Fixture	1,100	
	Common Ext Reflector	66	
	Common Int LED Fixture	8,740	
	Common Int Reflector	57	
	Custom	40	
Dwelling Ext LED Fixture	6		
Dwelling Int LED Fixture	1,700		
INSULATION OIL	25		
Participant (NEB)	5,000		
Pipe Wrap DHW Oil	100		
Refrig rebate	23		
SHOWERHEAD Elec	300		
Smart Strip	1,200		
THERMOSTAT OIL	50		
Common Int EISA Exempt	360		
Dwelling Int Reflector	100		
Vending Miser	4		

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Residential ConnectedSolutions	Thermostats New	805	\$ 45.00
	Thermostats Existing	1,674	\$ 25.00
	Battery Daily (number of unit)	50	\$ 1,600.00
	Evs Peak (customers)	37	\$ 100.00
	Water Heater Daily (units)	10	\$ 25.00
	Behavioral Peak (customers)	286,703	\$ -

Gas Programs			
Program	Measure	Units	Incentive
EnergyStar® HVAC	BOILER RESET	20	\$ 100
	Boiler90	200	\$ 450
	Boiler95	325	\$ 800
	COMBO CONDENSING	85	\$ 600
	COMBO CONDENSING 95	700	1,200
	COND WATER HEATER 0.80 UEF	5	\$ 250
	Furnace95ECM	345	\$ 300
	Furnace97ECM	40	\$ 500
	HEAT RECOVERY VENT	5	\$ 250
	WATER HEATER .64 UEF (med draw)	40	\$ 100
	WATER HEATER .68 UEF (high draw)	40	\$ 100
	ON DEMAND WATER HEATER 0.87 UEF	350	\$ 600
	WiFi Thermostat - cooling and htg	250	\$ 75
	WiFi Thermostat - gas ht only	750	\$ 75
Programmable Thermostat	60	\$ 25	
Combo Furnace	90	\$ 700	
EnergyWise	Aerator	160	Average incentive based on measure mix
	Weatherization	2,300	
	Air Sealing Kit (Gas)	500	
	Showerhead	300	
	Pipe Wrap	5,000	
	THERMOSTAT	410	
	WiFi THERMOSTAT	200	
EnergyWise Multifamily	Air Sealing	3,900	Average incentive based on measure mix
	Custom Non-Lighting Participant	58	
	Participant	4,000	
	Duct Sealing	10	
	Faucet Aerator	1,866	
	Insulation	3,200	
	Pipe Wrap (Water Heating)	882	
	Programmable Thermostat	833	
	Thermostatic Shut-off Valve	300	
Home Energy Reports	TSV Showerhead	519	Average incentive based on measure mix
	WiFi thermostat gas	500	
	New movers dual fuel	14,520	
	Opt-out dual fuel	75,803	\$ 3.86
	Opt-out gas only	17,091	\$ 3.86

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Gas Programs			
Program	Measure	Units	Incentive
Residential New Constructon	CODES AND STANDARDS	1	Average incentive based on measure mix
	CP	35	
	CP-DHW	35	
	RR CP	30	
	RR CP-DHW	30	
	RR Tier 1	48	
	RR Tier 1 - DHW	48	
	RR Tier 2	20	
	RR Tier 2 - DHW	20	
	RR Tier 3	1	
	RR Tier 3 - DHW	1	
	SHOWERHEAD	50	
	Tier 1	73	
	Tier 1 - DHW	73	
	Tier 2	70	
	Tier 2 - DHW	70	
	Tier 3	26	
	Tier 3 - DHW	26	
	Tier 4	10	
	Tier 4 - DHW	10	
Adaptive Reuse	75		
Single Family - Income Eligible	Heating System Replacement	220	Average incentive based on measure
	Weatherization	600	
Income Eligible Multifamily	Air Sealing_LI	1,554	Average incentive based on measure mix
	BOILER Commercial_LI	32	
	BOILER_LI	15	
	CUST NON-LGT_LI	50	
	Faucet Aerator_LI	4,800	
	Insulation_LI	1,884	
	Low-Flow Showerhead_LI	1,100	
	Participant (NEB)_LI	3,500	
	Pipe Wrap (Water Heating)_LI	700	
	Programmable Thermostat_LI	350	



# 2019 Commercial and Industrial (C&I) Energy Efficiency Solutions and Programs

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## 1. Introduction

The 2018-2020 Three-Year Plan details four central principles that encompass an advanced and innovative approach to serving commercial and industrial (C&I) customers and the building industry at large. These four principles are apparent in all aspects of the 2019 Plan and incorporated in the planning process, which included many brainstorming sessions from internal teams to external stakeholders. In addition, each of the Company's programs and the strategies, initiatives, demonstrations, and assessments contained within, are focused on meeting the needs of customers, the environment, and preparing for the future. The plan looks to integrate financing in the large commercial, small business and community initiatives. Below are the four key priorities the Company has identified in the 2018–2020 Three-Year Plan.

**Customers** - Deliver comprehensive services encompassing all market segments and customers. Such services will enable customers to control their energy use, manage their peak energy use, reduce their bills, and help support their financial well-being.

**Least Cost** - Deliver energy efficiency services as cost-effectively as possible through optimizing finance and promoting upstream initiatives. Continuing to deliver cost effective energy savings under Least Cost Procurement will create cost savings to all customers, while creating economic benefits that create and maintain local jobs and businesses.

**Environment** - Provide solutions that minimize greenhouse gas emissions and contribute to Rhode Island's clean energy policy goals, including the Resilient Rhode Island Act.

**Future** – Innovate to capture savings from new technologies and strategies to position energy efficiency programs for the future including the integration of energy efficiency with demand response, renewable energy, and smart grid technologies. This includes incorporating outcomes from the Rhode Island Power Sector Transformation Initiative and Docket 4600.

Affordability and financing for the Company's customers are important criteria to achieve all the energy efficiency strategies and innovations that the Company is proposing in this plan. The Company has worked closely with both The Rhode Island

Infrastructure Bank (RIIB) and outside sources of capital over recent years to assemble a set of offerings that allow nearly every type of building and project to be financed. National Grid, along with its partners, will continue to educate the market on these mechanisms and provide guidance to customers on which choices may be best for their particular project.

## **a. Structure of C&I Energy Efficiency Programs and Initiatives – Attachment 2**

### **Four Main C&I Themes**

1. **Better Customer Experience:** The Company believes that customer experience is prioritizing the customer's wants and needs and keeping central to the Company's business strategy for energy efficiency programs and peak demand reduction programs. Understanding the customer journey is about learning what customers experience from the moment they begin considering energy efficiency, and then working to make the journey toward energy efficiency solutions as simple, clear, and efficient as possible.
2. **Market Sector Approach:** The reasoning for this approach is simple: success lies in demonstrating a deep understanding of the customer's requirements, of their needs that are directly shaped by the industry and geographies in which the customers operate, and on the industry or sectors strategic and commercial pressures. A sector approach allows us to customize solutions that fit the customers' needs and increase participation in energy efficiency.
3. **Affordability and Financing:** An important goal of the Company's programs is to help minimize these upfront project costs so building owners are encouraged to invest in more comprehensive energy efficiency improvements and significant retrofits.
4. **Education, Awareness and Trainings:** Education, information and awareness are the first steps to making informed decisions. The Company will focus on all opportunities that help customers in RI become aware, educated and informed about energy efficiency so that they can participate in energy efficiency and help the state achieve its environmental goal.

#### **Four Types of Programs**

1. Large C&I New Construction – Focuses on offerings that target ground up new construction, major renovations, tenant fit-outs and end of life replacement equipment.
2. Large C&I Retrofit – Focuses on all services and technologies towards retrofits needed for existing buildings.
3. Small Business/ Direct Install (SMB/DI) – Focuses on providing turn-key solutions to many types of small businesses.
4. Demand Response programs - Focus on reducing peak electric demand and associated costs for large commercial customers. For small commercial customers peak demand reduction will be through direct load control technologies.

It should be noted that the offerings for Large C&I New Construction and Retrofit Programs are also available to small business customers.

The Appendices provide further details to the three programs mentioned above. The following figures and tables are available in the appendix:

1. Sample list of custom measures for New Construction and Retrofit Programs
2. Program logic model for Retrofit Program
3. Program logic model for New Construction Program
4. Goals and incentive description of each of the electric sub-programs
5. Goals and incentive description of gas program measures

## **2. Central Themes for Efficiency**

### **a. Better Customer Experience & Analytics**

The following sections describe the four broad areas mentioned previously and how they will connect with all the C&I energy efficiency programs and strategies: Large Commercial New Construction, Large Commercial Retrofit, Small Business Direct Install, and C&I Connected Solutions (Demand Response).

#### **i. Improving Quality and Efficiency in Project Cycle Times**

The Company is committed to providing customers with a more expedited project initiation and incentive application (transactional) experience. The Company continues

to look for process improvement relative to processing applications, and the building Technical Assistance (TA) review process. Early in 2018, the Company began designing and implementing a new web-based portal for customers to create and submit fully digital incentive applications replacing the PDF based forms that have been used for years. This new portal, Rhode Island Digital Application Portal, (RIDAP) will greatly improve the customer experience, accelerate application review and incentive payments, and potentially increase participation. RIDAP will be fully in place by the beginning of 2019.

#### **ii. Data Analytics**

National Grid, like many other utilities and other companies around the globe, is focused on how data can improve its decisions, inform its strategic planning, and understand its customers more completely. The Company plans to use a non-customer facing intelligence software platform, that will help with customer insights and enhance customer satisfaction. The software platform enable sales, marketing, and account management teams to connect the right customer to the right offer at the right time, driving customer conversion. This platform will also allow the Company to drive higher awareness and participation in programs by allowing for more impactful interactions with customers that deepen the value of energy projects. The Company will continue to examine new pathways to obtain more detailed information on its large customers that will drive a more targeted approach to customers and hence higher participation.

#### **iii. Tools for Customers' Management of Energy Usage**

The Company intends to help customers access their energy data to allow for greater awareness of energy consumption. The Company will seek to achieve this through the various methods described below:

#### **iv. Automated Benchmarking Systems**

National Grid has developed a path towards automating data uploads into Energy Star's Portfolio Manager. The Company acknowledges automated usage data transfer to customers as an important tool in the future for building labeling intentions, supporting prior OER commitments to support state/municipal facilities improvements, and as a tool for helping customers better understand their energy usage. In 2019 customers can automatically upload aggregate, whole building energy usage data, both electric and gas onto the Portfolio Manager and will allow building owners and stakeholders to

benchmark energy usage and performance and compare usage to similar buildings nationally. This process will also support the City of Providence’s building energy reporting and disclosure ordinance that the City is planning to implement in 2019. The ordinance will require building owners of large and medium sized buildings to report their annual energy use. The goal of this ordinance is to make building owners and operators more aware of their energy usage and help them improve energy efficiency of their buildings. The Company is currently supporting the City’s stakeholder process for the co-creation of this ordinance.

The Company will support benchmarking with customer support on automating data uploads as well as provide access to EPA training on Portfolio Manager. Additionally the Company will send marketing and informational emails to customers to inform them of the automated benchmarking process. The Company will also explore embedding benchmarking into its program offering process in 2019. The Company will provide a call in number to support customer questions related to the automated benchmarking process.

**v. Green Button**

The Green Button initiative is an industry-led effort that responds to a White House call-to-action to provide utility customers with easy and secure access to their energy usage information in a consumer-friendly and computer-friendly format. Customers are able to securely download their own detailed energy usage with a simple click of a literal “Green Button” on electric utilities’ websites.<sup>1</sup> In 2016-2017, more than 500 C&I and residential customers downloaded their energy use data with Green Button. This included both gas and electric customers. In 2019, National Grid plans to examine *Green Button Connect My Data*. *Green Button Connect My Data* is a new capability which allows utility customers to automate the secure transfer their own energy usage data to authorized third parties, based on affirmative (opt-in) customer consent and control.

**vi. Building Labeling**

The Company will continue to work with the Office of Energy Resources (OER) and other stakeholders to identify strategies for building labeling in the commercial and multifamily real estate sectors in Rhode Island. Building labeling will provide greater

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<sup>1</sup> <https://energy.gov/data/green-button>

transparency in the energy performance of a given building. This initiative, currently led by OER, is working to establish building labeling parameters and mechanisms for commercial and multifamily properties. This will likely require the linking of the Company's energy usage database with operational and asset based rating systems that property owners will use to benchmark their buildings. The Company will continue to work closely with OER to support property owner and tenant access to usage data. Benchmarking and Labeling efforts will also help towards achieving Zero Energy Building (ZEB) goals for existing buildings as detailed in the Company's ZEB white paper (see more details in the ZEB section below).

#### **b. Market Sector Approach**

Specific enhancements to some sectors are highlighted below:

- Grocery/Supermarkets
- Municipal & State Buildings
- State SEMP
- Manufacturing/Industrial
- K-12 schools
- Hospitality (Restaurants & Lodging)
- Specialty buildings including: Farm/Agriculture and Extended Care Facilities
- Hospitals
- Colleges and Universities
- Commercial Real Estate
- Multifamily

#### **i. Approach to Large and Mid-Sized Customers Based on Usage**

The Company's sales and operations teams will continue to address the unique needs of customers depending on their annual usage, peak demands and market segmentation. Customers with annual use greater than 1 million kWh per year and 75,000 therms or greater are classified as large and are managed by individual sales representatives. These customers are supported by Strategic Sales staff that is backed by technical experts for that particular customer type. The sales team works with customers either directly or through project expeditors and vendors and offer pathways to upgrade various systems within a facility including, not limited to, lighting, HVAC, and compressed air. They can also call on the Company's Technical Assistance (TA) Vendors

to help the customer with a more comprehensive look at their entire facility where appropriate. In many cases, this more comprehensive look helps customers uncover opportunities for savings previously unknown to them or beyond common measures.

The sections below provide details on each of the current market sectors.

**a. Grocery Sector**

The Company will continue to provide targeted energy savings opportunities to Rhode Island's grocery customers through the EnergySmart Grocer (ESG) Initiative. ESG has been in operation since 2013 and the third party contractor has been working with grocers to identify a wide array of retrofit and new construction opportunities. The program has had a tremendous amount of success engaging this segment and has met or exceeded its goals in both 2016 and 2017. National Grid expects that this effort will also meet its goals in 2018. This means that the ESG initiative will have delivered more 12,000 net MWh and more than 100,000 therms since its inception.

The customers served by this initiative include a combination of local, regional, national and even international grocers and other retail establishments who sell food and have heavy refrigeration usage. ESG provides "unitized" incentives – i.e., \$ per unit physical unit such as linear feet, square feet, horsepower, etc. – for the most common measures relevant to these customers which provides an easy to understand offering which leads to easier project planning and investment decisions. ESG also offers custom project engineering support to help customers pursue all cost effective measures in their facilities.

The measure mix to date includes but is not limited to

1. Infiltration measures (night covers, strip curtains)
2. Lighting (LED case lighting, case lighting controls, LED shelf or end-cap lighting, LED fixtures or solutions for walk-in refrigeration, LED parking lot lighting)
3. Refrigeration (adding doors to open refrigerated cases, highly efficient motors in refrigerated walk-ins and cases, anti-sweat heater controls)
4. Refrigeration controls (floating head pressure control and floating suction pressure control)
5. HVAC measures (controls and VFD's)

From 2016 to present ESG has delivered over 63% of its electric savings from refrigeration measures, 15% from HVAC measures, and 21% from lighting measures. The remaining 1% came from other areas.

**New in 2019:** The ESG initiative has introduced or is in the process of introducing a number of technologies and new options for customers. Some were noted in the 2018 plan such as hybrid condensers, hot water heat reclaim, and permanent magnet synchronous motors. Others were not and will be added in late 2018 or early 2019 such as coffin cases with lids, destratification fans, and variable speed drives on kitchen ventilation.

The Company will also explore opportunities with RTU controllers in the Grocery initiative.

Through implementing ESG over the last few years, the Company learned that marketplace understanding has grown tremendously through targeted outreach and is reflected in the strong delivery of the initiative. The Company also learned that greater integration across other offerings like the Small Business program could lead to better customer service and more successful projects. As a result, the Company has begun to incorporate ESG services for all small grocery customers as well. In fact, savings from independent markets increased approximately 50% from 2017 to 2018.

#### **b. Municipal and State Buildings**

The three year (2012-2015) DOE funded Public Energy Partnership (RIPEP) led to approximately 123 municipal and state buildings reaching an average of 28.6% projected energy reduction, far beyond the DOE goal of 20% for the partnerships. In combination with the Efficient Buildings Fund (EBF) through RIIB and the Company's existing collaboration with municipal customers, the Company forecasts continued momentum in energy efficiency in the municipal sector. In addition, incentives and technical support will continue to be offered in 2019, in specific areas including:

**Project/Energy Management Support:** In 2016, the Rhode Island Infrastructure Bank's (RIIB) Efficient Buildings Fund (EBF) was created to provide capital for comprehensive projects in the municipal and quasi-public agency space. The time and expertise required to identify, develop, and oversee these projects can be beyond the resource capacity of many towns and cities. Support in 2019 will continue to include reviewing

project submittals, supporting city/town Council approvals, implementation planning, reviewing efficiency project proposals, RFP development, and bidder selection.

**Implementation Support:** The support for energy efficiency project implementation and street lighting that the Company and its vendor provided in 2016 and 2017 produced significant results. Municipalities have recognized the value of this type of support as it provided a trusted partner to bring the time and expertise municipalities lack to identify, develop and oversee complex projects. In order to continue to serve this sector, there are several support mechanisms in place for 2019:

- URI will be supporting municipalities as they learn to use Portfolio Manager as well as meet the EBF's energy reporting and energy management plan development requirements. National Grid also has an automated process by which customers can authorize upload of utility data onto Portfolio Manager. This system can be used in 2019 for benchmarking using Portfolio Manager. Please refer to the section on Automated Benchmarking Systems, in the previous section, for details.
- The Company will continue to support municipal engagement in OER and RIIB programs like vendor selection, engineering support, and implementation of upgrades through the energy efficiency programs.
- The Company will also provide energy audits to select municipal/school/wastewater customers to support their EBF applications. In the past few years the Company has provided in the range of approximately 50 energy audits annually.
- For financing in this sector, the Company will continue to offer On-Bill Repayment for electric and gas measures. The Company and other partners such as OER will assist RIIB with municipal projects currently enrolled in the EBF program through RIIB, and on municipal projects that subscribe in 2018 and 2019. The Company plans to serve on the appropriate committees in order to ensure that customers have access to finance, that the process is easy, and that the Company and RIIB are working with customers in a coordinated way.

**c. State SEMP**

In June 2016, a joint Memorandum of Understanding (MOU) was signed between the Company, OER, Department of Administration (DOA) and Department of Capital Asset

Management and Maintenance (DCAMM). The purpose of this three year period MOU is to strengthen the State's commitment to economic growth and climate change mitigation, and to Lead by Example through the Governor's Executive Order (EO 15-17) that requires all State facilities to reduce their energy consumption 10% by the end of fiscal year 2019 (June 30, 2019). Consistent with this EO, this MOU is designed to integrate strategic energy planning across State, and Quasi State, facilities to leverage the Company's programs and best practices to achieve a minimum cumulative energy savings of ten percent (10%) below fiscal year 2014 levels by the end of fiscal year 2019. This MOU pertains to building projects (both retrofits and new construction) for State facilities.

The ten percent savings goal has been achieved. In 2019 the Company will pursue another three year State SEMP

In 2019 National Grid plans to assist the state SEMP with:

- Continue to identify and prioritize projects from the more than one dozen scoping studies and retro-commissioning reports that have been completed thus far.
- The Company is currently working with agencies and purchasing departments to develop three request qualifications and proposals that will be awarded in 2019 for the fiscal year ending June 30, 2019. Multiple buildings will be included addressing HVAC, Lighting and Insulation measures.
- The Company is also working with multiple State agencies on exterior lighting projects for 2019.
- Identifying remaining projects and proposing a budget for the remaining buildings to be included in the FY 2019 budget (due in January, 2018).

In addition, National Grid will continue to offer building operator certification trainings.

In 2019, National Grid will continue to provide scoping studies (energy audits) commissioning studies with the assistance of consultants, to create Request for Proposal documents coordinated with the agency and State purchasing. At this time, the Company is following multiple approaches to delivering energy efficiency based on building size and building function:

- For smaller buildings, multiple measures such as lighting, HVAC and others will be bid out (with assistance from lighting auditors and consultants) and installed in multiple facilities. This will provide economy of scale for buildings, typically by agency.
- For larger facilities, with similar needs (like lighting), multiple facilities and sites will be audited, specs written and an RFP will be developed and installed in multiple buildings.

**d. Manufacturing/Industrial**

The industrial sector accounts for one-third of the total U.S. energy consumption, and as such represents a substantial opportunity for cost-effective energy savings. Effectively managing and reducing industrial energy use has become a key priority for the Company.

The Industrial Initiative was started in 2013 as a demonstration project and enrolled seven customers over the course of 2013 and 2014. In addition, this helped the Company build relationships and trust with its top industrial customers in Rhode Island.

In 2015, National Grid formalized the program and expanded outreach to include 17 large industrial/manufacturing customers. From 2015-2018, 94 electric customers with complete or active projects in Rhode Island represent 24,102 annual MWh and 216 applications. Gas participation over the same period of time consists of 745,849 annual therms and 61 applications for 33 gas customers.

The National Grid Industrial Initiative assists busy plant managers identifying process improvements and energy efficiency projects. Tight budgets and limited staff time often make it difficult for businesses to take advantage of the savings these projects provide. The Industrial Energy Advisors' services are targeted towards large industrial facilities with significant electric and/or gas usage and are available at no cost to the customer. Unlike most commercial buildings, industrial facilities are likely to find that the majority of their energy consumption is production-related, instead of lighting or HVAC. The Industrial Initiative team focuses on process measures including:

- Free Cooling on Process Chillers
- Heat Recovery Projects
- Thermal Oxidizers

- Process Controls and Automation
- Drives, Motors, VSD Compressors
- Lighting Upgrades

As a result of the Industrial Energy Advisors' engagement, the proportions of process-related projects have increased, along with overall savings.

In 2019, the Company continues to maintain the key features of the initiative and results thus far have been extremely promising.

**Current program components and highlights:**

- An industrial-specific technical expert team from the Company's specialty engineering partner provides support to its sales team and technical solutions to its industrial customers. These solutions include: process energy related measures, management change recommendations, project management support, and other HVAC and lighting related options.
- A scoping study of the technical and energy management opportunities for the facility, at no cost to the customer. If a detailed analysis, in addition to a scoping study, is required (e.g. a detailed compressed air study), the costs of the study are shared with customers on a case by case basis.
- An incentives package that addresses the needs of the individual customer to the greatest extent possible. Customer needs assessment: The sales team and the Company's engineering partner will conduct needs assessments in order to provide the best solutions for its customers. The Company recognizes that some customers may need more assistance in management of their energy, such as examining interval data anomalies and working to correct them (frequently scheduling or equipment setting errors) before implementing energy saving measures. National Grid will categorize customers based on their levels of engagement and will develop different implementation paths based on each customer's needs.
- National Grid will also provide project progress tracking and support to overcome implementation barriers.

In 2019, National Grid and its engineering partner plan to reach out to at least 30 more customers who have not interacted with this initiative to date, as well as to follow up with customers who have successfully completed projects to see if the Company can help them solve additional problems.

**ii. Small Manufacturing/Industrial**

The Company continues to serve small and medium industrial/manufacturing facilities through its large retrofit initiatives, including Upstream Lighting and HVAC, in Rhode Island. However, the Company feels that this is still not sufficient. In 2019, National Grid will bring the expertise and problem solving abilities of the Industrial Initiative vendor to customers in the 200kW-400kW average monthly demand segment.

**e. K-12 Schools**

National Grid has worked with RI Department of Education (RIDE), OER, Northeast Energy Efficiency Partnerships (NEEP), and other interested parties to promote high performance and sustainability in K-12 public schools for many years.

Schools are eligible for National Grid's Large C&I programs including services such as benchmarking, audits, technical assistance, design support, incentives for energy efficiency, strategic planning support and with writing RFP's for procurement of design and construction teams (Performance based Procurement: Accelerate Performance Program).

National Grid supports NE-CHPSs guidelines for new construction. These guidelines will be updated early in 2019.

Building Operator Certification classes sponsored by National Grid in the Rhode Island and Massachusetts service areas are available to schools and many school facility managers have taken advantage of this program and follow up by actively engaging in energy efficiency solutions at their facilities.

In 2017, RIDE released the State of Rhode Island Schoolhouse Energy Report Card which benchmarked and provided Energy Use Intensity for 307 schools in Rhode Island. It outlined recommendations for energy conservation measures from lighting upgrades, to improving indoor air quality and reducing energy use via Energy Recovery Ventilation (ERV)/Dedicated Outside Air Handling (DOAH), delivering fresh outside air to classrooms. In 2019 the Company will look to leverage the above study and explore

comprehensive retrofit and new construction plans that incorporate school priorities while addressing energy efficiency savings and associated health and comfort benefits for students in these schools.

**New in 2019:** In 2019 National Grid will explore a SEMP structure for school districts with various stakeholders in the state, including RIDE, OER, NEEP, RIIB and other parties to promote energy efficient alongside infrastructure improvements in Rhode Island schools. The goal will be to develop a roadmap for school districts. These efforts will be integrated with its efforts on EBF with RIIB.

#### **f. Restaurants**

The Company will continue to offer energy efficiency services to its small to medium sized restaurants through the Direct Install and Large Retrofit/New Construction Programs. In addition, the Company will continue to expand its strategy for chain restaurants that was started in 2016. The strategy was to approach a corporate office with an energy efficiency action plan that can be tailored to the needs of a particular chain. An MOU is then signed between the corporate office and the Company that outlines the plan. The ideal candidates for this initiative are chain restaurants with 24/7 operations and a large number of stores. In 2016-2017 a large franchise restaurant in Rhode Island participated in this initiative specifically designed for chains and franchises. Eighty-eight restaurant locations have participated in this program so far, with total annual savings of 3,629,347 kWh from this initiative. Efficiency measures include: lighting, HVAC, refrigeration and restaurant equipment. In 2019, the Company will look to expand this initiative with other restaurant chains.

**New in 2019** - In 2019 the Company also plans to offer comprehensive energy efficiency services to small and medium sized non-chain restaurants, through the small business direct install program. The strategy will be to target potential customers with restaurant specific materials via various channels. The customer will get an on-site assessment and an assessment report that identifies opportunities and details costs, energy savings, incentives and payback. The installed measures will be a comprehensive mix of lighting, HVAC, refrigeration and controls as applicable.

#### **g. Lodging/Hospitality**

Lodging facilities in Rhode Island have participated in the Company's programs in the area of lighting. However, there is potential for more savings. In 2018 the Company

researched similar utility hospitality programs in the U.S. Based on this research there is strong indication that a targeted and continuous offering to this customer segment can yield deeper and more comprehensive energy efficiency savings.

**New in 2019:** In 2019 the Company will begin to provide hospitality and lodging customers with a comprehensive approach to energy efficiency specifically tailored to the hotel and motel market segment, including spas and resorts. The strategy will be to identify customers who are interested in installing energy efficiency measures in lodging facilities, provide site assessments to identify qualifying energy efficiency opportunities, determine savings, develop incentive applications and provide project management and oversight through the measure implementation process. National Grid continues to investigate whether an MOU structure with hotel chains or a vendor based program, similar to the GrocerSmart initiative is the optimal path forward.

The Company expects to incentivize various energy efficiency measures including ozone laundry and polymer laundry solutions, as applicable, through this initiative.

Additionally the program will also promote Demand Response (DR) opportunities to customers in this market segment.

### **iii. Specialty Buildings**

#### **a. Extended Care Facilities such as Nursing Homes/Assisted Living**

The Company has, over the past few program years, investigated different ways to try and serve nursing homes, rehabilitation facilities, and assisted living spaces beyond simple lighting retrofits. The latest attempt included trying to share the cost of an experienced energy manager to help these customers jumpstart project development. It was not successful. The Company's investigations turned up the following the pieces of information:

1. These facilities wanted to pursue energy efficiency and comfort upgrades to their facilities.
2. The vast majority of these facilities either did not have the resources or did not want to prioritize the resources to investigate energy efficiency opportunities, even with a generous cost share, let alone act on them.
3. The Company did not have a tool, beyond the limited resources of National Grid's OBR, to help them deal with these issues.

However, there is now Commercial Property Assessed Clean Energy (C-PACE) as a tool. C-PACE further defined in the “Affordability and Financing” section below, allows customers access to low cost private capital for terms that greatly exceed most conventional business loans. It also allows the customer to capitalize all costs related to the project. This means that the Company now has a solution to the largest barrier to moving forward with deeper and broader efficiency measures in this segment. These measures include, but are not limited to, HVAC improvements (including heat pumps), envelope improvements, energy management systems, energy efficient laundry systems, and Combined Heat and Power (CHP).

**b. Farm/Agriculture**

A few years ago OER and National Grid began an effort to serve farm and agricultural customers in the state of Rhode Island. Under the informal agreement between OER and the Company an allocation of Regional Greenhouse Gas Initiative (RGGI) funds was used to perform audits at pilot farms, train auditors, develop a list of technically sound measures, and create a fund to pay for energy efficiency incentives for delivered fuels (oil, propane). National Grid agreed to cover electric and natural gas energy efficiency incentives in accordance with Company policies.

In 2016, audit reports and recommendations were delivered to all nine pilot farms. Several farms have commenced with installing measures and the rest are evaluating which measures are best for their specific situations. National Grid and OER also created co-branded marketing pieces for this initiative.

In 2018, National Grid along with OER sponsored a University of Rhode Island (URI) Energy Fellow intern to develop an outreach strategy and an outreach plan to farms in Rhode Island. In 2019 National Grid will continue to support this fellowship internship to engage with farm and agriculture customers in Rhode Island. National Grid will also continue to offer audits and educational information regarding energy efficiency solutions tailored for farms and agriculture customers. The Company currently jointly markets with OER, via web, email and through the URI Energy Fellow intern at farmers markets and will continue these efforts in 2019.

#### **iv. Multifamily Sector**

The Multifamily Initiative will continue to provide joint residential and commercial energy services to condominiums and apartment complexes for energy efficiency upgrades. The C&I program specifically offers incentives for master metered gas measures that typically include boiler reset controls and insulation and air sealing. The remaining areas are addressed through residential incentives via a common point of contact. In 2019 the multifamily program will serve customers like non-profits, group homes and houses of worship that traditionally did not fit within the predefined program structure. These efforts are being coordinated with the Residential New Construction Program, Multifamily Retrofit Program and the Small Business Services Program. The Company continues to anticipate a higher volume of projects in the multifamily new construction space to come through the C&I programs in the next few years. The Company also plans to explore Demand Response opportunities in the multifamily space in 2019.

#### **v. Approach to Other Market Sectors**

**Hospitals:** The Company will continue to work with Rhode Island's five largest hospitals (all under one partnership) through the multiyear Strategic Energy Management Planning (SEMP) initiative (refer to the SEMP section for more details). The medium sized healthcare facilities will continue to be addressed through the channel sales group.

**Colleges and Universities:** These are currently served through either the Company's large commercial programs with a dedicated sales team or the Company's SEMP initiative. With a master-metered portfolio of buildings within the campus, most universities are tied to sustainability goals and climate action plans to reduce their greenhouse gas emissions. The Company's SEMP initiative allows enrolled university customers to engage in multi-year campus energy planning and assists them in identifying comprehensive and long-term energy efficiency opportunities. The Company will continue to explore opportunities for further SEMP university customers. Besides SEMP, the Company continues to provide energy services to universities in Rhode Island.

**Commercial Real Estate and Offices:** The Company's sales team continues to see many challenges and barriers in program participation of Commercial Real Estate (CRE) sector due to the split incentive between owners and tenants and difficulty accessing decision

makers. There are three ways the Company will promote energy efficiency services to this sector:

- **Benchmarking:** The Company will continue to refine its automated benchmarking capabilities in 2019. National Grid will work with partners such as the City of Providence, Chambers of Commerce, and other entities to ensure that customers are aware of the this tool, its benefits, and that it can help them see how their building’s energy use compares to peers. After a facility has been benchmarked, National Grid has various resources to help its owners achieve lower energy consumption per square foot.
- **Commercial Property Assessed Clean Energy (C-PACE):** C-PACE is an ideal tool for some commercial real estate owners and developers. It allows them to finance energy and related improvements in a way that is widely considered “off book” and can be passed through to renters in many types of leases. To advance the use of this unique mechanism National Grid will continue to work with the Rhode Island Infrastructure Bank (RIIB) and Sustainable Real Estate Solutions (SRS) to bring awareness to commercial building owners.
- **Sustainable Office Design:** The Company will continue to market the “Sustainable Office Design” (SOD) initiative to address Class A type office spaces. The Sustainable Office Design (SOD) initiative promotes high-performance office lighting and controls for quick turnaround tenant fit-outs. This is an easy to use, performance-based design approach that benefits owners or tenants with energy savings depending upon the lease arrangements. A fixed incentive per square foot along with a pre-set design criteria and lighting designer incentives will provide easy participation for the tenant fit-out projects. In 2019, the Company will look for ways to engage and inform tenants and leasing agencies of this opportunity so that there is participation in this initiative.

### **c. Education and Training**

National Grid is committed to promoting leadership in the community, various market sectors, trade organizations and associations by providing and sponsoring initiatives and outreach efforts for education and training.

The Company, as in previous program years, will continue to support opportunities to inform customers and trade allies/vendors/contractors, which serve various market

sectors, about existing and new or emerging energy efficient technologies, building systems and design, building energy codes and standards, improved installation practices, and up-to-date operation and maintenance (O&M) procedures. By integrating local, regional, and national educational and training initiatives throughout National Grid's various C&I programs, the Company hopes to build awareness about the benefits of energy efficient technologies, market National Grid's energy efficiency programs, provide expertise and experience on the need for integrated design, and improve construction and installation practices for an existing or new construction building project. This includes co-sponsorship of TEC-RI's training sessions. Information about National Grid's energy efficiency programs is also presented to members of several professional organizations including the Electrical League of Rhode Island and ASHRAE. Deeper energy savings, as well as other non-energy benefits, can be achieved for any given customer project when the customer, designer/engineer, or contractor/installer is able to express or share knowledge about an energy efficient technology, the associated costs, and energy savings potential.

**i. Building Operator Certification Training (BOC)**

BOC Levels I & II include HVAC, lighting and building controls. Students gain knowledge of their own building by completing projects involving documentation of building equipment, systems and controls, benchmarking the building's performance by using ENERGY STAR® Portfolio Manager™, updating occupancy profiles, reviewing HVAC systems and operation, and mapping the facility's electrical distribution system. In addition, the course addresses maintenance of building systems, equipment troubleshooting, preventive maintenance, advanced electrical diagnostics, HVAC optimization, and information on National Grid's energy efficiency programs.

In 2019, the Company plans to support Building Operator Certification (BOC) training by holding at least two Level I BOC classes in Rhode Island and Massachusetts as well as one Level II BOC class in Massachusetts. Classes will be held in the spring and the fall. The audience consists of facility managers, operating engineers, building technicians, and maintenance mechanics. The course provides a core foundation across the various building systems and maintenance practices of a typical commercial building – class instructors encourage class participation. In addition to the knowledge gained by listening to the instructors and completing both in classroom as well as out of classroom projects, the participants benefit from networking and learning from each other's

experiences with building maintenance and energy efficiency. Student satisfaction with the BOC training is high in that they would recommend it to others and their companies are likely to engage utility energy efficiency incentives for energy projects.

In addition to the classroom training, National Grid also sponsors BOC webinars for customers and staff. The webinars are on specific topics of interest to facility managers.

**ii. Code Compliance Enhancement Initiative (CCEI) Training**

CCEI includes in-person classroom and hands-on trainings, webinar presentations, project-specific technical assistance circuit riding, and development and dissemination of documentation/compliance tools like residential field guide, residential and commercial FAQs, technical bulletins, and case studies. CCEI focuses on ground-up new construction for residential and commercial buildings but also addresses additions, renovations, and retrofits. More details on this training are provided in the Large Commercial and Industrial Energy Efficiency Section under Building Energy Code and Appliance Standards.

**iii. Advanced Workforce & Channel Development (Demonstration)**

**Online Trade Ally Training on Advanced Lighting Systems**

Online Trade Ally targeted training, for Performance Lighting PLUS program, consolidates the best-of-class subject-matter expertise into one common platform with an electronic learning training program built to track the progress of participants. This online, on-demand learning platform will complement face-to-face and webinar based education, and is a proven way to meet the time demands of all trade allies. This online learning platform will provide efficient and effective education on Advanced Lighting Systems including controls and design. This online training is developed to increase program participation, and improve program process. This training will target trade allies (ESCOs contractors), internal sales teams, vendors, architects, designers, manufacturers' representatives, distributors and customers. Success will be measured by an increase in program participation and a reduction in project processing for incentives. A well trained trade ally network will increase customer satisfaction while also increasing energy savings.

This platform will be implemented in early 2019 and hosted and managed by a vendor, who will also track participation through the online training platform.

Utility Benefits	Trade Ally Benefits
<ul style="list-style-type: none"> <li>• Automates onboarding tasks</li> <li>• Deploys program changes faster</li> <li>• Pushes fresh content to engage allies</li> <li>• Provides metrics for ally tiering programs</li> <li>• Shares in industry-provided content</li> <li>• Uses portal customized with utility branding</li> <li>• Increased energy savings from knowledgeable trade allies</li> </ul>	<ul style="list-style-type: none"> <li>• Offers training access organization-wide</li> <li>• Educates all staff to increase project sales</li> <li>• Affords on-demand training when needed</li> <li>• Offers accredited CEU and certifications</li> <li>• Aligns real-time trainings with program changes</li> <li>• Recognizes achievement with rewards</li> <li>• Reports real-time metrics to track progress</li> </ul>

#### **d. Affordability and Financing**

Over the past few years, the Company along with the State of Rhode Island and the Energy Efficiency and Resource Management Council (EERMC), have made progress researching, planning, and developing opportunities for finance mechanisms that will help customers overcome cost barriers and promote affordability for investments in energy efficiency. This section outlines ongoing efforts to study, plan, coordinate and offer financial products that meet customer needs and assist in delivering energy savings.

National Grid believes that financing plays a critical role in meeting efficiency and other goals; and that it is critical to think creatively about the future roles for incentives, the role of the revolving loan fund (OBR), and other financing mechanisms; and the need to explore potential opportunities for leveraging public and private funds. Fortunately, as the focus on financing has increased, so has the number of market mechanisms available for funding efficiency projects. These mechanisms include the Rhode Island Infrastructure Bank’s Efficient Buildings Fund (EBF) and Commercial Property Assessed Clean Energy (C-PACE) programs, third party finance products, Pay as You Save (PAYs) programs, Metered Energy Efficiency Structure (MEETS), and others offer unique benefits and opportunities. Understanding these products, their ability to meet customers’ financing needs and how to harmonize them so that customers can

understand and choose their best option is an important focus of the second year of the 2018-2020 Plan.

National Grid believes a firm foundation for this work was laid in 2017. The Company engaged in multiple discussions with internal and external stakeholders including discussions with the Council, the EEMRC and a full day technical session with the PUC. External stakeholders included the OER, RIIB, the EERMC consulting team and their financial consultants from Dunskey Energy Consulting (Dunskey) and Rhode Island Housing. Many ideas were discussed in these various meetings, but three overarching ideas/questions came through:

1. How can financing be used to increase participation?
2. How can financing encourage customers to move beyond lighting?
3. How can financing be used to reduce program costs in the long term so that the programs can accomplish more with less/ same?

In many cases achieving all three things is not possible with the same customer, but it does not mean that the Company cannot pursue these ideas separately or in combinations across its entire customer base.

The Company has learned a great deal since those meetings and the technical session, which the Company will highlight below. National Grid will also detail existing finance mechanisms and what is planned for them in the coming year. In addition, National Grid will provide details about its cost reduction test within OBR, things that it has learned from this test, and future plans regarding this test.

**Lessons learned:**

- Awareness matters
- Meet customers where they are and challenge them
- Sales tools and training matters
- Sequence of presentation matters
- Type of customer matters

As described in the 2018-2020 Plan, the Company will pursue the vision of providing an array of appropriate financing options so customers can choose that which is most advantageous in each situation. The Company recognizes the need to dive deeply into

enhancing financing mechanisms for all sectors. In 2019, this includes creating a web page to let customers know their financing options, further integration of these mechanisms into the sales process, and working with partners to market C-PACE more widely. Residential finance opportunities are discussed in Attachment 1.

On the C&I side, the focus in 2019 will continue to be on large C&I, i.e. customers with annual usage greater than 1,000,000 kWh. Small business financing explorations will follow in subsequent years, benefiting from the learnings with larger customers. Larger small business customers will be made aware of the C-PACE mechanism in 2019. Specific activities will support action items defined in the Three-Year Plan and will include the of the following focus areas:

- Collaboration – National Grid agrees with a statement in Dunsky’s Three-Year Plan Review, *“National Grid’s work with the EEMRC, the Collaborative, and other stakeholders continues to be key to the success of energy efficiency activities in the state.”* To that end, in 2019, National Grid will continue to meet with members of the EEMRC and the Collaborative, as well as other stakeholders. The intent is to socialize ideas and foster collaboration on appropriate activities.
- Common reporting frameworks – Developing a set of common reporting metrics that provide transparency in the allocation of funds, consistency in reporting of customer transactions throughout the process, funding allocations and spend, etc. will provide valuable information for assessing and planning future activities. In 2019, National Grid will continue to pursue these goals with the State, the Council and RIIB. The objective is to create common sense guidelines that will enhance understanding and collaboration between organizations and help shape financial programs and offerings going forward.
- Understanding Product Offerings – Looking across the array of products already available and those under development can be confusing. Each one operates under a different structure (where the funds come from, how they are dispersed, etc.), requires different things from the customer (MOUs, Municipal Council Approval, follow-up data tracking, energy management plans, etc.), operates on a different cycle (e.g. semi-annual bond offerings), sets different financial limits, is available to limited segments of the market, and other varying characteristics/features. Gathering all this information into one place

would be very helpful in identifying the market segments, customer types, and/or project characteristics where each might be most successful.

2019 will be another pivotal year for financing in Rhode Island. It will be critical to assess and develop finance options that push forward deeper dive efficiency improvements that will help meet ambitious energy savings targets in the future and, at the same time, leverage those in place. Several of the existing options are described in more depth below.

**i. Rhode Island Infrastructure Bank – Efficient Buildings Fund**

The Efficient Buildings Fund (EBF) is a long-term, low cost financing program for local governmental units, including cities, towns and quasi-state entities, to invest in clean energy projects. EBF is administered in partnership between the OER and the Rhode Island Infrastructure Bank (Infrastructure Bank or RIIB). The EBF was created in 2015 with input from National Grid and a variety of stakeholders, many of which belong to the Rhode Island Energy Efficiency Collaborative. OER is responsible for determining project eligibility, reviewing project applications and producing a project priority list (PPL). The Infrastructure Bank only finances projects that are listed on the PPL. OER, the Infrastructure Bank and the National Grid municipal sales representative work together to originate efficiency projects that meet the requirements of least cost procurement. EBF also provides financing for renewable energy projects and uses other sources of capital to finance those transactions. The Infrastructure Bank does not receive an annual allocation of capital from the State of Rhode Island to support the EBF program.

\$5.0 million will be provided to EBF for an additional round of EBF financing. Based upon available resources and demand, the Infrastructure Bank expects to leverage the provided funds between two to five times. They project these 2019 financings will return energy savings of no less than 4,000 Annual MWh and 50,000 Annual therms. Additionally, to support the Infrastructure Bank's success, National Grid may fund approximately \$100,000 in technical assistance studies and OER will assist municipalities with automatically updating their Portfolio Manager accounts for EBF building benchmarking and reporting requirements. National Grid will also incentivize the cost-effective efficiency projects for electric and gas retrofits with direct incentives to EBF customers.

OER, the Infrastructure Bank, and National Grid have developed a pipeline of projects expected to be financed through EBF in 2019 and beyond, having developed more frequent application periods throughout the year. OER has also updated the EBF project regulations to allow for new construction projects to be financed through EBF. Additionally, OER, the Infrastructure Bank and National Grid's municipal sales lead have been meeting with town councils across Rhode Island to educate communities on the benefits of investing in clean energy projects. This additional education to communities across Rhode Island is an opportunity to showcase the EBF and benefits of investing in comprehensive energy efficiency projects.

In September 2017, the Rhode Island Department of Education (RIDE) released an assessment on the condition of Rhode Island's public school facilities. The condition assessment identified \$2.2 billion in investment needed to be made by Rhode Island school districts to bring the conditions of its public schools to current day standards. Many of the recommended improvements will involve energy efficiency investments and EBF will be a critical component to enable school districts to upgrade their facilities.

In November of 2018 the voters of RI will be asked to vote on a \$250 million bond that, if passed, will be used to improve the physical conditions of Rhode Island schools. Some of this money will, in turn, be used for energy efficiency improvements in existing schools and ensuring that new schools are both great learning environments and energy efficient.

National Grid believes that there is a significant energy efficiency potential if this bond is passed at the state level and if communities also approve investments in their schools through their municipal processes. In any given year, the need for school construction far exceeds the amount of Housing Aid available. The Infrastructure Bank has been working closely with the Rhode Island Department of Education to identify the process and types of projects that have been approved for Housing Aid and what opportunity exists to use EBF financing within the capital stack of a school construction project. National Grid commits to working with RIDE, OER and the Infrastructure Bank to build a pipeline of school construction projects eligible for EBF.

Funds allocated to the EBF, including interest earnings, will be used in accordance with least cost procurement law, the EBF enabling act (Chapter 46-12.2), and regulations filed by the Office of Energy Resources and Rhode Island Infrastructure Bank governing the administration of the program. The Bank administers the EBF as a revolving loan fund, making loans from time to time for eligible projects, and tracks the funds awarded under the Plan independently of other sources of funds which provide additional capital for the EBF program. The funds allocated to RIIB and EBF under prior and future Settlement Agreements have been or will be committed to financing energy efficiency projects. As those loans are repaid into the EBF, such repayments will be re-lent for other eligible energy efficiency projects on the OER PPL. To the extent that such repayments have not be re-lent for an eligible energy efficiency project, the repayments will be available to pay debt service in the unlikely event of a default on a RIIB issued EBF bond. Having these loan repayments available to pay debt service in the event of a default on an EBF bond provides significant interest savings for all borrowers of the EBF program.

Additionally, National Grid and the EBF administration team have agreed meet quarterly to review the status of the EBF program and to deliver a common reporting framework for EBF based upon feedback from the Public Utilities Commission. Information is communicated in National Grid's quarterly reports. Information will include the status of funds managed at the Infrastructure Bank (funds lent, returned, committed and available). National Grid, RIIB and OER will continue to have regular communication channels to monitor savings performance of the EBF energy efficiency projects, consistent with National Grid's commitments to transparency and reporting.

#### **ii. Commercial Property Assessed Clean Energy (C- PACE)**

C-PACE is an innovative way for customers to obtain long- term low-cost financing for energy efficiency, clean energy and other building improvements in their privately owned businesses or non-profits. Importantly, C-PACE offerings are financed through private capital and do not necessitate an allocation of ratepayer dollars. Voluntary assessments for repaying municipal bonds have been attached to property taxes since the early 1800s to fund projects for public good such as sidewalks, fire stations, and street lighting. The C-PACE financing repayment is facilitated through the same municipal property tax assessment process. A voluntary assessment (similar to a sewer

district assessment) is placed on the building owner's property tax bill. The assessment is repaid over the financing term (up to 25 years, project dependent). Given that longer term, and depending on the mix of energy efficiency and other projects, the annual energy cost savings can exceed the annual assessment payment, thereby enabling capital intensive equipment upgrades.

National Grid has been working closely with RIIB and its program administrator Sustainable Real Estate Solutions (SRS) and other stakeholders to launch a successful C-PACE program in Rhode Island. Recently, the Company's work with RIIB and SRS has included meetings to work through the process of making sure that:

1. National Grid sales staff understands the fundamentals of the C-PACE program and where it can be effectively used.
2. National Grid vendors understand the fundamentals of the C-PACE program and where it can be effectively used.
3. SRS and other RIIB vendors understand the fundamentals of National Grid energy efficiency programs and where energy efficiency projects will benefit C-PACE customers.
4. There is a plan to seed the commercial market with awareness of this unique product.

The Company believes that C-PACE and other publicly-funded financing mechanisms could fundamentally change the way customers think about efficiency upgrades, allowing them to bundle projects in ways they had not considered viable prior to this point in time. As such, the Company is pleased to commit to an ongoing collaboration with RIIB including common reporting requirements, continued financial and technical support as described above, and regular meetings and communication. The Company recognizes that this on-going coordination will help forge a strong partnership from which to promote comprehensiveness, address market barriers and enhance value for customers.

### **iii. On Bill Repayment (OBR)**

For large C&I customers the Company will continue to offer financing to help pay for customer costs through OBR from revolving loan funds. National Grid finances the customer portion of electric or gas efficiency projects, on bill, for up to five years at 0% interest. OBR offers easy access to finance as well as creates reduced customer

transactional friction by easing the repayment process by offering the repayment of the loans on the electric bill. This method of financing is often considered as operating expense by many customers. This allows the expense to be handled within existing operating budgets and often allows decisions to be made at a lower level than a capital expense. All customers are eligible for OBR.

Test Progress in OBR – In last year’s plan the Company hypothesized that it could use the attractiveness of the OBR mechanism to achieve a number of goals including incentive reduction and increased measure adoption beyond lighting. The Company chose to focus on cost reduction first.

In early 2018, the Company carved out ~1/3 of the available OBR funds to be used under the rules of what the Company calls “Financial Test 1.” The objective of this test was to determine if customers would be willing accept a lower incentive amount if they were allowed to “finance” the balance of their projects costs with OBR.

Customers were given the choice of a “normal incentive” (prescriptive or \$/MWh for custom) or a 15% reduction in the normal incentive amount with the ability to “finance” the remaining project costs through OBR.

The Company has offered this choice to 25 customers to date with 6 customers choosing to move forward with the 15% reduction and financing. To date this has reduced incentives by \$29,701. The Company plans to continue this test in through the remainder of 2018 and, at a minimum, through 2019.

National Grid has learned three things from interviewing sales people and reviewing the data so far.

1. The option of the lower incentive is rarely selected by customers who have already experienced the “normal incentive” and OBR before.
2. The order of presenting the offers is critically important. If the customer is offered the combination of reduced incentive and financing after the original incentive offer they feel like they are “being cheated” or being “charged interest in another form.”
3. The Company has little information on what type of financing mechanism a customer uses, if any, if they choose the “normal incentive.” Many customers are unwilling to share this information with us or simply don’t know.

4. In 2019, the Company may consider launching a second test that focuses on leveraging OBR to generate more projects that include measures beyond lighting measures. This test will only be launched once National Grid is sure that other, larger priorities are complete in the realm of financing. This includes but is not limited to:
- a. Displaying and promoting financing options to customers and vendors/partners on a public facing web site.
  - b. Ensuring that the Company's sales staff and vendors have integrated all current mechanisms into their sales processes with a special focus on the proper timing in presenting these mechanisms.
  - c. Ensuring that the Company's sales staff and vendors have the correct tools to present financial analyses to various levels of decision makers within an organization.

(Asterisk) Outside of an OBR test, National Grid will continue to strengthen its support for mechanisms like C-PACE and EBF which also have the potential to create multi measure projects.

The Company does not plan to ask for an OBR fund injection in 2019. There appears to be sufficient funds in the revolving loan fund to support the savings goals proposed for the 2019 Plan.

In 2019, the Company will conduct a discreet choice experiment and hold two focus groups to further its understanding of customers' preferences concerning OBR vs incentives.

The Company began committing finance for large commercial gas efficiency projects in 2015. These funds are in various stages of the finance process and a fraction of the funds are available to repurpose and commit to customers each year. The gas revolving loan fund has increased to approximately \$1.3 million and the Company plans to maintain this level in 2019. (Further refinements in the restaurant and hotel initiatives for the second draft may require an injection in this area.)

For small business customers, the Company continues from past years' successful experiences to offer on bill repayment for the customer portion of the project over 12 or 24 months. Due to changing ways in which energy savings are delivered to small

business customers, the Company has more customers opting for the 24-60 month option, thus diminishing repayments in future years. However, the Company projects the fund will be able to sufficiently finance the planned 2019 small business customer demand. National Grid's revolving loan fund projections for 2019 are illustrated in Attachment 5, Table E-10 and Attachment 6, Table G-10.

### **Third Party Finance Products**

National Grid is committed to providing financing solutions designed to accelerate sales and remove project cost barriers. Financing energy efficiency upgrades can provide business customers with positive cash-flow in part because the value of the savings can be quantified and is often more than the cost of financing. However, customers may need assistance finding the capital required to help them invest in energy efficiency. In addition, the approval process and conditions attached to traditional bank financing are such that many customers are deterred from borrowing.

In 2017, National Grid in Massachusetts went through a competitive RFP process for third party finance solutions and partnered with Ascentium Capital, a national equipment financing company, to introduce a solution for large C&I customers. Instead of using the entire incentive from National Grid to buy down the capital cost of the project, this new offering enables customers to direct a portion of their incentive to buy down the interest on a loan to zero, they receive from Ascentium Capital; the remainder is used to buy down the cost of the project and reduce the principal required. Ascentium provides a streamlined experience for customers, with quoting tools, applications, approvals, and documentation occurring online. Loans for commercial entities are available from \$10,000 up to \$1.5 million (preferred loan sizes are \$50,000 to \$250,000) and in terms from one to five years; municipal financing is also available in higher values.

In 2018, National Grid's sales representatives were trained in the use of this mechanism. The mechanism has been offered to many customers, but only one customer has proceeded to completion so far. In 2019, National Grid believes that number of transactions will rise as the product becomes better known in the marketplace. The Company will work towards a goal of five transactions in the next year.

### **3. Commercial and Industrial Energy Efficiency Programs**

The C&I Energy Efficiency programs are organized in the same way as the built environment – customers are making decisions around their investment in higher performing new construction and existing buildings. Depending on the needs and size of the customer within each of the segments, customers can participate in one or more of the four main energy efficiency programs. In 2019 Demand Response will be offered as another program that will support peak reduction strategies to both large commercial customers and small to medium business customers.

- The Large Commercial and Industrial New Construction Program
- The Large Commercial Retrofit Program
- The Small Business Direct Install (SMB/DI) Program
- Demand Response Program (C&I Connected Solutions)

Although there are four energy efficiency programs in the C&I sector, all C&I customers are eligible to participate in the Large Commercial and Industrial New Construction Program and the Large Commercial Retrofit Program. However, the Small Business Direct Install (SMB/DI) Program is restricted to customers who consume less than 1,000,000 kWh per year. Larger and more complicated measures not offered by the SMB/DI vendor go through the New Construction or Retrofit Programs. The following sections describe the various offerings under these three programs. In addition, a logic model describing the C&I programs and how they relate to short and long-term outcomes is provided in Appendix 2 and 3.

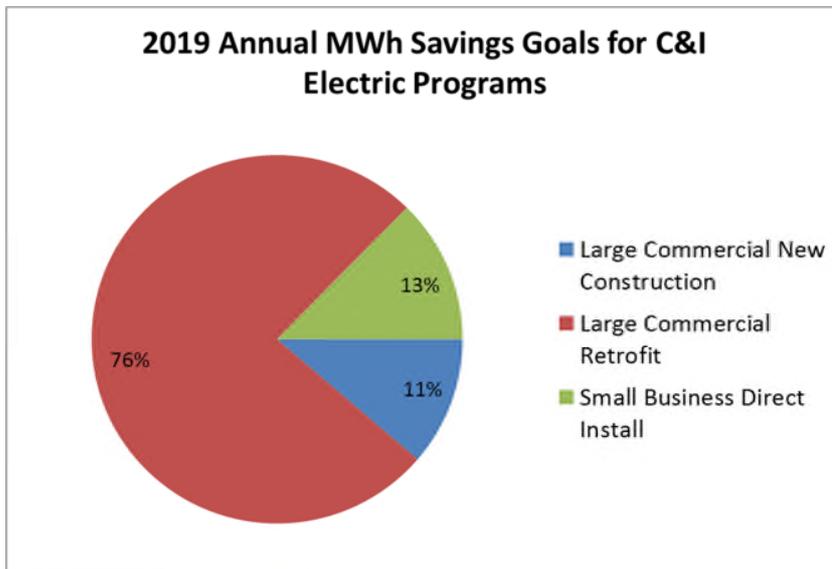
In 2019 the Company will continue to focus on demonstrations and assessments. Below is a list of all activities for demonstrations and assessment for 2019.

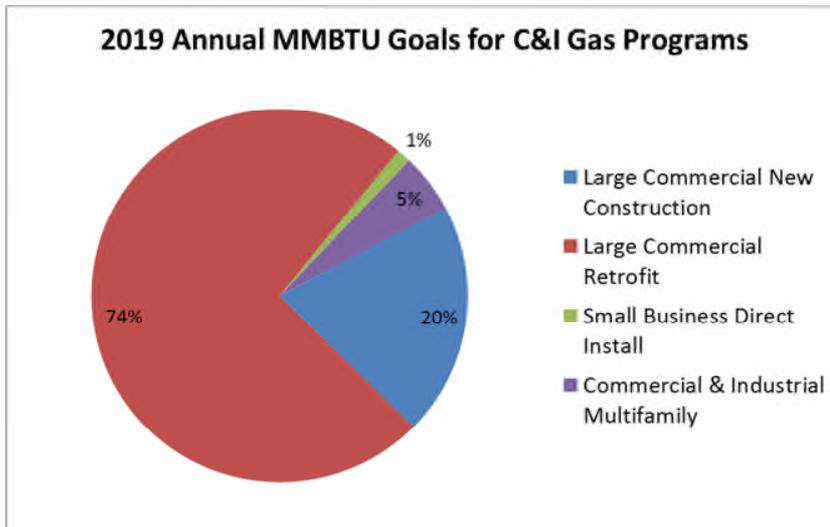
<b>Table 1. New Commercial and Industrial Demonstrations and Assessments, (2018-2020)</b>					
		<b>Name</b>	<b>C&amp;I program</b>	<b>Duration</b>	<b>Classification</b>
1		Performance based Procurement(Accelerate Performance)	New Construction	2018-2020	Demonstration
2.		Strategic Energy Management	Retrofit Program	2018-2020	Demonstration
3.	Industrial	Behavior change through education of small/medium plant personnel	Retrofit Program	2018-2020	Assessment
4.		Implement Underutilized Energy Efficiency Technologies on Mechanical Power Transmission Systems Demonstration	Retrofit Program	2018-2020	Demonstration
5.	Lighting Go-To-Market Strategies	Secure Lighting Spec (SLS)	Retrofit Program	2018-2019	Assessment
6.		Lighting as a Service	Retrofit Program	2018-2020	Assessment
7.		One-Fit – Lighting Manufacturer Based Turn-Key lighting design	Retrofit Program	2018-2019	Assessment
8		Web-Based Performance Lighting PLUS App	Retrofit Program	2018-2019	Assessment
9.	Lighting Technologies	Automated Window Shade Systems Assessment.	Retrofit Program	2018-2019	Assessment
10	Training	Online Trade Ally Training on Advanced Lighting Systems	Training	2019-2020	Demonstration

11.	Small Business	Heat Pumps Demonstration	Retrofit Program	2019-2020	Demonstration
12	Demand Response	Storage Demonstration	Demand Response	2019-2020	Demonstration

In 2019 the Company will explore and develop an evaluation process for coordinating demonstrations and assessments with the Evaluation Monitoring and Verification (EM&V) team.

**Figure 1. Commercial and Industrial Electric and Gas Goals by Program**





## 4. Large Commercial and Industrial New Construction Program

### a. Overview

The New Construction Program is divided into two main categories:

1. **New buildings, major renovations and tenant fit-ups:** This is specifically for those projects that are ground up new construction or major renovations, all of which traditionally involve some level of design and are governed by code. The section below describes this in detail.
2. **End of life replacements:** Typically with this category there is no design component. Customers purchasing new energy-consuming equipment, or replacing equipment that has reached end of useful life are incentivized to purchase and install energy efficient equipment. Measures installed are governed by codes and standards in some cases where equipment has reached the end of its life. Customers are encouraged to make efficient choices with every category of equipment purchase. The baseline energy is considered to be the energy code and savings are calculated from the baseline energy. This works the same way as the “systems approach” described below, whether through prescriptive or custom pathways.

### b. 2019 Goals

For the 2019 Plan, the Large Commercial and Industrial New Construction Program has the following goals:

**Table 2. Electric**

Demand Reduction (Annual kW)	Energy Savings (Annual MWh)	Customer Participation
1,409	10,863	84

**Table 3. Gas**

Energy Savings (Annual MMBtu)	Customer Participation
42,536	187

**c. New Buildings, Additions, Major Renovations and Tenant Fit-Ups**

The services and incentives offered are designed to promote and support high performance building design, equipment selection, and building operation. This program offers both technical assistance and financial incentives based on projected energy savings performance to incentivize building beyond the current energy code baselines. Technical assistance ranges from simple plan review and efficiency upgrade recommendations to complete technical reviews of energy models. In addition, the Company is utilizing existing energy efficiency technical assessment studies to provide engineering support to potential applicants for Advanced Gas Technologies (AGT) incentives. AGT provides an incentive to natural gas C&I customers as part of a demand leveling program. This program provides an incentive for summer load gas projects.

The Large Commercial and Industrial New Construction Program offers two approaches for ground up new construction or major renovation projects:

- **Systems Approach:** The Systems Approach is designed for individual measures and for those projects applying later in the design process and which are generally focused on one or two energy systems to increase efficiency.
- **Whole Building Approach:** The Whole Building Approach takes into account a comprehensive analysis of all building measures together and requires collaboration between National Grid and the Design Team from the conceptual design phase through project completion. It encompasses consideration of all energy saving opportunities, including shell, fenestration, equipment and system interactions.

**i. Systems Approach for New Construction**

There are a few ways a customer can take advantage of the New Construction Program using the “Systems Approach.”

**1.a. Prescriptive Path:** The prescriptive path is the quickest and simplest way to participate in the New Construction Program. This is used for equipment that is commonly replacing less efficient equipment and for which savings data is available due to the length of time the measure has been in the marketplace and the number of installations is large enough for there to be a representative sample. A fixed dollar amount is paid to the customer for replacement of a specific piece of equipment.

**1.b. Custom Express Path:** The custom express path is used when a measure may be relatively new to market. It is a more streamlined approach than the custom path. Custom Express refers to a suite of calculation tools available for TA vendors and partners which utilize pre-approved methodologies, industry standards and engineering best practices. A Custom Express tool is used to determine the project’s eligibility for an incentive on a case by case basis. This path can be used in conjunction with the New Construction Program but it is more commonly used for the Retrofit Program applications. The amount of the incentive for a measure going through the custom express path can vary from project to project based on projected savings.

**1.c. Custom Path:** For customers who wish to achieve deeper and broader savings compared to prescriptive offerings, a custom path is available. This involves a more complex engineering analysis and is frequently used by customers considering complex HVAC equipment and systems. Custom incentives for new construction projects are designed to cover up to 75% of the incremental cost between standard and premium efficiency equipment.

The sales team has the flexibility to offer incentives that can be negotiated with customers. The Sales staff determines how to negotiate, based on the customer’s financial needs. This approach helps the Company to maintain cost control with program budgets.

In 2019, the Company will continue offering custom gas and electric measure options. (Please refer to the appendix at the end of this attachment for a sample of custom measures.)

**ii. Whole Building Approach for New Construction**

Under the “**Whole Building Approach**”, there are two main pathways for customers who choose to do comprehensive and integrated designs for their projects. Rhode Island is currently using the code IECC 2012; the Company anticipates that the code, in Rhode Island, may change to the IECC 2015, in early 2019. If the code changes the Company will revisit the level of performance above code for incentives. In 2019 the Company will also study criteria for participation in this approach, by end use, and look to increase program participation requirements by end uses, like HVAC, to achieve a prescribed % better than standard practice baseline and will look to implement results from this study in the 2020 Annual Plan.

**2.a. Integrated Design Approach** is most applicable for buildings that are greater than 100,000 square feet. Buildings smaller than this size that are not a good fit for the Design Express path. Both owners and design teams are eligible for incentives or projects that perform 20% better than energy code. Customer incentives are based on kWh and Therm savings. Incentives are capped at 75% of the incremental cost of the energy saving measures. A fixed incentive is also offered to design teams for attending a design charrette/workshop that will enable them to incorporate energy efficiency early within the project stages. In addition, design team incentives are awarded for achieving energy savings that are 20% above the energy code savings target.

**2.b. Integrated Design Express:** This pathway is for smaller buildings in the 20,000 to 100,00 square feet range. Both owners and design teams are eligible for incentives on projects that perform 20% better than the energy code. Customer incentives are based on kWh and Therm savings. Incentives are capped at 75% of the incremental cost of the energy saving measures. In addition, design team incentives are awarded for achieving energy savings that are 20% above the energy code savings target.

**2.c. Operational Verification:** To ensure energy savings projects are installed and operated as designed, the Company will continue to provide operational verification

service in 2019 as in previous program years. This service will continue to be served by independent third-party vendors for verification of complex building systems, including HVAC projects involving energy management systems or other controls, ensuring proper installation and operation as designed. National Grid requires all projects which receive an incentive over \$100,000 to undergo operational verification. This service is also promoted for projects where the savings are dependent on control measures or operational improvements. National Grid typically provides these services at no cost.

**d. Initiatives specific to New Construction Program**

Specific initiatives are listed below within the New Construction Portfolio that addresses the unique needs of the New Construction market sector:

**i. Building Energy Code and Appliance Standards**

**Overview**

National Grid is one of a few utilities that have been allowed to claim energy savings for supporting progress related to the building energy code. The Company launched its Code Compliance Enhancement Initiative in 2013 and has been claiming savings for building energy code compliance support activities since 2014. The Company has also provided technical assistance for proposing new and improved appliance and equipment standards regulations for the State.

The Codes and Standards initiative is an innovative efficiency offering that saves energy on behalf of customers by: 1) intervening strategically in the construction industry to improve compliance with the state building energy codes, and 2) strengthening energy efficient energy codes and product standards.

**2019 Focus**

**Commercial Codes Savings:**

Savings listed below are included in the 2019 Goals listed for Large Commercial and New Industrial Program

<b>Electric: Energy Savings (Annual MWh)</b>	<b>Gas: Energy Savings (Annual MMBtu)</b>
277	343

While the State's deferred update to a more efficient building energy code and an increase in compliance with its current code continues to reduce the potential savings for this initiative compared to previous years, the Company will focus its efforts toward remaining compliance gaps. For the first time, The Company will also directly support the State's adoption of an updated base energy code and the use of the State's newly developed stretch code.

As for appliance and equipment standards, the Company proposes to continue its support of advanced state-level standards as well as supporting (where opportunities exist) the development of national standards.

**Energy Codes:**

The Code Compliance Enhancement Initiative (CCEI) is a focal point of the C&S initiative. The CCEI includes robust stakeholder engagement and industry group outreach, in-person classroom and hands-on trainings, project-specific technical assistance circuit riding, development and dissemination of documentation/compliance tools, and other services.

A 2016 compliance evaluation study for commercial projects found that compliance rates increased from about 70% with the state's previous 2009 IECC-based energy code to about 86% compliance with the current 2012 IECC-based version. In 2019, the Company will continue to deliver commercial energy code trainings focused on remaining code compliance gaps while supporting Rhode Island's anticipated transition to 2015/2018 IECC. Pending the passage of enabling regulations, the Company will also continue to work with the RI Building Code Commission to accommodate third party energy code specialists as optional energy related building inspectors for applicable projects undergoing the permitting process.

**Stretch Code support:**

In 2017, the Company guided the finalization of the stretch code for commercial buildings. In 2019, the Company's stretch code support will continue as follows:

- Provide technical expertise on energy related requirements
- Conduct stretch code specific trainings along with the base code trainings (as detailed in section above)

- Align the Company's New Construction Program with stretch code specifications as much as possible
- Advocate for increased use of the stretch code and work with the Company's customers to achieve the stretch code requirements.

In 2019 the Company will support buildings that achieve Stretch Code requirements with an additional flat incentive based on the size and type of project.

**ii. Appliance and Equipment Standards:**

Over the past few years, the Company has worked with associated stakeholders to spur the adoption of new product standards. While 2018's effort advanced further than previous attempts, the required legislation to cement this effort was not passed by state legislatures. The Company will continue to advocate for State appliance legislation in 2019 and provide technical support regarding such parameters as market potential, energy savings, and life-cycle cost analysis. The Company also proposes to directly pursue opportunities to partner with efficiency program administrators in California and beyond in advocating for federal appliance standards, including codifying federal appliance standards at the state level to prevent any potential backsliding.

**iii. Energy Efficiency Integration with Solar**

In 2019, the Company will continue to work to align its energy efficiency programs with the solar offerings in Rhode Island in order to help customers achieve zero-energy buildings. The Company will also work with the Office of Energy Resources' lead on the state's zero-energy initiatives pursuant to the Zero Energy Building Pathway to 2035 – Whitepaper Report of the Rhode Island Zero Energy Building Task Force (2016). ([https://www.nationalgridus.com/media/pronet/ri-ee-task-force/cm6459-ri-zne-white-paper-12\\_16.pdf](https://www.nationalgridus.com/media/pronet/ri-ee-task-force/cm6459-ri-zne-white-paper-12_16.pdf))

**iv. Indoor Agriculture Initiative**

In RI, there are currently three dispensaries for medical marijuana with no plans to expand that number anytime soon. Savings opportunities for indoor agriculture are limited to the grow facilities associated with these three dispensaries. The Strategic Sales team will continue outreach efforts to these facilities.

In addition, the legalization of recreational marijuana has had no movement in Rhode Island. In MA, as of July 1, 2018, recreational marijuana is now legal, but only a couple of licenses have been issued.

- <http://www.providencejournal.com/news/20180616/marijuana-jobs-in-limbo-after-ri-lawmakers-strike-dispensary-expansion-from-budget>

**v. Exterior Performance Lighting and Controls**

The goal of this initiative is to extend the Company's existing performance lighting offering (currently offered to new and retrofit projects) to exterior lighting applications. Through this initiative, the Company plans to encourage:

- a. An understanding of exterior lighting codes
- b. Code based lighting controls for exterior projects
- c. Code based exterior lighting design that promotes best practices while saving energy.
- d. Lighting designers to understand exterior lighting codes, and to design to exceed code through innovative designs and technologies. Lighting professionals including manufacturers' representatives, manufacturer engineers and ESCO's model the existing exterior lighting layout and propose a more efficient lighting layout with better uniformity that meets the required lighting zones (LZ) foot-candle level for that site. The exterior lighting design will be encouraged through higher incentives to incorporate additional lighting controls including: bi-level occupancy controls, and scheduled night set-back. Through the combination of "right sizing" the lighting and providing robust controls, this system will exceed current code LPD and code compliant controls practice. Greater exterior lighting codes training including exterior controls best practices and exterior lighting design is currently being developed by the IES. The Company plans on providing this training to its stakeholders in order to increase best practices. This along with a Performance Lighting PLUS online training will encourage greater knowledge of exterior lighting codes, and best practices.

In 2017 this initiative was incorporated into the Performance Lighting program.

**vi. Demonstrations:**

**Performance Based Procurement Demonstration**

The Company, in 2018, launched a new initiative under New Construction Program called Performance Based Procurement. Performance based procurement is a commercial new construction program enhancement that encourages building owners and developers to specify energy performance targets and include them in the project request for proposals. The design and construction teams are selected based on their ability to meet energy performance targets. Performance-based procurement holds teams contractually accountable throughout design and into occupancy, resulting in actual performance and verifiable energy savings.

Performance based procurement results in deep, fully realized energy savings beyond prescriptive code minimums. This increases value to the building owner and delivers greater savings to the new construction sector, where advancing energy codes and standards make energy savings goal achievement more challenging.

**Value to Customers:**

- Technical assistance to establish project energy requirements and evaluate team submittals.
- Procurement language that integrates building performance into existing RFP and contract documents.
- Easy-to-use processes from RFP through building operations.
- Connection to financial incentives, OBR and C-PACE, including incentives based on post-construction measured energy performance.
- Training and resources that allow owners to replicate this approach across a portfolio of buildings.

This initiative was launched in 2018 and will continue in 2019 and the Company is looking to scope three projects in the first year of launch.

## **5. Large Commercial Retrofit Program**

### **a. Overview**

The Large Commercial Retrofit Program serves the needs of existing buildings in their pursuit to lower energy consumption This program includes three distinct components

(similar to the New Construction program) each aimed to address specific market barriers and to advance efficiency: Prescriptive incentives are intended to support trade allies in advancing energy efficiency sales and to provide signals to customers who are making direct purchases that will encourage them to adopt the more efficient and more cost effective option. Custom incentives provide services to investigate opportunities to increase efficiency and support the steps needed to implement the upgrades. Finally, upstream delivery provides a more efficient way for customers to receive reduced pricing at the point of sale for energy efficient equipment purchased.

**b. 2019 Goals**

For the 2019 Plan, Large Commercial Retrofit has the following goals:

**Table 4. Electric**

<b>Demand Reduction (Annual kW)</b>	<b>Energy Savings (Annual MWh)</b>	<b>Customer Participation</b>
12,558	73,013	2,610

**Table 5. Gas**

<b>Energy Savings (Annual MMBtu)</b>	<b>Customer Participation</b>
155,049	70

**c. Pathways to Meet Program Requirements**

**i. Prescriptive Path**

Prescriptive incentives are available in this program for some of the more commonly installed pieces of energy efficient equipment that are replacing standard efficiency equipment. Manual application forms have been available on the Company’s website for customers and contractors to use when applying for incentives. Beginning in January 2014, prescriptive gas incentives were offered online. In the fall of 2018 National Grid plans to roll out an electronic application for customers to apply for prescriptive electric and gas incentives. This is known as Rhode Island Digital Application Portal (RIDAP). RIDAP was based on a similar model created by the Program Administrators in

Massachusetts, known as MassSave Application Portal (MAP). MAP was rolled out early in 2018. Most of the Massachusetts Program Administrators for both electric and gas energy efficiency for C&I participate in this portal for their customers and vendors. Access to the RIDAP portal will be available on the National Grid website.

A screen shot for this portal is displayed below.

The screenshot displays the National Grid MAP portal interface. At the top, there is a navigation bar with the National Grid logo, fuel type selection buttons (None Selected for Electric and Gas), and a message about offers for the provided Zip Code (02824). Below this is a 'Getting Started' section with a form to enter project details. The form includes a Zip Code field (02824) and a Building Type dropdown menu (Automotive). It also has two checked checkboxes: 'Existing Equipment Upgrade' and 'New Building or Equipment'. A 'DETERMINE YOUR NATIONAL GRID FUEL TYPES' button is located below the form. The 'Search Results' section shows a message: 'Great news! We've found high efficiency offers that may be available for Forestdale. Please select your National Grid fuel types:' followed by two buttons for 'Electric' and 'Gas', each with a 'nationalgrid' logo. A 'BROWSE FOR OFFERS' button is at the bottom of the search results section.

In 2019, the Company will continue to offer prescriptive gas and electric incentive options. For more details on measure descriptions refer to Attachment 2019 Technical Reference Manual.

### Custom Express Path

Similar to the New Construction Program above, the Retrofit Program also offers a custom express path for select retrofit measures. Some examples of electric custom express measures under the Retrofit Program include:

- Transformers
- Lighting
- Refrigerated Case Covers
- ECM Motors

Examples of custom express natural gas saving measures under the Retrofit Program include:

- EMS controls
- Energy Recovery Ventilator (ERVs)
- Heat Recovery Ventilators (HRVs)
- Steam Traps
- Pipe, Valve, and Tank Insulation
- Rooftop Units (RTU) Optimization

#### **ii. Custom Path**

A customized approach that assesses the operations of the building through a technical assessment report (TA study) is usually the first step a customer experiences before applying for a custom incentive. Similar to the New Construction Program, the energy efficiency technical assessment studies for the Retrofit Program can also be used by customers to provide engineering support for the Advanced Gas Technologies (AGT) Program.

These Large Commercial Retrofit Program incentives are designed to move customers to adopt more energy efficient operations and measures. Incentives cover up to 50% of the total project cost including labor and equipment. The ability to negotiate custom incentive levels and TA costs for some of the largest customers will also be available for this program. See more details on this in the Large New Construction section above.

In 2019, the Company will continue to offer custom gas and electric incentives. Refer to the appendix at the end of this attachment for a sample of custom measures and new technologies. In addition, the following technologies will be tested through building projects: In 2019 the Company will continue to focus on a system optimization approach by setting more aggressive, minimum thresholds for efficiency.

See below a case study of Calise & Sons Bakery that was a Custom Project.

**National Grid helps Calise & Sons Bakery with a major equipment upgrade.**

“This project is a pillar that supports the ‘Calise Way,’ which is our mission to produce high-quality breads and rolls in a safe and clean environment.”  
– Peter Petrocelli, Chief Financial Officer, Calise & Sons Bakery



**PROJECT FAST FACTS:**

Final cost of Installed ECMs	\$383,052
Authorized Incentive	\$103,442
Customer Cost	\$279,629
Annual kWh Reduction	543,071 kWh
Annual Carbon Reduction	200 metric tons CO <sup>2</sup> @ 810 pounds per MWh
Annual Savings	\$70,600 @ \$0.13/kWh
Return on Investment (ROI)	25%

**d. Commercial Retrofit Program: Gas Technologies**

The following technologies are being deployed or are currently being explored for the commercial retrofit program for various market sectors, like lodging, manufacturing, restaurants etc.

**i. Heat Exchanger Cleaning**

During 2016, a demonstration project on heat exchanger cleaning was completed in Boston. It was also tested in Rhode Island but costs for this measure were high and it did not screen well.

**ii. Xeros Polymer Laundry Solutions**

There is a new technology on the market for commercial laundry operations which uses 80% less water, 50% less energy (natural gas) and 50% less detergent than more traditional equipment. The market sector for this equipment crosses over the Company’s traditional market sectors – it includes commercial laundry facilities,

laundromats, universities, and hotels. In addition to the obvious energy saving benefits, there are other benefits associated with this technology including requiring a lower temperature to operate, ability to get out stains other cleaning cannot do, ability to complete a cycle in less time, and ability to clean some materials that were previously unable to be cleaned. In 2019, National Grid plans to target the on premise laundry customer segment as part of the Company's lodging and hospitality initiative as well as, commercial laundries and laundromats.

**iii. On-Premise Laundry (OPL)**

There are some on premise laundry solutions to reduce natural gas energy usage including ozone, condensing equipment and a retrofit for dryers. National Grid has experience offering incentives to customers installing this equipment. In 2018, webinars will be provided to further encourage customers to embrace these technologies. The Company has successfully incentivized new commercial washers and dryers in hotels in Massachusetts and would like to gain more traction in Rhode Island. There is an Energy Star rating for commercial OPL Washers but none for dryers; however the custom path can be used to calculate savings. This typically screens as an end of useful life measure by comparing the incremental cost of the energy efficient machine to the machine being replaced.

**iv. Dry Smart**

**New in 2019:** Dry Smart RMC™ (Residual Moisture Control) Due to the high costs associated with replacing commercial dryers, many times the units are repaired rather than replaced. This technology allows installation and monitoring of a moisture sensor retrofit at lower costs than replacement with a new energy efficient commercial dryer. The moisture sensor senses the level of dryness and stops the machine when a load is dry. This reduces gas that would otherwise be wasted. It has received good test results.

**v. Steam Trap Smart Tags**

In conjunction with doing a steam trap survey, smart tags can be added to each steam trap being reviewed. The steam trap vendor hangs the tag on each trap and provides National Grid and the customer with a spreadsheet providing information on the status of each steam trap including date of service. There will be a National Grid logo and an app that a new facilities manager can use to quickly get up-to-speed in learning about the condition of steam traps in their new building. Infrared images are also available.

This will also provide the new facilities manager with instantaneous information about National Grid's energy efficiency programs. No incentive is available at this time but may be considered in the future. These tags have been provided to National Grid's steam trap vendors to use on work done in the Company's energy efficiency programs. By the end of 2018, more data will be available. Once the data is entered into the system, it will take a couple of years before the savings can be measured. At that time, the bar codes will be scanned and the condition of the steam traps will be noted and savings from repairs can be determined.

**vi. Greenheck Grease Filters**

This is an emerging technology that incorporates an air to water heat exchanger into grease filters which fit into commercial kitchen exhaust hoods. In addition to exceeding UL grease collection requirements by 3.5 times, they also serve to pre-heat hot water. This also saves natural gas and electricity and the system captures and reuses waste heat that would otherwise be wasted to the outside. In 2016, EcoThermal, a manufacturer, partnered with the Company's vendors to perform demonstration projects in Rhode Island, Massachusetts and New York. As a result of this demo project, customers can expect energy savings and reduced cleaning costs to exceed \$4,000 per year. The average restaurant can save 2,000-3,500 therms per year in gas as a result of the pre-heating of hot water. This results in an average CO<sub>2</sub> reduction of 18.6 metric tons per site. That manufacturer has since gone out of business but the same technology is available with Greenheck. This is an HVAC manufacturer. Additional testing is being conducted in RI and MA. This will be a custom measure available for restaurants and colleges in 2019.

EcoThermal Filter's<sup>TM</sup> website mentions that National Grid incentives are available for Rhode Island commercial customers. Filters fit into standard commercial kitchen hoods, making installation easy. Regular maintenance can be done by the restaurant's team and a deeper cleaning requires filters to be disconnected. Some restaurants hire a hood cleaning company for this work.

Sales efforts of this product have stalled due to the manufacturer pulling sales back to its headquarters in Michigan. This measure can succeed again if a local installer and sales force can be found in Rhode Island. The Company is inquiring with the manufacturer about their plans. National Grid is developing a relationship with new players to this market in New England and will provide trainings and presentations to

the RI Hospitality Association Members to highlight this measure as well as other viable gas measures.

**vii. Removable Insulated Jackets for Big Steam Plants**

For some of National Grid's largest customers, steam turbine insulation jackets improve both efficiency as well as safety in the plant. They are easily removed and replaced by any staff member. Both standard and custom sized jackets are available. One single turbine can save \$9,500 in energy in a year. A heat loss reduction of 135 BTUs per square foot per hour can result from using the jackets. Touch temperature can be reduced from 750<sup>0</sup> F to 145<sup>0</sup> F, improving safety. This product also has a five year guarantee. This is a custom express gas measure that can save customers tens of thousands of therms annually. The measure will be aggressively implemented by the Company's energy efficiency sales teams in RI to all medium to large C&I customers who use steam and high temperature hot water for processes and space heating. It can also be used on all valves, fittings, steam traps, condensate tanks and uninsulated hot water tanks. The jacket has excellent synergies with general mechanical insulation on piping systems, steam system assessments and steam trap surveys. National Grid is providing training for these measures with targeted webinars on gas measures and Steam System Assessments.

**e. New Gas Measures Being Developed**

**i. Heat Watch**

**New in 2019:** The Company is also facilitating "Heat Watch" for Multifamily, small business and C&I programs. This service includes running boilers in conjunction with controlling and managing the whole boiler and heating systems for a facility. National Grid is currently working on a custom savings tool and new measure development approval processes. This service will save 5-8% of energy on steam systems by preventing overheating and improving temperature control of spaces, especially during spring and fall. Test results will not be available until Q1 2019 due to seasonal heat usage.

**ii. Cozy<sup>TM</sup> Radiator Covers**

**New in 2019:** The Cozy<sup>TM</sup> Radiator covers are insulated enclosures with a room temperature sensor controlling a fan that introduces heat to the space when needed.

It virtually makes each steam radiator its own controllable HVAC zone. One NY University was able to reduce boiler run times by 41%.<sup>2</sup> Non energy benefits include increased asset value, improved tenant/occupant comfort, reduced emissions, and improved safety. One college in RI has had good results. This measure is available as a custom project.

**iii. Aeroseal**

**New in 2019:** Aeroseal is for both heating and cooling. It provides duct sealing to seal up old leaks by blowing in atomized polymers. Before and after testing is being conducted.

Success of the new measures depends on multiple factors including energy savings, customer satisfaction, ease of use, and value to customers. If successful, testing results will be shared with the Strategic Sales team so they can in turn share the information with customers.

**f. Initiatives specific to Retrofit Program**

Specific initiatives are listed below within the retrofit portfolio that address specific and unique needs of the existing buildings upgrades:

**i. Retro-Commissioning**

Retro-Commissioning (RCx) is defined as “the process of applying rigorous testing, verification and upgrade protocol to an existing building control system to identify and correct operational inefficiencies”<sup>3</sup>. RCx can be coupled with a monitoring system which uses metering and software to provide ongoing energy performance feedback directly to building operators and or the Company.

RCx targets both electric and gas saving measures and helps commercial and industrial customers improve performance and reduce energy consumption of their facilities through the systematic evaluation of existing building systems and may include continuous commissioning. RCx recommendations from a study are usually no-cost and low-cost HVAC measures that can be implemented in the course of normal maintenance

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<sup>2</sup> <https://www.radiatorlabs.com/wp-content/uploads/2016/08/CaseStudy-ColumbiaUniversity.pdf>

<sup>3</sup> *Retro-commissioning Best Practice Study*, Revised Draft for C&IMC Review, MA, May 22, 2014

or enhancements to building automation systems, eliminating energy waste. In addition to energy benefits, RCx results in increased comfort for occupants, and provides building information to owners and operators that allow the building operators to meet occupant needs for specialized systems, safety, security, and improved long-term capital improvement plans.

National Grid launched a retro-commissioning initiative with four customers from the healthcare, hotel and education sectors in 2017 which continued into 2018. Certain screening criteria were used for the selection of customers. Criteria included whether or not customers had an EMS; whether or not they had controls; and if they frequently received complaints from occupants about being too hot or too cold. The intent was to look for customers that had the greatest need for this service and for National Grid to be able to learn from the experience. The selection criteria used, proved to be successful, as four out of the five candidates selected continued to proceed with the initiative. From the launch of this initiative the Company has learned about engagement and that sustained savings from retro-commissioning takes patience, sustained interest, and commitment from both customers and by implementers.

As a result of the Company's experience with retro-commissioning to date, the Company will work with the Massachusetts team and is considering a tiered approach for 2019. The first tier would be the most simple – take about five common measures and scope out inputs and outputs. This can be a Custom Express approach. The next tier, Phase 2 would be deeper and broader. The third tier would involve the more traditional full retro-commissioning.

In addition, the Company will facilitate transfer of information from the controls vendor to third party retro-commissioning vendors or TA vendors with some expertise in that area. The Rhode Island Products and Growth team will work with Massachusetts counterparts to encourage development of more expertise in this area.

## **ii. Boiler Tune-Up Initiative**

In 2015 a natural gas boiler tune-up demonstration project began in Rhode Island. In 2016, this project became an initiative and modifications were made to the qualifying criteria which broadened the reach to more customers. In 2016-2017 a strategy to engage with boiler service provider companies was deployed to pilot this program but was not successful. Many of the boiler tune-up service providers have existing contracts

with customers and were not willing to modify their contracts to accommodate this initiative. In 2019 the Company will continue its new go-to market strategy where the Company will continue to identify customers with gas boilers that meet the initiative criteria and the National Grid sales team will approach customers to enroll in this boiler tune-up initiative. Boiler Tune-Up is available for hot water and steam boilers that are 100 HP, 4.2 million btus input, or greater. There are three vendors that have performed the services. The Company is open to adding other service providers if they have qualified individuals and calibrated combustion analysis equipment. The uptake has been low and sporadic. The largest barrier in the market to this measure is that the service providers who do this work have for decades managed annual maintenance service contracts with their customers, which included boiler tune up.

**iii. Strategic Energy Management Planning (SEMP)**

The Strategic Energy Management Planning (SEMP) Initiative is available to National Grid's largest C&I customers who have the potential to go deeper with energy efficiency, have a level of in-house sophistication to make organizational changes to plan for multi-year energy planning, and are motivated by corporate and institutional sustainability goals. A Memorandum of Understanding (MOU) offers a way to document a commitment between the customer and the Company to work together to achieve mutually stated goals through specific actions that are tailored to the customer's facilities over a multi-year planning horizon. As such, an MOU (though non-binding in this case) can set the stage for achieving deeper and more comprehensive energy efficiency savings, and is more likely to succeed than a "one measure" or "one year" approach. Typically, MOUs include participation and a commitment by upper management, the establishment of specific, very aggressive energy efficiency saving targets, and measurement and verification strategies to document savings throughout the target facilities along with an incentive structure that meets the customer's financial criteria. This offering goes far beyond energy efficiency into sustainability and branding support for the customer.

The Company currently has four SEMP MOUs. Two are large university campuses, a third is with a hospital group comprising of RI's five largest hospitals. In the second quarter of 2016 the Company added an additional SEMP focused on State facilities (detailed above under Municipal and State Sector). The Company will continue to work with these customers to help achieve their MOU goals. In 2019 the Company will ramp up efforts

to engage more customers with SEMP initiatives. The potential customers include colleges and universities in Rhode Island not yet engaged with SEMP, cities, K-12 schools, industrial customers and with chain restaurants.

### Case Study for SEMP- Lifespan



#### How National Grid and Lifespan Made This Happen Together

Of all the projects recommended, Lifespan went forward with 60% of the projects initially. **National Grid was able to provide Lifespan with generous financial incentives through its Strategic Energy Management Plan (SEMP) initiative** which helped offset a significant portion of the equipment and installation costs. The combination of these incentives and an attractive on-bill financing option helped Lifespan secure the necessary capital to invest deeply in energy efficiency and patient care, while also reaching an attractive return on investment for the hospitals.

*Lifespan achieved 8 to 10 percent in savings. This equates to roughly \$1.4 million annually.*

When asked if companies should consider National Grid for their future projects, a representative from Lifespan said, *"I would highly recommend this thoughtful approach for energy planning and environmental stewardship. The energy savings are great, and all disciplines worked together to achieve scale."*

After the success of their last project, Lifespan is working with National Grid again to enable implementation of the remaining projects. The collaborative partnership between Lifespan, National Grid, and B2Q Engineering made this a **rewarding endeavor, benefiting Lifespan's patients, visitors, employees and finances.**

**With a team of technical experts, financial incentives to drive down capital costs, and resources to help you every step of the way, there's no better way to achieve the scale required to improve energy efficiency.**

In 2019 the Company will continue to develop the SEMP initiative to include three tiers of offerings to customers, including financial tiers and service offering tiers, such that customers receive products and services customized to meet their needs. The goal of these tiered offerings is to engage in more SEMP's in the coming years that are tailored to fit customers' needs. Tier 1 will be basic services that establish a governance structure and help the customer coordinate gross annual energy savings. Tier 2 will include the basic service available in Tier 1 plus Technical Assistance (TA) services, Tier 3 will include Tier 2 services plus provide project management services to the customer. National Grid is also engaging with SEMP customers with non-energy efficiency solutions within its SEMP initiative, such as renewables, storage, electric vehicles, and distributed energy resources and technologies.

**iv. Lighting Designer Incentives (LDI)**

Most lighting projects involve replacing old lighting fixtures with new, energy efficiency fixtures. This yields savings but leaves more savings untouched due to the lack of redesign. The LDI incentive goes directly to the lighting design team to fund their design and modeling efforts to achieve lighting energy savings while maintaining quality lighting design. The goal of this incentive is to have an early and deep impact on lighting projects, ensuring that energy efficiency and lighting quality is considered from the beginning and supported until the end of a project. The lighting designer becomes an energy efficiency champion, fighting for the best energy efficiency lighting for incentives. These lighting design solutions will have greater persistence because they are designed by professionals who have balanced the human needs of the project with the performance requirements of the lighting system, creating quality lighting designs that are "right-sized" for the project to meet the lighting end use needs in an energy efficient manner. The Company currently maintains a list of qualified Lighting Designers, as well as Engineers and Architects who have demonstrated at least 5 years of lighting design experience. In 2019, the Company plans to market the program to the construction and design community. The Performance Lighting PLUS training proposed in 2019 will target architects and engineers and to goal is to increase familiarity and participation in the LDI.

**Upstream Path:** This is described in more details in section 5.f.viii. below.

**v. Solid State Street Lighting**

Based on the feedback it received from Rhode Island cities and towns, the Company estimates total savings to be approximately 35,000-37,000 annual MWh for solid state street lighting in Rhode Island. As of this filing, 16 towns in Rhode Island and three fire districts have completed the purchase of street lights, representing approximately 47% of the municipalities served by National Grid. In addition, four fire districts and the town of Foster are in the completion stages for purchasing their own street lights. Five of these towns have completed installation of LEDs, either with or without controls. Eleven additional towns have received closing documents and could submit them at any time to complete the sales. Two others are in the process of purchasing their street lights from National Grid.

**Customer Owned Street Light Equipment**

Prior to rolling out the customer-owned street lighting tariff in 2014 and the energy efficiency program to customers, the Company held numerous meetings with municipalities and OER to ensure that customers understood what was involved in the process of acquiring the assets and equipment going forward. Beginning in 2016, the Company received the first requests for municipal customers in Rhode Island to purchase their own street lights from National Grid in anticipation of converting them to solid state street lighting and in some cases, attaching adjustable controls. In 2019, the Company anticipates the interest from cities and towns in converting their street lighting to LED to continue. As of this writing, there are 10 towns that have installed LED street lighting for which applications have been submitted but post inspections cannot be done until more information is received from the contractor.

National Grid recommends that municipal customers purchase LED fixtures and controls that meet the criteria of the Design Lights Consortium to take advantage of the Company's energy efficiency incentives. Information regarding energy efficiency incentives is provided by National Grid and OER. Historically, National Grid has not provided lighting design for street lighting because this is a customer option based on safety and security needs as well as the aesthetic preference.

On May 25, 2017, the PUC approved the Company's request to revise Street and Area Lighting S-05 – Customer Owned Equipment S-05 tariff (Rate S-05) to expand eligibility

to include any municipal city or town, any fire district, any municipal water utility board, Kent County Water Authority, Rhode Island Commerce Corporation, Quonset Development Corporation, Rhode Island Airport Corporation, Narragansett Bay Commission and the State of Rhode Island. This change went into effect on June 1, 2017. Rate S-05 had previously been restricted to only providing service to streetlights owned by municipalities after being purchased from National Grid, pursuant to R.I.G.L § 39-30-1. National Grid agreed to expand the availability of Rate S-05 to these other entities. The Company's request to revise Rate S-05 was supported by the Partnership for RI Streetlight Management (PRISM), the RI League of Cities and Towns and the Washington County Regional Planning Council.

In 2018, the Company added an additional 3,080 annual operating hour equivalent option to the tariff offering for customer owned LED street lighting.

Since the beginning of 2015, the Company has offered incentives to municipal customers of \$0.15 per kWh of first-year savings for qualifying LEDs and \$0.25 per kWh of first-year savings for qualifying controls associated with either the dimming or part-night run hours as set forth in the street lighting tariff. These incentive levels will continue in 2019. Since the tariff was amended, the incentive is now available for all of the entities listed in the tariff.

In addition to the funding provided by the systems benefit charge mentioned above, the OER continues to accept applications for street lighting grant funding from communities and will continue to evaluate the needs of communities for LED street lighting in 2019. There is a \$300,000 cap on the funding to individual cities and towns from OER. RIIB funding will continue in 2019.

Beginning in 2016, Rhode Island communities began to benefit from the Rhode Island Infrastructure Bank's (RIIB) Efficient Buildings Fund. Interested cities and towns applied for this funding in spring 2016. This funding is expected to continue for calendar year 2019.

### **Company Owned Street Light Equipment**

In January 2017, provisions in the Company's tariffs for company-owned street and area lighting making available an LED option for customers went into effect. When a customer leases its street lights from National Grid and requests the exchange of an existing luminaire for an LED fixture, the energy efficiency incentive paid to that

customer will be the same amount (\$0.15 per kWh of first-year savings) as is offered for qualifying LEDs in the customer-owned option. This incentive offering was presented to and agreed upon by the Collaborative in March 2016. Current company-owned street lighting tariffs bill energy consumption based on a dusk-to-dawn schedule. At this time, there is not an option for billing on other schedules such as part-night or dimming with the use of adjustable controls. Therefore, there is no energy efficiency incentive currently available for these adjustable controls. However, as the technology evolves and if it becomes a cost effective option for its customers, the Company would then consider the inclusion of adjustable controls or operating schedules in a future tariff filing and also include an incentive in a future energy efficiency program for company owned street lights. The Company will continue monitoring the accuracy, cost and other issues involved with street lighting controls.

Similar to a multifamily building or leased commercial space where the tenant pays the electric bill, as long as the landlord (in this case, National Grid) approves the replacement, the customer leasing the street light will receive the energy efficiency incentive directly.

The table below reflects some of the similarities and differences between the two ownership options available to customers for solid state street lighting.

Distinction	Customer-Owned	Company-Owned
LED Fixture	Customer owns the equipment and is responsible for the purchase, financing, and maintenance	National Grid owns, installs, and maintains the equipment. The customer requests the exchange of existing or installation of new lighting
Energy Efficiency Incentive	Customer receives a one-time incentive payment for the installation of LED equipment (after satisfactory post-inspection by National Grid)	Customer receives a one-time incentive payment for the installation of LED equipment (after satisfactory post-inspection by National Grid.)

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Distinction	Customer-Owned	Company-Owned
Purchase/Lease	Customer purchases the equipment	National Grid leases the equipment to the customer
Outreach	League of Cities and Towns, Annual Department of Public Works (DPW) meeting with Company, and various other meetings	League of Cities and Towns, Annual DPW meeting with Company, and various other meetings
Technical Support	Customer is responsible	Customer is responsible

**vi. Strategic Energy Management Demonstration (SEM)**

Strategic energy management (SEM) is a set of processes for business energy management. The main goal of SEM is to activate industrial and manufacturing customers, through a multiplicity of interventions including individual and group coaching, to address O&M measures in the short term, pursue capital measures in the medium term and establish a culture of continuous improvement in its energy performance over a longer-term period.

Success is judged from a custom built model that takes into account the host of factors that may influence energy use within a facility. While an increase in capital measures is a frequent and desirable outcome of the SEM process, it is excluded from the ultimate savings reported by the initiative.

The energy benefits of SEM include reduced energy consumption through improved energy efficiency and energy conservation, improved demand management and the potential for reduced demand charges, decreased overall energy cost, and reduced greenhouse gas (GHG) emissions.

National Grid issued a joint RFP with the Massachusetts Program Administrators (MA PAs) in 2017 to find a company with expertise in running an SEM initiative. Six responses were received, but the field was quickly narrowed to three companies that have had the most success with SEM initiatives in the United States and Canada. Ultimately, National Grid and the MA PAs selected Cascade Energy for their proven expertise in the field, stellar recommendations, and excellent communication skills.

Cascade is scheduled to begin recruiting for this initiative in August of 2018. National Grid is working closely with Cascade to launch begin cohort activities as close to January 1<sup>st</sup>, 2019 as possible. National Grid expects the first cohort to have between 7 and 10 customers.

**vii. Peak Load Reduction Strategies**

The Company plans to pursue electric and gas savings with its customers that will result in peak load reductions in addition to annual kWh/therm energy savings. In addition to exploring peak demand strategies with its SEMP and industrial customers where there are large pockets of savings, the Company will continue to pursue the following strategies for summer and/or winter peak reductions:

- a. Wireless temperature controls: These controls provide the benefits of large commercial HVAC equipment, especially roof-top units for small businesses. The Company will continue to create messaging around the benefits of these controls for electric and gas and how it has a direct response to the expectation of higher energy costs in winter and summer. Selectable settings and the ability to send system information directly to a computer or mobile device enables users to remotely manage multiple rooms and properties thereby improving energy efficiency and occupant comfort.
- b. Marketing campaign for best practice tips: This campaign, which has been carried out since 2015 will continue in 2019 as well. This consists of a list of best practices for reducing electric and gas usage during winter and summer months, and could be distributed to all C&I customers during the winter of 2017 and summer of 2018.
- c. Pipe Insulation and steam trap surveys are already part of the Company's measure mix that is offered to its customers. As part of the winter campaign both of these measures will be marketed through the Company's sales and marketing teams to reinforce the importance of these measures on winter usage.
- d. Boiler Tune-Up: The boiler tune up initiative described above will further assist customers with winter peak reduction.
- e. Lighting and controls: Several initiatives and measures help reduce summer peak load through lighting specific measures.

- f. Demand controlled ventilation and energy recovery on HVAC units: Both measures provided in the programs that save on peak reductions.
- g. Demand Response: The Company is pursuing a gas demand reduction pilot project to test DR capabilities (described in section below).

**viii. Products Offered Through “Upstream”**

When the Company refers to an “Upstream” initiative it is referring to the practice of offering an incentive directly to a manufacturer or distributor (mainly distributors in Company initiatives) of efficient equipment instead of offering an incentive to the customer through an application form after the sales transaction has been made. This allows them to sell the product for less and make it more appealing to a potential customer. It also allows the customer to acquire this more efficient equipment without the burden of paperwork and waiting for reimbursement.

**Upstream Lighting**

National Grid’s first, and flagship, upstream initiative is formally known as “Bright Opportunities Rhode Island”. This initiative was launched in February of 2012 with four types of LED and four types of fluorescent lamps. Today, the program includes a wide variety of LED lamps, small LED luminaires, and various sizes (1’x4’, 2’x2’, 2’x4’) of recessed ambient LED luminaires or “troffers.” To date, it has achieved tens of thousands of net annual MWh in savings and will continue to play a major role in the Company’s programs in 2019 and into the future due to the fact that:

- Moving products from Downstream to Upstream removes customer-facing paperwork that the Company’s customers have routinely indicated is a barrier to participation.
- Moving products from Downstream to Upstream has shown major increases in volume and energy savings in the past. This volume and increased competition between many manufacturers and distributors drives the prices of luminaires down quickly and has given the Company opportunities to reduce incentives and make the initiative an even more cost efficient way to deliver lighting savings.
- Moving products from Downstream to Upstream, especially in concert with Mass Save Program Administrators (PAs), tends to change the stocking

pattern of distributors across the region which facilitates the transition from fluorescent or HID sources to more efficient and more easily controlled LEDs.

Although the Company is constantly striving to deliver savings “deeper” than lighting, a rapid expansion to savings in lighting will have a positive effect (decreasing kW demand) in both winter and summer peak times due to the fact that commercial lighting is generally on during these times.

In 2017 and 2018, National Grid saw a lower volume of the type of LED lamps that were first introduced in the initiative come through the system. The Company believes that this is due to the fact that a substantial portion of this market has been converted to these types of LED lamps and that it might be nearing a saturation point. Therefore, in 2019, the Company will spend more time and incentive dollars focusing on how to increase the volume of luminaires, especially those which offer built-in controls which will result in more savings. Specifically, the Company will investigate how working with manufacturers and/or offering stocking incentives to distributors can influence the volume of products that distributors choose to stock and ultimately sell to customers. In 2019, the Company will also investigate how to incorporate network lighting controls into its Upstream Lighting Initiative.

National Grid will continue to offer incentives on linear LED replacements for T8 fluorescents, as there are places where this technology is appropriate. The Company continues to investigate other high efficiency lighting equipment and controls to potentially add to the program. In September of 2018 the company added several new types of lamps and lumaires. Below is a diagram of these new products.

Product Type Name	Incentive	Min. Contribution	QPL
Down-lights greater than 25 W	\$ 30.00	\$ 10.00	ENERGY STAR
Mogul Interior High Bay	\$ 70.00	\$ 15.00	DLC
Mogul Interior Low Bay	\$ 50.00	\$ 15.00	DLC
Mogul Exterior 175 W Equivalent	\$ 60.00	\$ 15.00	DLC
Mogul Exterior 250 W Equivalent	\$ 70.00	\$ 15.00	DLC
Mogul Exterior 400 W Equivalent	\$ 80.00	\$ 15.00	DLC
1x4, 2x2, 2x4 LED Troffer Retrofit Kit - Standard	\$ 25.00	\$ 15.00	DLC
1x4, 2x2, 2x4 LED Troffer Retrofit Kit - Premium	\$ 30.00	\$ 15.00	DLC
LED Strip/ Wrap	\$ 25.00	\$ 10.00	DLC

In late 2018 or early 2019, National Grid, along with its MA partners, will introduce even more upstream lighting products for customers. The list is still being assembled, but will include more specialty lamp types such as LED replacements for filament lamps seen in many bars and restaurants.

### **Upstream HVAC**

The success of the Upstream Lighting Initiative encouraged National Grid to explore other areas where the upstream model could be used successfully. After some research, the Company decided to issue a joint RFP with the Massachusetts Program Administrators (PAs) (under the “Mass Save” umbrella) for a company to run an initiative that will encourage distributors to change stocking patterns and advocate for energy efficient Upstream Unitary HVAC and Heat Pumps up to 25 tons.

This initiative currently offers air-cooled air conditioning and heat pumps systems, water-cooled air conditioning and heat pump systems, ductless mini and multi split systems, variable refrigerant flow systems, as well as dual enthalpy economizer controls and electronically commutated motor (ECM) circulator pumps for hydronic heating or service hot water applications.

In past years, as a way to get distributors to stock more efficient equipment, the Upstream HVAC program paid an incentive to distributors and distributors passed on different levels of incentives to customers based on their business model. In June of 2018, National Grid and the MA PAs decided that it was appropriate to show customers the exact amount they could expect as an incentive. The Company expects that this transparency will ultimately result in the sale of more of this type of equipment.

In 2019, National Grid’s goal will be to strengthen the marketing and training surrounding this new initiative format to end use customers and installation contractors. Marketing pieces will be created for use at distributor trade show events. Customer outreach through multiple channels, including social media and direct mail, will be tested to help promote the initiative in 2019.

In 2019, National Grid in conjunction with the Massachusetts PAs will go out to bid for an upstream HVAC, gas water heating, and foodservice equipment implementation vendor which will take effect April 1, 2019. New measures will be considered, if appropriate.

*\*It is important to note that savings from this particular set of products will be calculated from new construction baselines, not retrofit.*

### **Upstream Gas Equipment**

In Q4 2015 National Grid and the MA Program Administrators launched the first product in the new Gas Upstream Program. By partnering with local water heating distributors, the Company collaboratively promoted the sale of high-efficiency water heating equipment. The Company leveraged the commercial water heater distribution network by upselling and stocking high efficiency equipment to influence as many qualifying commercial water heater sales as possible. As of August 2018, the initiative had 45 active distributors in both MA and RI representing 207 branches. The initiative currently incents four different types of water heating equipment; Indirect, Storage, Tankless, and Volume.

The Company will continue working closely with its partner Energy Solutions to increase unit throughput and distributor participation. In 2019, Energy Solutions will continue to sign up new distributors, train them on the initiative, provide return on investment sales training to sales staff, and promote of the initiative out in the industry throughout the state. In 2019, the Company, as with the Upstream Lighting and Upstream HVAC initiatives, will investigate how working with manufacturers and/or offering stocking incentives to distributors can influence the volume of products that distributors choose to stock and ultimately sell to customers.

*\*It is important to note that savings from this particular product will be calculated from new construction baselines, not retrofit.*

### **Upstream Kitchen Equipment (Electric and Gas)**

In late December 2017, new gas cooking equipment measures, as well as electric cooking measures, were added to the suite of upstream point of sale food service products available at participating vendor locations throughout RI. As of June 2018, the processed natural gas therm savings are already almost double what were processed in the entire year of 2017. Electric savings are starting to come in as well in 2018.

In late 2018 or early 2019, National Grid will be sending out a direct mail marketing campaign to food service customers in an effort to promote gas and electric food service measures and where to purchase them. National Grid also plans to research other ways

to promote the program through coordination with the Rhode Island Restaurant Association, email newsletter campaign with participating equipment vendor, and other means to market the program further.

Momentum is building regarding the stocking and availability of high efficiency kitchen equipment for both gas and electric. Current 2018 results are expected to double by year end. This level is expected to continue into 2019.

### **Combined Heat and Power Initiative**

A combined heat and power (CHP) facility is “equipment used to produce electric energy and forms of useful thermal energy (such as heat or steam), used for industrial, commercial, heating, or cooling purposes, through the sequential use of energy.”<sup>4</sup> Generally speaking, due to current installation costs, CHP systems are best suited to customer sites where there are significant and coincident thermal and electrical loads for a vast majority of the hours of the year. Notably, significant thermal loads during summer nights and/or swing season (spring, fall) periods aren’t especially common outside of manufacturing facilities, though lower CHP installation costs could help to expand the potential population of sites where CHP could be cost effective and offer reasonable payback periods for customers.

Since 2012, the CHP provisions of the Least Cost Procurement law in R.I.G.L. §39-1-27.7<sup>5</sup> have required the Company to document the support for the installation and investment in clean and efficient CHP annually in its energy efficiency program plan by including a plan for identifying and recruiting qualified CHP projects, incentive levels, contract terms and guidelines, and achievable megawatt targets.<sup>6</sup>

For 2019, the Company will continue to offer a CHP incentive. In 2019, the Company’s emphasis will be on increasing the support for qualifying efficient CHP projects through the energy efficiency programs, as intended by the legislation. Due to the high capital cost and technical requirements of installing CHP, there is a very long lead time for a successful installation. With small numbers of projects and wide ranges of possible project sizes, the Company anticipates substantial variability in MW realized in any given

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<sup>4</sup> CFR Title 18, Part 292, Sub-Part A, 292.101 – Definitions

<sup>5</sup> See R.I.G.L. § 39-1-27.7(c) (6) (ii) through (iv); For the legislative history, see P.L. 2012, Ch. 363, S2792 Sub A (Enacted June 21, 2012).

<sup>6</sup> See R.I.G.L. § 39-1-27.7(c) (6) (iii).

year. Noting this, for 2018, the Company is proposing a target of 1 MW of installed capacity that is expected to correspond to approximately 8,000 MWh of savings. For 2019, the Company will explore leads for four additional projects that may complete in future years. In 2019, the Company will examine the CHP process for customers, the notification process and incentive levels for large projects with the OER, EERMC, Division and all members of the Collaborative with a focus on enhancements for 2020.

In 2019, the Company will introduce a prescriptive measure for small CHP systems, e.g. fewer than 35 kW.

To qualify for a CHP energy efficiency incentive, a proposed project must meet the following conditions:

- Host customers must be in the franchise service area of the Company.
- Proposed systems must either be (i) thermal leading and sized so the recoverable heat can be used to offset other facility thermal loads and generate electricity as a by-product, or (ii) using waste energy or waste heat to generate electricity.
- Both new construction and retrofit installations are eligible; in either case, the baseline system must be carefully documented.
- The overall minimum total system efficiency of the proposed CHP units must be 55% or greater<sup>7</sup>. System efficiency is calculated as Annual Useful Energy/Annual Natural Gas Input where
  - Annual useful energy = Net Annual kWh\*3,413/100,000 + utilized thermal output (therms)
  - Annual natural gas input = CHP gas input in therms (HHV)
- The equipment to generate electricity may be an internal combustion engine, gas turbine engine, steam turbine, back pressure turbine, or fuel cell and the facility will capture waste heat for use in the facility.

Wasted energy systems and back pressure or extraction turbines can qualify. For these facilities to qualify the following conditions must be met; because these systems are

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<sup>7</sup> The RI DEM's Air Quality Regulations ([http://www.dem.ri.gov/pubs/regs/regs/air/air43\\_12.pdf](http://www.dem.ri.gov/pubs/regs/regs/air/air43_12.pdf); Page 11) set a minimum system design efficiency of 55% for CHP to be eligible to apply for Emission Credits. As noted in the incentive levels section below, a higher energy efficiency incentive is available for systems with efficiencies of 60% or greater.

designed to take advantage of existing on site wasted energy or inefficient processes, there is no minimum total system efficiency requirement.

- Host customers must be in the franchise service area of the Company,
- All thermal and electric output of the CHP facility should be used on site,
- While it is expected that most of these applications will be retrofit, both new construction and retrofit installations are eligible; in either case, baseline system must be carefully documented,
- The project must pass cost effectiveness screening.

The Company will undertake the following steps to support qualified CHP projects.

#### **Identification and Recruitment of Qualified CHP Projects**

The Company currently works with vendors and customers to identify CHP opportunities at customer locations. The Company promotes CHP systems and outlines the process for qualification and implementation of CHP facilities through the Company's energy efficiency programs. The Company has sales and technical staff that are the primary points of contact for customers and vendors with potential CHP projects. The Company will continue to communicate criteria for CHP assessment and will communicate to vendors so that their presentations to customers will be more consistent with Company technical assistance requirements.

#### **Scoping Study/Qualification**

The Company will offer technical assistance on CHP projects beginning with a preliminary scoping of a potential site. This scoping will be based on an evaluation of:

- Monthly (or hourly, where available) electric, gas, and other fuel usage
- All site-specific forms of thermal energy end uses
- Coincidence of electric and thermal loads
- Proposed project cost

This scoping will determine if further study of the site appears favorable, i.e., provides CHP operating hours and load factors that would be an appropriate application of CHP.

### **Technical Assistance Study**

Assuming a favorable screening during preliminary scoping, National Grid will offer to co-fund a TA study of CHP with the customer. The TA study will be performed by an independent, qualified engineering firm. This study will assess thermal and electric loads, propose an appropriate CHP size and technology, compile a budget cost estimate, and identify potential barriers to the technology, etc. National Grid typically funds 50% of the cost of any TA study conducted by a preferred vendor selected by the Company, and up to 50% of the TA for other qualifying independent engineering firms. Any TA study by a CHP vendor or its representative which fulfills the CHP TA requirements may be accepted, though no co-funding will be provided. The TA study must be completed, submitted, and approved by the Company prior to implementation. The TA study must include an assessment of the likely on-peak kW reduction from the CHP given the proposed nameplate rating, the net CHP output after subtracting parasitic loads associated with the CHP, projected availability based on anticipated site-specific operating characteristics, and performance data on other similar units. (On-peak kW reduction = Net Output x Availability x % Loaded.) This kW load reduction should be used in the benefit-cost screening.

As indicated in the incentive levels section below, a larger incentive is available for CHP projects that include the implementation of energy efficiency measures at the host facility. If the customer wants to meet a higher tiered incentive and did not previously qualify for that higher tier, the company could include another audit. This audit would propose measures to fulfill that requirement with new energy efficiency opportunities. These opportunities themselves will be eligible for energy efficiency incentives and will help make sure that the CHP facility is correctly sized for the facility's needs and will avoid creating a disincentive for future load reduction at the site.

### **Cost Effectiveness**

The screening for cost effectiveness specific to CHP is included in the Total Resource Cost Test Description included as Attachment 4.

### **Incentive Levels**

If a project has been shown to be cost effective, it will be eligible for an incentive. Incentives will be determined following cost effectiveness screening in consultation with National Grid personnel. The following rules will apply to all CHP projects (regardless of

size) in the determination of the incentive. However, the amount of incentive the Company is willing to offer and commit to the customer could depend upon the amount of funds that are budgeted or remaining in the budget of the energy efficiency program or unique attributes of the project.

- For cost effective CHP projects, the target energy efficiency installation incentive (“installation incentive”) in 2019 is \$900 per net kW, where net is nameplate kW output minus CHP auxiliary kW. For CHP projects with efficiencies of 60% or greater, the target installation incentive in 2019 is \$1,000 per net kW. Wasted energy, back pressure turbines, and extraction turbines are eligible for incentives of \$900/kW.
- For cost effective CHP projects where the host customer also commits to implementing energy efficiency measures representing at least 5% of site energy use or the maximum load reduction identified by a TA Study, whichever is less.<sup>8</sup> The maximum installation incentive in 2019 is up to \$1,125 per net kW, and the CHP sizing must incorporate the load reduction. For CHP projects with efficiencies of 60% or greater and that have similar energy efficiency participation, the maximum installation incentive in 2019 is up to \$1,250 per net kW. A customer may be treated as having made this commitment to energy efficiency if they have made investments to achieve similar load reductions through energy efficiency within the previous five years.
- All CHP projects are also eligible to receive other incentives, such as the Advanced Gas Technology (AGT) incentive, subject to the incentive package cap described below.
- CHP facilities greater than 1 net MW may be offered an additional performance incentive, as further provided in the section entitled “Special Considerations for Large CHP Systems,” below.
- The CHP system costs must include: all system, auxiliary, and interconnection costs, and CHP maintenance. If the CHP system is receiving a tax credit or other financial arrangement that reduces the cost of the CHP to the

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<sup>8</sup> If CHP facility sizing is determined by electric load (or not constrained by either electric or thermal load), the requirement will be 5% of electric usage; if the facility sizing is determined by thermal load, the requirement will be 5% of thermal energy usage. The energy efficiency measures will themselves be eligible for incentives, and are not part of the CHP incentive package cap described below.

customer without distributing that cost reduction as an additional cost to other electric or gas ratepayers, it may be treated as a credit against the cost of the CHP project.

- The CHP incentive package cap from the Company will be 70% of the total project cost inclusive of the installation incentive, incentives related to gas service, present value of any performance incentive, system reliability procurement incentive, and any other incentives related to the transaction. For new construction installations, the incentive cap will be 70% of the incremental cost difference between the cost of what would have been done absent the CHP project and the cost of the CHP project.
- Retainage of 20% of the energy efficiency incentive payment will be held until commissioning is completed.

#### **Other Contract Terms and Guidelines**

In order to ensure proper operation of the CHP facility and persistence of energy savings, the following terms and guidelines will be required:

- Minimum requirements document. As part of the TA study, a minimum requirements document (“MRD”) will be developed. This MRD will contain engineering hardware and operational specifications that directly affect the savings estimates developed in the TA study. Compliance with the MRD will be necessary to receive rebate payments.
- All systems will require electric, thermal and gas metering for commissioning and monitoring of system efficiencies. Metering hardware and data collection services may be provided at little or no cost to the customer.
- The project must be commissioned. Commissioning is a process following installation whereby a third party verifies that the project is installed and operating as detailed in the TA study and MRD.
- The customer must sign and produce a contract for O&M services through the first planned major overhaul of the CHP unit after post installation commissioning. On-going O&M contracts for a minimum of ten (10) years from project commissioning are recommended.
- The customer must apply for interconnection service as soon as practical and not operate the unit until they receive the authorization to interconnect from the Company. While there may be site-specific interconnection

considerations for particular projects, please see the attached link for information on interconnection:

[http://www.nationalgridus.com/narragansett/business/energyeff/4\\_interconnect.aspx](http://www.nationalgridus.com/narragansett/business/energyeff/4_interconnect.aspx)  
[http://www.nationalgridus.com/narragansett/business/energyeff/4\\_interconnect.aspx](http://www.nationalgridus.com/narragansett/business/energyeff/4_interconnect.aspx)  
[http://www.nationalgridus.com/narragansett/business/energyeff/4\\_interconnect.aspx](http://www.nationalgridus.com/narragansett/business/energyeff/4_interconnect.aspx)

- As noted in section 5.a.i. of the Plan, kW-demand savings achieved via the electric energy efficiency programs, including CHP, will continue to be reported by the Company to ISO-NE as Other Demand Resources (“ODR”) and the revenue generated will be used to fund future energy efficiency projects through the Company’s programs.

### **Delivery Service Tariffs Applicable to CHP Installations**

Customers receiving an incentive payment for installation of CHP will be billed for delivery service charges on the appropriate general service tariff. The Company’s general service tariffs, Rates G-02, G-32 and G-62, include a CHP Minimum Demand Provision for those CHP installations that receive an energy efficiency incentive pursuant to this Plan. For Customers subject to this CHP Minimum Demand Provision, the monthly Demand will be the greater of a) the Demand as normally defined under the tariff provisions; or b) the Minimum Demand, which shall be 50% of the greatest fifteen-minute reading from the Customer’s generation meter(s) as measured in kilowatts during the month. The Customer Charge, Transmission Demand Charge, all per kWh charges and any other applicable charges and credits will be in addition to the Minimum Demand Charge. This rate treatment is designed to mitigate the cross-subsidies from other customers in the same rate class. The Company believes it is very important to ensure that a customer who is receiving incentives through the energy efficiency program continues to pay a fair share of the costs of the distribution system upon which the customer will continue to rely when the CHP unit is off-line.

### **Special Considerations for Large CHP Projects**

A project that is greater than 1 MW of net nameplate capacity shall be defined as a “Large CHP Project” and may be eligible for special considerations that support the development of CHP, while accounting for its unique characteristics.

### **Qualification**

The cost of the project will be reviewed by a design/build or general contractor experienced with CHP projects and revised as necessary.

### **Incentive and additional terms and conditions**

If a Large CHP Project passes the benefit cost test described in Attachment 4, the appropriate incentive will be determined, based on the guidelines for all CHP projects set forth in the section entitled "Incentive Levels," above.

An additional performance-based energy efficiency incentive, capped at \$20/kW-year (\$1.66/kW-month) for a period of up to ten years, will be offered as part of the incentive package for any project greater than 1 net MW. No payments will be made until the unit is in operation and provides demonstrated load reduction, and will be made semi-annually based on actual metered load reduction. Load reduction performance will be based on the net daily metered kW output of the system during ISO-New England's on-peak periods averaged over each six month period.

Performance incentives will be subject to budget limitations and, in all cases, will be subject to the 70% total project cost cap applicable to all CHP projects set forth in the section entitled "Incentive Levels," above. The total incentive package will include any incentives related to gas service, and the present value of the above-described performance incentive.

The customer will have to repay a portion of the incentive to the Company if the project is abandoned, removed from the premises, sold, or otherwise no longer utilized as the primary source of heat and electricity by the customer, within 10 years from the date of final incentive payment authorization. The repayment will be the energy efficiency installation incentive times the number of years remaining until the required ten years of service divided by ten. Other incentives, such as any Advanced Gas Technologies (AGT) incentives, may also have similar reclaim provisions.

### **Options for CHP proposal that fails cost effectiveness testing**

If a CHP project does not pass the benefit-cost test, the Company will work with the customer to develop other solutions that may still support the CHP facility. Such other solutions may include one or all of the following:

- Re-analyzing the optimal size of the CHP unit, or the number of generators. A different sized CHP unit might provide better efficiencies and pass the benefit cost test.
- Identifying other load reduction opportunities at the facility. Benefits can be garnered from load reduction in lieu of achieving that load reduction through CHP.

### **Targeted Outreach and Support for Potential CHP Customers**

The Company believes that significant savings can be generated with this technology in the coming years. The Company is focused on developing a pipeline of projects for small, medium and large customers. In addition to having a specific sales point person for CHP projects, the Company has a CHP program manager who helps customers navigate the technical and procedural aspects of bringing a CHP unit online. The Company also works with a TA vendor that provides assistance in identifying and executing CHP projects. In addition, the Company works with CHP vendors to offer RI customers smaller CHP units where installation and operations are turn-key. Furthermore, in 2016, the Company introduced a CHP manual to assist customers who are deciding if CHP is an option for their facilities. Other strategies that will enhance CHP acceptance will also be considered, such as: preparing and distributing case studies, providing plant operator training, and providing easier customer access to CHP unit performance data. Link to the manual: <http://ngrid.com/ri-chp>

### **Installation of Incremental or Additional Energy Efficiency Measures for Customers who have Previously Installed CHP**

The Company will individually review the installation of proposed incremental energy efficiency measures for customers who have previously installed CHP on site or who are adding additional energy efficiency equipment that might affect the performance of an existing CHP unit. The Company will carefully categorize and protect the benefits attributed to previously installed CHP projects, while at the same time foster any additional cost-effective energy efficiency measures that further reduce total energy use.

There are two types of project categories. The first category is “CHP Optimization” and involves measures which are installed with the purpose of increasing the output or operating efficiency of the existing CHP or other distributed generation (DG) unit; for

example: the addition of combustion air precooling on a gas turbine CHP unit. In order to maintain compliance with ISO-NE's FCM rules, such projects will be tracked in the FCM, if applicable, as incremental output of the associated DG facilities.<sup>9</sup> The second category is "Incremental EE", which includes "traditional" energy efficiency measures installed with the intent of reducing energy consumption in sites that have previously installed CHP. These measures may or may not affect CHP performance and output.

For locations where an existing CHP unit covers a large percentage of the total load at the facility, additional energy efficiency savings measures installed may result in lowering the output of the CHP system instead of a load reduction on the Company's electric grid. Therefore, to assess savings that can be claimed by the energy efficiency programs, hourly load mapping may be required to accurately assess the net savings on the Company's electric and gas distribution systems, which will be assessed at the Company's electric and/or gas revenue meters at the customer's site. In cases where a typically electric measure (like lighting) reduces the electric load enough to require reducing the CHP output, gas savings may result from a normally electrical energy efficiency measure and could be claimed in the Gas utility DSM programs.

**g. Retrofit Program Demonstrations and Assessments**

**i. Industrial Initiatives and demonstrations**

**Behavior Change through Education of Small/Medium Plant Personnel Demonstration**

Objective: The main objective is to give smaller plants cost effective access to independent air systems specialists in order to facilitate comprehensive compressed air systems assessment. The Company will develop technology and training materials needed to facilitate this objective through web based training materials and tools combined with remote data collection process and support to interested customers. The intent of this effort is to drive customers to the Company's current compressed air offerings. Training is one component and the other is to install metering for flow, power and pressure and implement any efficiency improvements by working with the customer.

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<sup>9</sup> ISO-NE's FCM rules require that new CHP facilities, or energy efficiency measures that result in the increased output of an existing CHP facility, are tracked in the FCM as distributed generation resources.

Benefits: Comprehensive systems assessments by independent compressed air system specialists are not easily affordable for small to medium size plants where total annual compressed energy cost is \$150,000 or less. This initiative will aim to educate plant personnel on the knowledge and tools required to conduct self-assessments, provide training and access to needed instrumentation and facilitate remote data collection and support to identify and implement energy efficiency measures. Completion of both phases of this initiative is expected to result in the development of a proven process to assist small and medium size plants with energy efficiency improvements related to compressed air systems.

This initiative was started in 2018 and will continue in 2019. The Company is looking to target three plants in the next year.

#### **Implement Underutilized Energy Efficiency Technologies on Mechanical Power Transmission Systems Demonstration**

Objective: To investigate adoption of higher efficiency belt and gear reduction drives associated with various types of machinery used in commercial and industrial facilities, such as belt drives on fans, pumps, production machinery, and other mechanical equipment. Another area of opportunity is replacement of low cost worm gear drives commonly incorporated as part of OEM equipment such as conveyors, material handling equipment, and as sub systems of major machinery. OEM equipment suppliers typically incorporate low cost lower mechanical efficiency components and systems into their products. This demonstration will attempt to promote cost effective retrofit of higher efficiency components and systems into these products or assemblies. Hopefully over the medium to longer term, this initiative could lead to an upstream incentive program targeting OEM markets.

Benefits: Upgrading conventional v-belt drives to notched or synchronous belt drives with efficiency can result in efficiency improvement ranging from 1-3%. The incremental cost associated with this upgrade is more than offset by energy savings over the life of the equipment.

This initiative was started in 2018 and will continue in 2019. The Company is looking to target three industrial sites with this demonstration.

## ii. Lighting Assessments

**Secure Lighting Spec (SLS)** is based upon a mutual agreement with Lighting Manufacturer Representatives (LMR) to engineer and deliver lighting & controls packages that exceed energy code or Industry Standard Practice (ISP), whichever is higher, by 25% or more. The goals of the Secure Lighting Spec are:

- a. Establish a special partnership between National Grid and Lighting Manufactures Representatives (LMR) to participate in targeted code-based lighting incentive programs.
- b. Utilize the LMR application engineers to implement best practice lighting design and photometric modeling for deep energy savings and qualitative lighting outcomes for the Company's customers and building occupants, while meeting IES standards.
- c. Achieve substantial energy savings by utilizing the lighting engineering capabilities of the LMR. Savings are based on projects achieving 25% or greater energy savings beyond what is required by the energy code.
- d. Incorporate energy efficiency incentive estimates early in project quotes to clients & customers through the LMR pre-approved product portfolio.
- e. Reduce the lighting system initial costs through advanced lighting engineering, energy efficiency incentives and operating costs for customers and clients for projects that meet energy efficiency goals.

**Lighting as a Service:** Lighting as a Service (LaaS) is a new business model that delivers the best lighting equipment and ongoing commissioning for system optimization through a subscription based service. The goals of LaaS are: To create a leased equipment business model with zero capital expense that eliminates initial cost barriers for energy efficiency lighting projects. LaaS contracts will allow customers to reap all of the benefits of LED technology, without getting bogged down in the detail of owning and operating the lighting asset. Since LaaS offers a full turn-key solution, this type of service partner can supply the design, financing, installation, maintenance, monitoring and responsive performance adjustments (such as color tuning and dimming.) National Grid will look to partner with a LaaS provider for these services to customers.

Benefits of LaaS are:

- a. Enables real-time energy monitoring for evaluation to confirm savings.

- b. Works with demand response by identifying lighting that can be reduced during DR events.
- c. Works best with sophisticated lighting technology that can be optimized and maintained through the service contract. It works with all code-based lighting incentive programs, and is compatible with PoE systems with a higher density of sensors and data.
- d. Is an integrated program approach, i.e., a program that offers energy audits and energy efficiency solutions for a specific building type with prearranged financing and retrofit lighting system options.
- e. Involves a detailed analysis of facilities including controls sequence of operations, building set-points, occupancy schedules and operation and maintenance protocols. Once the analysis is complete, recommended optimization measures and an ongoing plan for maintenance and operator training is implemented. This will increase energy savings persistence and customer satisfaction.

#### **One-Fit – Lighting Manufacturer Based Turn-Key lighting design**

The One-Fit lighting initiative would utilize lighting manufacturers to design all of the lighting for a project based on lighting modeling/calculations and include controls. A lighting manufacturer's application engineers will design the lighting for existing spaces and work with a distributor who will fill in any missing fixtures with other lighting products. Projects must include fixtures, retrofit kits and controls. This is a turn-key solution for the customer and installer. Qualified projects may also be eligible for OBR. The program will be based on Performance Lighting PLUS, thereby encouraging comprehensive lighting solutions with controls. Projects must be designed to meet the following criteria:

- a. Lighting to exceed code by at least 25%.
- b. Design must include controls that meet or exceed code
- c. Must meet IES recommendations for light level, distribution, spectrum, glare control, etc.
- d. LED lighting must be DLC QPL listed products, and lighting controls or equal
- e. Use the Performance Lighting PLUS incentive program
- f. Lighting system commissioning is required after 6 months to ensure optimal system operation

The One-Fit initiative would cover a range of project types with a cap on hours of operation at 2,500 hours minimum (for schools). Manufacturers will be partnered with energy contractors (PEXs) for purchase and installation. This is a perfect fit for schools and municipal projects.

The above stated lighting initiatives are currently in research phase and will be launched in the fall of 2018 and will continue in 2019. This assessment is looking to target three manufacturers.

### **Web-Based Performance Lighting PLUS App**

The assessment will include an online portal for National Grid's commercial clients as well as an incentive portal for National Grid's C&I Lighting program management staff targeting the Performance Lighting PLUS program for retrofit and new construction. The goal of this assessment is to increase participation in Performance Lighting PLUS by creating an easy web app for project processing.

#### **Client Portal**

*Client Portal will provide the following functions:*

- a. Clients self-register where their utility account information is validated
- b. Enter building information based on pre-defined data requirements from the lighting program.
- c. Create project investment proposals that are validated with the product information in the DesignLights Consortium (DLC) Qualified Product List and allow users to add custom measures
- d. Calculate incentives automatically based on incentive rules and submitted applications
- e. Manage projects and facilitate communication with National Grid C&I program management staff

#### **Incentive Portal**

*Incentive Portal will provide the following functions:*

- a. Track and Manage incentive programs
- b. Oversee and report on pipeline projects (energy savings potential and proposed upgrades)
- c. Define incentive rules and data collection requirements

- d. Automate the validation of incentive applications
- e. Introduce real-time energy savings and incentive expenditure monitoring

### **iii. Emerging Lighting Technologies Assessments**

#### **Automated Window Shade Systems Assessment**

Hypothesis: Will automated window shades provide increased electric energy savings in buildings with advanced lighting controls implementing daylight harvesting? Will automated window shades increase the thermal performance of the building envelope and provide gas savings in Therms?

For this assessment the Company is working with Ver-Tex a Boston based shade manufacturer representative, and SMMA to manage projects and establish the assessment parameters. Based on existing research, typical daylighting controls save 23% of the electric energy. With automated shades that total could increase to about 43%, almost doubling the savings. Additional savings can be obtained through using thermal insulating materials that can contain heat within a building while blocking the cold. The result is approximately 5 kWh of energy savings per sq.ft.

Automated Window Shade System assessment was started in 2018 and will continue in 2019.

### **iv. Strategic Energy Management Demonstration (SEM)**

Strategic energy management (SEM) is a set of processes for business energy management. The main goal of SEM is to activate industrial and manufacturing customers, through a multiplicity of interventions including individual and group coaching, to address O&M measures in the short term, pursue capital measures in the medium term and establish a culture of continuous improvement in its energy performance over a longer-term period.

Success is judged from a custom built model that takes into account the host of factors that may influence energy use within a facility. While an increase in capital measures is a frequent and desirable outcome of the SEM process, it is excluded from the ultimate savings reported by the initiative.

The energy benefits of SEM include reduced energy consumption through improved energy efficiency and energy conservation, improved demand management

and the potential for reduced demand charges, decreased overall energy cost, and reduced greenhouse gas (GHG) emissions.

National Grid issued a joint RFP with the Massachusetts Program Administrators (MA PAs) in 2017 to find a company with expertise in running an SEM initiative. Six responses were received, but the field was quickly narrowed to three companies that have had the most success with SEM initiatives in the United States and Canada. Ultimately, National Grid and the MA PAs selected Cascade Energy for their proven expertise in the field, stellar recommendations, and excellent communication skills.

Cascade is scheduled to begin recruiting for this initiative in August of 2018. National Grid is working closely with Cascade to launch begin cohort activities as close to January 1<sup>st</sup>, 2019 as possible.

## **6. Small Business Direct Install Program**

### **a. Overview**

The Small Business Direct Install Program (SMB/DI Program) provides turn-key services to commercial and industrial customers who consume less than 1,000,000 kWh per year. Previously the qualification level was set at an average monthly demand of less than 200kW. This was changed for two reasons:

1. This new qualification number will allow businesses and electricians/vendors to more easily tell who is eligible for the small business program.
2. The program will be able to serve slightly more customers than under the old qualification rules. National Grid will market to these newly qualified customers and expects an uptick in savings due to participation by some of these customers.

All customers who consume more than 1,000,000 kWh (new qualification point), but have an average monthly demand of less than 200 kW (old qualification point) will be allowed to participate in the SMB/DI program until July 31, 2019.

There is no upper limit of gas consumption that disqualifies a customer from receiving the gas measures offered by the SMB/DI program. The Company has delivered this program for more than two decades through a local vendor, who is known as the

“Regional Program Administrator” or “RPA”. The RPA is responsible for program management, data entry, and quality control. The RPA is located in Rhode Island, and employs local staff, local electricians and energy efficiency lighting materials procured through a competitive bid process. As of 2011, customers served by natural gas are also eligible for direct installation of natural gas energy efficiency measures.

### Small Business Case Study – Mews Traven

<p><b>Mews Traven, Wakefield RI</b></p> <p>Originally a small fishermen’s tavern which opened in 1947, owners Dave and Danny have transformed Mews Tavern into a legendary Rhode Island restaurant and bar. Mews took advantage of National Grid’s Small Business Program, after a free energy evaluation, they decided to move forward with recommended measures that helped decrease energy costs and their environmental impact.</p> <p>The project achieved estimated Annual Energy cost savings of \$10,439 and Annual kWh Savings 77,750 kWh</p>	 <p><b>Efficiency Improvements</b> Mews installed an Energy Management System and new energy efficient custom lighting.</p>
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Customers are provided turn-key services consisting of:

- An Energy Audit
- Direct Installation of Measures
- Company incentive contribution of up to 70% of the total project cost
- On-bill repayment (OBR) for eligible customer’s project costs and a financing term to 60 months (never more time than to establish positive cash flow) at zero (0) percent interest or a lump sum payment with a 15% discount, resulting in most customers’ projects having a positive cash flow when they choose the OBR repayment option.

Since its inception when the SMB/DI Program focused primarily on lighting and refrigeration direct install measures, it has broadened its scope to include identifying:

- Cost-effective “custom” electric and gas measures, such as Energy Management Systems (EMS).
- Time dependent opportunities such as replacing roof top HVAC units and heating systems.
- Participation in residential programs where buildings may have both commercial and residential properties in the same buildings.

As noted previously, the Company is continuously working with its engineers and technical assistance experts to try and move as many measures from the custom category to prescriptive or “custom express” to streamline the process for customers as much as possible. This should encourage the vendor and the customer to install these measures more frequently and reduce the technical costs of the program.

In addition to cost-effective custom and time dependent measures mentioned above, the SMB/DI Program offers incentives on the following measures:

- LED lamps and luminaires
- Occupancy sensors and controls
- Energy Management Systems (EMS)
- Thermostats (including Wi-Fi)
- Insulation
- Hot water reset
- Low flow pre-rinse spray valves
- Refrigeration measures such as evaporator fan controls, efficient evaporator fan motors, automatic door closers and door heater control devices for walk-in coolers
- Pipe Insulation

**b. 2019 Goals**

For the 2019 Plan, Small Business Direct Install has the following goals:

**Table 6. Electric**

<b>Demand Reduction (Annual kW)</b>	<b>Energy Savings (Annual MWh)</b>	<b>Customer Participation</b>
1,213	12,163	617

**Table 7. Gas**

Energy Savings (Annual MMBtu)	Customer Participation
2,559	65

**Outreach/Offering Changes**

As part of an effort to increase participation in the Direct Install Small Business Program, in 2019, for the second year, the Company will target businesses as well as residents as part of the Community Initiative. Many residents are also small business owners. By targeting residential customers to learn about the Small Business Direct Install Program, the Company has an opportunity to tap a segment of its customer base that may have been hard to reach in the past. Cities and towns taking part in the Community Initiative have goals for small business as well as residential involvement.

In addition, National Grid will build on the connections made with community leaders through the Community Initiative to determine how and when to target certain business types or geographic locations in a city or town. Some ideas include door to door direct install/audit scheduling, as have been done in several areas in the past or holding information sessions in Spanish or Portuguese.

To complement the strategy above to reach the small business sector in these targeted communities, National Grid plans continue to work with local Chambers of Commerce and other local small business groups to schedule workshops that address many of these customers’ small business needs including energy efficiency and demand response.

The Company is also constantly reviewing additional products or technologies that may help save small businesses energy. In 2019, the program will offer filament style LED lamps to appropriate businesses such as bars, restaurants, and small lodging facilities.

Frequently, very small businesses (under 25,000 kWh consumed per year) do not need an energy audit to realize that they can make energy improvements to their spaces. To that end, National Grid will be creating a marketing campaign directed at these customers and local electricians with messaging to let them know of all the Upstream energy efficiency products that they or their electrician can purchase at a discount to decrease energy use in their space.

Companies with fewer than 20 people represent 90.2% of all Rhode Island employers. Mid-sized companies with 20-99 employees represent 8.0% of private employment.\*

In 2019, the Company will explore how to work with the large commercial and industrial sector as well as the municipal sector in conjunction with the Community Initiative.

Overall, the Company has a strong foundation of experience delivering this program, which enables it to meet program goals and to continue to develop and implement new products and services. As a result of the Company's increased move to vertical market sectors to serve customers better, the following segments are no longer included in the small business segment:

- K-12 Schools
- National Chain Retail Locations and Restaurants
- Small Grocery Stores (not including convenience)
- (Restaurants (non-chain))

The refrigerator/freezer recycling program offered to residential customers where old working refrigerators and freezers are picked up for \$50 each is now open to small business customers. National Grid estimates that approximately 75-100 of these types of units will be recycled in the 2019 program year.

#### **Small Business Heat Pump Demonstration**

New in 2019: In 2019 the Company will promote cold climate heat pumps, for small business customers who heat using oil, propane and electric resistance heat. This could mean early replacement of equipment to cold climate heat pumps or the customer could use cold climate heat pumps as the primary heat source with oil as back up heat.

The Company will look to incentivize the installation of 20 heat pumps at customer sites.

The Company hopes to learn about incentives needed to move small business customers to cold climate heat pumps, barriers for adoption, the customer value proposition and non-energy benefits associated with installation and operation of cold climate heat pumps. The Company will include audits and weatherization for customer sites as part of this installation.

## 7. C&I Connected Solutions (Demand Response)

The Company will be implementing active demand reduction based on the recently evaluated pilot efforts in 2017 and 2018. The active demand response program is called Connected Solutions. During the summer of 2017, National Grid deployed C&I active demand reduction pilots in Rhode Island. Customers with interval meters on G-02 or G-32 rates, with demand of 250 kW or higher and the ability to curtail 50 kW, were eligible for the demonstration. Under this active demand reduction approach customers agree to respond to an event call targeting conditions that typically result in system peak. In 2017 a total of 12 MW demand reduction was enrolled and in 2018 a total of 27 MW are currently enrolled in the demonstration.

The demonstration project in 2017 and 2018, will serve as the basis for a new statewide C&I curtailment active demand reduction program offering in 2019 that is technology agnostic and provides an incentive for verifiable shedding of load in response to a signal or communication from the Company. Performance will be measured on MW reduction during an event. Typical technologies or strategies used to curtail load include energy management systems, building management systems, software and controls, HVAC controls, lighting with controls (manual, networked system or integrated), process offsets, any Open ADR compliant technology, startup sequencing, among other customer facility specific approaches. Since the offering is technology agnostic, the Company will be able to incent the performance of customers adopting innovative and emerging demand reduction technologies, including battery storage technologies. Customers can use any technology or strategy at their disposal and be incentivized based on the performance of their curtailment. In essence, the incentive must be greater or equal to the customer's opportunity cost, for them to curtail– if it makes sense for a customer to shed load for the incentive price paid to them by the Company, then the customer will curtail.

This initiative uses Curtailment Service Providers (“CSPs”) to assess curtailment opportunities at a facility and deliver curtailment services to enrolled customers. CSPs identify curtailment opportunities for deployment under the Company's initiative, as well as demand charge and Installed Capacity (“ICAP”) tag<sup>10</sup> management opportunities,

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<sup>10</sup> Installed Capacity Tag is a capacity payment that is set for a customer by using their peak demand during the peak day/hour on the NEPOOL grid

and present a complete curtailment proposal to the customer. The demand charge and ICAP tag management provide opportunities for direct bill savings to customers.

Customers and CSPs respond to dispatch signals or criteria specified by the Company, generally using a system peak trigger. Events will be called the day before curtailment is needed. The core model remains focused on reducing demand during summer peak events typically targeting fewer than twenty hours per summer. The goal of the offering is to call events at times of peak energy use. For customers participating in ISO-NE demand response markets, ISO-NE event days will be excluded from baseline calculations. The program is structured to avoid interfering with the ISO-NE programs or penalizing customers for participating in both programs.

The customer value proposition for large C&I customers, subject to demand charges and/or ICAP tags, with means of controlling lighting, comfort, and/or process loads, is that they can use this solution to generate revenue by altering their operations a few times per year. The demand response program incentive, combined with any ISO-NE CSO obligation revenue, demand charge management, and ICAP tag management, round out a compelling package for customers to adjust operations.

The Company can add a new service offering to the portfolio to provide value to large C&I customers and generate claimable benefits, primarily avoided capacity, Transmission & Distribution (T&D), and capacity Demand Reduction Induced Price Effect (DRIPE).

This Plan is being coordinated with the SRP Plan to ensure that the customer offerings are cohesive and a comprehensive marketing plan is being implemented. The proposed SRP Marketing and Engagement Plan would promote the Portal described in the SRP plan, and promote incentives already available through existing Company and State programs. Please refer to the SRP Plan, SRP Marketing Engagement with NWA's section, for details. In 2019, the Company will continue to explore demand response program opportunities for small business customers with direct load control technologies. The Company will look to incentivize energy efficient connected technologies through the energy efficiency programs and will explore opportunities to reduce peak load by providing incentives for automatic load reduction during demand response events. Technologies include Wi-Fi thermostats that control air conditioners, smart heat pump water heaters, smart electric water heaters and network lighting. In addition, the Company will explore other demand response-enabled technologies as they become

available in the market. The Company will also explore opportunities in the connected space, with other non-energy Wi-Fi enabled technologies that may be an entry point or an engagement opportunity for energy efficiency and demand response with customers.

### **Energy Storage Initiative**

**New in 2019:** The Company is interested in exploring ways to encourage the development and deployment of energy storage systems (ESS) within the state for use in load shifting demand response (DR) applications. ESS offer the unique ability for repeated and flexible load shifting that has no impact on the operations of the end use customer facility and, as a result, can be scaled beyond the technical potential presented by flexible and controllable load DR programs. The Company's benefit-cost modeling shows energy storage-enabled DR to be cost effective and proposes a storage-enabled DR initiative to incentivize behind-the-meter ESS through a Pay-for-Performance incentive structure.

The Company will incent the performance of customers adopting innovative and emerging demand reduction technologies, like battery storage.

#### **Performance and Incentive structure:**

- A performance-based incentive will be paid out for a period of 5 years. The rate will be guaranteed to be fixed at \$300 per kW/year for 5 years and will be subject to revision after the 5 year period, based on updated avoided cost estimates at the time of the revision. The funding and performance incentive rate guarantee are required to address market barriers to customer financing of energy storage assets and provide a guaranteed stream of revenue until the customer achieves system payback, which is estimated at 5 years under the proposed incentive levels.
- Load reduction performance will be based on actual measured load reduction across all National Grid demand response dispatch events each year.

Performance based incentives will be subject to budget limitations and, in all cases, will be subject to the 70% total project cost cap applicable to all battery storage projects.

**Interaction with Other Company Energy Storage Initiatives:**

The Company is developing two Energy Storage Initiatives, as detailed in Docket Nos. 4770/4780 Amended Settlement Agreement:

- One behind-the-meter (BTM) system co-located with a DCFC site, which will consist of an approximate 250 kW two hour energy storage system, supporting approximately two to six DCFC ports.
- One front-of-the-meter (FTM) storage system, which will consist of an approximate 500 kW three hour energy storage system for the primary purpose of realizing distribution system value, with the exact storage size and capacity to be determined by system need and location.

The Docket Nos. 4770/4780 demonstrations primarily focused on testing grid-connected systems or to mitigate the load impact associated with EV charging. Whereas, the Energy Storage Initiative in the 2019 Plan is a storage-enabled Demand Response (DR) program that is focused on incentivizing the use of customer-owned behind-the-meter (BTM) storage to shift peak load at traditional end-use customer facilities. The energy efficiency Storage Initiative is specifically targeted to facilitating BTM storage to be used for DR and is separate from these other efforts.

The Company's intent is to test storage use cases in both FTM and BTM in order to identify all applications that are beneficial to customers and to the grid as a whole. A secondary benefit of testing both categories of storage applications is that it will help spur the development of a robust storage market in Rhode Island, where the contributing parties may differ between large grid connected applications and smaller BTM applications.

**8. Marketing to National Grid's Business Customers**

In 2018, the Company continued to build awareness of, and increase participation in, its energy saving offerings for Rhode Island's business customers. The Company did significant research through customer surveys to understand the mindset of its commercial and industrial customers. The Company leveraged the results of these studies as well as media habits research which informs us about how its business

customers are consuming media in the development of a strategic communications plan. This year the Company has implemented a strategy of building awareness upfront with customers, which leads to increased program participation. This was done by increasing a focus on using Company-owned assets such as email and digital advertising as well as digital and broad-based media to inform the wider customer base that National Grid offers programs that save energy and money. The Company also followed-up with more targeted marketing campaigns that seek to educate the customer on the specific details of those programs that are available to business customers in Rhode Island. National Grid has seen the results that indicate that efforts to generate awareness led to increased engagement with the more targeted campaigns that addressed more specific program details.

The commercial product marketing team will evaluate the marketing strategy which was implemented in 2018 in which two campaigns were run in market in parallel: The one dedicated to awareness “Energy Efficiency Familiarity” campaign and the other with programmatic focus on the details of the specific programs. The Company will use those learnings to inform the 2019 marketing plan.

**Energy Efficiency Familiarity Campaign** – The campaign was focused on the awareness stage of the customer journey.

- Channels used: Broad-based TV, radio, print, digital, email
- Campaign intent was to touch every customer consistently utilizing maximum reach channels to increase level of familiarity among all customers. Messaging went out consistently in order to stay present on customers’ minds.
- This campaign tied directly to the question customers respond to in the “Brand, Image and Relationship” (BIR) tracker which is the customer survey / study that is used to track customer awareness / familiarity with the Company’s energy efficiency programs.

**Programmatic Focus Campaign** – This campaign focused on talking to customers that are past the awareness phase of the customer journey. They are aware of the Company’s energy efficiency offerings and since they are in the desire, research, and participation phase of the customer journey, messaging can communicate details or specifics of individual program offerings.

- Channels used: Pre-roll video, advertorials, e-newsletters

- Primary messaging focused on financial opportunities such as rebates, incentives, and 3rd party financing. Secondary messaging will continue to speak non-energy benefits of energy efficiency, such as increased comfort or safety of a facility.
- Messaging serves as a follow-up to the familiarity campaign because it provides more information on the energy savings available that was mentioned as part of the Familiarity Campaign.

The Company is tracking its progress against these initiatives and based on performance will look to expand or pull back in 2019. Campaigns are tracked based on campaign channel metrics which differ for each channel. Web site visits, digital impressions, email click and open rates etc. All marketing tactic results are compared against industry benchmarks for success. The Company's main focus in 2018 has been to increase scores related to Energy Efficiency Familiarity but also to continue the balance between familiarity and programmatic marketing. In 2019 the Company will analyze the best balance and approach that will help achieve energy efficiency savings goals for the year. To track familiarity with the Company's energy saving offerings among business customers, the Company conducts ongoing research through its "Brand, Image and Relationship" (BIR) tracker. The Company's internal customer insights team conducts and analyzes this survey. Commercial customers are surveyed via phone and are asked: "How familiar are you with energy savings or incentive programs from National Grid to help you with ways to use less gas or electricity?" The survey is conducted seven days per week, and the Company contacts 10 commercial customers per week. The results are reported on a quarterly basis and the Company has specified metrics and scores that it is measuring against.

In addition to these initiatives, the Company's annual Customer & Partner Energy Efficiency Summit (EE Summit) has helped cement its relationships with its largest customers. The EE Summit has been held at Gillette Stadium in Foxboro, MA since 2014. The EE Summit exemplifies the Company's customer focused philosophy, providing solutions that break through its customers' pain points and roadblocks. The summit's goal is to make the energy solutions the Company offers more accessible and easier to implement for customers. It's also an opportunity for the Company to build personal relationships with customers, sales teams and vendors. The Summit includes vendor partners and acclaimed speakers on teamwork, problem solving, sustainability, and innovative energy approaches. The Company's 2018 EE Summit will be held on October

25, 2018. The next Summit will be held on October 25<sup>th</sup> 2019. This event is promoted to business customers via email blasts, LinkedIn posts, and digital advertising

While National Grid's paid media primarily targets people directly involved in the decision making process for capital budgets and facility improvements/projects, C-Suite & Facility Managers, Small Business owners, the Company does have some advertising/communications dedicated to its secondary audience of key influencers. These are the people/firms that influence energy project go-forward decisions. They may have an existing relationship with the customer. Distributors, Project Expeditors, Engineers, Architects, etc. National Grid's newsletter has a "trade corner". The trade ProNet website ([www.ngrid.com/pronet](http://www.ngrid.com/pronet)) was awarded Top 10 in Chartwell's 2017 Best Practices Awards. . Chartwell, Inc. is a specialized information provider for the utility industry that provides strategic research and facilitates issue-targeted forums for collaboration among utility industry peers.

**National Grid's monthly e-Newsletter for Small Business Customers**

**nationalgrid**

**National Grid's new e-Newsletter**

Welcome to the first issue of our new monthly e-newsletter – exclusively for small business customers like you. We hope you enjoy this new way to get and stay up to speed on the latest in energy savings and high-performance strategies – find information about energy-related events, informative videos, infographics, energy-saving solutions, program information from National Grid, and much more.

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**VIDEO: Upgrade your business with efficient LEDs**

Making lighting upgrades can help to avoid costly incidents. Watch to learn about this and other energy-saving solutions for business.

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By taking action now, you'll save money and stay cool during the hot summer months.

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**As Summer warms up, get your business ready to save electricity!**  
By managing your energy use at the right times, you can help the grid and save!

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# Spotlight

## Program Marketing



### SUMMARY

Trade professionals such as architects, engineers, HVAC technicians and contractors can influence energy decisions for their clients, and play a key role in connecting them with National Grid's energy efficiency solutions. Over the past several years, National Grid has spearheaded ways to better connect the trade professional and design community with the utility's energy saving solutions. In particular, National Grid's Professional Network website ([ngrid.com/pronet](http://ngrid.com/pronet)) has seen dramatic growth since its implementation nearly four years ago.

Trade ally familiarity  
with program

82%

Trade ally satisfaction with  
National Grid

56%

### CHALLENGE

In 2014, [National Grid's](#) surveys of trade professionals revealed pain points around operational issues, according to Michael Blaney, Senior Specialist, Energy Products Marketing.

One of the more easily identifiable pain points was National Grid's retail customer site, which was difficult to navigate, incomplete and often outdated. "We had a hodgepodge of different areas to get information," said Melvyn Berger, B2B Energy Efficiency Marketing. "The corporate site was convoluted, complex and easy to get lost in."

National Grid decided to overhaul the site, making it a go-to resource for trade professionals to get fast, easy access to information on the utility's programs and services.

### SOLUTION

Site development was an 18-month project. Having worked outside the utility environment, Blaney brought the perspective of National Grid Professional Network ([ProNet](#)) users to the project.

[The new site](#) shows trade professionals how to take advantage of National Grid's technology and energy efficiency programs. The one-stop resource provides access to information, education and training targeted to individual segments of the trade professional community.

process changes and updated communication efforts, is designed to make it easier for trade and allied professional audiences to work with the utility. It was designed to cover relevant topics without overloading users with too much information, according to Berger.

The company uses marketing segmentation and innovative persona-based content marketing to target a variety of professionals who would benefit from National Grid's programs and services, driving them to the [ProNet](#) site.

### RESULTS

In 2017, the site recorded 593,000 visits. Since the launch, [ProNet](#) website awareness for targeted segments has increased 24 points, to 84%, while website satisfaction has increased 10 points to 36%.

Program leaders attribute these results to National Grid's focus on helping trade and allied professionals grow their businesses and effective marketing, specifically "with a focus on carefully selected topics that were of interest to the audience," Blaney noted.

"If they can upsell to higher performing equipment, they make more money, and their client gets a better lifetime ownership cost, too," he said.

May 24, 2018

# Spotlight

## Program Marketing



Image courtesy of National Grid

During the website update, National Grid recognized the influential role played by trade-related professionals such as architects or design engineers who serve specific niches.

“They are the customers’ advisors, and customers rely on them to a great degree to help in their decision-making,” said Michael Blaney, Senior Specialist, Energy Products Marketing. “Part of this challenge was to get away from thinking about just residential contractors and to consider how these expensive and often complex projects are influenced and executed.”

[www.ngrid.com/pronet](http://www.ngrid.com/pronet)

### COMPANY PROFILE

National Grid is an electricity, natural gas, and clean energy delivery company that supplies the energy for more than 20 million people through its networks in New York, Massachusetts, and Rhode Island. It is the largest distributor of natural gas in the Northeast. National Grid also operates the systems that deliver gas and electricity across Great Britain.

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*“The numbers speak for themselves. We have a much more streamlined process to manage the leads that have come through and to work them through our sales funnel.”*

— Melvyn Berger  
B2B Energy Efficiency Marketing, National Grid

## 9. Appendices

### a. Appendix 1 Sample list of custom measures in the energy efficiency program

#### Building envelope measures

- Fenestration
- Insulation

#### Laundry systems

- Polymer bead systems
- Ozone systems

#### Commercial kitchen measures

- Large dishwashing systems
- Heat recovery for water heating from
  - Cooking surface exhaust
  - Large refrigeration

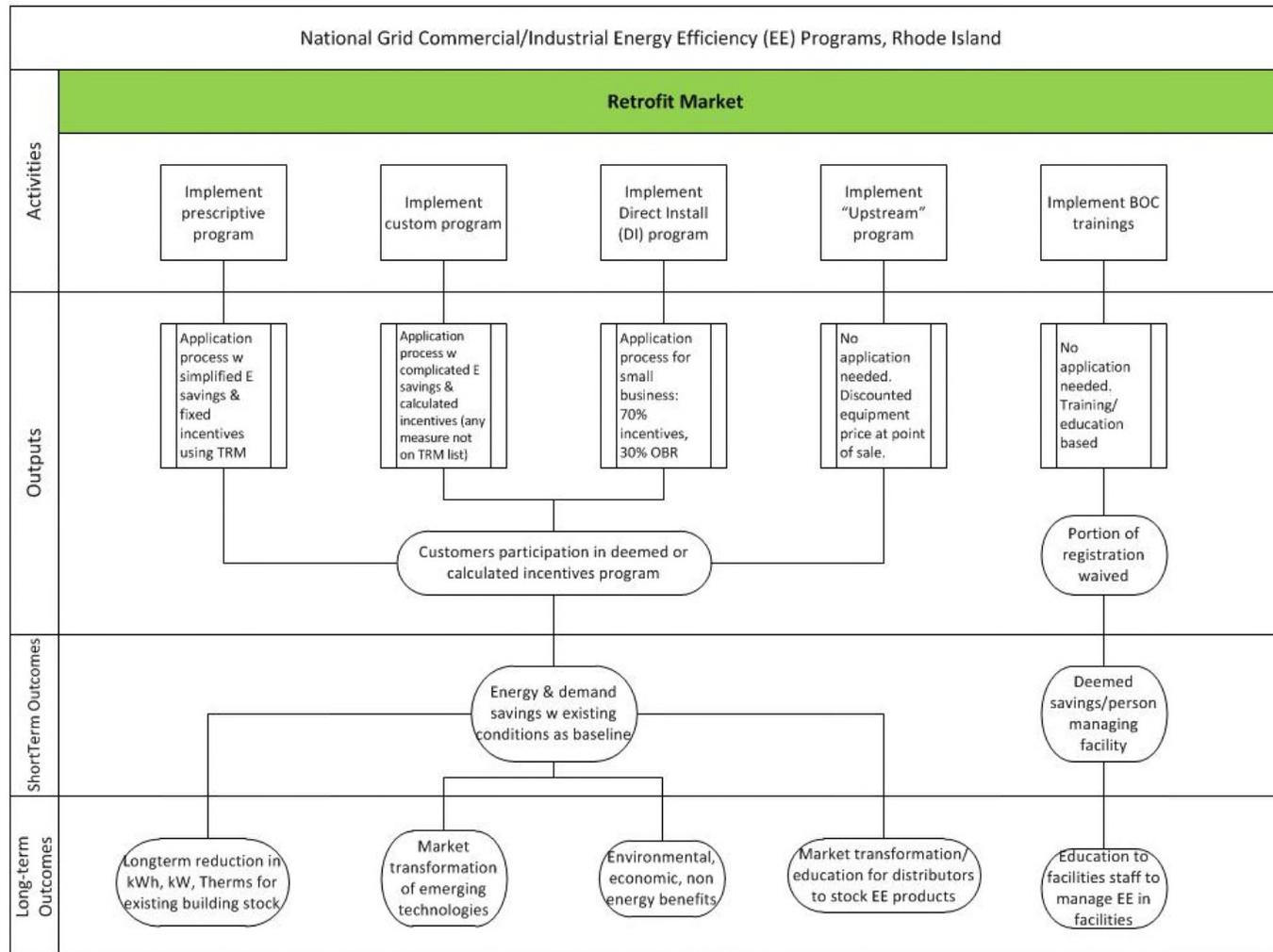
#### Manufacturing

- Process improvements
- Energy efficient production equipment
- Specialized lighting
- Compressed air

#### HVAC

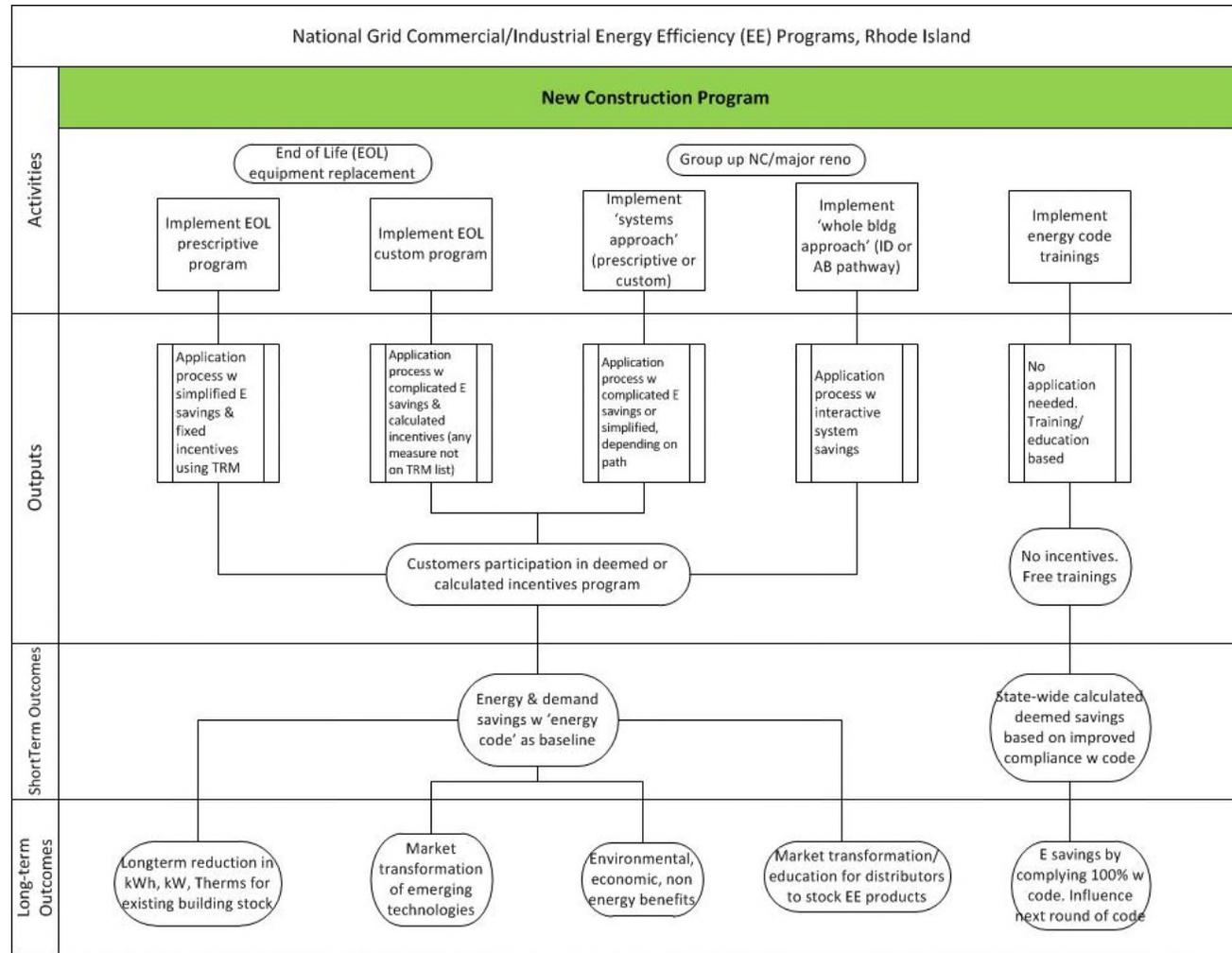
- Variable refrigerant flow systems
- Energy recovery ventilation (ERV)
- Air source and water source gas engine driven heat pumps
- Smart HVAC monitoring and control systems
- Dry Smart gas dryers

**c. Appendix 2: Retrofit Logic Model**



TRM = Technical Reference Manual    OBR = On Bill Repayment    BOC = Building Operation Certification

**d. Appendix 3: New Construction Logic Model**



TRM = Technical Reference Manual ID = Integrated Design path AB = Advanced Buildings path

**e. Appendix 4: Subprogram and Measure Savings Goals and Incentives**

**Electric Subprogram Net Savings Goals and Incentive Descriptions**

<b>Electric Programs</b>			
<b>Program</b>	<b>Subprogram</b>	<b>Annual kWh Goal</b>	<b>Incentive</b>
Large Commercial New Construction	C&I Codes	276,821	Typically up to 75% of Incremental Cost
	D2 CAIR	886,800	
	D2 HVAC	1,088,493	
	D2 Custom	6,459,680	
	D2 Lights	1,984,215	
	D2 VSD	166,718	
Large Commercial Retrofit	CHP	421,000	Typically up to 50% of Project Cost
	EI Custom	27,052,618	
	EI HVAC	1,962,567	
	EI Light	20,015,888	
	EI VSDs	2,345,300	
	Street Lighting	3,776,370	
	Upstream Lighting	17,439,184	
Small Business Direct Install	SCI	12,162,756	70% of Project Cost 30% Financed
<b>Program</b>	<b>Subprogram</b>	<b>Demand Response kW Goal</b>	<b>Incentive</b>
Commercial Connected Solutions	Daily DR Resources	2,300	\$300/kW/year
	Peak Shaving DR (MW)	32,000	\$35/kW/year

**Gas Program Measure Group Description with Quantity and Rebate Levels**

<b>Gas Programs</b>			
<b>Program</b>	<b>Measure Groups</b>	<b>MMBtus</b>	<b>Rebate Level</b>
Large Commercial New Construction	Boiler95	984	\$ 1,500
	CODES AND STANDARDS	343	N/A
	COMBO COND BOIL/WTR HTR 90+	653	\$ 1,500
	COND UNIT HEATER 151-400 MBH	181	\$ 750
	Condensing boiler <= 300 mbh	65	\$ 1,500
	Condensing boiler 1000-1700 mbh	647	\$ 7,500
	Condensing boiler 1701+ mbh	1,463	\$ 10,000
	Condensing boiler 300-499 mbh	248	\$ 2,000
	Condensing boiler 500-999 mbh	864	\$ 4,000
	COOKING-COMBO OVEN 1	297	\$ 1,000
	COOKING-CONVECTION OVEN 1	571	\$ 1,150
	COOKING-CONVEYOR OVEN 1	235	\$ 1,000
	COOKING-FRYER-1000	5,395	\$ 1,150
	COOKING-STEAMER-1000	280	\$ 1,000
	Furnace95ECM	30	\$ 500
	Furnace97ECM	12	\$ 800
	INFRARED HEATER - LOW INT	266	\$ 750
	WATER HEATER TANK 0.67 EF	298	\$ 111
	Water Heating Boiler - 85% TE	47	\$ 111
	Water Heating Boiler - 92% TE	112	\$ 111
	COMBO COND BOIL/WTR HTR 95+	3,943	\$ 111
	COND WATER HEATER 90%MIN 75-800	2,858	\$ 111
Custom	22,745	Up to 75% of Total Resource Cost	
Large Commercial Retrofit	BOILER RESET 1 STAGE	177	\$ 225
	Builder Operator Certification	1,667	\$ 518
	LF_SHWR_HD_1.75_GPM_DI	104	\$ 200
	Pre Rinse Spray Valve	341	\$ 25
	STEAM TRAPS	1,677	\$ 50
	THERMOSTAT	16	\$ 25
	WiFi Thermostat - cooling and htg	33	\$ 100
	WiFi Tstat-heat only	132	\$ 100
	Custom Retrofit	150,903	Up to 50% of Total Resource Cost
Small Business Direct Install	FAUCET_AERATOR_0.5_DI	302	\$ 11
	INSUL_PIPE_DI_1.5IN_H2O	21	\$ 6
	INSUL_PIPE_DI_2IN_H2O	3	\$ 8
	LF_PRE_RINSE_SPRAY_NZL	607	\$ 100
	LF_SHWR_HD_1.75_GPM_DI	795	\$ 25
	SALON_NOZZLE	201	\$ 100
	THERMOSTAT	631	\$ 126

<b>Gas Programs</b>			
<b>Program</b>	<b>Measure</b>	<b>MMBtus</b>	<b>Rebate Level</b>
C&I Multifamily	Air Sealing_MF	3,645	Average Incentive based on measure mix
	CUST NON-LGT_MF	3,762	
	Faucet Aerator_MF	367	
	Insulation_MF	7	
	Low-Flow Showerhead_MF	82	
	Pipe Wrap (Water Heating)_MF	41	
	Programmable Thermostat_MF	1,578	
	TSV Showerhead_MF	406	
WiFi thermostat gas_MF	940		



## 2019 Measurement and Verification Plan

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The Narragansett Electric Company  
d/b/a National Grid  
RIPUC Docket No. 4888  
2019 Energy Efficiency Program Plan  
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## **1. Introduction**

Evaluation, Measurement and Verification (EM&V) has been an integral part of National Grid's energy efficiency program planning process. The Company's EM&V Plan continues to focus on evaluating Rhode Island sites and markets while leveraging as many resources as possible from evaluation studies in other National Grid territories in order to maximize value for ratepayers while minimizing costs. These studies are commissioned by the Company, conducted by independent evaluators, and overseen by the Company along with the Rhode Island Energy Efficiency & Resource Management Council and the Office of Energy Resources.

## **2. Evaluation Studies Completed in 2018**

The Company, with oversight from the Rhode Island Energy Efficiency & Resource Management Council evaluation consultants and the Office of Energy Resources evaluation staff, completed 13 evaluation studies in 2018 (see below). The research studies include impact evaluations, process evaluations and market studies in the residential and commercial and industrial (C&I) sectors.

### **Commercial & Industrial**

1. Impact Evaluation of 2013-2015 Custom CDA (draft)
2. Impact Evaluation of PY2015 RI C&I Upstream Lighting Initiative
3. Impact Evaluation of PY2016 RI C&I Small Business Initiative: Phase I (draft)

### **Residential**

1. Statewide Behavioral Evaluation: Savings Persistence Literature Review
2. 2017 Seasonal Savings Evaluation
3. Wifi Thermostat Demand Response
4. On-Site Saturation Lighting Market Assessment
5. EnergyWise HEAT Loan Assessment (draft)
6. Residential Appliance Saturation Survey
7. Impact Evaluation of Income Eligible Services Single Family Program

### **Cross-Cutting**

1. Jobs Study 2017
2. Avoided Energy Supply Components in New England 2018
3. System Reliability Procurement Study

Section 4 provides detailed description, findings and recommendations of each of the studies above along with selected research studies completed in other regions and/or other National Grid jurisdictions. The results of these evaluations have been judged by the Company and the oversight team to be applicable to Rhode Island's energy efficiency programs. The Company is adopting the results of these studies in 2019 program planning due to similarity, either in the measures offered, or program structure or delivery.

A complete list of historical research studies is provided in Section 5 along with a brief summary of the impact of those results in planning the Company's programs. Prior year studies that have been superseded by studies completed since the filing of the 2018 Energy Efficiency Plan have been removed from this list.

### **3. 2019 Planned Evaluation Studies**

This section describes planned studies that focus on areas of interest to the Rhode Island programs and build on the deep history of evaluation studies commissioned by the Company over many years. In order to optimize the use of evaluation resources, where programs are considered to be similar in program delivery and population served with those offered in Massachusetts, the studies will be done in conjunction with the Company's Massachusetts retail affiliate. The Company will also stay abreast of the voluminous Massachusetts evaluation activities that may be beneficial and applicable in Rhode Island.

Table 1 lists evaluation studies that the Company plans to conduct in 2019 to inform the next planning cycle. Study labeling codes have been added to the study names to facilitate distinct identification. For example, RI-17-CG-CustGas refers to the Custom Gas Evaluation Study that started in 2017 in the commercial sector for gas while RI-18-RE-IESF refers to evaluation study of the income eligible single family program in 2018 for electric and gas. The study codes take the general form shown in Table 2.

**Table 1. Planned Evaluation Studies in 2019**

Sector	Study Code	Type	Affected Programs	Study Name	State Lead
C&I	RI-19-CG-CustGas	Impact (Rolling)	Custom	PY2017 Impact Evaluation of Custom Gas Installations	MA
C&I	RI-18-CE-CustElec	Impact (Rolling)	Custom	PY2016 Impact Evaluation of Custom Electric Installations (continued from 2018)	MA
C&I	RI-19-CE-CustElec	Impact (Rolling)	Custom	PY2017 Impact Evaluation of Custom Electric Installations	MA
C&I	RI-19-CE-UpstrLight	Impact (Rolling)	Upstream Lighting	Impact Evaluation of Upstream Lighting Program [Year(s) TBD]	MA
C&I	RI-19-CE-SBNonLight	Impact	Small Business	PY2016 SBS Non-lighting Impact Evaluation	MA
C&I	RI-19-CX-Presc	Impact	Prescriptive Gas & Electric	Prescriptive Gas & Electric Measures (specific measures TBD)	MA
Res	RI-19-RX-IESF	Process	Income Eligible Single Family	Process Evaluation of Income Eligible Single Family Program	RI
Res	RI-19-RE-UpstrLight	Market	Residential Lighting	Residential Lighting Market Assessment	MA
Res	RI-19-RE-AppRecycle	Market	Residential Products	Residential Products: Appliance Recycling Savings Update (including RI in MA effort)	MA
Res	RI-19-RE-HEM	Market/Impact	EnergyWise	Residential Home Energy Monitoring System Evaluation	RI
Cross	RI-19-XX-DataCollect	Market	Multiple	Primary Data Collection for Potential Study	RI
Cross	RI-19-XE-HPmarket	Market	Multiple	Heat Pump Market Assessment	RI
Cross	RI-19-XX-Jobs	External	Multiple	Jobs study	RI
Cross	RI-18-XX-Piggybacking	Process	Multiple	Rhode Island Piggybacking Diagnostic Study (continued from 2018)	RI
Pilot	RI-19-CG-GasDR	Impact	Pilot	Gas Demand Response Pilot Evaluation Study	RI
Others	RI-19-XX-M&VLegislation	External	Multiple	Legislated M&V Review Study	RI

**Table 2. Study Labeling Code Format**

[State]	–	[Year Study Conducted]	–	[Sector]	[Fuel]	–	[Keyword]
RI		18		R = residential	E = electric		
		19		C = commercial	G = gas		
		⋮		X = cross sector	X = electric & gas		

The proposed budget for evaluation study expenditures in 2019 is approximately \$1.9 million (\$1.57 million for electric and \$0.38 million for gas) excluding internal staffing

costs. The proposed budget for EM&V comprises approximately 1.8% of the total portfolio budget in 2019. Final reports along with graphical executive summaries will be made publicly available upon completion of the evaluation studies.

### **3.1 Commercial and Industrial Studies**

#### **a. RI-19-CG-CustGas - Impact Evaluation of PY2017 Custom Gas Installations**

The objective of this impact evaluation is to provide verification of natural gas energy savings estimates for a sample of custom gas projects through site-specific inspection, metering, and analysis. The results of this study will be used to determine the realization rates for custom gas energy efficiency offerings based on installations from 2017. This will be the second year of 'rolling' evaluations in coordination with evaluation efforts in Massachusetts, where the first year was a 'full' study (as has historically been done every 3 years), while subsequent years will evaluate roughly 1/3 of the number of sites, which will keep the realization rates updated yearly.

#### **b. RI-18-CE-CustElec - Impact Evaluation of PY2016 Custom Electric Installations (Continued from 2018)**

The objective of this impact evaluation is to provide verification of electric energy savings estimates for a sample of both lighting and non-lighting custom electric projects through site-specific inspection, metering, and analysis. The results of this study will be used to determine the final realization rates for custom electric energy efficiency offerings based on installations from 2016. This is the first year of 'rolling' evaluations in coordination with evaluation efforts in Massachusetts, where the first year is a 'full' study (as has historically been done every 3 years), while subsequent years will evaluate roughly 1/3 of the number of sites, which will keep the realization rates updated yearly.

#### **c. RI-19-CE-CustElec - Impact Evaluation of PY2017 Custom Electric Installations**

The objective of this impact evaluation is to provide verification of electric energy savings estimates for a sample of custom electric projects through site-specific inspection, metering, and analysis. The results of this study will be used to determine the final realization rates for custom electric energy efficiency offerings based on

installations from 2017. This will be the second year of ‘rolling’ evaluations in coordination with evaluation efforts in Massachusetts, where the first year (see RI-18-CE-CustElec above) was a ‘full’ study (as has historically been done every 3 years), while subsequent years will evaluate roughly 1/3 of the number of sites, which will keep the realization rates updated yearly.

**d. RI-19-CE-UpstrLight - Impact Evaluation of PY20xx Upstream Lighting Program [Year(s) TBD]**

The objective of this impact evaluation is to provide verification of electric energy savings estimates for a sample of upstream lighting projects through site-specific inspection, metering, and analysis. The results of this study will be used to determine the impact savings factors that will apply to upstream lighting offerings. The years on which this study will be based are still to be determined, as the details of the ‘rolling’ evaluation scheme are still being finalized. This will be the beginning of rolling evaluations in coordination with evaluation efforts in Massachusetts, where a ‘full’ study was performed in 2018 (as has historically been done every 3 years), and subsequent years will evaluate roughly 1/3 of the number of sites, which will keep the realization rates updated yearly.

**e. RI-19-CE-SBNonLight - Impact Evaluation of PY2017 Small Business Electric Installations**

The objective of this impact evaluation is to provide verification of electric energy savings estimates for a sample of small business non-lighting electric projects through site-specific inspection, monitoring, and analysis. The results of this study will be used to determine the final realization rates for small business, non-lighting electric energy efficiency offerings installed in 2017.

**f. RI-19-CX-Presc - Prescriptive Gas & Electric Measures**

The objective of this impact evaluation is to provide verification or re-estimation of electric energy and demand and/or natural gas savings estimates for a subset of prescriptive projects through site-specific inspection, monitoring, and analysis. The results of this study will be used to determine new deemed savings values and/or

savings parameters for selected Prescriptive energy efficiency offerings installed in 2017. The specific measures to include in this study are still to be determined.

## **3.2 Residential Studies**

### **a. RI-19-RX-IESF - Process Evaluation of the Income Eligible Single Family Program**

This study is a process evaluation of the Income Eligible Services program for single family homes in Rhode Island. The objectives of this study are to assess effectiveness of program delivery procedures, determine barriers to program delivery and participation and identify practical approaches to improve the overall effectiveness of the program.

### **b. RI-19-RE-UpstrLight - Residential Lighting Market Assessment**

The objective of this study is to characterize the current lighting market conditions in Rhode Island. The proposed study will involve sales data analysis using LightTracker and National Electrical Manufacturers Association (NEMA) shipment data to examine market share and bulb sales in Rhode Island and compare these findings to similar efforts in Massachusetts. This effort may also include targeted market assessment activities that provide useful point of comparison with the broader range of ongoing market assessment in MA and other areas of research to gather insights on how the market is evolving in Rhode Island as 2020 approaches.

### **c. RI-19-RE- AppRecycle - Residential Appliance Recycling Savings Update**

This objective of this study is to examine the current characteristics of refrigerators and freezers being recycled through the Residential Products program and compare the results to the findings in the 2011 Appliance Turn-In program. This study will review historical program tracking data and apply updated unit characteristics to the refrigerator and freezer models described in the Uniform Methods Project to update the savings for the next program planning cycle. This research effort will leverage on-going efforts conducted for the residential appliance recycling program in Massachusetts.

**d. RI-19-RE-HEM - Residential Home Energy Monitoring Demonstration**

This study will evaluate the home energy monitoring demonstration, particularly the Sense Home Energy Monitors, in Rhode Island to understand how customers interact with this type of connected home technology. The study will quantify kWh reduction attributable to the device, customer satisfaction, and identify customer segments that are likely to benefit the most from the program. This effort will also examine potential barriers to participation and explore ways to optimally scale up program delivery.

**3.3 Cross-Sector/Other Studies**

**a. RI-19-XX-DataCollect - Primary Data Collection for Potential Study**

This task will support primary data collection efforts in preparation for a potential study in Rhode Island. This effort will include C&I on-site data collection and may include other areas of research. The potential study will be managed by the Office of Energy Resources.

**b. RI-19-XE-HPmarket - Heat Pump Market Assessment**

This study will evaluate the current status of the heat pump market and assess potential for future growth of heat pumps in Rhode Island for displacing electric heat and for fuel switching for space heating and resulting cooling. The study will collect data from heat pump owners, contractors, manufacturers and distributors and review existing research and evaluation in the small commercial and residential markets to understand the current status of both supply-side and demand-side markets, trends, and perceptions.

**c. RI-19-XX-Jobs - Job Impacts Analysis Study**

The study will identify the job impacts of National Grid's energy efficiency programs and services delivered in Rhode Island electricity and natural gas customers. Similar to the jobs studies conducted in 2013 to 2017, the study will survey the Company, vendors, distributors, partners, and market players to quantify the number of jobs and associated business impacts due to energy efficiency programs in 2018. As part of the 2018 jobs study, an element of workforce development will be incorporated.

**d. RI-18-XX-Piggybacking - Piggybacking Diagnostic Study (Continued from 2018)**

This study is assessing the validity and strategic value of Rhode Island's historic practice of using evaluation results from other states and/or leveraging evaluation studies from other states with a Rhode Island sample. This study will identify key parameters for consideration when determining if a Rhode Island-specific evaluation should be undertaken. It will outline best practices for utilizing data from other states, either in combination with Rhode Island data or through direct adoption. This study will also estimate the monetary benefit of using and/or leveraging study results for various monitoring and verification purposes such as program improvement or ISO-NE verification.

**e. RI-19-CG-GasDR - Gas Demand Response Pilot Evaluation Study**

The goal of the Gas Demand Response Pilot is to reduce peak period gas consumption of large commercial customers during the winter season. It is planned to run in the winter of 2018-2019 and the winter of 2019-2020. The gas DR pilot will be evaluated in the spring/summer of 2019 and 2020. In 2019, RI-19-CG-GasDR will evaluate winter 2018-2019 performance for benefits to the customer and the distribution system and to determine if it has a pathway to be cost effective at scale.

**f. RI-19-XX-M&V Legislation - Legislated M&V Study**

The objective of this study is to verify claimed energy savings from the Company's energy efficiency programs and review the Company's evaluation process as required by the M&V legislation in Rhode Island. The study will be managed by the Office of Energy Resources.

## 4. Evaluation Study Findings

**Study Name:** Two-Tier Steam Trap Savings Study

**Type of Study:** Impact Evaluation

**Evaluation Conducted by:** Energy & Resource Solutions

**Date Evaluation Completed:** April 26, 2018

### Evaluation Objective and High Level Findings:

This Massachusetts study was designed to generate two prescriptive steam trap repair and replacement deemed savings estimates by leveraging the existing data collected from the Phase 2 Steam Trap Evaluation and to establish qualification criteria to be used when assigning the proper savings tier for prescriptive steam trap replacements.

ERS chose pressure as the sole key variable and 15 psig as the threshold value for the deemed savings tiers. Based on the parameter assessment, ERS concluded that the orifice size, hours of operation, and thermal efficiency have a direct relationship with operating pressure while leak factor (among the other parameters not chosen for assessment) has no relationship with pressure. The following table, taken from the study, shows the inputs to the savings calculation.

**Table 1. Savings Equation Input Parameter Breakdown**

Parameter	Units	Original	Low Pressure	High Pressure
Pressure	psig	7.2 / 86.7	7.2	86.7
Enthalpy, sat. liquid	Btu/lb <sub>m</sub>	196 / 295	196	295
Enthalpy, sat. steam	Btu/lb <sub>m</sub>	1,156 / 1,186	1,156	1,186
Orifice size (diameter)	in	0.25	0.25	0.156
Hours of operation	hours/yr	2,802	2,525	6,558
Thermal efficiency	%	80	80	78
Leak factor	%	36.9	36.9	36.9
Discharge coefficient	%	70	70	70
Condensate return factor	%	36.3	36.3	36.3
Low pressure incidence rate	%	90	N/A	N/A
Rate of failure in bulk installations	%	50	50	50
Per trap annual savings	MMBtu	12.2	8.4	35.6

**Programs to which the Results of the Study Apply:** C&I Retrofit

### Evaluation Recommendations included in the study:

ERS recommends that the PAs adopt a two-tier approach for prescriptive steam trap savings in 2019 and beyond using the following criteria for applying deemed savings appropriately: If the system operating pressure is ≤15 psig, PAs should claim 8.4 MMBtu/yr for every steam trap repaired or replaced at the facility through the program. If the system operating pressure is >15

psig, PAs should claim 35.6 MMBtu/yr for every steam trap repaired or replaced at the facility through the program.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

National Grid adopted recommendations from the study.

**Savings Impact:**

Savings that are able to be claimed for repairing or replacing steam traps are based on the system operating pressure. This study lowers the deemed savings value for low-pressure steam traps and increases it for high-pressure steam traps.

**Study Name:** Impact Evaluation of PY 2015 Rhode Island Commercial and Industrial Upstream Lighting Initiative

**Type of Study:** Impact Evaluation

**Evaluation Conducted by:** DNV GL

**Date Evaluation Completed:** September 5, 2018

**Evaluation Objective and High Level Findings:**

The primary goal of this impact evaluation is to quantify the electric energy savings and demand reduction attributable to the Rhode Island C&I Upstream Lighting Program.

The following table gives energy savings system factors as recommended by the evaluator.

**Table 1-5: Proposed Energy Savings factors (MA+RI)**

Product type	Category	ISR	kW Saved per Unit	HOU	HVAC Interactive Effect (kWh)
G24 LED	5	67%	0.0173	5,389	102%
A-line, 40/60w	4	65%	0.0312	2,905	99%
A-line, 75/100w	4	65%	0.0438	2,905	99%
Decoratives	4	65%	0.0196	2,905	99%
LED Retrofit kit, <25W	3	66%	0.0356	3,335	103%
LED Retrofit kit, >25W	3	66%	0.0525	3,335	103%
MR16	3	66%	0.0205	3,335	103%
PAR20	3	66%	0.0261	3,335	103%
PAR30	3	66%	0.0354	3,335	103%
PAR38	3	66%	0.0410	3,335	103%
Stairwell Kit, 2ft w/sensor	2	70%	0.0358	5,831	100%
Stairwell Kit, 4ft w/sensor	2	70%	0.0309	5,831	100%
TLED, 2ft	1	67%	0.0079	4,296	104%
TLED, 4ft	1	83%	0.0158	4,296	104%

The study also updated peak demand savings factors, as given in the table below, taken from the report.

**Table 1-6. Proposed new peak demand savings factors (MA+RI)**

Product type	Category	Summer CF	Winter CF	Summer kW HVAC Interactive Effect	Winter kW HVAC Interactive Effect
G24 LED	5	85%	82%	115%	100%
A-line, 40/60w	4	45%	43%	112%	87%
A-line, 75/100w	4	45%	43%	112%	87%
Decoratives	4	45%	43%	112%	87%
LED Retrofit kit, <25W	3	58%	59%	121%	90%
LED Retrofit kit, >25W	3	58%	59%	121%	90%
MR16	3	58%	59%	121%	90%
PAR20	3	58%	59%	121%	90%
PAR30	3	58%	59%	121%	90%
PAR38	3	58%	59%	121%	90%
Stairwell Kit, 2ft w/sensor	2	66%	68%	112%	100%
Stairwell Kit, 4ft w/sensor	2	66%	68%	112%	100%
TLED, 2ft	1	80%	59%	121%	98%
TLED, 4ft	1	80%	59%	121%	98%

**Programs to which the Results of the Study Apply:** C&I Upstream Lighting

**Evaluation Recommendations included in the study:**

National Grid's vendor should include a flag for customers that have key account managers National Grid can compare the purchase details with any other current or planned National Grid initiatives the customer could participate in and direct those customers to the initiative that best fits the customer's needs.

National Grid's vendor should record and track any customer follow-up activity relating to initiative products in the new inspection tracking system. This will help ensure that when National Grid is contacted by a customer directly and works with that customer to return or exchange any products received through the initiative, this activity gets tracked and saved, to be retrievable later.

Vendors should add data validation to tracking data entries so that returns (negative entries) cannot be entered without linking sales to support the return. Initiative tracking data associated with a site can include a negative sales quantity which is typically from customer lamp returns. This will allow easier verification of lamp returns made by customers and help to avoid possible keying errors. National Grid's vendor should record their follow-up on QC contractor results and how those results were reflected in their tracking system.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

National Grid will consider recommendations from the study.

**Savings Impact:** This study reduced the savings estimates for upstream stairwell fixtures, along with the combined category of upstream retrofit kits, A-lines and decoratives, and G24s. It increased savings estimates for linear fixtures and lamps.

**Study Name:** RI C&I Impact Evaluation of 2013-2015 Custom Comprehensive Design Approach

**Type of Study:** Impact Evaluation

**Evaluation Conducted by:** DNV GL

**Date Evaluation Completed:** September 2018 (draft; numeric results are final)

**Evaluation Objective and High Level Findings:**

The objective of this impact evaluation was to provide verification of electric energy and demand and natural gas therm savings estimates for a sample of custom CDA projects through site-specific inspection, monitoring, and analysis, and to determine prospective gross realization rates for custom CDA energy efficiency projects. These site-specific results were aggregated with results from National Grid sites included in the recently finalized MA CDA study to determine realization rates for RI.

The following table summarized the results of the study. The study found an energy realization rate of 47%.

Results	Annual Energy	On-Peak Energy	Summer On-Peak	Winter On-Peak
	MWh	%	kW	kW
Total Tracking Savings	12,900	58%	3,166	1,825
Total Evaluated Savings	6,106	51%	1,560	461
Realization Rate	47.3%	88%	49.3%	25.3%
Error Ratio	0.47	0.83	0.68	0.78
<b>Confidence Interval</b>	<b>90% Confidence</b>		<b>80% Confidence</b>	
Relative Precision	±18.0%	±38.9%	±23.2%	±29.1%
Error Bound	1,097	1,468	361.4	134.4

**Programs to which the Results of the Study Apply:** C&I Gas and Electric New Construction

**Evaluation Recommendations included in the study:**

This study was in draft form at the time of writing; formal recommendations have not yet been made.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

As this study was in draft form at the time of writing, recommendations will be reviewed when the report is complete, and recommendations will be implemented by National Grid if deemed appropriate.

**Savings Impact:**

The adoption of these results led to a reduction in the savings that National Grid claims from CDA projects.

**Study Name:** Impact Evaluation of PY2016 RI C&I Small Business Initiative: Phase I

**Type of Study:** Impact Evaluation

**Evaluation Conducted by:** DNV GL

**Date Evaluation Completed:** September 2018 (draft)

**Evaluation Objective and High Level Findings:**

The primary objective of this impact evaluation was to provide verification or re-estimation of electric energy and demand savings estimates for a sample of custom and prescriptive electric lighting Small Business (SB) projects through site-specific inspection, monitoring, and analysis. These site-specific results were aggregated with results from the 54 National Grid sites included in the recently finalized Massachusetts SB study to determine realization rates for National Grid’s SB initiative in RI. As savings from lighting measures represent a significant majority of SB savings (~96%), only lighting measures have been assessed in this evaluation.

The following table summarizes the results of the study. This study was in draft form at the time of writing. These factors were used in 2019 planning and may be adjusted slightly before study finalization. Final factors will be adopted by National Grid.

Savings Parameter	Value	Precision at 80% Confidence
Installation Rate (Quantity Adjustment - kW)	100.0%	±0.6%
Delta Watts (Technology Adjustment - kW)	98.5%	±1.2%
Connected kW Realization Rate	96.8%	±2.0%
Summer kW Realization Rate	92.2%	±6.8%
Winter kW Realization Rate	98.0%	±11.3%
<b>kW Factors (Precision at 80% confidence)</b>		
Summer Coincidence Factor	49.5%	±15.7%
Winter Coincidence Factor	60.4%	±9.6%
Summer kW HVAC Interactive Effect	108.0%	±1.9%
Winter kW HVAC Interactive Effect	99.8%	±0.2%
<b>kWh Factors (Precisions at 90% confidence)</b>		
kWh HVAC Interactive Effect	100.1%	±0.9%
Hours of Use Realization Rate	101.0%	±9.9%
% On Peak kWh	63.6%	±11.6%
<b>Non-Electric</b>		
Heating HVAC Interaction Effect (MMBtu/kWh)	-0.00091	

**Programs to which the Results of the Study Apply:** C&I Electric Small Business

**Evaluation Recommendations included in the study:**

This study was in draft form at the time of writing; formal recommendations have not yet been made.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

As this study was in draft form at the time of writing, recommendations will be reviewed when the report is complete, and recommendations will be implemented by National Grid if deemed appropriate.

**Savings Impact:**

The adoption of these results led to a slight reduction in the savings that National Grid claims from Small Business lighting projects.

**Study Name:** P72 Prescriptive C&I Loadshapes of Savings

**Type of Study:** Impact Evaluation

**Evaluation Conducted by:** DNV GL

**Date Evaluation Completed:** March 7, 2018

**Evaluation Objective and High Level Findings:**

This Massachusetts study pooled known sources of 8,760 savings loadshapes in an interactive tool to estimate general prescriptive measure loadshapes over customizable time periods. The resulting loadshapes may be used in measure-level savings calculations and in the PA benefit cost model. DNV GL, ERS, DMI and Cadmus contributed a combined total of 676 different energy savings loadshapes to make up the savings tool. The loadshapes were almost entirely sourced from prescriptive impact evaluation projects vetted by the Massachusetts PAs and Energy Efficiency Advisory Council.

The study provides the following key findings:

- Coincidence energy savings associated with summer and winter peak and off-peak energy periods for the prescriptive C&I measure level categories listed below:

Electric cooling – chillers	Exterior lighting
Electric cooling – unitary equipment	Interior Lighting
Compressed air	Lighting Controls
Refrigeration	VFDs
- The associated uncertainty for each measure level coincidence energy savings estimate shown by the relative precision of coincident energy savings at 90% confidence level (%)

**Programs to which the Results of the Study Apply:**

The results of this study apply to the following C&I Electric programs: Large Commercial New Construction, Large Commercial Retrofit, Small Business, and Upstream Lighting

**Evaluation Recommendations included in the study:**

No formal recommendations were made in this evaluation.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

No formal recommendations were made in this evaluation.

**Savings Impact:**

This evaluation does not impact claimed savings. The updated loadshapes will increase the BC ratio for some measures and will decrease it for others.

**Study Name:** P78 Upstream LED Net-to-gross Analysis

**Type of Study:** Net-to-Gross

**Evaluation Conducted by:** DNV GL

**Date Evaluation Completed:** August 15, 2018 (draft; results are final)

**Evaluation Objective and High Level Findings:**

This Massachusetts study's overall goals were to:

- Provide a retrospective 2016 NTG ratio associated with the Upstream Lighting Initiative, for both screw-based and linear LEDs.
- Estimate a prospective NTG for the 2019-2021 Three-Year Plan, through a consensus process
- Research other key market elements, such as factors influencing the purchase of LED products, awareness of the Upstream Initiative, and customer lighting purchase decision-making processes

RI does not apply retrospective realization rates. The prospective realization rates resulting from this study are shown in the table below.

Prospective NTG	2019	2020	2021
Screw-based	0.73	0.63	0.53
Linear	0.80	0.73	0.66

Other research findings included:

*Participant Characterization of the Initiative's Influence:* Respondents reported that the Initiative primarily influenced the timing and quantity of their LED purchases. The survey results suggest that only a small share of participants would not have installed any LEDs without support from the Initiative; 5% of 2016 upstream lighting participants would not have purchased any screw-based LEDs and 18% would not have purchased any linear LEDs without the Initiative. This suggests that the 2016 participants were aware of LED lamps and inclined to purchase them, but the Initiative encouraged them to purchase more LEDs and to accelerate those purchases.

Prior program participation also continues to have a cumulative effect on upstream lighting participation. Forty-five percent of all 2016 participants have previously participated in programs or offerings for energy-related equipment purchases. Furthermore, of those participants who purchased additional LEDs outside of a PA program, over two-thirds indicate that past program experience influenced them to purchase more LEDs.

*Market Development:* 2016 participants have a high saturation of LED technologies. In 2018 on-site staff observed that 71% of screw-based lamps and 58% of linear lamps at these sites were LEDs, with a portion of these lamps purchased outside the 2016 Upstream Lighting Initiative. As expected, this is significantly higher than the LED saturation of the total C&I population in 2015.<sup>1</sup> Planned research on the saturation of LEDs in the rest of the C&I population will allow us to determine current levels of LED market saturation that can be compared to the 2015 saturation.

<sup>1</sup> <http://ma-eeac.org/wordpress/wp-content/uploads/MA-CI-Market-Characterization-Study.pdf>

*Lamp Replacement Decisions:* The majority of 2016 participants purchased lamps through the Initiative to use in simple replacements of existing lamps (61.4% of participants) rather than renovations or new construction. Less than 3% of participants purchased lamps to install in newly constructed buildings. Ninety-four percent of participants that purchased linear LED equipment to replace existing equipment replaced equipment that was still functioning. On the other hand, only 70% of participants purchased A-lamps, downlights, and reflectors to replace functioning equipment.

*Continued Importance of Market Actors:* Distributors and contractors play a large role in spreading program awareness. Roughly three-quarters of the 2016 participants reported that their supplier informed them of discounted lighting and another 44% that did not report learning about the rebate from their supplier indicated they learned about the discount from a contractor or distributor. On the other hand, a smaller share of 2016 participants indicated that market actors influenced their decision to purchase LEDs outside a PA program than those in the 2015 study.

**Programs to which the Results of the Study Apply:** C&I Upstream Lighting

**Evaluation Recommendations included in the study:**

Ensure program records include account numbers going forward and assess effectiveness of this requirement. Many of the 2016 upstream observations did not include identification variables that would allow the team to easily link the data with existing accounts in the tracking database as it assessed out-of-program purchases. Changes to the Initiative in 2017 required buyers to give account numbers, however, the PAs and C&I data management team should assess whether those program changes are effective and that future upstream purchases can be linked to existing accounts.

The PAs should also monitor these changes with the program implementer to ensure that these added requirements do not hinder participation in the Initiative. If the PAs find this is hindering participation, they should also consider investigating whether this requirement is disproportionately impacting contractors who may not have their customers' account numbers available.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

National Grid is considering the recommendations for adoption.

**Savings Impact:**

The adoption of these results led to a reduction in the savings that National Grid claims from C&I Upstream Lighting.

**Study Name:** P81 Process Evaluation of C&I Upstream Lighting Initiative

**Type of Study:** Process

**Evaluation Conducted by:** DNV GL

**Date Evaluation Completed:** August 2018 (draft; numeric results are final)

**Evaluation Objective and High Level Findings:**

The key objectives of this Massachusetts evaluation were:

- Gauge the success of recent process improvements to the Initiative.
- Assess the impact of the programmatic changes on data accuracy.
- Understand the current state of the C&I market for non-screw-based LED lighting.
- Measure participating customer and trade-ally satisfaction with the Initiative.

The study found the in-service rate (ISR) to be 76.15% across all categories. Due to the accelerated pace of the study, the ISR was not broken out across all categories of Upstream Lighting. In the future, this work will continue, and the ISR will continue to be refined, including differentiation of ISRs between categories.

Work on other objectives of this study is currently underway.

**Programs to which the Results of the Study Apply:** C&I Upstream Lighting

**Evaluation Recommendations included in the study:**

This study was in draft form at the time of writing; formal recommendations have not yet been made.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

As this study was in draft form at the time of writing, recommendations will be reviewed when the report is complete, and recommendations will be implemented by National Grid if deemed appropriate.

**Savings Impact:**

The adoption of these results led to an increase in the savings that National Grid claims from upstream stairwell fixtures, along with the combined category of upstream retrofit kits, A-lines and decoratives, and G24s. It led to a decrease in the savings that National Grid claims from upstream linears, exteriors, and high/low bays.

**Study Name:** National Grid Rhode Island Lighting Market Assessment

**Type of Study:** Market

**Evaluation Conducted by:** NMR Group, Inc.

**Date Evaluation Completed:** July 27, 2018

**Evaluation Objective and High Level Findings:**

The study was designed to estimate lighting saturation and other critical market indicators in Rhode Island. The study collected lighting inventories from a sample of homes in Rhode Island and compared LED saturation to findings from similar studies carried out in Massachusetts and New York.

Evidence from this study suggests that the Rhode Island programs have had a strong impact on saturation and penetration of LEDs in Rhode Island homes. LED saturation was 33% in Rhode Island compared to only 14% in New York. LED penetration was 88% in Rhode Island compared to 72% in New York.

The study assessed similarities between the residential lighting markets in Rhode Island and Massachusetts, ultimately concluding that the two markets are substantially similar; therefore, Rhode Island can likely use the results from the recently completed NTG study in Massachusetts.

**Programs to which the Results of the Study Apply:**

Residential Lighting

**Evaluation Recommendations included in the study:**

Adopt the Massachusetts NTG values for 2019 and tentatively as a placeholder for 2020, in the absence of additional research.

Program Year	Standard	Reflector	Specialty	All LEDs
2019	35%	45%	45%	39%
2020	30%	40%	40%	34%

Update the numbers for residential upstream lighting hours-of-use (HOU), and lifetime in-service rates (ISR) for LEDs. These updated values are provided for application to the upstream lighting program and should not be applied to any direct install programs.

Factor	2018 TRM Values	Updated Value
LED Daily HOU	3.0	3.1
LED Discounted Lifetime ISR		
A-line ISR <sup>1</sup>	93%	93%
Reflector ISR <sup>2</sup>	94%	94%
Specialty ISR <sup>2</sup>	Varies <sup>3</sup>	94%
<sup>1</sup> Assumes a sunset year of 2022; sunset years are defined as points in time past which savings are no longer claimed, based on the assumption that consumers are unlikely to find non-LED lamps available to purchase.		
<sup>2</sup> Assumes a sunset year of 2023.		
<sup>3</sup> The 2018 TRM provides values for two EISA exempt categories with ISR of 95% and 97% based on estimated useful lives of 15,000 or 25,000 hours. Neither category is directly comparable to the specialty ISR developed.		

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

The Company adopted recommended NTG, ISR and HOU based on this study in program planning and reporting in 2019.

**Savings Impact:** The adoption of these results led to a decrease in the savings that National Grid claims for lighting measures offered through Residential Lighting Program.

**Study Name:** 2017 Residential WiFi Thermostat DR Evaluation

**Type of Study:** Impact and Process

**Evaluation Conducted by:** Navigant Consulting, Inc.

**Date Evaluation Completed:** March 30, 2018

**Evaluation Objective and High Level Findings:**

This study assessed National Grid's WiFi thermostat DR program, ConnectedSolution, to test the effectiveness of controllable thermostats as a demand reduction (DR) technology and customer acceptance of the DR program offerings in Massachusetts and Rhode Island.

The evaluation showed promise for thermostats as a residential DR technology, though important differences exist across different thermostat models and customer acceptance has not been adequately tested due to the relatively mild temperatures on event days. The study found average demand savings of 0.44 kW per thermostat in Massachusetts and 0.52 kW per thermostat in Rhode Island.

- Massachusetts: 0.48 kW per Ecobee, 0.53 kW per Honeywell, and 0.41 kW per Nest30
- Rhode Island: 0.59 kW per Ecobee, 0.48 kW per Honeywell, and 0.41 kW per Nest31

**Programs to which the Results of the Study Apply:**

Residential DR

**Evaluation Recommendations included in the study:**

- National Grid should claim the following average demand savings per thermostat: 0.59 kW per Ecobee, 0.48 kW per Honeywell, 0.41 kW per Nest
- Remove thermostats that persistently opt out or modify the Nest participation incentive structure to include a participation requirement  
Consider implementing auto-unenroll functionality
- Proactively monitor connectivity issues; remove thermostats with persistent connectivity issues; consider implementing an auto-unenroll functionality.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

The Company adopted recommended kW based on this study in program planning and reporting in 2019.

**Savings Impact:** The adoption of these results led to claimable demand savings from Residential DR program.

**Study Name:** 2017 Seasonal Savings Evaluation

**Type of Study:** Impact

**Evaluation Conducted by:** Navigant Consulting, Inc.

**Date Evaluation Completed:** March 9, 2018

**Evaluation Objective and High Level Findings:**

In 2017, National Grid offered some of its customers in Massachusetts and Rhode Island a new energy savings opportunity – thermostat optimization. National Grid selected Nest to provide Seasonal Savings (SS), its thermostat optimization program during the 2017 summer season. The Seasonal Savings program made the intended setpoint adjustments, resulting in decreased runtime and, consequently, energy savings.

In Rhode Island, the Seasonal Savings program resulted in energy savings of 29.2 kWh per thermostat, with total savings of 57 MWh between July 27 and September 30, 2017. 5 Average peak demand savings were 0.068 kW per thermostat, with total peak demand savings of 134 kW.

**Programs to which the Results of the Study Apply:**

Residential DR

**Evaluation Recommendations included in the study:**

- **National Grid should claim the following average energy/demand savings per thermostat in 2017:** Average energy savings of 29.2 kWh per thermostat, and average demand savings of 0.068 kW per thermostat.
- **Continue offering a summer thermostat optimization program to achieve energy and demand savings** Consider offering a winter thermostat optimization program to address electric and gas savings.
- **The summer SS program should be evaluated an additional year to:**
  - Assess how customers respond to two summers of schedule adjustments
  - Understand whether customers leave SS during hot weather
  - Seek to ascertain a relationship between savings and weather
  - Develop an approach to incorporate SS into the Massachusetts and Rhode Island Technical Reference Manuals

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

The Company will consider recommendations in program planning.

**Savings Impact:** The adoption of these results led to claimable demand savings from Residential DR program.

**Study Name:** Rhode Island Home Energy Reports Savings Decay: Literature Review

**Type of Study:** Impact

**Evaluation Conducted by:** Illume Advising, LLC

**Date Evaluation Completed:** January 19, 2018

**Evaluation Objective and High Level Findings:**

The study reviewed research from 11 utilities to address the research question: What happens to energy savings when Home Energy Report (HER) recipients no longer receive reports or if they receive reports at a reduced cadence? Illume analyzed study results, paying particular attention to: fuel type, length of time customers received reports, climate/location, customer baseline energy use, and customer characteristics. Incorporating these comparisons, four predictive scenarios were developed to illustrate possible impact on savings if National Grid Rhode Island altered the report cadence of its Statewide Behavioral Program customer groups.

- Finding 1: Across 15 study groups, the decay rate for first-year electricity savings ranges from 2 percent to 36 percent with a median of 20 percent. The median remained around 20 percent even when the team subset the studies based on location, report cadence, and length of treatment period.
- Finding 2: Most customer treatment groups have high baseline electric and natural gas energy use which may limit their applicability to Rhode Island. Many programs specifically select high energy users, while on average, the Rhode Island customer treatment groups have moderate baseline energy use. Research literature suggests that customers with higher baseline energy use typically save more energy as a result of receiving HERs (Alcott, 2011). In the literature review, only one program had customers with moderate baseline energy use and that program had widely varying decay rates of 6 percent and 32 percent for its two study groups.
- Finding 3: Results from multi-year studies in Illinois and Connecticut suggest that decay rates may accelerate over time.
- Finding 4: Only 4 studies have examined savings decay in natural gas usage and they report widely varying results of 0 to 150 percent decay rates. The single study of natural gas decay over time, reports modest increases in decay rates from 7 percent to 38 percent over five years.
- Finding 5: Approaches such as report timing, report cycling, electronic portals, and emailed reports may provide options for modifying the treatment approach to reduce costs, yet maintain more savings over completely stopping reports. However, these approaches have not been thoroughly tested and compared against the typical HER program.

**Programs to which the Results of the Study Apply:**

Residential Behavior

**Evaluation Recommendations included in the study:**

- Recommendation: In any predictive benefit-cost modeling, National Grid Rhode Island should take into account the potential risks and rewards of over- or under-predicting savings. For example, in this report we present scenarios showing 20 percent and 30 percent first-year decay rates. A lower decay rate assumption may over-predict actual savings while a higher decay rate assumption could cause a program to fail a benefit-cost screen and result in a missed opportunity.
- Recommendation: In any predictive benefit-cost modeling, National Grid Rhode Island may want to model savings assuming a 40 to 80 percent decay in electricity savings in years 2 through 4 after treatment stops. However, any assumptions will also need to take into account the risks and rewards of over- or under-predicting savings.
- Recommendation: For predictive benefit-cost modeling for natural gas savings, National Grid Rhode Island should model high and low savings decay scenarios while understanding the uncertainties of these assumptions.
- Recommendation: National Grid Rhode Island's Statewide Behavioral Program may benefit (from a benefit-cost perspective) from modifying the treatment approach. We suggest piloting new approaches when the current implementer contract ends. Two approaches that may merit further scoping and testing are:
  - Report cycling: National Grid can test the effect on electricity savings from cycling reports with a one year on/one year off cadence. The pilot could split larger treatment waves (such as the March 2013 or January 2014 waves) so that a portion of each wave receives reports each year.
  - Report timing: For natural gas, National Grid can test sending fewer reports and only send them during the heating season. For example, the program might send reports only in October and January.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

The Company will consider recommendations in program planning and reporting in 2019.

**Savings Impact:** N/A

**Study Name:** Rhode Island Income Eligible Services Single Family Program Impact Evaluation

**Type of Study:** Impact

**Evaluation Conducted by:** Cadeo

**Date Evaluation Completed:** August 30, 2018

**Evaluation Objective and High Level Findings:**

This study was designed to estimate energy savings and realization rates for each electric, natural gas, propane and heating oil measures and/or measure groups. The study analyzed 2015 and 2016 program participants and used a combination of billing analysis, engineering analysis and building simulation to estimate savings for each measure groups. The results are presented in the table below:

**Table 4. IES PY 2015-2016 Ex Post Savings by Measure and Fuel**

IES Measure	Electric (kWh)	Natural Gas (Therms)	Oil (MMBTU)	Other (MMBTU)
AC Replacement (Window Unit)	71	N/A	N/A	N/A
AC Timer	0	N/A	N/A	N/A
Appliance Removal (Refrigerator or Freezer)	1,036	N/A	N/A	N/A
Clothes Washer and Dryer**	Various (See Workbook for Details)			
Dehumidifiers Replacement**	1,106	N/A	N/A	N/A
Domestic Hot Water (Aerators or Showerheads)	160	8	0.9	0.8
Education Materials (TLC kits)	21	N/A	N/A	N/A
Freezer Replacement	333	N/A	N/A	N/A
Heat Pump Water Heaters	814	N/A	N/A	N/A
Heating Systems	N/A	79	7.8	7.9
Furnace Fan (due to heating system replacement), kWh	N/A	16	10	16
CFL	N/A			
LED Bulbs	N/A			
LED EISA EXEMPT	18*	N/A	N/A	N/A
LED Reflectors	N/A			
Programmable Thermostats**	232	34	3.4	3.4
Electric savings (Fan savings and cooling savings for CAC), kWh	18.8	11.2	8.7	11.2
Refrigerator Replacement	467	N/A	N/A	N/A
Smart Strip	75	N/A	N/A	N/A
Waterbed	872	N/A	N/A	N/A
Weatherization	1,201	124	12.6	12.4
Furnace Fan Savings, kWh	N/A	63	65	63
Cooling Savings, kWh	78	30	30	30

\*Note: 18 kWh represents the average per-bulb savings estimate for all lighting measures

\*\*Added to IES after 2016 or under consideration for future inclusion; not offered as part of IES during 2015 and 2016

**Key**

	Billing Analysis
	Engineering Algorithm
	Building Simulation

**Programs to which the Results of the Study Apply:**

Residential Income Eligible Single Family Program

**Evaluation Recommendations included in the study:**

Use estimated kWh and therms savings for each measure groups to update current savings assumptions for measures offered through the program

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

The Company adopted recommended kWh and therms savings based on this study in program planning and reporting in 2019.

**Savings Impact:** The adoption of these results led to a decrease in the savings that National Grid claims for measures offered through Residential Income Eligible Services Single Family Program.

**Study Name:** Rhode Island Residential Appliance Saturation Survey

**Type of Study:** Market

**Evaluation Conducted by:** NMR

**Date Evaluation Completed:** October 02, 2018

**Evaluation Objective and High Level Findings:**

The Residential Appliance Saturation Survey (RASS) study included 900 web surveys and 75 follow-up on-site verification visits with National Grid Rhode Island customers. The study also used on-site verification visit data to conduct a mini-split heat pump (MSHP) technical feasibility analysis and collected lighting data for an upstream program net-to-gross analysis. This effort developed an inventory of residential end-uses, including appliances, consumer electronics, heating and cooling equipment, thermostats, water heating, and building characteristics.

Heating and Cooling

- Fuel. The slight majority (51%) of customers' primary heating fuel was natural gas. While single-family customers were next most likely to primarily use fuel oil for heating (36%), multifamily customers were next most likely to primarily use electric heat (33%).
- Boilers. Boilers were the most common heating system and were 14 years old, on average across all fuel types. Natural gas boilers were most common, with penetration reaching 37%. Oil boilers had the next highest penetration (28%), yet they were much more common in single-family (32%) than in multifamily (1%) homes.
  - The average rated (not tested) annual fuel utilization efficiency (AFUE) among the boilers observed on site was 83 for natural gas boilers (n = 33) and 84 for oil boilers (n = 16).<sup>2</sup> These values are in line with federal standards (80-84) but notably lower than the minimum AFUE requirement for National Grid natural gas boiler rebates (90).
- Furnaces. Furnaces were the next most common heating system. Natural gas furnaces were most common (23%) followed by fuel oil (6%) and propane (2%). Furnaces were 14 years old, on average across all fuel types.
  - The average rated AFUE among the furnaces observed on site was 85 for natural gas furnaces (n = 11), 81 for oil furnaces (n = 3), and 86 for propane furnaces (n = 4). These AFUEs are above the federal standard (80), but well below the minimum program requirement for natural gas furnaces (95).

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<sup>2</sup> Note that rated AFUE can and often does differ from tested efficiencies.

- Electric heat sources. The most commonly reported electric heating equipment was space heaters (13%) followed by baseboard heaters (11%), central air source heat pumps (3%), and MSHPs (2%).
- Cooling. One-fifth of customers have no cooling systems. Room air conditioners were the most commonly reported cooling systems (59%), followed by central air (27%) and MSHP or air source heat pumps (5%). Room air conditioners were newer than central air conditioners (eight versus 13 years old, on average). In accordance with age, the average central air conditioner seasonal energy-efficiency ratio (SEER) was below the federal standard as well (11 versus 13), but the average room air conditioner energy-efficiency ratio (EER) was in line with federal standards (10 versus 9-11).

#### Thermostats

- Programmable. While programmable thermostats are in more than one-half (51%) of homes, two-fifths of those who have them say they do not use the programmable features.
- Wireless. Only one in ten homes (9%) have adopted smart wireless (Wi-Fi) thermostats.
- Settings. Depending on the time of day, customers set their thermostats to between 66°F and 68°F in the winter, on average. Those who have cooling systems set their thermostats on average to 70°F during the cooling season. Comparing their minimum setpoints to their maximum setpoints, customers change their thermostat set points by 3°F on average over the course of typical winter day and 1°F on average on a typical summer day.

#### Water Heating

- Fuel. Natural gas was the most commonly used water heating fuel source (50%) followed by electricity (26%), fuel oil (20%), and propane (4%).
- System. Water heaters were most often natural gas standard tank units (40%), followed by standard electric storage tank units (23%).
- Age. While the average age of water heaters was only nine years, nearly one in five (17%) were 18 years old or older and one-half were manufactured before 2011.
- Efficiency. Aside from inefficient tankless coil systems, the average Energy Factor (EF) among fossil-fuel based units ranged from 0.61 to 0.91. The average EF among the 12 electric units observed on site was 1.07 – the one heat pump water heater observed on site had an EF of 2.40.

- Heat pump water heaters. Only 1% of homes had heat pump water heaters (HPWHs), but one-third of homes had water heaters installed in locations that could technically readily accommodate a HPWH because they were sufficiently large, warm, and had a drain to handle condensation. The lack of a drain is the most common reason why a space was not currently suitable for a HPWH – ignoring the drain issue, 53% of spaces would have been suitable for a HPWH installation.

#### Appliances

- Refrigerators. The average home had 1.19 refrigerators, with 16% of homes having more than one. Fourteen percent of refrigerators were new (manufactured after 2012) and ENERGY STAR® labeled. The average refrigerator was 11 years old.
- Dishwashers. Two-thirds (67%) of homes had dishwashers. Sixteen percent were new and ENERGY STAR labeled. The average dishwasher was 11 years old.
- Clothes washers and dryers. Nearly four-fifths of homes had in-unit clothes washers (78%) and dryers (78%). Fifteen percent of clothes washers were new and ENERGY STAR, but only 4% of clothes dryers were. The average clothes washer was ten years old and the average clothes dryer was 11 years old. Dryers were most often electric – 64% of customers had electric clothes dryers. Based on self-reported data, the average home runs 4.6 loads of laundry per week.
- Dehumidifiers. More than one-quarter (28%) of customers had dehumidifiers, and one-quarter of dehumidifiers were new and ENERGY STAR labeled. Where age was discernable, dehumidifiers were seven years old, on average (n=24).
- Freezers. Standalone freezers were uncommon (9% penetration); three of nine observed on site were new and ENERGY STAR.

#### Consumer Electronics

- Electronics. With high penetration levels, the average home had 2.13 cell phones, 2.29 televisions, and 1.31 laptop computers. Laptop computer (81%) penetration was particularly high compared to desktop computer (44%) penetration.
- Advanced power strips. More than one-quarter (27%) of customers had advanced power strips (APS). That penetration level was higher than initially expected since APS are generally considered an emerging technology, not often available outside of energy-efficiency programs. The high APS penetration is likely attributable to National Grid's aggressive programs, which have distributed or rebated over 80,000 APS in Rhode Island since January 2016.

#### Miscellaneous End-Uses

- Photovoltaic (PV) solar panels have not penetrated the market: only 1% of homes have them installed. Their average installed capacity was 6.11 kW. One in ten of homes with PV solar panels had energy-storage batteries. Most miscellaneous end-uses, such as pools (8%), air purifiers (6%), and electric cars (1%), also had limited penetration.

#### Building Characteristics

- Type, Age, Size. Compared to the population, the web-survey sample oversampled homes in buildings with two to four units (33%) and under-sampled single-family detached homes (44%). On-site visits more closely resembled the population, with single-family detached homes comprising more than one-half (53%) of the sample and homes in buildings with two to four units comprising roughly one-quarter (23%) of the sample. The population (85%) has a slightly older building stock than the web (62%) and on-site (69%) samples, with more homes built before 1990.
- Insulation. While the average R-value for on-site homes' exterior above grade walls is about 9, when we group all walls to unconditioned space, including walls to garages, unconditioned basements, and so forth, their average R-value drops to about 7. These buffer spaces are often inconsistently insulated, resulting in lower overall R-values.
- Windows. Most window glazing was double paned (89%) and most had vinyl frames (64%) – 44% of total glazing area across all homes was composed of vinyl-framed double-paned windows. About one-fifth (19%) had a low-emissivity coating and less than 4% were filled with insulating gas.
- Air infiltration. The majority of homes (86%) received the two lowest air infiltration rankings – loose or semi-loose, based on Manual J's qualitative assessment criteria.
- Duct sealing. More than one-half of ducts are either entirely unsealed (23%) or sealed to below-average standards (29%), again using Manual J qualitative assessment criteria.

#### **Programs to which the Results of the Study Apply:**

Residential EnergyWise SF/MF, Residential Income Eligible Services SF/MF, Residential Lighting and Products, Residential HVAC/HEHE programs

#### **Evaluation Recommendations included in the study: N/A**

#### **Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

The Company will use the results in program planning and reporting in 2019 and future years.

#### **Savings Impact: N/A**

**Study Name:** Rhode Island HEAT Loan Assessment

**Type of Study:** Market

**Evaluation Conducted by:** Research into Action

**Date Evaluation Completed:** October 3, 2018 (draft)

**Evaluation Objective and High Level Findings:**

This study was designed to understand the extent to which HEAT Loans enable EnergyWise and HVAC projects and to identify opportunities for changes to the HEAT Loan offering that will enable higher uptake of measures offered through the programs. To address the objectives, RIA team conducted participant surveys, contractor and lender interviews and program tracking data analysis.

The key findings are summarized below:

- The current HEAT Loan model with 0% interest for customers over seven years is well-liked by customers, contractors, and lenders. Contractors were not interested in offering their own financing and lenders were not interested in a loan loss reserve model. Half of HEAT Loan recipients would not have used the loan if it included interest.
- The HEAT Loan is generating energy savings for National Grid that would not have otherwise occurred. The HEAT Loan availability was very important in those loan customers' decisions to install measures following their home energy assessment. Without the HEAT Loan, three-quarters of loan recipients would have canceled, postponed, or reduced their home energy project scope. Very few customers use other loan products to finance energy efficiency upgrades in their homes. Contractors reportedly would not sell as much efficient HVAC equipment without the HEAT Loan.<sup>3</sup> HEAT Loan projects typically included more measures than non-HEAT Loan projects and HEAT Loan projects substantially enabled natural gas savings for the EnergyWise program.
- There is an opportunity to improve customer education on the HEAT Loan process. Some customers are reportedly unclear about the HEAT Loan process, including the home energy assessment requirement, rebates, and how the contractor is paid. Lenders report receiving numerous customer questions they say should not be their responsibility to answer and thought that better education and outreach by National Grid would improve customer understanding.
- The home energy assessment requirement limits HEAT Loan participation for customers with emergency HVAC replacements, particularly in the wintertime. As reported by HVAC contractors, some customers who may benefit from the HEAT

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<sup>3</sup> In addition, HEAT Loan projects typically included more measures than non-HEAT Loan projects and HEAT Loan projects significantly enabled natural gas savings for the EnergyWise program, however these findings from the program tracking data do not speak to causality.

Loan do not want to lengthen their HVAC upgrade projects to meet the home energy assessment requirement for loan eligibility.

- There is widespread interest in the HEAT Loan, and customers want to be able to finance other upgrades with it. More than half of HVAC program participants reported interest in using the HEAT Loan to finance for future upgrades and surveyed participants wanted to be able to use the HEAT Loan to finance efficient air conditioning, window replacements, and solar installations.
- Program database records contained aggregated, missing, or implausible values that impeded measure-level analyses. These challenges affected several variables important for calculating energy savings and measure costs including annual kWh, lifetime MWh, lifetime therms, annual therms, and measure lifetime. Further complicating analyses was the fact that insulation savings were aggregated at the project level and could not be broken out to determine relative contributions of wall, attic, basement, and floor insulation.

**Programs to which the Results of the Study Apply:**

Residential EnergyWise Single Family Program, Residential HVAC/HEHE program

**Evaluation Recommendations included in the study:**

- Maintain the 0% interest to the customer with the interest rate buy down for the lenders.
- Maintain the HEAT Loan offering for EnergyWise customers.
- National Grid should provide HVAC contractors and assessors with a pamphlet to give customers that explain the HEAT Loan process, including the need to contact National Grid to schedule the assessment, authorization and application requirements, how rebates tie in, and how the contractor is paid.
- National Grid should create a policy for emergency replacement situations that defines a winter-months protocol for RISE Engineering to respond to customer requests for assessment scheduling within four business hours; and RISE should inform the customer of their eligibility to apply for a HEAT Loan with a lender at the time of assessment scheduling.
- Conduct research to determine which additional measures would offer cost-effective energy savings if financed through the HEAT Loan.
- National Grid should work with their implementers to assess the feasibility of tracking measure-level savings across EnergyWise and HVAC projects and the possibility of implementing automated data quality checks that identify values outside an expected range.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

The Company will continue to offer the HEAT Loan program in 2019 and will consider study recommendations in program planning.

**Savings Impact:** N/A

**Study Name:** RLPNC 18-5 Home Energy Assessment LED Net-to-Gross and EUL Consensus

**Type of Study:** Impact

**Evaluation Conducted by:** NMR Group, Inc.

**Date Evaluation Completed:** July 23, 2018

**Evaluation Objective and High Level Findings:**

This study was designed to provide a means through which the Massachusetts PAs and EEAC consultants could come to consensus on what prospective NTGR values should be used for LEDs installed as part of the Home Energy Services (HES) initiative.

The final NTGR and Effective Useful Life (EUL) values adopted by the PAs and EEAC are included in Table 1. Since it is uncertain if the upstream LED program will exist for all years 2019 – 2021, the PAs and EEAC consultants agreed to varying NTGR values based on when the upstream program ends.

**Table 1: Prospective HEA LED NTGR and Effective Useful Lives**

Program Year	Effective Useful Life	Upstream Program Ends			
		Dec. 31, 2021 (Base)	Dec. 31, 2018	Dec. 31, 2019	Dec. 31, 2020
2019	3	88%	88%		
2020	2	80%	83%	82%	
2021	2	66%	74%	72%	69%

**Programs to which the Results of the Study Apply:**

Residential EnergyWise Single Family Program

**Evaluation Recommendations included in the study:**

National Grid should use this data to come to a consensus on NTG values for LED lighting through the Home Energy Services Program.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

The Company adopted recommended NTG and EUL based on this study in program planning and reporting in 2019.

**Savings Impact:** The adoption of these results led to an increase in the savings that National Grid claims for lighting measures offered through Residential EnergyWise Single Family Program.

**Study Name:** RLPNC 17-3 Advanced Power Strip Metering Study

**Type of Study:** Impact

**Evaluation Conducted by:** NMR Group, Inc.

**Date Evaluation Completed:** August 2, 2018

**Evaluation Objective and High Level Findings:**

The study was designed to measure baseline usages and the energy reduction potential (ERP), kWh and kW savings of Tier 1 and Tier 2 advanced power strips (APS). The study relied on in-home metering of end-use energy consumption. In total, the study metered 133 sites, including 65 control sites and 68 treatment sites.

The study found baseline usage values that are lower than those published in the previous Technical Resource Manual (TRM), possibly due to decreased usage times. Tier 2 Infrared Strips generated the highest ERP and kWh and peak demand savings. Tier 2 Infrared/Occupancy Sensing strips were the next highest performers. Tier 1 APS also demonstrated substantial savings across these metrics. Results are presented in the table below:

Table 1. kWh and kW Savings from Advanced Power Strips

APS	Gross kWh Savings	Gross kW Savings
Tier 1 - HES	114	9
Tier 1 – Online/Upstream	111	6
Tier 2 IR	225	31
Tier 2 IR - OS	132	12

As part of the metering study, NMR looked at the setups for 26 pre-existing (customer installed) APS units and recommend reducing savings by 8% to account for installations that produce zero or reduced savings. The study recommended applying a 92% realization rate on gross savings for Massachusetts.

**Programs to which the Results of the Study Apply:**

Residential Products

**Evaluation Recommendations included in the study:**

The study reported the following considerations:

- The PAs should adopt baseline usage estimates for HECs, PCs, and combined end-uses as part of updates to the TRM for the 2019–2021 program cycle. The estimates should be independent of APS technology or brand.
- The PAs should adopt performance bands for Tier 2 APS products as part of the next program cycle (2019–2021). Performance bands should be based on technology differences between Tier 2 APS products.
- The PAs should explore benchmarks outside ERP, including persistence and satisfaction, when considering performance bands.

- The PAs should consider using future program tracking efforts or surveys to update the percentage of HEC versus PC end-uses.
- The PAs should continue to monitor and consider the decreases in television viewing time when planning for future program activities and evaluations.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

The Company adopted recommended gross kWh savings and realization rates for APS Tier 1 and Tier 2 based on this study in program planning and reporting in 2019.

**Savings Impact:** The adoption of these results led to a decrease in the savings that National Grid claims for advanced power strips through Residential Products Program.

**Study Name:** RLPNC 18-1 Appliance Recycling Report

**Type of Study:** Impact

**Evaluation Conducted by:** NMR

**Date Evaluation Completed:** September 12, 2018 (draft)

**Evaluation Objective and High Level Findings:**

This study was designed to estimate unit energy consumption (UEC), adjusted gross energy savings, and net energy savings (and a net-to-gross ratio) based on the characteristics and alternative outcomes for refrigerators and freezers currently recycled through the Residential Products program.

Based on the characteristics of units recycled in 2017, the UMP regression algorithm suggests that the current UEC (equivalent to gross energy savings) is 1,019 kWh for refrigerators and 718 kWh for freezers. On average, survey respondents reported that they had their refrigerators plugged in 88% of the year prior to recycling and their freezer for 68% of the year. Application of these part-use factors yielded an adjusted gross energy savings of 897 kWh for refrigerators and 488 kWh for freezers. The study also yielded a net-to-gross ratio of 44% for refrigerators and 56% for freezers, or net savings of 398 kWh and 275 kWh, respectively.

**Programs to which the Results of the Study Apply:**

Residential Products

**Evaluation Recommendations included in the study:**

Use estimated kWh savings and NTG for to update savings values used for refrigerator/freezer recycling through the Residential Products Program.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

The Company adopted recommended kWh savings and NTG based on this study in program planning and reporting in 2019.

**Savings Impact:** The adoption of these results led to a decrease in the savings that National Grid claims for appliance recycling offered through Residential Products Program.

**Study Name:** RLPNC 17-4 and 17-5: Products Impact Evaluation of In-service and Short-Term Retention Rates Study

**Type of Study:** Impact

**Evaluation Conducted by:** NMR

**Date Evaluation Completed:** March 23, 2018

**Evaluation Objective and High Level Findings:**

This study was designed to establish current estimates of in-service rates (ISRs) and short-term retention rates for products currently offered through the Residential Consumer Products Core Initiative or the Mass Save® Home Energy Assessment (HEA) Program. Process research questions focused on product installation experiences, satisfaction with product performance, and likelihood of recommending the product. The evaluated in-service rates and short-term retention rates are provided below:

**Table 1: Evaluated ISR and Short-term Retention Rates**

Product Name	MA Primary Research			Literature Range	
	Sample Size	ISR	Short-term Retention		
<b>Low to Moderate Price Measures</b>					
Leave behind APS Tier 1	252	81%	94%	76%	42% - 86%
Online APS Tier 1	359	89%	97%	86%	80%
Online APS Tier 2	340	81%	93%	75%	80% - 87%
Dehumidifiers	137	99%	97%	96%	94%
Room Air Cleaners	126	100%	97%	97%	100%
Temperature Sensitive Showerheads, Adapters	178	86%	91%	78%	N/A
<b>High Price Measures</b>					
Dryers	128	98%	99%	97%	N/A

\*Note that two dryers had never been installed and one was removed. While we do not have further details on the two never installed, the respondent who removed one plans to reinstall it in the future.

Overall, 82% of respondents who purchased products through the program voice satisfaction with product performance and similar percentages say they would recommend the products. Also, Respondents who removed APS (both tiers and program delivery modes) and showerheads from service voice skepticism about whether they will reinstall the products.

**Programs to which the Results of the Study Apply:**

Residential Products

**Evaluation Recommendations included in the study:**

The PAs should use the combined Massachusetts ISR/short-term retention rates listed in Table 1 for the 2017 Annual Report, the 2018 Annual Report, updates to the TRM, and program planning for 2019 to 2021 for all evaluated products

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

The Company adopted recommended ISR/short-term retention rates based on this study in program planning and reporting in 2019.

**Savings Impact:** The adoption of these results led to a decrease in the savings that National Grid claims for products offered through Residential Products Program.

**Study Name:** Massachusetts Residential HVAC Net-to-Gross and Market Effects Study (TXC34)

**Type of Study:** Impact/Market

**Evaluation Conducted by:** NMR/Tetra tech

**Date Evaluation Completed:** July 27, 2018

**Evaluation Objective and High Level Findings:**

The primary purpose of this study was to estimate and recommend net-to-gross ratios (NTGRs) for selected heating, cooling, and water heating measures that will receive Mass Save® Standard rebates in 2019-2021. Another purpose was to measure market effects indicators for evidence of progress toward market transformation that may be attributed to the program, and to set baselines for comparison with future measurements.

This study’s recommended NTGRs differ from current TRM values, which are mostly based on a 2012 study. The recommended 2019-2021 NTGRs for ductless mini-split heat pumps (DMSHPs) and boilers increased from the 2016-2018 NTGRs. The recommended NTGRs for heat pump water heaters (HPWHs), central air conditioning (CAC), central heat pumps (CHP), and furnaces decreased. The results are presented below:

**Consensus Group Recommended 2019-2021 Net-to-Gross Ratios**

Measure	Previous	Recommended
Ductless MSHP	0.62	0.77
Heat pump water heater	1.00	0.83
Central air conditioner	0.86	0.67
Central heat pump	0.86	0.60
Furnace	0.81	0.76
Hot water boiler	0.77	0.79
Condensing combination boiler	0.74	0.79

**Programs to which the Results of the Study Apply:**

Residential HVAC/HEHE programs

**Evaluation Recommendations included in the study:**

Use NTGRs recommended by consensus group for equipment incentivized by standard rebates.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

The Company adopted recommended NTGs based on this study in program planning and reporting in 2019.

**Savings Impact:** The adoption of these results led to a slight increase in the overall savings that National Grid claims for measures offered through Residential HVAC Program.

**Study Name:** RLPNC 18-4 Products Net-to-Gross Consensus Report

**Type of Study:** Impact

**Evaluation Conducted by:** NMR

**Date Evaluation Completed:** August 9, 2018

**Evaluation Objective and High Level Findings:**

The PAs and EEAC engaged NMR Group, Inc., to lead a consensus process that would yield recommended prospective NTGRs for 2019 to 2021 for the Residential Retail Products Program. The consensus approach rests on the assumption that asking a panel of experts, who represent various stakeholder groups, to review and asses NTGRs will diminish the bias inherent in relying on a single estimate of NTGR or the interpretation of one stakeholder group. As part of the consensus process the PAs, EEAC consultants, and evaluators reviewed and discussed retrospective and prospective NTGR estimates and market information drawn from literature reviews, ENERGY STAR market penetration rates, and historical as well as planned specification changes.

The NTG results of the consensus process are presented below:

**Table 1: Recommended Prospective NTGRs**

	2019	2020	2021
<b>Recommended Product NTGRs for Program Planning</b>			
Freezers	60%	58%	56%
Room Air Cleaners	71%	68%	65%
Clothes Dryers	57%	54%	51%
Dehumidifiers	61%	58%	55%
Room Air Conditioners	63%	63%	63%
Pool Pumps	95%	93%	91%
Tier 1 Advanced Power Strips	100%	100%	100%
Tier 2 Advanced Power Strips	100%	100%	100%
Temperature Sensing Showerheads	97%	97%	97%
Refrigerators*	N/A	N/A	N/A
Clothes Washers*	N/A	N/A	N/A
Dishwashers*	N/A	N/A	N/A

\* As refrigerators, clothes washers, and dishwashers are not included in 2019-2021 Plan the consensus panel deferred conversation on these products.

**Programs to which the Results of the Study Apply:**

Residential Products

**Evaluation Recommendations included in the study:**

Use NTGRs recommended by consensus group for energy star products offering through the Residential products program.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

The Company adopted recommended NTGs based on this study in program planning and reporting in 2019.

**Savings Impact:** The adoption of these results led to a decrease in the overall savings that National Grid claims for measures offered through Residential Products Program.

**Study Name:** Res 1 Baseline Loadshape Study (Cooling season report)

**Type of Study:** Impact

**Evaluation Conducted by:** Navigant

**Date Evaluation Completed:** February 7, 2018

**Evaluation Objective and High Level Findings:**

The study documented the load shapes, summer peak demand levels and summer energy consumption for all major end uses, metered at approximately 350 homes representative of the Massachusetts statewide population during the summer of 2017. The results are designed to assist the PAs and EEAC in designing and evaluating program offerings targeted to reduce residential peak demands now and in the future.

The study highlights are presented below:

- Central air conditioners (AC) and room AC are the largest contributors to residential peak demand. Cooling collectively makes up about half of total residential ISO-NE and residential peak demand, with household ISO-NE peak demands of 1.7 kW and 0.6 kW from central AC/heat pump (HP) and room AC, respectively. The saturation of central cooling increased from 29% in 2008 to 45% of households in 2017, negating all cooling equipment efficiency gains over the same time period.
- Across the rest of the metered end uses, individual homes have a variety of significant end use loads during peak times. Dehumidifiers, clothes dryers, pool pumps, and hot water heaters all have significant load during peak times.
- Heat pump water heaters appear to use about half as much electricity as domestic water heaters, which corroborates much of the expected savings, at least during the summer.

**Programs to which the Results of the Study Apply:**

Residential Lighting and Products, Residential EnergyWise SF/MF, Residential HVAC/HEHE, Residential New Construction, Income Eligible Services SF/MF programs

**Evaluation Recommendations included in the study:**

No formal recommendations were made in this evaluation.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

No formal recommendations were made in this evaluation.

**Savings Impact:**

This evaluation does not impact claimed savings. The updated loadshapes will increase the BC ratio for some measures and will decrease it for others.

**Study Name:** Res 1 Baseline Loadshape Study (Heating season report)

**Type of Study:** Impact

**Evaluation Conducted by:** Navigant

**Date Evaluation Completed:** March 15, 2018

**Evaluation Objective and High Level Findings:**

The study documented load shapes, winter peak demand levels and winter energy consumption for all major end uses, metered at approximately 350 homes representative of the Massachusetts statewide population during the winter of 2017/2018. The results are designed to assist the PAs and EEAC in crafting and evaluating program offerings targeted to reduce residential peak demands now and in the future.

The study highlights are presented below:

1. Based on initial analysis of lighting data, lighting is likely the end use with the largest contribution to total winter consumption and winter peak. Further improvements in the installed lighting efficiency and controls, either induced by programs or the overall market, will cause significant reductions in peak loads.
2. Electric resistance heat has a surprisingly flat hourly load shape on peak days, more similar to a refrigerator than an air conditioner on a peak day.
3. Electric resistance heating consumption is highly variable. The top 25% of households with electric resistance heat presently consume approximately ten times as much as the median.
4. Electric water heaters offer a significant opportunity for winter peak demand savings, the largest non-HVAC opportunity.

**Programs to which the Results of the Study Apply:**

Residential Lighting and Products, Residential EnergyWise SF/MF, Residential HVAC/HEHE, Residential New Construction, Income Eligible Services SF/MF programs

**Evaluation Recommendations included in the study:**

No formal recommendations were made in this evaluation.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

No formal recommendations were made in this evaluation.

**Savings Impact:**

This evaluation does not impact claimed savings. The updated loadshapes will increase the BC ratio for some measures and will decrease it for others.

**Study Name:** Market-Rate Multifamily NEI – Phase I Final Memo (MF NEI Matrix and Program Data Analysis)

**Type of Study:** Benefits

**Evaluation Conducted by:** Tetra Tech

**Date Evaluation Completed:** March 30, 2018

**Evaluation Objective and High Level Findings:**

This Massachusetts study seeks to better understand the NEIs associated with retrofits to market-rate multifamily (MF) properties (defined as properties with five or more dwelling units) that accrue to the owners and managers of the properties, including whether or not any additional NEIs should be applied, whether NEI values differ based on type and ownership of building, and whether there is double counting of NEIs.

Findings

All residential MF-specified measures and associated NEIs in the BCR tables were included in the TRM. NMR confirmed that the residential NEI values in the TRM and BCR models are consistent with the values reported in the original source document.

For the most part, the residential MF Retrofit initiative NEI values are quite similar to the HES initiative NEI values. The LIMF Retrofit initiative generally has higher values for the same NEIs and measures, and for some measures – such as air sealing, low-flow showerheads, thermostats, and refrigerators – the LIMF Retrofit initiative has additional NEIs that accrue to the owners and managers of the LIMF facilities.

At the time of the initial review, the program tracking data did not consistently track whether measures, such as lighting, thermostats, hot water heaters and air conditioners, were installed in common areas or housing units. The PAs now track lighting by location.

For C&I MF retrofits, the PAs did not consistently use the same NEI values for the same measures in their 2016-18 plan BC models. For example, for lighting, Eversource used the residential value and National Grid used both the residential value and the C&I existing buildings value, while for HVAC measures, Eversource appeared to use the NEI value for “HVAC – custom” rather than “HVAC-prescriptive” (as reported in the 2012 C&I Retrofit NEI study)

The BCR models do not appear to capture the diversity of electric and gas HVAC measures installed in C&I MF retrofit projects and are therefore not attributing all of the NEIs to the C&I MF initiative. The NEIs are attributed to the initiative to which the savings are claimed (the C&I MF Retrofit and C&I RF initiatives, respectively).

As noted in the NEI Framework Study Report, due to the double counting associated with property values or rental income and the individual non-property value NEIs that are the source of changes in property value or rental income, we recommend that the PAs not count their existing property value NEIs (including “housing unit value” for owners) for those measures with both property and non-property NEIs. But for those measures that only have property value NEIs, such as appliances and low-flow showerheads, we recommend using, in the BCR

calculations, the property value NEIs as proxies for the individual NEIs that have not yet been counted.

From the 2015 program year tracking data for the Residential MF Retrofit initiative and C&I MF Retrofits, lighting accounts for the largest share of electric savings (75%), followed by HVAC measures, while envelope, hot water, and HVAC measures account for the bulk of natural gas savings (40%, 27%, and 18%, respectively).

A majority of the HVAC electric and therm savings are attributed to major equipment types that are amenable to a life-cycle cost analysis, such as air conditioning, ASHP, and boilers. In contrast, the vast majority of hot water measure savings are attributable to measures such as faucet aerators and low-flow showerheads that are not appropriate for a life-cycle analysis.

**Programs to which the Results of the Study Apply:** Residential Multifamily Retrofit, Low-Income Multifamily Retrofit, C&I Multi-family

**Evaluation Recommendations included in the study:**

For measures that exist in the LIMF initiative and market-rate MF initiative (hot water measures, lighting, thermostats, air sealing, refrigerators), the team recommends that the PAs apply the associated LIMF owner NEIs to market rate MF projects (Rental Units Marketability, Reduced Tenant Complaints, Property Durability, Equipment Maintenance and Reliability [thermostats only]). For those MF NEIs that have occupant and owner values (increased home/property durability), the team recommends applying the owner NEI only. Appendix B and the accompanying spreadsheet details the measure-level NEI recommendations.

For common area lighting installed through the residential MF Retrofit initiative, the team recommends applying the C&I lighting O&M NEI value. The team notes that C&I Retrofit NEIs are currently applied to eligible C&I measures installed through the C&I MF Retrofit initiative

Ensure that the C&I MF NEIs for common area measures (i.e., not in-unit measures) are being applied consistently across the PAs' BCRs and reflect the diversity of the C&I NEIs provided by the source document

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

National Grid is considering the recommendations from this study.

**Savings Impact:**

This study does not impact claimed savings.

**Study Name:** Non-Energy Impact Framework Study Report

**Type of Study:** Benefits

**Evaluation Conducted by:** Tetra Tech

**Date Evaluation Completed:** January 23, 2018

**Evaluation Objective and High Level Findings:**

The objective of this Massachusetts study was to: develop a clear, consistent strategy and plan for conducting future NEI research, ensure coordination to avoid the inadvertent double counting of NEIs across residential and C&I initiatives, identify NEIs that are not currently being claimed by the PAs but could potentially be claimed and prioritize these for research, and outline detailed approaches and steps the PAs can take to update current NEI values, reconcile conflicts in the NEI values used for different purposes, and/or estimate values for potential new NEIs.

**Programs to which the Results of the Study Apply:** All

**Evaluation Recommendations included in the study:**

The PAs should not count their existing property value NEIs for those measures. Rather, in the BCR calculations, the PAs should count the NEI values associated with the individual amenities such as improved comfort, health, home durability, reduced O&M costs, reduced tenant complaints, etc. For those measures that only have property value NEIs, such as appliances and low-flow showerheads, we recommend using in the BCR calculations the property value NEIs as proxies for the individual NEIs that have not yet been counted.

The PAs should review the BCR-model-related differences highlighted in this report and determine whether there is a reason for each. If so, the PAs should cite their reason for using those values. If not, the PAs should update their claimed NEI values to match the relevant Massachusetts NEI studies.

In cases where the PAs decide to apply an NEI for one initiative or measure to a different initiative or measure, the PAs should provide clear public documentation of how the decision was made, such as via citation of the source of each NEI in the technical reference manual (TRM).

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

National Grid is considering the recommendations from this study.

**Savings Impact:**

This study does not impact claimed savings.

**Study Name:** Massachusetts Commercial and Industrial Upstream HVAC/Heat Pump and Hot Water NTG and Market Effects Indicator Study

**Type of Study:** NTG and Market Effects

**Evaluation Conducted by:** DNV GL, NMR Group, Tetra Tech

**Date Evaluation Completed:** September 5, 2018

**Evaluation Objective and High Level Findings:**

The primary purpose of this study was to measure the retrospective (2016) and estimate the prospective (2019-2021) net-to-gross ratio (NTGR) and market effects indicators for selected equipment types supported by the Upstream HVAC/Heat Pump (HP) Initiative and the Upstream Water Heater Initiative. The equipment, which PA staff selected in collaboration with the evaluation team, comprises five types of HVAC/HP and gas-fired water heating equipment:

- Ductless mini-split heat pumps
- Electric water-source heat pumps
- Air-cooled unitary/split central air conditioning (>5 tons)
- Gas-fired storage water heaters between 76,000 and 300,000 BTU/hour
- Gas-fired tankless water heaters between 180,000 and 199,900 BTU/hour

Surveyors asked distributors to estimate the expected share of 2018 total sales from high-efficiency equipment with and without the initiative. This information allowed the team to understand the influence distributors expect the Initiatives to have on future high-efficiency sales while not requiring them to estimate sales two to four years in the future. Using these estimates, the study calculated a 2018 Distributor-Reported NTGR which was used to inform the development of the 2019-2021 NTG.

	n	Avg. Percentage With Initiative	Avg. Percentage Without Initiative	Prospective 2018 NTG
Air-cooled unitary and split CAC and HP system (>5 tons)	7	52.0%	30.6%	41.1%
Ductless Mini-split Heat Pump	7	80.8%	34.8%	56.9%
Electric Water-source Heat Pump	6	80.5%	64.4%	19.9%
Gas-fired Storage Water Heaters	14	63.7%	57.2%	10.3%
Gas-fired Tankless Water Heaters	13	95.8%	78.1%	18.5%

This research suggests that while the Initiative did modify distributor behavior by motivating them to stock and upsell high-efficiency equipment more than they had before, these changes may not have had much impact on the surveyed buyers' decision-making. Many of the surveyed buyers indicated they were interested in high-efficiency equipment prior to the transaction and the Initiative had minimal impact on their decision to purchase an initiative-eligible unit.

Representatives from the PAs, EEAC, and Evaluators met on July 16 and July 23 to determine the prospective NTGR to use for each evaluated equipment type in the 2019-2021 Three-Year Plan. In developing these ratios, the group took into consideration the distributor self-reported retrospective and prospective NTG, the causal pathway results, and known program changes.

Equipment Type	2019	2020	2021
<b>HVAC</b>			
Air-cooled unitary and split CAC and HP system (>5 tons)	55%	54%	53%
Ductless mini-split heat pump (based on removing lower efficiency tier from Initiative)	51%	49%	47%
Electric water-source heat pump	50%	49%	48%
<b>Water heating</b>			
Gas-fired storage water heaters and indirect water heaters	31%	30%	29%
Volume water heaters (based on removing lower efficiency tier and offering multiple tiers)	60%	59%	58%
Gas-fired tankless water heaters	60%	59%	58%

**Programs to which the Results of the Study Apply:** C&I Electric and Gas New Construction

**Evaluation Recommendations included in the study:**

Adopt the 2019-2021 prospective NTGRs developed as part of this study, contingent on actual changes made to the initiative. The low retrospective NTGRs and findings from this study suggest that initiative changes should be considered prior to adopting NTGRs for 2019-2021.

Review efficiency requirements and incentive levels and assess whether the efficiency requirements are stringent enough, and the incentive levels high enough, to produce the expected outcomes.

Revise marketing materials to increase contractor and end-user awareness of the initiative.

Work with distributors to reduce the administrative burden of participating in the Initiative. The 2017 Process Evaluation found that many distributors experienced an increase in administrative burden and cash flow concerns as a result of participating in the Initiative. These distributors keep a portion of the incentive to cover such costs. Program staff should work with the implementer and partner distributors to develop tools or processes to reduce these concerns.

Provide training and outreach to contractors to increase their understanding of Initiative reporting requirements and the importance of complying with them. To improve contractor compliance with Initiative reporting requirements, consider offering a portion of the incentive to contractors.

Require distributors to include end user contact information in each application. The evaluation team encountered difficulties in reaching 2016 Initiative participants due to tracking data quality. While the HVAC tracking data included customer contact information, many fields were blank or, when populated, did not provide surveyors enough information to reach the actual decision maker.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

National Grid is considering recommendations from the study.

**Savings Impact:**

The results of this study reduced the savings claimed by National Grid for these equipment categories.

**Study Name:** Evaluation of 2017 Demand Response Demonstration: C&I ConnectedSolutions

**Type of Study:** Impact and Process

**Evaluation Conducted by:** DNV GL

**Date Evaluation Completed:** February 23, 2018

**Evaluation Objective and High Level Findings:**

The purpose of this Massachusetts study was to provide verification of the proper baseline application and impacts calculated by the AutoGrid system, examine the effectiveness of the Connected Solution baseline, and assess ex-post impacts. It was also designed to understand customer acceptance and experience with the intervention, readiness of systems for larger deployment, and PA and vendor success in delivery.

The study provides the following key findings:

- The demonstration has a good general design with areas that performed very well. Participants received customized services that fit their unique opportunities. Planned curtailment included a diverse set of end uses and systems.
- With a few minor exceptions, participant respondents indicated that they curtailed load when asked to do so. There were only a few incidents of employee complaints or disruption of business operations.
- Collaboration and communication between National Grid and the CSPs was very good. CSPs appreciated that National Grid staff were open to "on-the-fly tweaks" of demonstration design and delivery.
- Participants were very satisfied with the Connected Solutions demonstration, though these results are based upon surveys performed prior to participant receipt of incentives.
- The committed enrolled capacity of the demonstration was 20.6 MW. The reduction calculated by the hybrid baseline used by National Grid and verified in this study produced curtailment estimates of 14.5 and 15.9 MW for the two events. A regression analysis performed on participants provided impact estimates of 12.3 and 12.8 MW for each event.
- The nature of the hybrid baseline offers a generous, low-risk baseline for customers that carries an aggregate impact that is higher than reductions based on an adjusted or unadjusted 10 of 10 baseline individually, as well as the regression load reduction estimate.
- The combination of achieving less than committed curtailment despite a baseline that has increased potential for upward bias has implications for the demonstration as it evolves. In the absence of penalties for non-performance, incentive changes may be necessary to better align committed and achieved reductions. Left unchanged, this combination can be expected to put pressure on cost-effectiveness.
- There were delays in providing CSPs and participants with event performance data, which also delayed participant payment.

- The demonstration missed the system's peak, which occurred in June when the demonstration was still in its early stages. This prevented some participants from receiving the benefit of an ICAP reduction.
- Demonstration information could better describe several program elements including when events might be called, the possibility of events being cancelled, how customers would be paid and for how much, and participation benefits.

**Programs to which the Results of the Study Apply:** C&I ConnectedSolutions

**Evaluation Recommendations included in the study:**

- Given the divergence between delivered load reduction and committed capacity at the customer level, National Grid should develop a way to manage this shortfall: either recognize this underperformance as a planning assumption that reflects the difference between the reduction committed vs. achieved, or consider an adjustment to the incentive structure to bring performance and committed capacity into closer alignment.
- Examine the root cause(s) that prevented prediction of the system peak. Understanding this cause will enable corrections to be made before the 2018 summer season.
- Improve to data availability for AutoGrid to calculate and provide event performance values to customers and vendors to confirm their performance level and as a touchpoint to foster further demonstration engagement.
- Revise supporting information to better describe how customers will be paid, the incentive level they can expect, the possibility of events being cancelled or not allowing cancellations, and potential ancillary benefits such as ICAP tag reduction.
- Revise the process for uploading data needed as part of the enrollment process to make it more flexible and easier for CSP data submissions.
- Work with CSPs to develop a more effective system to support demonstration management needs in terms of tracking marketing leads and the sales pipeline.
- National Grid or the vendors should inquire with participants about the sufficiency of their final 2017 incentive payments. Alternatively, DNV GL can ask about them as part of the 2018 season evaluation, though incentive receipt would have occurred roughly 11 months prior, if gathered this way.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

National Grid is considering recommendations from the study.

**Savings Impact:**

Although there were many important findings in this study, the principal conclusion that Connected Solutions customers, in aggregate, did not deliver the committed load reduction in the 2017 season needs to be recognized both from a program management, system operations perspective and from a cost-effectiveness perspective.

**Study Name:** Analysis of Job Creation from 2017 Expenditures for Energy Efficiency in Rhode Island by National Grid

**Type of Study:** Economic Impact

**Evaluation Conducted by:** Peregrine Energy Group

**Date Evaluation Conducted:** 2018

**Evaluation Objective and High Level Findings:**

In order to quantify the number of direct workers involved, National Grid commissioned Peregrine Energy Group, Inc. (Peregrine) to conduct a study of the job impacts of National Grid's energy efficiency programs delivered to Rhode Island electricity and natural gas customers in 2017.

Peregrine determined that 726 full-time equivalent (FTE) employees had work in 2017 as a result of investments by National Grid in energy efficiency programs provided to its Rhode Island electricity and natural gas customers. Most of the jobs created as a result of energy efficiency investments were local because they were tied to installation of equipment and other materials. The study identified 917 companies and agencies involved in National Grid's 2017 energy efficiency programs, 79% of which were located in Rhode Island.

The study is designed to be conducted annually.

**Programs to which the Results of the Study Apply:** This is an overall indicator of economic impact, not applied to a specific program.

**Evaluation Recommendations included in the study:** The evaluation study does not include recommendations.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**  
N/A

**Savings Impact:** N/A

**Study Name:** National Grid Rhode Island System Reliability Procurement Pilot: 2012-2017  
Summary Report

**Type of Study:** Impact and Process

**Evaluation Conducted by:** Opinion Dynamics Corporation

**Date Evaluation Conducted:** 2018

**Evaluation Objective and High Level Findings:**

A final evaluation of the System Reliability Procurement Pilot, DemandLink load curtailment pilot, in Tiverton and Little Compton was completed in July 2018 by Opinion Dynamics Corporation (ODC). The final evaluation examined the effectiveness of each of the strategies employed by the Company to deliver 1 MW of load relief by 2017 (the last year of the Pilot) to defer the new substation feeder for 4 years, from 2014 to 2018. These strategies included (1) implementation of the DemandLink Programmable Controllable Thermostat Program, (2) enhancement of existing statewide energy efficiency offerings, and (3) introduction of new SRP-specific energy efficiency offerings.

The final impact evaluation found that the Tiverton Pilot fell short of its 1 MW load reduction goal. However, the Tiverton Pilot's initial progress postponed the investment of the wires alternative that would have occurred in 2014, if not earlier. The investment in the substation upgrade was further deferred due to slower than expected load growth and cooler summer temperatures in 2017.

**Programs to which the Results of the Study Apply:** Demand Response (DR) offerings, future non-wires alternative project.

**Evaluation Recommendations included in the study:**

- Future DR programs should not rely on equipment that requires customer action or reinstallation each year. The window AC plug devices used in the Tiverton Pilot were discontinued in 2016 due to significant connectivity issues and misuse by customers.
- Future DR programs should deploy a more aggressive offset strategy for events or consider cycling of the unit instead; maintain the event length at 3 hours to avoid negative savings in the last hour of the event; consider precooling before event; conduct additional testing of central AC thermostats to confirm connectivity before events begin.
- Targeted energy efficiency continue to be utilized in future initiatives. However, the Company should diversify away from lighting measures and consider new outreach channels to reach small commercial customers.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

The Company plans to apply recommendations to future initiatives. Although the Tiverton Pilot did not meet its reduction goal, the Company gained valuable insight into customer behavior, marketing effectiveness, and DR strategies that will help improve future offerings.

**Savings Impact:** N/A

**Study Name:** Avoided Energy Supply Components in New England: 2018 Report

**Type of Study:** Avoided Costs

**Evaluation Conducted by:** Synapse Energy Economics

**Date Evaluation Conducted:** 2018

**Evaluation Objective and High Level Findings:**

The Avoided Energy Supply Components in New England: 2018 Report (2018 AESC Study) was sponsored by all the electric and gas efficiency program administrators in New England and was designed to be used for cost effectiveness screening in 2019 through 2021. The avoided costs reflect current and expected market conditions and are highly influenced by the cost of fossil fuels and expectations about ISO-NE's forward capacity market.

**Programs to which the Results of the Study Apply:** All programs

**Evaluation Recommendations and Program Administrator Response**

Company should use the avoided costs for cost effectiveness screening in 2019 through 2021. The Company applied the results of this study to its cost effectiveness screening of 2019 measures, programs, and portfolio.

**Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:**

The Company adopted the recommendations.

**Savings Impact:** N/A



<b>2018</b>	
<b>Study</b>	<b>Impact Descriptions</b>
Energy & Resource Solutions, Two-Tier Steam Trap Savings Study. April 2018.	This MA study recommends a two-tier approach for prescriptive steam traps. It calculates deemed savings to be 8.4 MMBtu/yr for system operating pressure ≤15 psig, and 35.6 MMBtu/yr for system operating pressure is >15 psig.
DNV GL, Impact Evaluation of PY 2015 Rhode Island Commercial and Industrial Upstream Lighting Initiative. September 2018.	The study updated impact factors for the Upstream Lighting initiative. The RI study leveraged the MA study of the same initiative.
DNV GL, Rhode Island Commercial & Industrial Impact Evaluation of 2013-2015 Custom Comprehensive Design Approach. September 2018 (draft; numeric results are final).	The study updated the realization rate for the CDA initiative. The RI study leveraged the MA study of the same initiative.
DNV GL, Impact Evaluation of PY2016 RI C&I Small Business Initiative: Phase I. September 2018 (draft).	The study updated impact factors for the Small Business initiative. The RI study leveraged the MA study of the same initiative.
DNV GL, Prescriptive C&I Loadshapes of Savings. March 2018.	This MA study pooled known sources of 8,760 savings loadshapes in an interactive tool to estimate general prescriptive measure loadshapes over customizable time periods.
DNV GL, P78 Upstream LED Net-to-gross Analysis. August 2018.	The MA study updated net-to-gross values for the Upstream Lighting initiative for 2019, 2020, and 2021.
DNV GL, P81 Process Evaluation of C&I Upstream Lighting Initiative. August 2018 (draft; numeric results are final).	The MA study updated in-service rates for the Upstream Lighting initiative.
Illume Advising LLC, Rhode Island Statewide Behavioral Evaluation: Savings Persistence Literature Review. January 2018.	This study reviewed the existing research on the persistence of savings generated by HERs with particular attention to the applicability of each study to Rhode Island. The study explored potential impacts on the HER program when reducing the cadence of reports.
Synapse Energy Economics, Avoided Energy Supply Components in New England 2018 Report. March 2018.	This study developed new estimates of avoided costs associated with energy efficiency measures for program administrators throughout New England States. Rhode Island used the avoided costs of energy, capacity, natural gas, fuel oil, environmental costs and demand reduction induced price effects resulting from this study for 2019 program planning.
Navigant, 2017 Seasonal Savings Evaluation. March 2018.	This study evaluated the Nest thermostat optimization program offered in Massachusetts and Rhode Island. The study found that the program achieved energy and demand savings of 57 MWh and 134 kW, respectively, in Rhode Island

<p>Navigant, 2017 Residential Wifi Thermostat Demand Response. April 2018.</p>	<p>This study evaluated the controllable thermostats as a demand response technology offered through Massachusetts and Rhode Island ConnectedSolutions programs. The study found average demand savings of 0.44 kW per thermostat in Massachusetts and 0.52 kW per thermostat in Rhode Island.</p>
<p>NMR, Rhode Island Lighting Market Assessment. July 2017</p>	<p>This study estimated lighting saturation and other critical market indicators in Rhode Island and included a detailed comparison to Massachusetts. The study concluded that the two markets are substantially similar, therefore Rhode Island can use the results from the recently completed net-to-gross consensus study in MA to inform program planning for the Residential Upstream Lighting program.</p>
<p>Research Into Action, Rhode Island HEAT Loan Assessment. August 2018 (draft)</p>	<p>This study assessed the extent to which HEAT Loan encourages uptake of weatherization and HVAC projects through the EnergyWise program. Findings from this study will be used to inform program planning and support future potential studies in Rhode Island.</p>
<p>NMR, Rhode Island Residential Appliance Saturation Survey. August 2017 (in-progress)</p>	<p>This study developed an inventory of residential end-uses, including appliances, consumer electronics, heating and cooling equipment, thermostats, water heating, and building characteristics. Findings from this study will be used to inform program planning and support future potential studies in Rhode Island.</p>
<p>Cadeo, Rhode Island Impact Evaluation of Income Eligible Services Single Family Program, August 2018</p>	<p>This study deemed savings values and realization rates for electric and gas participants using billing and engineering analysis. The Company adopted the deemed savings values in the 2019 program plan.</p>
<p>NMR, RLPNC 17-11 LED Net-to-Gross Consensus Panel Report. June 2018. (Leveraged study from MA)</p>	<p>This study yielded recommended prospective net-to-gross ratios for 2019 to 2021 for the Residential Upstream Lighting program in MA. Rhode Island adopted the NTG established for 2019 (35% for standard and 45% for reflector/specialty) due to similarity in lighting market condition.</p>
<p>NMR, RLPNC 18-5 Home Energy Assessment LED Net-to-Gross and EUL Consensus. July 2018 (leveraged study from MA)</p>	<p>The study yielded recommended net-to-gross and estimated useful life for direct installed LED bulbs offered through the Home Energy Services Initiative in Massachusetts. Rhode Island adopted the results from this study to inform 2019 planning for the Residential EnergyWise program.</p>

NMR, RLPNC 18-4 Products Net-to-Gross Consensus Study, August 2018. (Leveraged study from MA)	This study yielded prospective net-to-gross for Residential Retail products for 2019 to 2021 in Massachusetts. Rhode Island adopted the results from this study to inform 2019 planning for the Residential Products program.
NMR, RLPNC 18-1 Appliance Recycling Results. July 2018. (Leveraged study from MA)	This study provided updated inputs for UEC and savings calculation for refrigerator and freezer recycling in Massachusetts. Rhode Island adopted the results from this study to inform 2019 planning for the Residential Products program.
NMR, RLPNC 17-3 Advanced Power Strip Metering Study. August 2018. (Leveraged study from MA)	This study yielded recommended gross electric savings and realization rates from advanced power strips offered through the Home Energy Services and upstream programs. Rhode Island adopted the result from this study to inform savings for Tier 1 and Tier 2 advanced power strips offered through Residential Lighting program.
Navigant, MA Residential Electric Loadshape and Baseline Study (Heating and Cooling Season report). July 2018. (Leveraged study from MA)	This study collected saturation, penetration and usage behavior data for all major electric and gas appliances in Massachusetts. Rhode Island adopted the end use load shapes determined by this study.
NMR, RLPNC 17-4/17-5 Products Impact Evaluation of In-service and Short-term Retention Rates Study. March 2018. (Leveraged study from MA)	This study yielded estimates of in-service rates (ISRs) and short-term retention rates for products currently offered through the Residential Consumer Products Core Initiative or the Mass Save® Home Energy Assessment (HEA) Programs. Rhode Island adopted the result from this study to inform savings for measures offered through Residential Products program.
NMR/Tetra Tech, TXC34 Massachusetts Residential HVAC Net-to-Gross and Market Effects Study. July 2018. (Leveraged study from MA)	This study yielded recommended net-to-gross ratios for selected heating, cooling, and water heating measures that will receive Mass Save® Standard rebates in 2019-2021. Rhode Island adopted the result from this study to inform savings for measures offered through Residential HVAC/HEHE programs.
Tetra Tech, Market-Rate Multifamily NEI – Phase I Final Memo. March 2018.	This MA study reviewed non-energy impacts associated with market-rate multifamily properties, including whether or not any additional NEIs should be applied, whether NEI values differ based on type and ownership of building, and whether there is double counting of NEIs.

<p>Tetra Tech, Non-Energy Impact Framework Study Report. January 2018.</p>	<p>This MA study reviewed the current status of NEIs and had the following recommendations: do not count existing property value NEIs, review the BCR-model-related differences highlighted in the study and determine whether there is a reason for each, and, in cases where an NEI for one initiative or measure is applied to a different initiative or measure, provide clear public documentation of how the decision was made.</p>
<p>DNV GL, NMR Group, Tetra Tech, Massachusetts Commercial and Industrial Upstream HVAC/Heat Pump and Hot Water NTG and Market Effects Indicator Study. September 2018.</p>	<p>This MA study updated NTG for the following upstream equipment:</p> <ul style="list-style-type: none"> <li>• Ductless mini-split heat pumps</li> <li>• Electric water-source heat pumps</li> <li>• Air-cooled unitary/split central air conditioning (&gt;5 tons)</li> <li>• Gas-fired storage water heaters between 76,000 and 300,000 BTU/hour</li> <li>• Gas-fired tankless water heaters between 180,000 and 199,900 BTU/hour</li> </ul>
<p>DNV GL, Evaluation of 2017 Demand Response Demonstration: C&amp;I ConnectedSolutions. February 2018.</p>	<p>This MA study reviewed the baseline application and impacts calculated by the AutoGrid system, examine the effectiveness of the Connected Solution baseline, and assess ex-post impacts. It was also designed to understand customer acceptance and experience with the intervention, readiness of systems for larger deployment, and PA and vendor success in delivery.</p>
<b>2017</b>	
<b>Study</b>	<b>Impact Descriptions</b>
<p>ILLUME Advising, LLC, Rhode Island Home Energy Report Program Impact and Process Evaluation. August 2017</p>	<p>This study estimated realization rates for electric and gas savings for program years 2014 to 2016 using a billing analysis. The realization rates from this study were adjusted to remove potential double counted savings from HER and other energy efficiency programs.</p>
<p>Navigant, Rhode Island Energy Efficiency Program Customer Participation Study – Phase 1, October 2017</p>	<p>The study characterized participants and non-participants in several energy efficiency programs and identified customers that can be potentially targeted to increase participation.</p>
<p>NMR, 2017 Rhode Island Single-Family Code Compliance/Baseline Study, July 2017</p>	<p>This study yielded the final agreed upon baseline values to update the User Defined Reference Home (UDRH) in Rhode Island</p>

ICF, 2017 Rhode Island Residential Code Savings Analysis	This study found that the average Rhode Island home could attain annual electric savings of 3,690 kWh and gas savings of 10 MMBtu if it fully complied with the state's building energy code.
NBI, 2017 Rhode Island Commercial Code Savings Analysis	This study found that the average Rhode Island commercial building could attain annual electric savings of 0.73 kWh/sf and gas savings of 0.90 MMBtu/sf if it fully complied with the state's building energy code.
NMR, 2017 Rhode Island Code Compliance Enhancement Initiative Attribution and Savings Study	The study found residential and commercial attribution factors of 23% and 46, respectively, which were used along with study results on average savings as well as construction activity projections to calculate the CCEI's projected savings from 2018-2020.
Peregrine Energy Group, Analysis of Job Creation from 2016 Expenditures for Energy Efficiency in Rhode Island by National Grid, April 2017	A study of the job impacts of National Grid's energy efficiency programs delivered to Rhode Island electricity and natural gas customers in 2016. The study estimated that 702 FTE workers, across 923 companies and agencies were employed in 2016 as a result of investments energy efficiency programs in Rhode Island.
New Buildings Institute, Energy Impacts of Commercial Building Code Compliance in Rhode Island, July 2017	This study quantified the energy impacts of energy code compliance patterns from field data collection and analysis of building characteristics.
The Cadmus Group, Inc., Ductless Mini-Split Heat Pump Impact Evaluation, 2016	This study estimated savings from various types of heat pumps.
DNV-GL, Impact Evaluation of 2014 Custom HVAC Installations, September 2017	The study updated realization rates for custom electric HVAC projects, as part of a study leveraging the MA study of the same program element.
DNV-GL, 2014 RI Custom Process Impact Evaluation, December 2017	The study updated realization rates for custom process projects, as part of a study leveraging the MA study of the same program element.
TetraTech, C&I Programs Freeridership & Spillover Study, September 2017	This study updated free-ridership and spillover values for the C&I electric and gas programs.
DNV-GL, MA C&I Steam Trap Evaluation Phase 2 , Feb, 2017)	This study updated steam trap savings estimates.
DNV-GL, Gas Boiler Market Characterization Study Phase II: Final Report, March 2017	This study updated C&I condensing boiler savings estimates.
DNV-GL, MA45 Prescriptive Programmable Thermostats, March 2017	This study updated programmable thermostat deemed gas savings for C&I programs.
<b>2016</b>	
<b>Study</b>	<b>Impact Descriptions</b>
DNV-GL, Impact Evaluation of 2014 Custom Gas Installations in Rhode Island Final Report, July 2016	This study yielded an energy realization rate for Custom Gas projects.

<p>DNV-GL, Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations  Final Report, July 2016</p>	<p>This study yielded an energy realization rate for prescriptive compressed air compressors, dryers, and EE accessories.</p>
<p>DNV-GL, Impact Evaluation of 2012 National Grid-Rhode Island Prescriptive Chiller Program  Final Report, July 2016</p>	<p>This study yielded an energy realization rate for prescriptive chillers.</p>
<p>DNV-GL, Multifamily Impact Evaluation, National Grid Rhode Island, January 2016</p>	<p>This study estimated realization rates for electric and gas savings for 2013 participants using a billing analysis. The results include a low level of precision and thus the realization rates are not applicable. The Company has been improving tracking, savings estimations and verification processes in line with the study's recommendations.</p>
<p>Research Into Action, National Grid Rhode Island EnergyWise Single Family Process Evaluation, August 2016</p>	<p>This study surveyed customers, vendors, contractors, and lending agencies to order to assess customer experience, HEAT Loan lender perspectives on the program, performance of the lead vendor and sub-contractors and lessons learned from programs elsewhere in the country.</p>
<p>DNV-GL, Impact Evaluation of 2014 EnergyWise Single Family Program, National Grid Rhode Island, August 2016</p>	<p>This study estimated deemed savings values and realization rates for electric and gas 2014 participants using billing and engineering analysis. The Company adopted the deemed savings values in the 2017 program plan.</p>
<p>Massachusetts Special and Cross-Cutting Research Area: Low-Income Single-Family Health- and Safety-Related Non-Energy Impacts (NEIs) Study. Prepared by the NMR Group and Three3, Inc. for the Massachusetts Program Administrators. August 5, 2016.</p>	<p>This study developed Non Energy Impacts for low income programs, based on USODE's Weatherization Assistance Program tailored to MA context. Dollar benefits rose substantially over prior values primarily based on avoidance of deaths due to thermal stress.</p>
<p>Cadmus Group; Large Commercial and Industrial On-Bill Repayment Program Evaluation, September, 2016</p>	<p>National Grid commissioned this study to evaluate the financing component of the large commercial and industrial (LCI) energy efficiency program. Cadmus evaluated the program design, performance, and sustainability; the overall market for the program; and the program's penetration of that market to date.</p>
<p>Ductless Mini-Split Heat Pump (DMSHP) Final Heating Season Results; Ductless Mini-Split Heat Pump (DMSHP) Cooling Season Results, COOL SMART Impact Evaluation Team, 2015 / 2016</p>	<p>Heating and cooling memos that describe the number of full load hours found with field installed systems in MA and RI; these hours were used with historic data on incentivized systems to come up with average savings per unit.</p>

<p>DNV GL, Stage 2 Results—Commercial and Industrial New Construction Non-Energy Impacts Study—Final Report, prepared for the Massachusetts Program Administrators, March 2016</p>	<p>The purpose of this study was to quantify the dollar value of participant NEIs for C&amp;I NC projects completed in 2013, and to estimate gross NEIs per unit of energy savings resulting from NC electric and gas measures separately.</p>
<b>2015</b>	
<b>Study</b>	<b>Impact Descriptions</b>
<p>DNV-GL, Rhode Island Small Business Energy Efficiency Program Prescriptive Lighting Study: Final Report, July 2015</p>	<p>This study is RI-specific and yielded an energy realization rate for prescriptive lighting measures.</p>
<p>Cadmus, Inc., High Efficiency Heating Equipment Impact Evaluation: Final Report, March 2015</p>	<p>The study determined revised deemed savings values for each furnace and boiler measure, including condensing boilers and early replacement of heating equipment. The study also reflected the increasing baseline for standard efficiency heating equipment.</p>
<p>DNV-GL, Retrofit Lighting Controls Measure Summary of Findings: Final Report (MA), October 2014</p>	<p>The study examined trends in lighting control savings and noted a decrease in savings over previous program years. It recommended updated coincidence factors as well as potential program and technology areas that may yield higher savings. Finally, the study recommended a change in the savings calculation algorithm for lighting controls.</p>
<p>Tabors Caramanis Rudkevich, Avoided Energy Supply Costs in New England: 2015 Report, April 2015</p>	<p>This study developed new estimates of avoided costs for application in 2016 through 2018 energy efficiency programs throughout the six New England states. Avoided costs were developed for natural gas, electric energy, electric capacity, demand reduction induced price effects (DRIPE), other fuels (oil, propane and wood), and carbon.</p>
<p>DNV-GL, Massachusetts 2013 Prescriptive Gas Impact Evaluation; Steam Trap Evaluation Phase 1, March 2015</p>	<p>The study concluded that there should continue to be both prescriptive and custom pathways for steam trap retrofit incentives, and further recommended that a group convene to review and revise the deemed savings estimate for steam traps. The study also recommended the use of a six year lifetime for steam traps.</p>
<p>Cadmus, Inc., LED Incremental Cost Study – Modeling LightTracker LED and Halogen Pricing Data, June 2015</p>	<p>This memo summarizes selected findings from the LightTracker LED, CFL, and halogen pricing data modeling effort and the resulting state-level price forecast through 2020 for LED, CFL, and halogen bulbs. These results are based on light bulb price data from 25 states that lacked LED programs from 2009 to 2014.</p>

Cadmus, Inc., Cool Smart Incremental Cost Study: Final Report, July 2015	This incremental cost study estimates how manufacturing production costs (MPCs) and purchase prices of residential air conditioning (AC) and heat pump (HP) equipment change as equipment efficiency increases. The results support Cool Smart program enhancements and cost-effectiveness analysis, as well as potential upstream residential upstream heating, ventilation and air conditioning (HVAC) incentive programs.
Cadmus, Inc., Lighting Interactive Effects Study Preliminary Results – Draft, April 2015	This memo details the preliminary findings of the Lighting Interactive Effects study evaluated for the Massachusetts (MA) Program Administrators to better understand and report the true impact of energy efficient lighting retrofits. It recommended factors for electric and gas energy to be applied to residential program savings.
<b>2014</b>	
<b>Study</b>	<b>Impact Descriptions</b>
DNV GL, 2014 , Impact Evaluation of National Grid Rhode Island C&I Prescriptive Gas Pre-Rinse Spray Valve Measure	The evaluation examined the gas and water savings associated with the installation of reduced-flow pre-rinse spray valves. The results are based on site measurements from MA and RI facilities. The final gross gas and water savings are 11.4 MMBtu and 6,410 gallons per spray valve respectively.
DNV GL, 2014 Impact Evaluation of National Grid Rhode Island Custom Refrigerator, Motor and Other Installations	Three custom electric end-uses, Refrigerator, Motor, and Other, were evaluated to provide updated realization rates. The RI results were combined with MA results from a parallel study in order to increase the statistical significance of the final results. The final energy realization rate is 84.8%
DNV GL, 2014 Impact Evaluation of Rhode Island Commercial and Industrial Upstream Lighting Program	This study examined the performance of lighting systems that were discounted at the distribution level. The evaluation included metering at Rhode Island project sites that was combined with the results of metering done in MA to yield more accurate impacts for lighting offered in this upstream initiative. The final energy realization rate is 80.3% for LEDs and 109.5% for fluorescents.
NMR Group, Inc., Northeast Residential Lighting Hours-of-Use Study	This multi-State study provided updated hours-of-use assumptions for residential lighting programs in various room types.

<p>The Cadmus Group, Impact Evaluation: Rhode Island Income Eligible Services, Volume II</p> <p>The Cadmus Group, National Grid Income Eligible Services Process Evaluation</p>	<p>This RI-specific impact evaluation focused on the electric and gas savings resulting from the participation of these dwellings in in-home retrofit of electrical components and weatherization of electric, gas, and fossil fuel heated homes. It used billing analysis, engineering reviews, and interviews for the process components.</p>
<p>National Grid, Macroeconomic Impacts of Rhode Island Energy Efficiency Investments</p> <p>REMI Analysis of National Grid's Energy Efficiency Programs</p>	<p>This study quantifies the macroeconomic impacts of National Grid's 2014 EE Program Plan for Rhode Island and provides updated economic impact multipliers to quantify the benefits of future EE programs in the Rhode Island economy. This updates the multipliers from an economic impact study conducted by Environment Northeast (ENE) in 2009.</p>
<b>2013</b>	
<b>Study</b>	<b>Impact Descriptions</b>
<p>KEMA, Inc., Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations</p> <p>KEMA, Inc., Impact Evaluation of 2011 Rhode Island Custom Lighting Installations</p>	<p>The Custom and Prescriptive Lighting studies involved the impact evaluation of components of the Large Commercial and Industrial electric efficiency programs. The studies included on-site engineering and end-use metering of a statistically drawn random sample of participants. The custom portion of the study was coupled with the results of the 2013 Massachusetts Custom Lighting study.</p>
<p>Energy Efficiency Messaging, Residential Energy Efficiency Program Communications Focus Groups</p>	<p>The study analyzed customers' perceptions of energy efficiency programs and messaging materials via focus group testing.</p>
<p>KEMA, Inc., Impact Evaluation of 2011 Prescriptive Gas Measures</p>	<p>On-site monitoring and verification of installation provided updated impacts for four major prescriptive gas measures. Programs and measures are similar between National Grid affiliates in MA and RI, and results are applied to RI. The overall realization rate for the four measures was approximately 102% and the relative precision was about ±15%.</p>

KEMA, Inc., and DMI, Inc., Impact Evaluation of 2011-2012 Prescriptive VSDs	This evaluation provided a new estimate of the impacts of prescriptive variable speed drives, based on pre-post metering of measures installed in 2011 and 2012. Programs and measures are similar between National Grid affiliates in MA and RI, and results are applied to RI. Key findings include an annual kWh realization rate was 94% with a relative precision of +/- 23%, and identification of factors that influenced the realization rate.
The Cadmus Group, Inc., 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing	The results of this study yielded updated net-to-gross factors and estimates of the timing of equipment replacement for residential heating and cooling measures. Programs and measures are similar between National Grid affiliates in MA and RI, and results are applied to RI.
KEMA, Inc., Process Evaluation of the 2012 Bright Opportunities Program	This study provided net-to-gross ratios for the Commercial Upstream Lighting initiative offered in MA and RI, as well as a process assessment of this generally successful initiative.
KEMA, Inc., Impact Evaluation of 2010 Prescriptive Lighting Installations	The RI Prescriptive lighting study listed above did not examine case lighting separately from other lighting systems. To complement the RI-specific results, this MA study provided impact updates on case lighting.
Opinion Dynamics (2013). Massachusetts Cross-Cutting Behavioral Program Evaluation Integrated Report.	This study provided an updated realization rate for savings from gas customers who participate in the Opt-out channel of the Home Energy Reports program.
<b>2012</b>	
<b>Study</b>	<b>Impact Descriptions</b>
KEMA, Inc., Impact Evaluation of the 2010 Custom –Industrial Process and Compressed Air impact evaluation, September, 2012	Study produced realization rates for energy, seasonal demand, and percent energy on peak for both programs. The RI results were combined with MA results from a parallel study in order to increase the statistical significance of the final results. The final energy realization rate is 92.7%.
TetraTech, Final Report – Commercial and Industrial Non-Energy Impacts Study, (prepared for Massachusetts Program Administrators), June 29, 2012	This report provides a comprehensive set of statistically reliable Non-energy impact (NEI) estimates across the range of C&I prescriptive and custom retrofit programs offered by the MA electric and gas Program Administrators (Pas). The analytical methods used allow this report’s findings to be applicable to RI.

2011	
Study	Impact Descriptions
NMR Group, Inc., The Rhode Island Appliance Turn-In Program Process Evaluation, March 4, 2011.	Combined, these two studies assessed free-ridership rates and savings for the Rhode Island Refrigerator and Freezer Recycling program. In addition, the evaluation found that there were three distinct groups of refrigerators being recycled through the program – primary, secondary – replaced, and secondary – not replaced. The study produced updated free-ridership rates and savings for the three categories of refrigerators and freezers.
NMR Group, Inc., The Rhode Island Appliance Turn-In Program Impact Evaluation, October 2011.	
KEMA, Inc., Impact Evaluation of the 2009 Custom HVAC and 2008-2009 Custom CDA Installations, September 1, 2011	Study produced realization rates for energy, seasonal demand, and percent energy on peak for both programs. The RI results were combined with MA results from a parallel study in order to increase the statistical significance of the final results. The final energy realization rate for Custom HVAC is higher than the PY 2011 realization rate by about 10% (increased from 100.5% to 110.4%). The final energy realization rate for Custom CDA is higher than the PY 2011 realization rate by about 20% (increased from 97.2% to 119.6%).
KEMA, Inc., C&I Lighting Loadshape Project, Prepared for the Regional Evaluation, Measurement, and Verification Forum, June 2011.	A compilation of lighting loadshape data from the Northeast. The study provided updated coincidence factors for the Energy Initiative and Small Business Lighting programs. The Small Business program summer coincidence factor went from 0.80 to 0.79, while the Energy Initiative summer coincidence went from 0.88 to 0.89
KEMA, Inc., C&I Unitary HVAC Loadshape Project Final Report, Prepared for the Regional Evaluation, Measurement, and Verification Forum, June 2011.	From end use metering, the study produced updated diversity and equivalent full load hours for unitary HVAC measures
2010	
Study	Impact Descriptions
ADM Associates, Inc., Residential Central AC Regional Evaluation, Final Report, October 2009	KWh and kW savings figures for the installation of efficient residential CAC systems
2007	
Study	Impact Descriptions

RLW Analytics, Small Business Services Custom Measure Impact Evaluation, March 23, 2007	Verification of energy savings from custom lighting projects in the Small Business Services program.
RLW Analytics, Impact Evaluation Analysis of the 2005 Custom SBS Program, May 29, 2007	Realization rates for the Small Business Services program



## 2019 Rhode Island Test Description

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## **Introduction**

This section has been prepared pursuant to Section 1.2(B) of the Least Cost Procurement Standards (Standards) for the procurement of energy efficiency resources, approved by the Rhode Island PUC in Docket 4684.

The Company assessed the cost-effectiveness of the 2019 Annual Plan according to the Rhode Island Benefit Cost Test (RI Test) as approved by the PUC in Docket 4755. In accordance with the Docket 4600 Benefit-Cost Framework, the 2019 Annual Plan includes three new benefits for cost-effectiveness screening. These benefits include: oil supply Demand-Reduction-Induced Price Effect (DRIPE), non-embedded NOx reductions, and value of improved reliability.

The source for many of the avoided cost value components is “Avoided Energy Supply Components in New England: 2018 Report” (2018 AESC Study) prepared by Synapse Energy Economics for AESC 2018 Study Group, June 1, 2018.<sup>1</sup> This report was sponsored by all the electric and gas efficiency program administrators in New England and is designed to be used for cost effectiveness screening in 2019 through 2021.

It is the intent of National Grid that the RI Test as described here will be in place until the next review of the Standards in advance of the 2020-2022 Least Cost Procurement Plan. However, additional benefits and costs may be added in future Annual Plans and the component values may be updated over the course of the three year period based on the availability of new study results. Future updates to inputs and values will be included in future Annual Plan filings.

As specified in the Standards,

- i. The distribution company shall assess the cost-effectiveness of measures, programs, and portfolios according to a benefit-cost test that builds on the Total Resource Cost Test approved by the Public Utilities Commission (PUC) 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 distribution company 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.

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<sup>1</sup> The report is available online at: <http://ma-eeac.org/studies/special-cross-sector-studies/>

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.

- ii. The distribution company shall apply the following principles when developing the RI Test:
  - a. **Efficiency as a Resource.** EE is one of many resources that can be deployed to meet customers' needs. It should, therefore, be compared with both supply-side and demand-side alternative energy resources in a consistent and comprehensive manner.
  - b. **Energy Policy Goals.** Rhode Island's cost-effectiveness test should account for its applicable policy goals, as articulated in legislation, PUC orders, regulations, guidelines, and other policy directives.
  - c. **Hard-to-Quantify Impacts.** Efficiency assessment practices should account for all relevant, important impacts, even those that are difficult to quantify and monetize.
  - d. **Symmetry.** Efficiency assessment practices should be symmetrical, for example, by including both costs and benefits for each relevant type of impact.
  - e. **Forward Looking.** Analysis of the impacts of efficiency investments should be forward-looking, capturing the difference between costs and benefits that would occur over the life of efficiency measures with those that would occur absent the efficiency investments. Sunk costs and benefits are not relevant to a cost-effectiveness analysis.
  - f. **Transparency.** Efficiency assessment practices should be completely transparent, and should fully document and reveal all relevant inputs, assumptions, methodologies, and results.
- iii. With respect to the value of greenhouse gas reductions, the RI Test shall include the costs of CO<sub>2</sub> mitigation as they are imposed and are projected to be imposed by the Regional Greenhouse Gas Initiative. The RI 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 RI Test may include the

value of greenhouse gas reduction not embedded in any of the above. The RI Test may also include the costs and benefits of other emissions and their generation or reduction through Least Cost Procurement.

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

### **The Rhode Island Test Overview**

The RI Test compares the present value of a stream of **net benefits** associated with the **net savings** of an energy efficiency measure or program **over the life** of that measure or program to the total costs necessary to implement the measure or program. The RI Test may be applied to any energy efficiency program independent of the primary fuel or resource the effort focuses on.

The RI Test captures the value created by efficiency measures installed in a particular program year over the useful life of the measure. The measure life is based on the technical life of the measure modified to reflect expected measure persistence. Because the RI Test captures the value associated with a stream of benefits over a period of time, the benefits from a measure are present valued so that costs and benefits may be compared.

The benefits calculated in the RI Test are the avoided resource supply and delivery costs, valued at marginal cost for the periods when there is a load reduction, as well as the monetized value of non-resource savings.

The program costs are those paid by both the utility and by participants plus the increase in supply costs for any period when load is increased. All equipment, installation, O&M, removal, evaluation and administration costs are included.

All savings included in the value calculations are net savings. The expected net savings are typically an engineering estimate of savings modified to reflect the actual realization of savings based on evaluation studies. The expected net savings also reflect market effects due to the program. The RI Test captures the combined effects of a program on both the participating customers and those not participating in a program. From a resource acquisition perspective, if the program induces participants or non-participants to acquire energy efficiency devices without program expenditures, these effects—known as spillover—should be attributed as program benefits in the RI Test. The costs incurred by customers to acquire equipment on their own are also counted as costs in the RI Test.

On the other hand, if a customer accepts program funds to implement an energy efficiency measure they would have done anyway, the savings associated with this practice is known as “free ridership.” From the perspective of resource acquisition through utility programs, it is important to distinguish whether the customer would have implemented the efficiency measure without the program. Therefore, savings associated with free-ridership are deducted from program savings.<sup>2</sup>

The benefits and costs considered in Rhode Island are detailed in the next section.

### **Description of Program Benefits and Costs**

The following benefits and costs are included in the RI Test. They are listed here with details after.

- 1) Electric Energy Benefits
- 2) Electric Generation Capacity Benefits
- 3) Electric Transmission Capacity and Distribution Capacity Benefits
- 4) Natural Gas Benefits
- 5) Fuel Benefits (including the value of delivered fuel savings from programs that influence delivered fuel consumption)
- 6) Water and Sewer Benefits
- 7) Non-Energy impacts
- 8) Price Effects
- 9) Non-embedded Greenhouse Gas Reduction Benefits
- 10) Economic Development Benefits
- 11) Non-embedded NOx Reduction Benefits
- 12) Value of Improved Reliability
- 13) Combined Heat and Power Benefits

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<sup>2</sup> Both free-ridership and spillover have been determined from surveys of program participants, non-participants, and other market actors

- 14) Utility Costs
- 15) Participant Costs

All of the benefits are monetized benefits directly associated with the installation of electricity or natural gas efficiency projects.

### **1) Electric Energy Benefits**

Avoided electric energy costs are appropriate benefits for inclusion in the RI Test. When consumers do not have to purchase electric energy because of their investment in energy efficiency, an avoided resource benefit is created.<sup>3</sup>

Electric energy savings are valued using the avoided electric energy costs developed in the 2015 AESC Study Update, Appendix B.<sup>4</sup> The values in the AESC Study represent wholesale electric energy commodity costs that are avoided when generators produce less electricity because of energy efficiency.<sup>5</sup> They include pool transmission losses incurred from the generator to the point of delivery to the distribution companies, the costs of renewable energy credits borne by generators, and a wholesale risk premium that captures market risk factors typically recovered by generators in their pricing. The avoided energy costs also internalize the expected cost of complying with current or reasonably anticipated future regional or federal greenhouse gas reduction requirements which are borne by generators and passed through in wholesale costs.

The avoided energy costs in the 2015 AESC Study Update are provided in four different costing periods consistent with ISO-NE definitions. Net energy savings are split up into these periods in the value calculation. The time periods are defined as follows:

- Winter Peak: October – May, 7:00 a.m. – 11:00 p.m., weekdays excluding holidays.
- Winter Off-Peak: October – May; 11:00 p.m. – 7:00 a.m., weekdays. Also including all weekends and ISO defined holidays.
- Summer Peak: June – September, 7:00 a.m. – 11:00 p.m., weekdays excluding holidays.

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<sup>3</sup> For strategic electrification measures, the RI Test counts the incremental electric heating load as a negative benefit.

<sup>4</sup> The values for Rhode Island have also been included as Table E-9 in Appendix 5.

<sup>5</sup> Avoided costs may be viewed as a proxy for market costs. However, avoided costs may be different from wholesale market spot costs because avoided costs are based on simulation of market conditions, as opposed to real-time conditions. They may be different from standard offer commodity costs because of time lags and differing opinions on certain key assumptions, such as short term fuel costs.

- Summer Off-Peak: June – September; 11:00 p.m. – 7:00 a.m., weekdays. Also including all weekends and ISO defined holidays.

In the benefits calculation, energy savings are grossed up using factors that represent transmission and distribution losses because a reduction in energy use at the customer means that amount of energy does not have to be generated, plus the extra generation that is needed to cover the losses that occur in the delivery of that energy is not needed.

Net energy savings for a program (or measures aggregated within a program) are allocated to each one of these time periods and multiplied by the appropriate avoided energy value.<sup>6</sup> The dollar benefits are then grossed up using the appropriate loss factors representing losses from the ISO delivery point to the end use customer.

- Summer Peak Energy Benefit (\$) = kWh \* Energy%<sub>SummerPk</sub> \* SummerPk\$/kWh<sub>(@Life)</sub> \* (1 + %Losses<sub>SummerPk-kWh</sub>)
- Summer OffPeak Energy Benefit (\$) = kWh \* Energy%<sub>SummerOffPk</sub> \* SummerOffPk\$/kWh<sub>(@Life)</sub> \* (1 + %Losses<sub>SummerOffPk-kWh</sub>)
- Winter Peak Energy Benefit (\$) = kWh \* Energy%<sub>WinterPk</sub> \* WinterPk\$/kWh<sub>(@Life)</sub> \* (1 + %Losses<sub>WinterPk-kWh</sub>)
- Winter OffPeak Energy Benefit (\$) = kWh \* Energy%<sub>WinterOffPk</sub> \* WinterOffPk\$/kWh<sub>(@Life)</sub> \* (1 + %Losses<sub>WinterOffPk-kWh</sub>)

## 2) Electric Generation Capacity Benefits

Avoided electric generation capacity values are appropriate for inclusion in the RI Test. When generators do not have to build new generation facilities or when construction can be deferred because of consumers' investments in energy efficiency, an avoided resource benefit is created. In the New England capacity market, capacity benefits accrue because demand reduction reduces ISO-NE's installed capacity requirement. The capacity requirement is based on load's contribution to the system peak, which, for ISO-NE, is the summer peak. Therefore, capacity benefits accrue only from summer peak demand reduction; there is currently no winter generation capacity benefit.

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<sup>6</sup> The notation "@Life" in the equation for value for this and other value components is an indication that the avoided value component for each benefit (e.g., electric energy, capacity, natural gas, etc.) is the cumulative net present value (in 2018 dollars) of avoided costs for each year of the planning horizon from the base year over the life of the measure. For example, the avoided value component for a measure with an expected life of ten years for any given benefit component is the sum of the net present value of the annual avoided costs for that component in Year 1, Year 2, Year 3, etc., through Year 10.

Demand savings created through program efforts are valued using the avoided capacity values from the 2018 AESC, Appendix B.<sup>7</sup> The values contained in the study reflect the avoided cost of peaking capacity, and incorporate a reserve margin and losses incurred from the generator to the point of delivery to the distribution companies. ISO-New England reserve margins are incorporated into the capacity values, since energy efficiency avoids the back-up reserves for that generation as well as the generation itself. A loss factor representing losses from the ISO delivery point to the end-use customer is used as a multiplier, since those losses are not included in the avoided costs. Demand savings are calculated to be coincident with the ISO-NE definition of peak.

The dollar value of benefits are therefore calculated as:

- $\text{Generation Capacity Benefit}(\$) = \text{kW}_{\text{Summer}} * \text{GenerationCapValue}\$/\text{kW}_{(\text{@Life})} * (1 + \% \text{Losses}_{\text{SummerkW}})$

In addition to the traditional valuation of electric generation capacity, for which results are provided in Appendix B, the 2018 AESC study developed a new approach to valuing the capacity of short duration measures that are not actively bid in the ISO-New England Forward Capacity Market (FCM). The AESC study has always provided avoided electric generation capacity values that are differentiated based on whether a measure is bid in the FCM (“cleared capacity”) or is not bid in the FCM and passively reduces system load and, as a result, reduces the ISO-NE load forecast and the resulting amount of capacity that is procured through the FCM (“uncleared capacity”), with the overall avoided capacity value representing a weighted average of the cleared capacity and uncleared capacity values. Given the three year forward nature of the FCM and the timing of the ISO-NE load forecast, it takes five years from the time of load reduction for uncleared capacity to begin impacting the FCM procurements. As a result, measures with a useful life less than five years (ex. demand response) would not produce any generation capacity benefits in years 1-5 under the traditional capacity modeling methodology.

The 2018 AESC study conducted a detailed analysis of the ISO-NE load forecast methodology and determined that there are deferred capacity benefits for short duration measures that are not bid in the FCM which persist beyond the useful measure life of the measure. The logic behind this analysis is that the ISO-NE load forecast utilizes multiple years of historical load data and that even a load reduction for only one year will have a lasting impact on the load forecast for a number of years. The deferred capacity valuation methodology for uncleared capacity is used to determine the avoided

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<sup>7</sup> The values for Rhode Island have also been included as Table E-9 in Appendix 5

electric generation capacity value for demand response measures based on the values provided in Appendix J of the 2018 AESC study.

### 3) Electric Transmission Capacity and Distribution Capacity Benefits

Avoided transmission and distribution capacity values are appropriate for inclusion in the RI Test. When transmission and distribution facilities do not have to be built or can be deferred because of lower loads as a result of consumers' investments in energy efficiency, an avoided resource benefit is created.

Electric distribution capacity benefits are valued in the RI Test using avoided distribution capacity values calculated in a spreadsheet tool that was developed in 2005 by ICF International, Inc., updated with recommendations from the 2018 AESC Study. The tool calculates an annualized value of statewide avoided distribution capacity values from company-specific inputs of historic and projected capital expenditures and loads, as well as a carrying charge calculated from applicable tax rates and Federal Energy Regulatory Commission (FERC) Form 1 accounting data.

Electric transmission capacity benefits are valued in the RI Test based on the costs of Pool Transmission Facilities (PTF). The 2018 AESC study calculates an avoided cost for PTF of \$94/kW-year in 2018 dollars. Based on recommendations from the 2018 AESC Study, the Company is using the PTF costs instead of local transmission investments.

Capacity loss factors are applied to the avoided T&D capacity costs to account for local transmission and distribution losses from the point of delivery to the distribution company's system to the ultimate customer's facility. Thus, losses will be accounted for from the generator to the end use customer.

T&D benefits could be allocated to summer and winter periods, depending on the relation between summer and winter peaks on the local system. However, the Company's system is summer peaking. Therefore, the T&D benefits will be exclusively associated with summer demand reduction and the dollar value will be calculated as follows:

- Transmission Benefit (\$) =  $(kW_{\text{Summer}} * \text{Trans}\$/kW_{(\text{@Life})} * [1 + (\text{Losses}_{\text{SumkWTrans}})])$
- Distribution Benefit (\$) =  $(kW_{\text{Summer}} * \text{Dist}\$/kW_{\text{Life}(\text{@Life})} * [1 + (\text{Losses}_{\text{SumkWDist}})])$

### 4) Natural Gas Benefits

Avoided natural gas consumption is appropriate for inclusion in the RI Test. When a project in which consumers have invested saves natural gas, an avoided resource benefit is created.

Natural gas benefits in the RI Test will be valued using avoided natural gas values from the 2018 AESC Study, Appendix C. These costs include commodity, transportation, and retail delivery charges that would be avoided by fuels not consumed by end users.

The AESC Study Report presents avoided natural gas value components into end-use categories to match with individual program characteristics. The natural gas categories are:

- Commercial and industrial, non-heating. This assumes savings are constant throughout the year and averages monthly natural gas values over 12 months.
- Commercial and industrial, heating. Averages the monthly values for the months of November through March.
- Residential heating. Averages the monthly values for the months of November through March. As these months have the highest natural gas values, by averaging over a fewer number of months, natural gas savings in this category typically have the highest value.
- Domestic hot water. This assumes savings are constant throughout the year and averages monthly natural gas values over 12 months.

Using each of these end-use value components, the dollar value of fuel benefits is calculated as:

- Natural Gas Benefits (\$) = MMBtu Gas Savings \* (Gas\$/MMBTU<sub>(EndUseCategory,@Life)</sub> + Greenhouse Gas \$/MMBTU<sub>(@Life)</sub>)

## 5) Delivered Fuel Benefits

Avoided delivered fuel costs (natural gas, propane, or fuel oil) are appropriate for inclusion in the RI Test. When a project in which consumers have invested saves fuel an avoided resource benefit is created.

Fuel benefits in the RI Test are valued using avoided fuel values from the 2018 AESC Study, Appendix D. The fuel oil categories are Residential #2, Commercial #2, Commercial #4, and Commercial and Industrial #6.

Using each of these end-use value components, the dollar value of fuel benefits is calculated as:

- Fuel Benefits (\$) = MMBTU\_Fuel Savings \* Fuel\$/MMBTU<sub>(EndUseCategory,@Life)</sub>

## 6) Water and Sewer Benefits

Water savings created from program efforts should be valued and included in the RI Test. Water savings can be valued using avoided water and sewer values that are based on average water and sewer rates in Rhode Island. While there are no specific water efficiency measures, when a project in which consumers have invested to save electricity or fuel also affects water consumption—for example, a cooling tower project that reduces makeup water needed—a resource benefit is created. Depending on the project and metering configuration, changes in water consumption may also affect sewerage billings.

Water and sewerage rates were determined from an August 2014 internet survey of rates posted by the City of Providence<sup>8</sup> and the Narragansett Bay Commission<sup>9</sup>.

Water and sewer benefits are counted for all projects, where appropriate, and calculated as follows:

- Water and Sewerage Benefits (\$) = Water and/or Sewerage Savings \* Water and/or Sewer \$/Gal<sub>(@Life)</sub>

## 7) Non-Energy Impacts

Other quantifiable non-resource or non-energy impacts may be created as a direct result of Least Cost Procurement efforts and, are therefore appropriate for inclusion in the RI Test. Non-energy impacts are typically associated with the number of measures installed, rather than the energy consumption of the equipment. They may be positive or negative. They may be one time benefits or recur annually. These effects will be included when they are a direct result of the measure and when they are quantifiable and avoidable.

The specific values of non-energy impacts used in the 2019 Annual Plan for prescriptive measures are documented in the 2019 RI Technical Reference Manual. Non-energy impacts may include – but are not limited to – labor, material, facility use, health and safety, materials handling, national security, property values, and transportation. For

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<sup>8</sup> Water Rates.” Providence Water Supply Board. 2014.  
<<http://www.provwater.com/depts/cs/billrates.htm>>

<sup>9</sup> “Rates.” Narragansett Bay Commission. 2014.  
<<http://www.narrabay.com/en/Customer%20Service/Rates.aspx>>

income-eligible measures, non-energy impacts also include the impacts of having lower energy bills to pay, such as reduced arrearages or avoided utility shut off costs. Non-energy impacts for Commercial and Industrial custom measures are counted when supported by site specific engineering calculations or other analyses.

The dollar value of non-resource benefits will be calculated as follows

- One-time Non-energy impacts (\$) = Non-energy impact (\$)/unit \* Number of units
- Annual Non-energy impacts (\$) = Non-energy impact (\$)/unit \* Number of units \* Present Worth Factor<sub>(@Life)</sub>

## 8) Price Effects

The Demand-Reduction-Induced Price Effect (DRIPE) is the reduction in prices in energy and capacity markets resulting from the reduction in need for energy and/or capacity due to efficiency and/or demand response programs. Consumers' investments in energy efficiency avoid both marginal energy production and capital investments, but also lead to structural changes in the market due to lower demand. Over a period of time, the market adjusts to lower demand, but until that time the reduced demand leads to a reduction in the market price of electricity. This is the observed in the New England market when ISO-New England activates its price response programs. When this price effect is a result of consumers' investments in energy efficiency, it is appropriate to include it in the RI Test.

DRIPE effects are very small when expressed in terms of an impact on market prices, i.e., reductions of a fraction of a percent. However, the DRIPE impacts are significant when expressed in absolute dollar terms over all the kWh and kW transacted in the market. Very small impacts on market prices, when applied to all energy and capacity being purchased in the market, translate into large absolute dollar amounts.

DRIPE values developed for energy efficiency installations in 2019 from the 2018 AESC Study are used in the RI Test. The price effects are expressed as \$/kWh for each of the four energy costing periods, \$/kW for capacity, \$/MMBtu for natural gas, and \$/MMBtu for oil. There are also cross fuel effects that apply when natural gas energy efficiency affects the price of electricity due to the fact that residential heating and electric generation compete for natural gas supply in the winter. The resulting scarcity of natural gas for generation may drive up the cost of electricity. Therefore, reduction in natural gas consumption due to energy efficiency may cause a price effect for electricity. (Even though the price effect is in electricity, that DRIPE benefit is converted to \$/MMBtu so that it can be attributed to the gas savings that create the effect.) In addition, reducing

demand for petroleum and refined products leads to a reduction in oil prices. The DRIPE benefit is calculated as:

- Summer Peak Energy DRIPE Benefit (\$) = kWh \* Energy%<sub>SumPk</sub> \* (SummerPkDRIPE\$/kWh<sub>(@Life+ElectricGasDRIPE\$/kWh)</sub> \* (1 + %Losses<sub>SummerPk-kWh</sub>))
- Summer OffPeak Energy DRIPE Benefit (\$) = kWh \* Energy%<sub>SumOffPk</sub> \* (SumOffPkDRIPE\$/kWh<sub>(@Life +ElectricGasDRIPE\$/kWh)</sub> \* (1 + %Losses<sub>SummerOffPk-kWh</sub>))
- Winter Peak Energy DRIPE Benefit (\$) = kWh \* Energy%<sub>WinterPk</sub> \* (WinterPkDRIPE\$/kWh<sub>(@Life+ElectricGasDRIPE\$/kWh)</sub> \* (1 + %Losses<sub>WinterPk-kWh</sub>))
- Winter OffPeak Energy DRIPE Benefit (\$) = kWh \* Energy%<sub>WinOffPk</sub> \* (WinterOffPkDRIPE\$/kWh<sub>(@Life+ElectricGasDRIPE\$/kWh)</sub> \* (1 + %Losses<sub>WinterOffPk-kWh</sub>))
- Generation Capacity DRIPE Benefit (\$) = kW<sub>Summer</sub> \* CapDRIPEValue\$/kW<sub>(@Life)</sub> \* (1 + %Losses<sub>SummerkW</sub>)
- Natural Gas DRIPE Benefit (\$) = MMBTU\_Fuel Savings \* (GasDRIPEValue\$/MMBTU<sub>(@Life)</sub> + GasElectricDRIPE\$/MMBtu)
- Oil DRIPE Benefit (\$) = MMBTU Fuel Savings \* (OilDRIPEValue\$/MMBTU<sub>(@Life)</sub>)

**9) Non-embedded Greenhouse Gas Reduction Benefits**

In accordance with Section 1.2(B)(iii) of the Standards, the RI Test includes the value of non-embedded greenhouse gas (GHG) reductions.

The 2018 AESC Study developed two approaches for calculating non-embedded cost of carbon. The first approach is based on global marginal abatement costs that yield a value of \$100 per short ton of CO<sub>2</sub> emissions and is identical to the prior 2015 AESC Study value used in the 2018 Plan. The second approach is based on New England specific marginal abatement costs, where it is assumed that the marginal abatement technology is offshore wind. Based on the projection of the future costs of offshore wind energy, the 2018 AESC Study establishes a New England specific cost of \$174 per short ton.

The Company proposes to continue using the \$100 per short ton value in the RI Test as a conservative and reasonable estimate of the societal cost of carbon emissions, and as the long-term value of the cost to achieve the Resilient Rhode Island Act carbon emission reduction goal of 80% below 1990 levels by 2050.

The costs of compliance with the Regional Greenhouse Gas Initiative (RGGI) are already included or “embedded” in the projected electric energy market prices. Therefore, the

difference between the \$100 per short ton societal cost and the RGGI compliance costs already embedded in the projected energy market prices represents the value of carbon emissions not included in the avoided energy costs.

An example of this calculation for the year 2019 is shown below. The resulting \$91.53 non-embedded avoided cost is applied as a benefit in the RI Test in that year.

- Societal Cost (\$100) – Embedded RGGI Compliance Cost (\$8.67) = Non-Embedded Cost (\$91.33)

The Company obtained the non-embedded CO<sub>2</sub> values from the following tables in the 2018 AESC Study for use in the RI Test cost-effectiveness screening: Table 154 for electric savings and Table 156 for gas savings and oil savings.

#### **10) Economic Development Benefits (Non-CHP Measures)**

In accordance with Section 1.2(B)(i) of the Standards, the RI Test includes the application of multipliers for economic development impacts to all energy efficiency measures. This section details the methodology for applying economic benefits to non-CHP measures. Section number 9 in this document refers to the application of economic benefits to CHP measures.

The macroeconomic multipliers for the economic growth and job creation benefits of investing in cost-effective energy efficiency are derived from a recent study “Macroeconomic Impacts of Rhode Island Energy Efficiency Investments: REMI Analysis of National Grid’s Energy Efficiency Programs”, National Grid Customer Department, November, 2014.

The multipliers from the REMI analysis take into account how the energy efficiency programs impact Rhode Island’s economy in three ways:

1. Program and participant spending represents a direct investment in Rhode Island energy efficiency infrastructure, creating jobs (construction impacts).
2. Bill savings to participants have positive economic impacts over the life of the energy efficiency measures, resulting in more spending on goods and services.
3. Rate increases and participant contributions to the cost of installing energy efficiency measures create short-term costs and reduce spending on goods and services.

It is likely that the benefit of bill savings to customers is already accounted for in cost-effectiveness screening since the value of all energy savings is included as a monetary

benefit. In addition, the impact of customer costs is also already included as a negative dollar benefit. Therefore, to ensure no double counting of costs and benefits, only the multipliers associated with construction impacts should be included in the RI Test.

It is widely acknowledged that increased spending from installing energy efficiency measures creates jobs in the local economy. The Company, therefore, will apply the multipliers below to program and participant spending in its benefit-cost model. These multipliers are derived from Table 2 of the REMI analysis report.

GDP Multipliers for Construction Impacts		GDP/\$ Spending	
		Electric	Natural Gas
Residential	Program Spending	0.71	0.71
	Participant Spending	0.75	0.75
Commercial	Program Spending	0.56	0.56
	Participant Spending	0.58	0.58

The Company finds that this application is a suitable first step in incorporating economic development impacts to the RI Test. The Company is working with a consultant in 2018 to update the economic impact study. The Company plans to refine these assumptions for its 2020 Annual Plan.

#### 11) Non-embedded NO<sub>x</sub> Reduction Benefits

In accordance with Section 1.2(B)(iii) of the Standards and the Docket 4600 Benefit-Cost Framework, the RI Test now includes the value of nitrogen oxides (NO<sub>x</sub>) emission reductions not already embedded in the avoided cost of energy.

NO<sub>x</sub> emissions come from a variety of sources including industrial processes and the combustion of natural gas for electric generation and heating systems. NO<sub>x</sub> contributes to the formation of fine particles (PM) and ground level ozone that are associated with adverse health effects including respiratory illness. When a consumer installs an energy efficiency measure that reduces electric generation and natural gas usage NO<sub>x</sub> emissions, an avoided resource benefit is created.

The 2018 AESC Study utilizes published averages for the continental United States to develop a non-location specific, non-embedded NO<sub>x</sub> emission cost of \$31,000 per ton of nitrogen, which translates into an avoided wholesale cost for NO<sub>x</sub> of \$1.65 per MWh.

The Company obtained the non-embedded NO<sub>x</sub> values from the following tables in the 2018 AESC Study: Table 157 for electricity and Table 158 for non-electric fuels.

## **12) Value of Improved Reliability**

In accordance with the Docket 4600 Benefit-Cost Framework, the RI Test now includes the value of improved reliability from energy efficiency investments.

The 2018 AESC Study used the following methodology to determine the value of improved reliability. The study used the value of lost load (VoLL) from the Lawrence Berkeley National Laboratories (LBNL) assessment “Updated Value of Service Reliability Estimates for Electric Utility Customers in the United States.” Berkeley: LBNL, 2015. LBNL-6941E). The VoLL describes the cost to consumers of being unable to take power from the system. The AESC 2018 Study then applied customer segment ratios typical to New England to adjust the LBNL findings to be suitable for the region. The resulting value is \$37/kWh. The study also computed an estimate of the value of reliability as the ratio of annual state Gross Domestic Product (GDP) to annual energy consumption which results in a lower bound of \$12/kWh.

The 2018 AESC Study then examined the effect of load reduction’s ability to increase reserve margins in the ISO New England (ISO-NE) Forward Capacity Market (FCM) and therefore increase reliability in the wholesale generation market.

Load reductions can improve generation reserves in the following ways:

1. To the extent that energy efficiency reduces the capacity clearing price in ISO-NE FCM auctions, the amount of capacity acquired will increase, leading to higher reserve margins and therefore increased reliability.
2. Lower capacity market prices will result in some additional supply resources not clearing in the FCM auction. Some of those resources will continue to operate and provide generation when supply is tight and prices are high.
3. The ISO-NE Competitive Auctions with Sponsored Policy Resources (CASPR) program will result in some resources supported by state mandates being excluded from participating in the FCM auctions. With lower load, these non-cleared capacity resources will create a contribution to reserves and reliability.
4. Some energy efficiency measures that reduce load do so without impacting the amount of cleared capacity in the FCM such as measures in behavior based programs and demand response programs not bid into the market. These load reductions will increase the reserve marking and therefore improve reliability.

The ISO-NE marginal reliability index (MRI) estimates values from the above impacts of load reduction. The MRI is the change in loss of energy expectation (LOEE) in MWh, for each additional MW of available capacity or reserve margin. The 2018 AESC Study calculated the final values per kW-month for increased reserve capacity, by multiplying

the two estimates of the VoLL by the FCM Auction 12 MRIs at various clearing prices, with the corresponding reserve margins.

As recommended by the AESC 2018 Study, the Company applies different reliability values to measures that clear and don't clear the Forward Capacity Market auction. This is due to the fact that the reliability effect of cleared energy efficiency load reductions will be partially offset by reduction in the amount of other capacity cleared, while uncleared load reductions will not be subject to such offsets.

The Company applied Reliability Value of Cleared EE (\$/kW-year) from AESC 2018 Study to all summer kW savings associated with cleared measures and the Reliability Value of Uncleared EE (\$/kW-year) from Table 99 to all summer kW savings associated with uncleared measures.

The reliability benefit is calculated as follows with the Reliability Value\$/kW changing whether a measure is assumed to be cleared or uncleared in the FCM auction. The 2018 AESC Study finds that the 15-year levelized benefit of increasing generation reserves through reduced energy usage is \$0.65/kW-year for cleared resources and \$6.60/kW-year for uncleared load reductions.

- Wholesale Reliability Value Benefit (\$) = kWSummer \* ReliabilityValue\$/kW(@Life) \* (1 + %LossesSummerkW)

### 13) Combined Heat and Power Benefits

R.I.Gen.Laws §39-1-27.7(c) (6) (iii) directs the Company to support the development of combined heat and power (CHP). The law requires that the following criteria be factored into the Company's CHP plan: (i) economic development benefits in Rhode Island; (ii) energy and cost savings for customers; (iii) energy supply costs; (iv) greenhouse gas emissions standards and air quality benefits; and (v) system reliability benefits.<sup>10</sup> Of these, energy and cost savings and energy supply costs are captured in the energy benefits described above. The other three benefits – economic development, greenhouse gas, and system reliability benefits – are described here.

#### Economic Development

For all CHP projects, net economic development benefits will be counted as benefits. The rate of economic development benefit will be \$0.80 of lifetime gross state product increase per dollar of program investment, based on the report, "Macroeconomic

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<sup>10</sup> See R.I. Gen.Laws § 39-1-27.7(c) (6) (iii).

Impacts of Rhode Island Energy Efficiency Investments: REMI Analysis of National Grid's Energy Efficiency Programs, prepared by National Grid in August 2014, as an update to the 2009 study "Energy Efficiency in Rhode Island: Engine of Economic Growth," prepared by Environment Northeast. The \$0.80 multiplier reflects the present value of lifetime state gross domestic product (GDP) effects of program and participant spending that creates jobs in construction and other industries as the project is planned, and equipment is purchased and installed. Therefore, the CHP Economic Development benefits will be calculated as:

- Program and participant spending(\$) x \$0.80

#### Greenhouse gas emissions standards and air quality benefits

For all CHP projects, greenhouse gas mitigation and air quality benefits will be counted as benefits to the extent they are not already captured in the BCR screening values and to the extent that usable emissions data is available. The emissions profile of the CHP site facility prior to the installation of the retrofit (most likely a combination of grid supplied generation for electricity and an on-site boiler for thermal needs) will be compared to the emissions post-retrofit (most likely the CHP unit alone). The change in emissions in tons will be multiplied by a value of \$/ton for each pollutant and the values will be summed over all pollutants and counted as a benefit in the benefit/cost calculation. This method is contingent on having emissions data for all pollutants. This information is often difficult to come by; for example, ISO-New England annually publishes emissions per kWh for only SO<sub>x</sub>, NO<sub>x</sub>, and CO<sub>2</sub>. Similarly, the amount of emissions for all pollutants associated with a particular CHP unit is not always provided. Where locational information is not available, the value of CO<sub>2</sub> emission reductions and NO<sub>x</sub> reductions will be calculated consistent with section 9 and 11 above.

#### System Reliability

If a CHP project is proposed in a system reliability target area, the system reliability benefits from deferring a distribution system upgrade would be captured in the System Reliability Procurement report. In the context of CHP located elsewhere in the state, system reliability benefits are the local distribution benefits created by the introduction of the CHP unit in the local area. Notably, CHP projects do not produce the same level of deferred distribution investment savings described in Section (3) above as traditional energy efficiency.<sup>11</sup> Accordingly, the distribution benefits are modified as follows:

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<sup>11</sup> With traditional energy efficiency projects, the installed measures permanently reduce load on the electric distribution system and, therefore, reduce the need to make distribution investments. CHP projects may not result in similar deferred distribution investment savings. A CHP unit may not be available at all peak times, and, absent any contractual or mechanical modification to ensure that the load does not reappear, the Company will still need to design and maintain the distribution system for when that unit goes off line during a peak hour on a peak day. This is particularly significant with larger CHP

- For CHP systems of less than 1 MW net capacity, the distribution deferral benefit value estimated by the Company based on system wide averages will be multiplied by 0.75 to incorporate an estimate of the reliability experience of discrete deployment of CHP units compared with end-use reduction efficiency measures which are spread across the state;<sup>12</sup>
- For CHP systems equal to or greater than 1 MW net capacity, the distribution benefit will consider location-specific distribution benefits, as opposed to average system-wide benefits. The results of this analysis will replace the adjusted 0.75 of average system-wide distribution benefit described for CHP projects of less than 1 MW. This may entail a detailed engineering analysis performed by the Company, and additional costs. This consideration will have two parts: 1) identification of foreseeable investments that the CHP installation could potentially help defer, and their value; and 2) whether the unit will be sufficiently reliable, or firmed through the provision of physical assurance by the customer, to enable such savings to be realized;
- For CHP projects greater of 1 net MW or greater, gas system benefits not paid out as incentives to the Customer via the AGT incentive or gas service contract terms will be counted as benefits.<sup>13</sup>

#### 14) Utility Costs

Utility costs incurred to achieve implementation of energy efficiency measures and programs are appropriate for inclusion in the RI Test. These costs have been categorized as follows:

- Program Planning and Administration (PP&A): These costs are the administrative costs associated with the utility role in program delivery, including payroll, information technology, contract administration, and overhead expenses.

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projects, in which a single host customer represents a significant percentage of the total load on a feeder. With multiple smaller units, some level of savings is possible, but these units are still not likely to produce distribution benefits in the same manner as traditional energy efficiency.

<sup>12</sup>As explained in footnote 11, *supra*, while multiple small CHP units may produce some level of savings, these units are still not likely to produce distribution benefits in the same manner as traditional energy efficiency. Therefore, the 0.75 factor is adopted as a planning assumption to represent the contingency that, when a single CHP unit on a feeder fails to perform, the load reappears on the system. As more CHP units, particularly smaller units, are deployed in the state, the diversity of operation may allow the adjustment factor to be increased. The Company intends to review this planning assumption based on actual experience for future EE Program Plan filings.

<sup>13</sup> For example, a 3 MW installation with an additional sales volume of approximately 150,000 Dth per year would generate approximately \$130,000 of marginal revenue per year under current rates. Assuming \$100,000 of capital costs, the project could qualify for up to \$573,000 in AGT funding, subject to budget limitations.

- **Marketing:** These are the costs of marketing and advertising to promote a program. The costs also include the payroll and expenses to manage marketing.
- **Rebates and Other Customer Incentives:** These are the incentives from the programs to customers to move them to install energy efficient equipment. Incentives include, but are not limited to, rebates to customers, copayments to vendors for direct installation of measures, payments to distributors to buy down the cost of their products for sale in retail stores, payments to vendors to create and deliver information, the cost of an education course, or payments to lenders to buy down the interest in a loan. Customer incentives typically cover a portion of the equipment and installation costs directly associated with the energy efficient equipment being installed.<sup>14</sup> For a retrofit project, the customer incentives cover a portion of the full cost of the efficiency project, as it is assumed that the alternative to the project is no customer action. For a failed equipment replacement/renovation/new construction project, these customer incentives cover a portion of the incremental additional costs associated with moving to a higher efficiency item or practice compared to what the customer would have done otherwise.
- **Sales, Technical Assistance, and Training (STAT):** These costs include the training and education of the trade ally community regarding the company's current energy efficiency programs. Examples of trade allies include but are not limited to: equipment vendors, heating contractors, lead vendors, project expeditors, weatherization contractors, and equipment installers. These costs also include the tasks associated with internal and contractual delivery of programs. Tasks associated with this budget category include but are not limited to: lead intake, customer service, rebate application, quality assurance, technical assessments, engineering studies, plan reviews, payroll and expenses.
- **Evaluation:** These are the costs of evaluation or market research studies to support program direction and post-installation studies to study program effectiveness or verification of savings estimates. These costs also include the payroll and expenses to manage the research.
- **Shareholder Incentive:** This is the incentive received by the Company for meeting specified savings goals and/or performance targets; because the Company would not implement energy efficiency programs to the extent it does without the incentive, the shareholder incentive is included in the cost of energy efficiency.

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<sup>14</sup> The full cost of the efficiency project is not necessarily the same thing as the full cost of the project being undertaken by the customer. For example, a customer may be renovating an HVAC system including installation of a new chiller and chilled water distribution. While the new distribution system may be part of the construction project, if it does not contribute to energy savings, it will not be included in the efficiency project cost; only the incremental cost of the new efficient chiller will be considered.

## 15) Customer Costs

The customer's costs include their contribution to the installation cost of the efficient measure. Typically, this is the portion of the equipment and installation cost not covered by the customer incentive. As noted above, it excludes the cost of equipment that might be part of the customer's construction project, but that is not related to the energy efficiency portion of the project.

### Benefit/Cost Calculations

The cost effectiveness of a measure, program, or portfolio is simply the ratio of the net present value of the benefits to the net present value of the costs.

For the 2018 Annual Plan, all costs and benefits will be expressed in constant 2018 dollars. Where escalation of avoided costs or costs is needed to produce values in 2018 dollars, appropriate inflation rates are used.

The avoided value component for each benefit (e.g., electric energy, capacity, natural gas, etc.) is the cumulative net present value (in 2018 dollars) of lifetime avoided costs for each year of the planning horizon from the base year up to the measure life of the equipment. Since all of the future year values are in constant 2018 dollars, lifetime benefits thus calculated are discounted back to mid-2018 using a real discount rate equal to  $[(1 + \text{Nominal Discount Rate}) / (1 + \text{Inflation})] - 1$ .

As prescribed by the Standards, all values in the Plan and the benefit-cost model are stated in present value terms, "using a discount rate that appropriately reflects the risks of the investment of customer funds in energy efficiency; in other words, a low-risk discount rate which would indicate that energy efficiency is a low-risk resource in terms of cost of capital risk, project risk, and portfolio risk". Specifically for the 2018 Annual Plan, the Company used a real discount rate of 0.27% equal to the twelve-month average of the historic yields from a ten-year United States Treasury note, using the 2016 calendar year to determine the twelve-month average.

The total benefits will equal the sum of the NPV of each benefit component:

[Energy Benefits + Generation Capacity Benefits + Avoided T&D Benefits +  
Natural Gas Benefits + Fuel Benefits + Water & Sewer Benefits + Non-Resource  
Benefits + Price Effects Benefits + Non-embedded Greenhouse Gas Reduction  
Benefits + Economic Development Benefits + Non-embedded NOx Reduction  
Benefits + Value of Improved Reliability]

The total costs will equal the sum of the NPV of each cost component:

[Program Planning and Administration + Sales, Training, Technical assistance + Marketing + Rebates and Other Customer Incentives + Evaluation + Shareholder incentive+ Customer Cost]

The RI Test benefit/cost will then equal:  
$$\frac{\text{Total NPV Benefits}}{\text{Total NPV Costs}}$$

Per the Standards, on a program level, all benefit categories are included in the benefit/cost calculation. All cost categories, except the shareholder incentive, are included at the program level because they are tracked at that level.<sup>15</sup>

On a sector level, the cost of pilots and educational/outreach programs which are not focused on producing savings and the projected shareholder incentive, are included with the other costs in the determination of cost effectiveness. The shareholder incentive is included at this level because it is designed to achieve savings targets by sector. At a portfolio level, the allocations to the Office of Energy Resources and EERMC are also included in the cost effectiveness calculation.

Separate calculations of benefits and cost-effectiveness are provided for the electric energy efficiency programs and natural gas energy efficiency programs. Some electric energy efficiency programs are expected to produce natural gas savings in addition to electricity savings while some natural gas energy efficiency programs are expected to produce electricity savings in addition to natural gas savings. All of the resource benefits produced by a program are shown with that program. For example, an HVAC project that improves air distribution incented through the electric Large C&I Retrofit Program will produce natural gas savings when natural gas is used by the participant for heating.

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<sup>15</sup> Commitments, if any, of customer incentives made from one year to the next are excluded from the program costs used in the benefit/cost calculation. The costs are only counted in the year in which the incentive is paid and the savings are counted.



**Table E-1  
National Grid  
Electric DSM Funding Sources in 2019 by Sector  
\$(000)**

	<u>Projections by Sector</u>			<b>Total</b>
	<b>Income Eligible Residential</b>	<b>Non-Income Eligible Residential</b>	<b>Commercial &amp; Industrial</b>	
<b>(1) Projected Budget (from E-2):</b>	<b>\$15,881.56</b>	<b>\$46,201.42</b>	<b>\$45,423.52</b>	<b>\$107,506.50</b>
<b>Sources of Other Funding:</b>				
(2) Projected DSM Commitments at Year-End 2018:	\$0.00	\$0.00	\$0.00	\$0.00
(3) Projected Year-End 2018 Fund Balance and Interest:	\$0.00	(\$430.45)	\$4,326.42	\$3,895.97
(4) Projected FCM Payments from ISO-NE:	\$665.60	\$8,974.30	\$13,945.10	\$23,585.08
<b>(5) Total Other Funding:</b>	<b>\$665.60</b>	<b>\$8,543.85</b>	<b>\$18,271.52</b>	<b>\$27,481.06</b>
<b>(6) Customer Funding Required:</b>	<b>\$15,215.96</b>	<b>\$37,657.56</b>	<b>\$27,152.00</b>	<b>\$80,025.4</b>
<b>(7) Forecasted kWh Sales:</b>	<b>204,962,351</b>	<b>2,763,353,818</b>	<b>4,293,953,687</b>	<b>7,262,269,856</b>
(8) Energy Efficiency Program charge per kWh, excluding uncollectible recovery:				<b>\$0.01101</b>
(9) Proposed System Reliability Factor per kWh, excluding uncollectible recovery:				<u>-\$0.00001</u>
(10) Total Proposed Energy Efficiency Charge per kWh, excluding uncollectible recovery:				\$0.01100
(11) Currently Effective Uncollectible Rate				1.30%
<b>(12) Energy Efficiency Program charge per kWh, including uncollectible recovery:</b>				\$0.01114
(13) Currently Effective EE Charge				<u>\$0.00972</u>
(14) Proposed Adjustment to Reflect Fully Reconciling Funding Mechanism				\$0.00142

Notes:

- (1) Projected Budget from E-2 includes OER and EERMC costs allocated to each sector based on forecasted sales and RIIB costs allocated to C&I sector.
- (2) DSM Commitments are projects that are under construction with anticipated completion in 2018.
- (3) Fund balance projections include projected revenue and spend through year end with Low Income sector set to \$0 through projected subsidization from other sectors, minus commitments which are illustrated separately on line (2). The Company proposes to refile this table with updated Fund Balance projections on December 1, 2018 as proposed in Section 6(a) of the Plan's Main Text.
- (4) The total projection of FCM revenue is allocated by kWh sales to each sector.
- (5) Line (2) + Line (3) + Line (4)
- (6) Line (1) - Line (5)
- (7) Per Company Forecast
- (8) Line (6) ÷ Line (7), truncated to 5 decimal places
- (9) Truncated to 5 decimal places
- (11) Proposed System Reliability Factor is from the 2019 System Reliability Procurement Plan. Charge reflects projected year-end 2018 fund balance.
- (10) Line (8) + Line (9)
- (11) Uncollectible rate approved in Docket No 4770.
- (12) Line (10) ÷ (1-Line (11)), truncated to 5 decimal places
- (13) Currently Effective EE Charge includes System Reliability Factor and uncollectible recovery.
- (14) Line (13) - Line (12)

Table E-2  
National Grid  
2019 Electric Energy Efficiency Program Budget (\$000)

	Program Planning & Administration	Marketing	Rebates and Other Customer Incentives	Sales, Technical Assistance & Training	Evaluation & Market Research	Shareholder Incentive	Grand Total
<b>Non-Income Eligible Residential</b>							
Residential New Construction	\$67.0	\$2.5	\$449.4	\$301.4	\$38.3		\$858.6
ENERGY STAR® HVAC	\$86.6	\$108.4	\$1,945.8	\$556.6	\$26.6		\$2,724.0
EnergyWise	\$415.7	\$414.6	\$13,414.9	\$1,392.9	\$139.5		\$15,777.5
EnergyWise Multifamily	\$103.3	\$43.8	\$2,150.0	\$721.0	\$46.8		\$3,064.9
ENERGY STAR® Lighting	\$401.4	\$515.8	\$13,328.7	\$638.4	\$83.9		\$14,968.2
Residential Consumer Products	\$91.4	\$568.3	\$737.4	\$709.8	\$17.6		\$2,124.5
Home Energy Reports	\$99.1	\$10.9	\$2,501.2	\$10.2	\$19.7		\$2,641.2
Residential ConnectedSolutions	\$8.7	\$8.7	\$162.0	\$103.8	\$0.0		\$283.1
Energy Efficiency Education Programs	\$0.0	\$40.0	\$0.0	\$0.0	\$0.0		\$40.0
Residential Pilots	\$43.4	\$24.5	\$104.1	\$50.8	\$0.0		\$222.7
Community Based Initiatives - Residential	\$6.2	\$56.3	\$59.1	\$0.0	\$0.0		\$121.5
Comprehensive Marketing - Residential	\$5.7	\$550.8	\$0.0	\$0.0	\$0.0		\$556.5
Residential Shareholder Incentive	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$2,143.8	\$2,143.8
<b>Subtotal - Non-Income Eligible Residential</b>	<b>\$1,328.4</b>	<b>\$2,344.6</b>	<b>\$34,852.6</b>	<b>\$4,484.8</b>	<b>\$372.4</b>	<b>\$2,143.8</b>	<b>\$45,526.6</b>
<b>Income Eligible Residential</b>							
Single Family - Income Eligible Services	\$353.0	\$129.1	\$9,184.8	\$1,820.5	\$207.2		\$11,694.7
Income Eligible Multifamily	\$111.7	\$9.5	\$2,682.3	\$525.3	\$54.2		\$3,382.9
Income Eligible Shareholder Incentive	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$753.9	\$753.9
<b>Subtotal - Income Eligible Residential</b>	<b>\$464.7</b>	<b>\$138.6</b>	<b>\$11,867.1</b>	<b>\$2,345.8</b>	<b>\$261.4</b>	<b>\$753.9</b>	<b>\$15,831.5</b>
<b>Commercial &amp; Industrial</b>							
Large Commercial New Construction	\$281.8	\$377.5	\$2,931.1	\$1,311.0	\$134.8		\$5,036.1
Large Commercial Retrofit	\$851.9	\$288.0	\$15,611.12	\$3,917.21	\$688.3		\$21,356.5
Small Business Direct Install	\$356.9	\$356.7	\$7,165.0	\$459.3	\$375.0		\$8,712.8
Commercial ConnectedSolutions	\$12.2	\$6.5	\$1,810.0	\$195.5	\$0.0		\$2,024.1
Commercial Pilots	\$19.4	\$30.0	\$87.5	\$61.0	\$0.0		\$197.9
Community Based Initiatives - C&I	\$1.7	\$18.8	\$19.7	\$0.0	\$0.0		\$40.1
Finance Costs	\$0.0	\$0.0	\$5,000.0	\$0.0	\$0.0		\$5,000.0
Commercial & Industrial Shareholder Incentive	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$2,007.28	\$2,007.3
<b>Subtotal - Commercial &amp; Industrial</b>	<b>\$1,523.9</b>	<b>\$1,077.4</b>	<b>\$32,624.4</b>	<b>\$5,943.9</b>	<b>\$1,198.1</b>	<b>\$2,007.3</b>	<b>\$44,374.9</b>
<b>Regulatory</b>							
OER	\$783.6	\$0.0	\$0.0	\$0.0	\$206.3		\$989.8
EERMC	\$783.6	\$0.0	\$0.0	\$0.0	\$0.0		\$783.6
<b>Subtotal - Regulatory</b>	<b>\$1,567.2</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$206.3</b>	<b>\$0.0</b>	<b>\$1,773.4</b>
<b>Grand Total</b>	<b>\$4,884.2</b>	<b>\$3,560.6</b>	<b>\$79,344.1</b>	<b>\$12,774.5</b>	<b>\$2,038.1</b>	<b>\$4,905.0</b>	<b>\$107,506.5</b>
System Reliability Procurement							\$439.3

Notes:

- (1) 2018 Large Commercial Retrofit Commitments (\$000);
- (2) For more information on Finance Costs, please refer to the 2019 C&I Program Description, Attachment 2.
- (3) OER and EERMC total 2.0% of customers' EE Program Charge collected on Table E-1, minus 2%.  
\$206,250 is included in OER budget for Evaluation and Market Research to comply with Senate Bill 2500, enacted in June 2018. The law requires the OER to hire an energy consulting company or firm to review and confirm reported energy savings.
- (4) Finance Costs include \$5.0 million transfer to the Rhode Island Infrastructure Bank Efficient Buildings Fund and \$0 to the Company's revolving loan funds. Finance Costs are detailed in Table E-10.
- (5) System Reliability funds are included for illustrative purposes. They are part of the 2019 System Reliability Procurement Report, filed as a separate docket.

Table E-3  
National Grid  
Derivation of the 2019 Spending and Implementation Budgets (\$000)

	Proposed 2018 Budget From E-2	Commitments	Regulatory Costs	Shareholder Incentive	Eligible Sector Spending Budget for Shareholder Incentive on E-9	Implementation Expenses for Cost- Effectiveness on E-5
<b>Non-Income Eligible Residential</b>						
Residential New Construction	\$858.6					\$858.6
ENERGY STAR® HVAC	\$2,724.0					\$2,724.0
EnergyWise	\$15,777.5					\$15,777.5
EnergyWise Multifamily	\$3,064.9					\$3,064.9
ENERGY STAR® Lighting	\$14,968.2					\$14,968.2
Residential Consumer Products	\$2,124.5					\$2,124.5
Home Energy Reports	\$2,641.2					\$2,641.2
Residential ConnectedSolutions	\$283.1					\$283.1
Energy Efficiency Education Programs	\$40.0					\$40.0
Residential Pilots	\$222.7					\$222.7
Community Based Initiatives - Residential	\$121.5					\$121.5
Comprehensive Marketing - Residential	\$556.5					\$556.5
Residential Shareholder Incentive	\$2,143.8			\$2,143.8		\$0.0
<b>Subtotal - Non-Income Eligible Residential</b>	<b>\$45,526.6</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$2,143.8</b>	<b>\$42,876.9</b>	<b>\$43,382.8</b>
<b>Income Eligible Residential</b>						
Single Family - Income Eligible Services	\$11,694.7					\$11,694.7
Income Eligible Multifamily	\$3,382.9					\$3,382.9
Income Eligible Shareholder Incentive	\$753.9			\$753.9		\$0.0
<b>Subtotal - Income Eligible Residential</b>	<b>\$15,831.5</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$753.9</b>	<b>\$15,077.6</b>	<b>\$15,077.6</b>
<b>Commercial &amp; Industrial</b>						
Large Commercial New Construction	\$5,036.1	\$0.0				\$5,036.1
Large Commercial Retrofit	\$21,356.5	\$0.0				\$21,356.5
Small Business Direct Install	\$8,712.8	\$0.0				\$8,712.8
Commercial ConnectedSolutions	\$2,024.1					\$2,024.1
Commercial Pilots	\$197.9					\$197.9
Community Based Initiatives - C&I	\$40.1					\$40.1
Finance Costs	\$5,000.0					\$5,000.0
Commercial & Industrial Shareholder Incentive	\$2,007.3			\$2,007.3		\$0.0
<b>Subtotal - Commercial &amp; Industrial</b>	<b>\$44,374.9</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$2,007.3</b>	<b>\$40,145.6</b>	<b>\$42,367.7</b>
<b>Regulatory</b>						
OER	\$989.8		\$989.8			\$989.8
EERMC	\$783.6		\$783.6			\$783.6
<b>Subtotal - Regulatory</b>	<b>\$1,773.4</b>	<b>\$0.0</b>	<b>\$1,773.4</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$1,773.4</b>
<b>Grand Total</b>	<b>\$107,506.5</b>	<b>\$0.0</b>	<b>\$1,773.4</b>	<b>\$4,905.0</b>	<b>\$98,100.2</b>	<b>\$102,601.5</b>

Notes:

- (1) Spending budget = Total Budget from E-2 minus commitments, regulatory costs, pilots, Demand Response, and shareholder incentive.
- (2) Implementation Expenses = Total Budget from E-2 minus commitments and shareholder incentive.
- (3) Finance Costs include \$5.0 million transfer to the Rhode Island Infrastructure Bank Efficient Buildings Fund and \$0 to the Company's revolving loan funds. Finance Costs are detailed in Table E-10.

**Table E-4**  
**National Grid**  
**Proposed 2019 Budget Compared to Approved 2018 Budget (\$000)**

	<b>Proposed Implementation Budget 2019</b>	<b>Approved Implementation Budget 2018</b>	<b>Difference</b>
<b>Non-Income Eligible Residential</b>			
Residential New Construction	\$858.6	\$764.6	\$94.0
ENERGY STAR® HVAC	\$2,724.0	\$2,206.6	\$517.4
EnergyWise	\$15,777.5	\$14,916.3	\$861.2
EnergyWise Multifamily	\$3,064.9	\$3,062.6	\$2.3
ENERGY STAR® Lighting	\$14,968.2	\$6,768.6	\$8,199.6
Residential Consumer Products	\$2,124.5	\$1,831.1	\$293.4
Home Energy Reports	\$2,641.2	\$2,629.3	\$11.8
Residential ConnectedSolutions	\$283.1	N/A	N/A
Energy Efficiency Education Programs	\$40.0	\$40.0	\$0.0
Residential Pilots	\$222.7	\$922.6	-\$699.9
Community Based Initiatives - Residential	\$121.5	\$163.0	-\$41.5
Comprehensive Marketing - Residential	\$556.5	\$556.7	-\$0.2
<b>Subtotal - Non-Income Eligible Residential</b>	<b>\$43,382.8</b>	<b>\$33,861.5</b>	<b>\$9,521.3</b>
<b>Income Eligible Residential</b>			
Single Family - Income Eligible Services	\$11,694.7	\$9,329.3	\$2,365.4
Income Eligible Multifamily	\$3,382.9	\$2,557.4	\$825.6
<b>Subtotal - Income Eligible Residential</b>	<b>\$15,077.6</b>	<b>\$11,886.7</b>	<b>\$3,191.0</b>
<b>Commercial &amp; Industrial</b>			
Large Commercial New Construction	\$5,036.1	\$6,111.7	-\$1,075.6
Large Commercial Retrofit	\$21,356.5	\$24,030.7	-\$2,674.2
Small Business Direct Install	\$8,712.8	\$6,924.5	\$1,788.3
Commercial ConnectedSolutions	\$2,024.1	N/A	N/A
Community Based Initiatives - C&I	\$40.1	\$40.9	-\$0.8
Commercial Pilots	\$197.9	\$993.8	-\$795.9
Finance Costs	\$5,000.0	\$0.0	\$5,000.0
RI Infrastructure Bank	\$0.0	\$5,000.0	-\$5,000.0
<b>Subtotal Commercial &amp; Industrial</b>	<b>\$42,367.7</b>	<b>\$43,101.6</b>	<b>-\$734.0</b>
<b>Regulatory</b>			
EERMC	\$783.6	\$686.1	\$97.5
OER	\$989.8	\$686.1	\$303.8
<b>Subtotal Regulatory</b>	<b>\$1,773.4</b>	<b>\$1,372.1</b>	<b>\$401.3</b>
<b>TOTAL IMPLEMENTATION BUDGET</b>	<b>\$102,601.5</b>	<b>\$90,221.9</b>	<b>\$12,379.6</b>
<b>OTHER EXPENSE ITEMS</b>			
Commitments	\$0.0	\$0.0	\$0.0
Company Incentive	\$4,905.0	\$4,346.7	\$558.3
<b>Subtotal - Other Expense Items</b>	<b>\$4,905.0</b>	<b>\$4,346.7</b>	<b>\$558.3</b>
<b>TOTAL BUDGET</b>	<b>\$107,506.5</b>	<b>\$94,568.6</b>	<b>\$12,937.9</b>

Notes:

- (1) Program Implementation Budget excludes Commitments, Company Incentive; derived on Table E-3
- (2) Total Budget includes Implementation, Commitments; illustrated on Table E-3
- (3) There is no change in Finance Costs from 2018 to 2019. The \$5.0 million transfer to the Rhode Island Infrastructure Bank Efficient Buildings Fund is now included in the Finance Cost line. The Company has not included any fund injections to the revolving loan fund in the 2019 Plan.
- (4) OER 2019 budget includes \$206,250 for Evaluation and Market Research to comply with Senate Bill 2500, enacted in June 2018. The law requires the OER to hire an energy consulting company or firm to review and confirm reported energy savings.
- (5) The EnergyStar ENERGY STAR® Lighting budget increase is driven by an 88% in the number of lightbulbs incented over the 2018 Annual Plan.
- (6) The Single Family - Income Eligible Services budget increase is driven by increasing the number of jobs for existing measures including heating system replacements and weatherizations and also offering new measures such as Heat Pump Minisplits.
- (7) The Large Commercial New Construction budget decrease is due to a net decrease in MWh savings from the 2018 Annual Plan and from identifying cost efficiencies.
- (8) The Large Commercial Retrofit budget decrease is due to a net decrease in MWh savings from the 2018 Annual Plan and from identifying cost efficiencies.
- (9) The Small Business Direct Install budget increase is due to a net increase in MWh savings from the 2018 Annual Plan.

**Table E-5**  
**National Grid**  
**Calculation of 2019 Program Year Cost-Effectiveness**  
**All Dollar Values in (\$000)**

	<b>RI Test Benefit/ Cost<sup>1</sup></b>	<b>Total Benefit</b>	<b>Program Implementation Expenses<sup>2</sup></b>	<b>Customer Contribution</b>	<b>Shareholder Incentive</b>	<b>¢/Lifetime kWh</b>
<b>Non-Income Eligible Residential</b>						
Residential New Construction	3.06	\$ 4,165.2	\$ 858.6	\$ 501.8		10.5
ENERGY STAR® HVAC	3.19	\$ 13,509.9	\$ 2,724.0	\$ 1,505.9		10.7
EnergyWise	1.90	\$ 34,784.9	\$ 15,777.5	\$ 2,541.9		46.9
EnergyWise Multifamily	2.94	\$ 9,978.8	\$ 3,064.9	\$ 330.0		11.8
Home Energy Reports	3.40	\$ 8,974.5	\$ 2,641.2	\$ -		10.9
ENERGY STAR® Lighting	4.90	\$ 66,421.1	\$ 14,968.2	\$ (1,405.4)		5.3
Residential Consumer Products	2.92	\$ 8,149.2	\$ 2,124.5	\$ 664.0		9.7
Residential ConnectedSolutions	3.24	\$ 918.5	\$ 283.1	\$ -		N/A
Energy Efficiency Education Programs			\$ 40.0			
Residential Pilots			\$ 222.7			
Community Based Initiatives - Residential			\$ 121.5			
Comprehensive Marketing - Residential			\$ 556.5			
<b>Non-Income Eligible Residential SUBTOTAL</b>	<b>2.96</b>	<b>\$ 146,902.2</b>	<b>\$ 43,382.8</b>	<b>\$ 4,138.1</b>	<b>\$ 2,143.8</b>	<b>11.1</b>
<b>Income Eligible Residential</b>						
Single Family - Income Eligible Services	2.81	\$ 32,821.8	\$ 11,694.7	\$ -		27.2
Income Eligible Multifamily	2.87	\$ 9,711.8	\$ 3,382.9	\$ -		11.1
<b>Income Eligible Residential SUBTOTAL</b>	<b>2.69</b>	<b>\$ 42,533.7</b>	<b>\$ 15,077.6</b>	<b>\$ -</b>	<b>\$ 753.9</b>	<b>20.5</b>
<b>Commercial &amp; Industrial</b>						
Large Commercial New Construction	6.69	\$ 36,177.5	\$ 5,036.1	\$ 369.9		3.2
Large Commercial Retrofit	7.01	\$ 231,722.1	\$ 21,356.5	\$ 11,689.5		3.8
Small Business Direct Install	2.79	\$ 31,386.4	\$ 8,712.8	\$ 2,556.7		7.7
Commercial ConnectedSolutions	8.32	\$ 16,839.9	\$ 2,024.1	\$ -		N/A
Commercial Pilots			\$ 197.9			
Community Based Initiatives - C&I			\$ 40.1			
Finance Costs			\$ 5,000.0			
<b>C&amp;I SUBTOTAL</b>	<b>5.36</b>	<b>\$ 316,125.8</b>	<b>\$ 42,367.7</b>	<b>\$ 14,616.1</b>	<b>\$ 2,007.3</b>	<b>4.8</b>
<b>Regulatory</b>						
OER			\$ 989.8			
EERMC			\$ 783.6			
<b>Regulatory SUBTOTAL</b>			<b>\$ 1,773.4</b>			
<b>TOTAL</b>	<b>4.00</b>	<b>\$ 505,561.7</b>	<b>\$ 102,601.5</b>	<b>\$ 18,754.3</b>	<b>\$ 4,905.0</b>	<b>7.2</b>

Notes:

(1) RI Test B/C Test = (Energy + Capacity + Resource Benefits+Economic Benefits + Carbon Benefits) / (Program Implementation + Customer Contribution + Shareholder Incentive)

Also includes effects of free-ridership and spillover.

(2) For Implementation Expenses derivation, see Table E-3.

(3) ENERGY STAR® Lighting customer cost is negative due to a high free-ridership rate. Any financial incentives paid to free-riders are counted as a cost because the Company incurred those costs as part of the overall cost of the Plan regardless of whether the participant is free-rider or not. Therefore the Company reduces benefits and the customer cost by the net-to-gross ratio but not the incentives.

**Table E-5A**  
**National Grid**  
**Calculation of 2019 Program Year Cost-Effectiveness with TRC Test**  
**All Dollar Values in (\$000)**

	TRC Benefit/ Cost <sup>1</sup>	Total Benefit	Program Implementation Expenses <sup>2</sup>	Customer Contribution	Shareholder Incentive	¢/Lifetime kWh
<b>Non-Income Eligible Residential</b>						
Residential New Construction	2.04	\$ 2,773.1	\$ 858.6	\$ 501.8		10.5
ENERGY STAR® HVAC	2.06	\$ 8,701.3	\$ 2,724.0	\$ 1,505.9		10.7
EnergyWise	1.08	\$ 19,866.1	\$ 15,777.5	\$ 2,541.9		46.9
EnergyWise Multifamily	2.13	\$ 7,247.0	\$ 3,064.9	\$ 330.0		11.8
Home Energy Reports	2.26	\$ 5,962.0	\$ 2,641.2	\$ -		10.9
ENERGY STAR® Lighting	3.67	\$ 49,795.5	\$ 14,968.2	\$ (1,405.4)		5.3
Residential Consumer Products	2.11	\$ 5,880.9	\$ 2,124.5	\$ 664.0		9.7
Residential ConnectedSolutions	3.24	\$ 918.5	\$ 283.1			
Energy Efficiency Education Programs			\$ 40.0			
Residential Pilots			\$ 222.7			
Community Based Initiatives - Residential			\$ 121.5			
Comprehensive Marketing - Residential			\$ 556.5			
<b>Non-Income Eligible Residential SUBTOTAL</b>	<b>2.04</b>	<b>\$ 101,144.4</b>	<b>\$ 43,382.8</b>	<b>\$ 4,138.1</b>	<b>\$ 2,143.8</b>	<b>11.1</b>
<b>Income Eligible Residential</b>						
Single Family - Income Eligible Services	1.93	\$ 22,519.5	\$ 11,694.7	\$ -		27.2
Income Eligible Multifamily	2.05	\$ 6,933.9	\$ 3,382.9	\$ -		11.1
<b>Income Eligible Residential SUBTOTAL</b>	<b>1.86</b>	<b>\$ 29,453.4</b>	<b>\$ 15,077.6</b>	<b>\$ -</b>	<b>\$ 753.9</b>	<b>20.5</b>
<b>Commercial &amp; Industrial</b>						
Large Commercial New Construction	4.84	\$ 26,145.0	\$ 5,036.1	\$ 369.9		3.2
Large Commercial Retrofit	5.38	\$ 177,673.7	\$ 21,356.5	\$ 11,689.5		3.8
Small Business Direct Install	1.79	\$ 20,173.7	\$ 8,712.8	\$ 2,556.7		7.7
Commercial ConnectedSolutions	8.32	\$ 16,839.9	\$ 2,024.1			
Commercial Pilots			\$ 197.9			
Community Based Initiatives - C&I			\$ 40.1			
Finance Costs			\$ 5,000.0			
<b>C&amp;I SUBTOTAL</b>	<b>4.08</b>	<b>\$ 240,832.3</b>	<b>\$ 42,367.7</b>	<b>\$ 14,616.1</b>	<b>\$ 2,007.3</b>	<b>4.8</b>
<b>Regulatory</b>						
OER			\$ 989.8			
EERMC			\$ 783.6			
<b>Regulatory SUBTOTAL</b>			<b>\$ 1,773.4</b>			
<b>TOTAL</b>	<b>2.94</b>	<b>\$ 371,430.1</b>	<b>\$ 102,601.5</b>	<b>\$ 18,754.3</b>	<b>\$ 4,905.0</b>	<b>7.2</b>

Notes:

(1) TRC B/C Test = (Energy + Capacity + Resource Benefits) / (Program Implementation + Customer Contribution + Shareholder Incentive)

Also includes effects of free-ridership and spillover.

(2) For Implementation Expenses derivation, see Table E-3.

(3) ENERGY STAR® Lighting customer cost is negative due to a high free-ridership rate. Any financial incentives paid to free-riders are counted as a cost because the Company incurred those costs as part of the overall cost of the Plan regardless of whether the participant is free-rider or not. Therefore the Company reduces benefits and the customer cost by the net-to-gross ratio but not the incentives.



**Table E-6A**  
**National Grid**  
**Summary of 2019 Demand Response Benefits and Savings**

	Benefits (000's)													Load Reduction (KW)		MWh Saved		
	Total	Summer Generation	Capacity DR/PE	Capacity		Dist	Reliability	Energy			Non Electric Non Resource	Societal Carbon	Summer	Annual	Lifetime			
				Trans	DR/PE			Peak	Off Peak	Energy DR/PE								
<b>Non-Income Eligible Residential</b>																		
Residential Connected Solutions	\$919	\$33.03	\$554.1	\$166	\$144	\$20	\$0.17	\$0.11	\$0.15	\$0	\$0.25	1,564	8	8				
<b>Commercial &amp; Industrial</b>																		
Commercial Connected Solutions	\$16,840	\$539.32	\$9,047.1	\$3,644	\$3,168	\$442	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	34,300	0	0				
<b>TOTAL</b>	<b>\$17,758</b>	<b>\$572</b>	<b>\$9,601</b>	<b>\$3,810</b>	<b>\$3,313</b>	<b>\$462</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>35,864</b>	<b>8</b>	<b>8</b>				

**Table E-7**  
**National Grid**  
**Comparison of 2019 and 2018 Goals**

	Proposed 2019				Approved 2018		Difference	
	Annual Summer Demand Savings (kW)	Annual Energy Savings (MWh)	Demand Response (kW)	Planned Unique Participants	Annual Demand Savings (kW)	Annual Energy Savings (MWh)	Annual Summer Demand Savings (kW)	Annual Energy Savings (MWh)
<b>Non-Income Eligible Residential</b>								
Residential New Construction	112	756		550	49	619	63	137
ENERGY STAR® HVAC	590	2,710		2,187	433	2,091	158	619
EnergyWise	1,287	8,182		10,250	286	6,157	1,001	2,024
EnergyWise Multifamily	283	3,593		4,000	329	4,207	-46	-614
Home Energy Reports	4,278	24,130		291,149	3,325	25,054	952	-924
ENERGY STAR® Lighting	6,681	48,381		236,810	4,413	38,891	2,268	9,490
Residential Consumer Products	668	3,925		13,359	429	2,849	239	1,076
Residential ConnectedSolutions			1,564				N/A	N/A
<b>Non-Income Eligible Residential SUBTOTAL</b>	<b>13,898</b>	<b>91,677</b>	<b>1,564</b>	<b>558,305</b>	<b>9,264</b>	<b>79,868</b>	<b>4,634</b>	<b>11,809</b>
<b>Income Eligible Residential</b>								
Single Family - Income Eligible Services	815	3,742		3,000	696	4,185	120	-443
Income Eligible Multifamily	223	3,219		5,000	170	3,287	54	-68
<b>Income Eligible Residential SUBTOTAL</b>	<b>1,039</b>	<b>6,961</b>		<b>8,000</b>	<b>865</b>	<b>7,472</b>	<b>174</b>	<b>-511</b>
<b>Commercial &amp; Industrial</b>								
Large Commercial New Construction	1,409	10,863		84	1,728	13,959	-319	-3,096
Large Commercial Retrofit	12,558	73,013		2,610	11,910	75,616	648	-2,603
Small Business Direct Install	1,213	12,163		617	1,034	9,940	179	2,222
Commercial ConnectedSolutions			34,300				N/A	N/A
<b>C&amp;I SUBTOTAL</b>	<b>15,180</b>	<b>96,038</b>	<b>34,300</b>	<b>3,311</b>	<b>14,673</b>	<b>99,515</b>	<b>508</b>	<b>-3,477</b>
<b>TOTAL</b>	<b>30,117</b>	<b>194,677</b>	<b>35,864</b>	<b>569,615</b>	<b>24,802</b>	<b>186,855</b>	<b>5,315</b>	<b>7,821</b>

Notes:

- (1) Planned 2018 participation takes into account net-to-gross and estimates unique participation by taking into account 2017 unique customer accounts to savings ratios. Therefore the number of planned measures may be more than the estimated participants shown. For measure counts please view the widget tables in Attachments 1 and 2. Table E-7 no longer includes a comparison to the previous year's participation. Due to the way unique participation is calculated it is not possible to compare year-over-year results.
- (2) There are additional Low Income participants in Residential New Construction.
- (3) A customer can participate in more than one program, for example, ENERGY STAR® Lighting and Home Energy Reports, therefore the population reached can be more than 100%.

**Table E-8**  
**National Grid**  
**Avoided Costs Used in 2019 Benefit-Cost Model**

	Rhode Island					DRIPE for Installations in 2019				
	Winter Peak Energy	Winter Off-Peak Energy	Summer Peak Energy	Summer Off-Peak Energy	Annual Market Capacity Value Weighted Avg	Winter Peak Energy	Winter Off-Peak Energy	Summer Peak Energy	Summer Off-Peak Energy	Annual Market Capacity Value Weighted Avg
Units:	\$/kWh	\$/kWh	\$/kWh	\$/kWh	\$/kW-yr	\$/kWh	\$/kWh	\$/kWh	\$/kWh	\$/kW-yr
Period:										
2019	0.062	0.057	0.042	0.038	88.02	0.06	0.04	0.04	0.03	402.36
2020	0.064	0.061	0.049	0.043	64.99	0.09	0.07	0.07	0.05	503.53
2021	0.067	0.061	0.056	0.047	52.74	0.10	0.08	0.09	0.06	90.61
2022	0.063	0.057	0.052	0.042	50.68	0.10	0.07	0.09	0.06	68.43
2023	0.064	0.057	0.049	0.039	56.80	0.09	0.06	0.07	0.04	45.49
2024	0.068	0.063	0.048	0.044	62.68	0.07	0.05	0.05	0.04	12.05
2025	0.063	0.060	0.050	0.045	70.91	0.05	0.04	0.04	0.03	267.40
2026	0.063	0.059	0.054	0.047	80.87	0.04	0.03	0.03	0.02	364.34
2027	0.068	0.064	0.051	0.045	89.45	0.02	0.01	0.02	0.01	424.20
2028	0.070	0.062	0.055	0.045	95.69	0.01	0.01	0.01	0.01	416.70
2029	0.072	0.066	0.054	0.046	102.17					321.20
2030	0.066	0.062	0.057	0.052	97.66					177.02
2031	0.065	0.061	0.052	0.045	95.69					102.18
2032	0.065	0.060	0.054	0.046	102.17					48.04
2033	0.070	0.061	0.054	0.045	97.66					11.66
2034	0.069	0.058	0.058	0.046	95.69					
2035	0.071	0.064	0.064	0.054	102.17					
2036	0.072	0.064	0.067	0.057	103.86					
2037	0.074	0.065	0.071	0.060	105.57					
2038	0.076	0.066	0.075	0.063	107.32					
2039	0.078	0.067	0.079	0.066	109.09					
2040	0.079	0.068	0.084	0.069	110.89					
2041	0.082	0.069	0.088	0.073	112.72					
2042	0.084	0.070	0.093	0.077	114.58					
2043	0.086	0.071	0.099	0.081	116.47					
2044	0.089	0.073	0.105	0.085	118.40					
2045	0.091	0.075	0.111	0.090	120.35					
2046	0.095	0.077	0.118	0.095	122.34					
2047	0.098	0.079	0.125	0.101	124.36					
2048	0.102	0.082	0.133	0.107	126.41					

Source:  
AESC 2018 Study , Appendix B, in 2018 dollars

**Table E-9**  
**National Grid**  
**2019 Targeted Shareholder Incentive**

Energy Incentive Rate: 3.50%

	(1)	(2)	(3)	(4)	(5)
Sector	Spending Budget \$(000)	Target Incentive \$(000)	Annual kWh Savings Goal	Threshold kWh Savings	Target Incentive Per kWh
Income Eligible Residential	\$15,078	\$528	6,960,964	5,220,723	\$0.076
Non-Income Eligible Residential	\$42,877	\$1,501	91,677,196	68,757,897	\$0.016
Commercial & Industrial	\$40,146	\$1,405	96,038,410	72,028,808	\$0.015
Total	\$98,100	\$3,434	194,676,571	146,007,428	\$0.018

Demand Incentive Rate: 1.50%

	(6)	(7)	(8)	(9)	(10)
Sector	Spending Budget \$(000)	Target Incentive \$(000)	Annual kW Savings Goal	Threshold kW Savings	Target Incentive Per kW
Income Eligible Residential	\$15,078	\$226	1,039	779	\$217.7
Non-Income Eligible Residential	\$42,877	\$643	13,898	10,424	\$46.3
Commercial & Industrial	\$40,146	\$602	15,180	11,385	\$39.7
Total	\$98,100	\$1,472	30,117	22,588	\$48.9

**Notes:**

(1) and (6) Eligible Spending Budget excludes Commitments, Regulatory Costs, Pilots, and Shareholder Incentive. See Table E-3 for details.

(2) Equal to the incentive rate (3.5%) x Column (1).

(3) and (8) See Table E-7

(4) and (9) 75% of Column (3). No incentive is earned on annual kWh savings in the sector unless the Company achieves at least this threshold level of performance.

(5) Column (2)\*1000/Column (3). This illustration is for achieved savings equal to the savings target. The incentive earned per kWh will vary with the percent of the savings target achieved

(7) Equal to the incentive rate (1.5%) x Column (1).

(10) Column (7)\*1000/Column (8). This illustration is for achieved savings equal to the savings target. The incentive earned per kW will vary with the percent of the savings target achieved

The shareholder incentive for Energy and Demand incentives will be calculated as follows, where SB is the Spending Budget in the sector:

- From 75% of savings to 100% of savings: Shareholder Incentive = SB x (0.15 x % of savings achieved – 0.10)
- x 0.7 for electric energy savings
- x 0.3 for electric demand savings
- x 1.0 for natural gas savings
- From 100% of savings to 125% of savings: Shareholder Incentive = SB x (0.05 x % of savings achieved)

**Table E-10  
National Grid  
Revolving Loan Fund Projections**

<b>Large C&amp;I Revolving Loan Fund</b>		<b>Small Business Revolving Loan Fund</b>	
(1) Total Loan Fund Deposits Through 2018	\$ 21,979,678	(1) Total Loan Fund Deposits Through 2018	\$ 4,658,971
(2) Current Loan Fund Balance	\$ 11,383,787	(2) Current Loan Fund Balance	\$ 2,743,229
<i>Loans Paid Year-To-Date</i>	\$ 1,858,283	<i>Loans Paid Year-To-Date</i>	\$ 1,761,048
<i>Repayments Year-To-Date</i>	\$ 3,603,331	<i>Repayments Year-To-Date</i>	\$ 1,818,583
(3) Projected Additional Loans by Year End 2018	\$ 4,664,177	(3) Projected Additional Loans by Year End 2018	\$ 600,000
(4) Projected Additional Repayments by Year End 2018	\$ 2,573,808	(4) Projected Additional Repayments by Year End 2018	\$ 909,291
<b>(5) Projected Year End Loan Fund Balance 2018</b>	<b>\$ 9,293,417</b>	<b>(5) Projected Year End Loan Fund Balance 2018</b>	<b>\$ 3,052,520</b>
(6) 2019 Fund Injection	\$ -	(6) 2019 Fund Injection	\$ -
<b>(7) Projected Loan Fund Balance, January 2019</b>	<b>\$ 9,293,417</b>	<b>(7) Projected Loan Fund Balance, January 2019</b>	<b>\$ 3,052,520</b>
(8) Projected Repayments throughout 2019	\$ 6,000,000	(8) Projected Repayments throughout 2019	\$ 2,000,000
(9) Estimated Loans in 2019	\$ 7,400,000	(9) Estimated Loans in 2019	\$ 3,000,000
<b>(10) Projected Year End Loan Fund Balance 2019</b>	<b>\$ 7,893,417</b>	<b>(10) Projected Year End Loan Fund Balance 2019</b>	<b>\$ 2,052,520</b>
<b>Public Sector Revolving Loan Fund</b>		<b>Efficient Buildings Fund</b>	
(1) Total Loan Fund Deposits Through 2018	\$ 1,562,529	(1) Energy Efficiency Funds allocated to EBF through 201	\$ 11,870,447
(2) Current Loan Fund Balance	\$ 314,070	(2) Total EBF Loans Outstanding	\$ 15,587,000
<i>Funds returned to OER</i>	\$ 700,000	<i>Loans Paid Year-To-Date</i>	\$ -
<i>Repayments Year-To-Date</i>	\$ 208,917	<i>Repayments Year-To-Date</i>	\$ 880,890
(3) Projected Additional Loans by Year End	\$ -	(3) Projected Additional Loans by Year End 2018	\$ 5,700,000
(4) Projected Additional Repayments by Year End	\$ 104,458	(4) Projected Additional Repayments by Year End 2018	\$ -
<b>(5) Projected Year End Loan Fund Balance 2018</b>	<b>\$ 418,529</b>	<b>(5) Total EBF Loans Outstanding</b>	<b>\$ 20,406,110</b>
(6) 2019 Fund Injection	\$ -	(6) 2019 Fund Injection	\$ 5,000,000
<b>(7) Projected Loan Fund Balance, January 2019</b>	<b>\$ 418,529</b>	<b>(7) 2019 Beginning of Year EBF Loans Outstanding</b>	<b>\$ 20,406,110</b>
(8) Projected Repayments throughout 2019	\$ 240,000	(8) Projected EBF Loan Repayments in 2019	\$ 1,183,360
(9) Estimated Loans in 2019	\$ -	(9) New EBF loans in 2019	\$ 15,000,000
<b>(10) Projected Year End Loan Fund Balance 2019</b>	<b>\$ 658,529</b>	<b>(10) Projected Year End 2019 EBF Loans Outstanding</b>	<b>\$ 34,222,750</b>
		(11) Energy Efficiency Funds allocated to EBF through 2019	\$ 16,870,447
		(12) Loans to Energy Efficiency Fund Contribution Ratio	2.0

Notes

- 1 Funding injections since loan funds began.
- 2 Current Loan Fund Balance is through August 2018; it includes all loans and repayments made by August 2018. Public Sector Revolving Loan Fund reduced by transfers to RI PEP Incentives. EBF reports in terms of loans outstanding.
- 3 Projected Loans from September to Year-End 2018 is estimated based on projects currently under construction that are anticipated to be paid out by year-end. It is difficult to project this amount accurately due to the fact that projects could be delayed by a month or two resulting in payment occurring in 2019 instead of 2018.
- 4 Projected Repayments from September to Year-End 2018 is estimated based on the monthly average amount of repayments. EBF only receives repayments one time per year so the projected repayments for all of 2018 are included in line (2).
- 5 Equal to (2) - (3) + (4). EBF equal to (2) - (repayments YTD) + (3).
- 6 Proposed 2019 Fund Injection detailed on Table E-2
- 7 Equal to (5) + (6). EBF equal to line (5).
- 8 Assumption based on monthly average repayments in 2018 over 12 month period; repayments accumulate over time and may vary widely.
- 9 Amount projected to be lent to customers in 2019
- 10 Equal to (7) + (8) - (9). EBF equal to (7) - (8) + (9).



**Table G-1  
National Grid  
Gas DSM Funding Sources in 2019 by Sector  
\$(000)**

	<u>Projections by Sector</u>			<b>Total</b>
	<b>Income Eligible Residential</b>	<b>Non-Income Eligible Residential</b>	<b>Commercial &amp; Industrial</b>	
<b>(1) Projected Budget (from G-2):</b>	<b>\$8,361.4</b>	<b>\$14,538.9</b>	<b>\$8,692.5</b>	<b>\$31,592.8</b>
<b>Sources of Other Funding:</b>				
(2) Estimated Year-End 2018 Fund Balance and Interest:	\$0.00	\$1,837.1	\$5,525.7	\$7,362.8
(3) Low Income Weatherization in Base Rates:	\$200.00			\$200.00
<b>(4) Total Other Funding:</b>	<b>\$200.0</b>	<b>\$1,837.1</b>	<b>\$5,525.7</b>	<b>\$7,562.8</b>
<b>(5) Customer Funding Required:</b>	<b>\$8,161.4</b>	<b>\$12,701.9</b>	<b>\$3,166.8</b>	<b>\$24,030.0</b>
(6) Forecasted Firm Dth Sales	1,373,241	18,648,373	19,699,548	39,721,163
(7) Forecasted Non Firm Dth Sales			1,589,138	1,589,138
(8) Less: Exempt DG Customers			(1,330,639)	(1,330,639)
<b>(9) Forecasted Dth Sales:</b>	<b>1,373,241</b>	<b>18,648,373</b>	<b>19,958,047</b>	<b>39,979,661</b>
Average Energy Efficiency Program Charge per Dth (10) excluding Uncollectible Recovery:				\$0.601
Proposed Energy Efficiency Program Charge per Dth (11) excluding Uncollectible Recovery	\$0.715	\$0.715	\$0.485	
(12) Currently Effective Uncollectible Rate	<u>1.91%</u>	<u>1.91%</u>	<u>1.91%</u>	
<b>Proposed Energy Efficiency Program Charge per (13) Dth including Uncollectible Recovery:</b>	<b>\$0.728</b>	<b>\$0.728</b>	<b>\$0.494</b>	
Currently Effective Energy Efficiency Program Charge (14) per Dth	\$0.869	\$0.869	\$0.671	
Adjustment to Reflect Fully Reconciling Funding (15) Mechanism	(\$0.141)	(\$0.141)	(\$0.177)	

**Notes**

(1) Projected Budget from G-2 includes OER and EERMC costs allocated to each sector based on forecasted sales.

(2) Fund Balance projections include projected revenue and spend through year-end with Residential and C&I sector subsidies applied to Income Eligible as detailed in the 2018 EE Plan Table G-1. The Company proposes to refile this table with updated Fund Balance projections on December 1, 2018 as proposed in Section 6(a) of the Plan's Main Text.

(11) As agreed to by the settling parties, the proposed EE program charges allow for the use of collections from one sector to fund energy efficiency services in other sectors that would otherwise not be supported with the proposed collection rates. The C&I charge includes collection of \$6.3 million of which \$4.3 million will be allocated to the low income sector and \$1.9 million to the residential sector.

(12) Uncollectible rate approved in Docket No. 4770.

**Table G-2  
National Grid  
2019 Gas Energy Efficiency Program Budget (\$000)**

	Program Planning and Administration	Marketing	Rebates and Other Customer Incentives	Sales, Technical Assistance and Training	Evaluation & Market Research	Shareholder Incentive	Grand Total
<b>Non-Income Eligible Residential:</b>							
ENERGY STAR <sup>®</sup> HVAC	\$67.4	\$120.0	\$1,726.5	\$247.2	\$3.8	\$0.0	\$2,164.9
EnergyWise	\$239.5	\$78.3	\$6,594.8	\$1,534.1	\$19.6	\$0.0	\$8,466.3
EnergyWise Multifamily	\$64.5	\$34.0	\$1,216.0	\$356.0	\$7.0	\$0.0	\$1,677.5
Home Energy Reports	\$21.5	\$0.9	\$415.0	\$5.1	\$5.5	\$0.0	\$447.9
Residential Pilots	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Residential New Construction	\$23.6	\$3.2	\$508.4	\$186.7	\$15.8	\$0.0	\$737.6
Comprehensive Marketing - Residential	\$0.5	\$73.2	\$0.0	\$0.0	\$0.0	\$0.0	\$73.7
Community Based Initiatives - Residential	\$0.5	\$18.8	\$19.7	\$0.0	\$0.0	\$0.0	\$39.0
Residential Shareholder Incentive	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$680.3	\$680.3
<b>Subtotal - Non-Income Eligible Residential</b>	<b>\$417.4</b>	<b>\$328.3</b>	<b>\$10,480.3</b>	<b>\$2,329.3</b>	<b>\$51.6</b>	<b>\$680.3</b>	<b>\$14,287.2</b>
<b>Income Eligible Residential:</b>							
Single Family - Income Eligible Services	\$148.7	\$14.9	\$3,778.0	\$1,029.8	\$41.5	\$0.0	\$5,012.8
Income Eligible Multifamily	\$92.3	\$10.3	\$2,474.5	\$348.9	\$6.7	\$0.0	\$2,932.7
Income Eligible Shareholder Incentive	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$397.3	\$397.3
<b>Subtotal - Income Eligible Residential</b>	<b>\$241.0</b>	<b>\$25.2</b>	<b>\$6,252.5</b>	<b>\$1,378.7</b>	<b>\$48.2</b>	<b>\$397.3</b>	<b>\$8,342.8</b>
<b>Commercial &amp; Industrial</b>							
Large Commercial New Construction	\$82.4	\$193.7	\$1,274.0	\$743.4	\$95.8	\$0.0	\$2,389.2
Large Commercial Retrofit	\$194.7	\$293.0	\$2,631.7	\$887.7	\$206.9	\$0.0	\$4,214.0
Small Business Direct Install	\$5.3	\$26.9	\$50.0	\$37.6	\$4.7	\$0.0	\$124.4
Commercial & Industrial Multifamily	\$28.9	\$16.4	\$756.0	\$109.7	\$7.3	\$0.0	\$918.4
Commercial Pilots	\$10.6	\$9.5	\$241.1	\$89.9	\$30.0	\$0.0	\$381.1
Finance Costs	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Community Based Initiatives - C&I	\$0.2	\$6.3	\$6.6	\$0.0	\$0.0	\$0.0	\$13.0
Commercial & Industrial Shareholder Incentive	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$383.0	\$383.0
<b>Subtotal - Commercial &amp; Industrial</b>	<b>\$322.0</b>	<b>\$545.7</b>	<b>\$4,959.4</b>	<b>\$1,868.4</b>	<b>\$344.7</b>	<b>\$382.95</b>	<b>\$8,423.1</b>
<b>Regulatory</b>							
EERMC	\$235.5	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$235.5
OER	\$235.5	\$0.0	\$0.0	\$0.0	\$68.8	\$0.0	\$304.2
<b>Subtotal - Regulatory</b>	<b>\$470.9</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$68.8</b>	<b>\$0.0</b>	<b>\$539.7</b>
<b>Grand Total</b>	<b>\$1,451.3</b>	<b>\$899.1</b>	<b>\$21,692.1</b>	<b>\$5,576.3</b>	<b>\$513.3</b>	<b>\$1,460.6</b>	<b>\$31,592.8</b>

**Notes:**

- (1) OER and EERMC is equal to 2% of total collections from customers' Energy Efficiency Program Charge, reduced by 2%.
- (2) Finance Costs include payments made to Rhode Island Infrastructure Bank Efficient Buildings Fund
- (3) \$68,750 is included in OER budget for Evaluation and Market Research to comply with Senate Bill 2500, enacted in June 2018. The law requires the OER to hire an energy consulting company or firm to review and confirm reported energy savings.

**Table G-3**  
**National Grid**  
**Derivation of the 2019 Spending & Implementation Budgets (\$000)**

	<b>Proposed 2018 Budget From G-2 (\$000)</b>	<b>Outside Finance and Stakeholder Oversight Costs (\$000)</b>	<b>Shareholder Incentive (\$000)</b>	<b>Eligible Sector Spending Budget for Shareholder Incentive on G-9 (\$000)<sup>1</sup></b>	<b>Implementation Expenses for Cost-Effectiveness on G-5 (\$000)<sup>2</sup></b>
<b>Non-Income Eligible Residential</b>					
ENERGY STAR <sup>®</sup> HVAC	\$ 2,164.9		\$ -		\$ 2,164.9
EnergyWise	\$ 8,466.3		\$ -		\$ 8,466.3
EnergyWise Multifamily	\$ 1,677.5		\$ -		\$ 1,677.5
Home Energy Reports	\$ 447.9		\$ -		\$ 447.9
Residential Pilots	\$ -		\$ -		\$ -
Residential New Construction	\$ 737.6				\$ 737.6
Comprehensive Marketing - Residential	\$ 73.7		\$ -		\$ 73.7
Community Based Initiatives - Residential	\$ 39.0		\$ -		\$ 39.0
Residential Shareholder Incentive	\$ 680.3		\$ 680.3		\$ -
<b>Subtotal - Non-Income Eligible Residential</b>	<b>\$ 14,287.2</b>	<b>\$ -</b>	<b>\$ 680.3</b>	<b>\$ 13,606.8</b>	<b>\$ 13,606.8</b>
<b>Income Eligible Residential</b>					
Single Family - Income Eligible Services	\$ 5,012.8		\$ -		\$ 5,012.8
Income Eligible Multifamily	\$ 2,932.7		\$ -		\$ 2,932.7
Income Eligible Shareholder Incentive	\$ 397.3		\$ 397.3		\$ -
<b>Subtotal - Income Eligible Residential</b>	<b>\$ 8,342.8</b>	<b>\$ -</b>	<b>\$ 397.3</b>	<b>\$ 7,945.5</b>	<b>\$ 7,945.5</b>
<b>Commercial &amp; Industrial</b>					
Large Commercial New Construction	\$ 2,389.2		\$ -		\$ 2,389.2
Large Commercial Retrofit	\$ 4,214.0		\$ -		\$ 4,214.0
Small Business Direct Install	\$ 124.4		\$ -		\$ 124.4
Commercial & Industrial Multifamily	\$ 918.4		\$ -		\$ 918.4
Commercial Pilots	\$ 381.1		\$ -		\$ 381.1
Finance Costs	\$ -	\$ -	\$ -		\$ -
Community Based Initiatives - C&I	\$ 13.0		\$ -		\$ 13.0
Commercial & Industrial Shareholder Incentive	\$ 383.0		\$ 383.0		\$ -
<b>Subtotal - Commercial &amp; Industrial</b>	<b>\$ 8,423.1</b>	<b>\$ -</b>	<b>\$ 383.0</b>	<b>\$ 7,659.0</b>	<b>\$ 8,040.1</b>
<b>Regulatory</b>					
EERMC	\$ 235.5	\$ 235.5			\$ 235.5
OER	\$ 304.2	\$ 304.2			\$ 304.2
<b>Subtotal - Regulatory</b>	<b>\$ 539.7</b>	<b>\$ 539.7</b>	<b>\$ -</b>		<b>\$ 539.7</b>
<b>Grand Total</b>	<b>\$ 31,592.8</b>	<b>\$ 539.7</b>	<b>\$ 1,460.6</b>	<b>\$ 29,211.4</b>	<b>\$ 30,132.2</b>

**Notes:**

- (1) Eligible Sector Spending Budget = Budget from G-2 minus Regulatory Costs, Pilots, and Shareholder Incentive
- (2) Implementation Expenses = Budget from G-2 minus Shareholder Incentive

**Table G-4  
National Grid  
Proposed 2019 Budget Compared to Approved 2018 Budget (\$000)**

	<b>Proposed Budget 2019 from G-2</b>	<b>2018 Approved Gas Budget</b>	<b>Difference</b>
<b>Non-Income Eligible Residential</b>			
ENERGY STAR® HVAC	\$ 2,164.9	\$ 1,730.4	\$ 434.5
EnergyWise	\$ 8,466.3	\$ 8,370.8	\$ 95.5
EnergyWise Multifamily	\$ 1,677.5	\$ 1,267.1	\$ 410.5
Home Energy Reports	\$ 447.9	\$ 428.7	\$ 19.3
Residential Pilots	\$ -	\$ 19.6	\$ (19.6)
Residential New Construction	\$ 737.6	\$ 587.4	\$ 150.3
Comprehensive Marketing - Residential	\$ 73.7	\$ 73.7	\$ -
Community Based Initiatives - Residential	\$ 39.0	\$ 39.2	\$ (0.2)
Residential Shareholder Incentive	\$ 680.3	\$ 624.9	\$ 55.5
<b>Subtotal - Non-Income Eligible Residential</b>	<b>\$ 14,287.2</b>	<b>\$ 13,141.6</b>	<b>\$ 1,145.6</b>
<b>Income Eligible Residential</b>			
Single Family - Income Eligible Services	\$ 5,012.8	\$ 4,032.4	\$ 980.4
Income Eligible Multifamily	\$ 2,932.7	\$ 2,349.5	\$ 583.2
Income Eligible Shareholder Incentive	\$ 397.3	\$ 319.1	\$ 78.2
<b>Subtotal - Income Eligible Residential</b>	<b>\$ 8,342.8</b>	<b>\$ 6,701.1</b>	<b>\$ 1,641.7</b>
<b>Commercial &amp; Industrial</b>			
Large Commercial New Construction	\$ 2,389.2	\$ 2,658.1	\$ (268.8)
Large Commercial Retrofit	\$ 4,214.0	\$ 3,643.3	\$ 570.7
Small Business Direct Install	\$ 124.4	\$ 132.5	\$ (8.0)
Commercial & Industrial Multifamily	\$ 918.4	\$ 410.2	\$ 508.2
Commercial Pilots	\$ 381.1	\$ 482.1	\$ (101.0)
Finance Costs	\$ -	\$ -	\$ -
Community Based Initiatives - C&I	\$ 13.0	\$ 9.8	\$ 3.2
Commercial & Industrial Shareholder Incentive	\$ 383.0	\$ 342.7	\$ 40.3
<b>Subtotal Commercial &amp; Industrial</b>	<b>\$ 8,423.1</b>	<b>\$ 7,678.6</b>	<b>\$ 744.5</b>
<b>Regulatory</b>			
EERMC	\$ 235.5	\$ 279.8	\$ (44.3)
OER	\$ 304.2	\$ 279.8	\$ 24.4
<b>Subtotal Regulatory</b>	<b>\$ 539.7</b>	<b>\$ 559.6</b>	<b>\$ (19.9)</b>
<b>TOTAL BUDGET</b>	<b>\$ 31,592.8</b>	<b>\$ 28,080.9</b>	<b>\$ 3,511.9</b>

Notes:

- (1) Program Implementation Budget excludes Commitments, Company Incentive; derived on Table G-3
- (2) Total Budget includes Implementation, Commitments; illustrated on Table G-3
- (3) Finance Costs include funds allocated to Rhode Island Infrastructure Bank Efficient Buildings Fund.
- (4) OER 2019 budget includes \$68,750 for Evaluation and Market Research to comply with Senate Bill 2500, enacted in June 2018. The law requires the OER to hire an energy consulting company or firm to review and confirm reported energy savings.

**Table G-5**  
**National Grid**  
**Calculation of 2019 Program Year Cost-Effectiveness**  
**All Dollar Values in (\$000)**

	<b>Rhode Island Benefit/Cost</b>	<b>Total Benefit</b>	<b>Program Implementation Expenses</b>	<b>Customer Contribution</b>	<b>Shareholder Incentive</b>	<b>\$/Lifetime MMBtu</b>
<b>Non-Income Eligible Residential</b>						
Energy Star® HVAC	2.33	\$ 12,366.4	\$ 2,164.9	\$ 3,144.9		\$ 11.15
EnergyWise	1.91	\$ 20,378.1	\$ 8,466.3	\$ 2,215.0		\$ 15.98
EnergyWise MultiFamily	3.23	\$ 6,527.4	\$ 1,677.5	\$ 342.0		\$ 7.91
Home Energy Reports	4.31	\$ 1,931.2	\$ 447.9	\$ -		\$ 3.88
Residential New Construction	1.55	\$ 2,223.0	\$ 737.6	\$ 695.2		\$ 14.77
Comprehensive Marketing - Residential			\$ 73.7			
Community Based Initiatives - Residential			\$ 39.0			
Residential Pilots			\$ -			
<b>Non-Income Eligible Residential Subtotal</b>	<b>2.10</b>	<b>\$ 43,426.2</b>	<b>\$ 13,606.8</b>	<b>\$ 6,397.0</b>	<b>\$ 680.3</b>	<b>\$ 12.41</b>
<b>Income Eligible Residential</b>						
Single Family - Income Eligible Services	2.86	\$ 14,329.1	\$ 5,012.8	\$ -		\$ 27.31
Income Eligible Multifamily	3.99	\$ 11,714.1	\$ 2,932.7	\$ -		\$ 8.16
<b>Income Eligible Residential Subtotal</b>	<b>3.12</b>	<b>\$ 26,043.3</b>	<b>\$ 7,945.5</b>	<b>\$ -</b>	<b>\$ 397.3</b>	<b>\$ 14.63</b>
<b>Large Commercial &amp; Industrial</b>						
Large Commercial New Construction	2.82	\$ 14,996.9	\$ 2,389.2	\$ 2,924.0		\$ 7.50
Large Commercial Retrofit	4.41	\$ 25,522.7	\$ 4,214.0	\$ 1,577.3		\$ 4.18
Small Business Direct Install	2.87	\$ 407.8	\$ 124.4	\$ 17.8		\$ 6.72
Commercial & Industrial Multifamily	4.48	\$ 4,444.3	\$ 918.4	\$ 74.0		\$ 6.37
Commercial Pilots			\$ 381.1			
Community Based Initiatives - C&I			\$ 13.0			
Finance Costs			\$ -			
<b>Commercial &amp; Industrial Subtotal</b>	<b>3.49</b>	<b>\$ 45,371.7</b>	<b>\$ 8,040.1</b>	<b>\$ 4,593.1</b>	<b>\$ 383.0</b>	<b>\$ 5.56</b>
<b>Regulatory</b>						
EERMC			\$ 235.5			
OER			\$ 304.2			
<b>Regulatory Subtotal</b>			<b>\$ 539.7</b>			
<b>Grand Total</b>	<b>2.70</b>	<b>\$ 114,841.2</b>	<b>\$ 30,132.2</b>	<b>\$ 10,990.1</b>	<b>\$ 1,460.6</b>	<b>\$ 9.29</b>

Notes:

(1) RI Test B/C Test = (Energy + Capacity + Resource Benefits+Economic Benefits + Carbon Benefits) / (Program Implementation + Customer Contribution + Shareholder Incentive)

Also includes effects of free-ridership and spillover.

(2) For Implementation Expenses derivation, see Table G-3.

**Table G-5A**  
**National Grid**  
**Calculation of 2019 Program Year Cost-Effectiveness with TRC Test**  
**All Dollar Values in (\$000)**

	<b>TRC Benefit/ Cost</b>	<b>Total Benefit</b>	<b>Program Implementation Expenses</b>	<b>Customer Contribution</b>	<b>Shareholder Incentive</b>	<b>\$/Lifetime MMBtu</b>
<b>Non-Income Eligible Residential</b>						
Energy Star® HVAC	1.10	\$ 5,849.5	\$ 2,164.9	\$ 3,144.9		\$ 11.15
EnergyWise	0.93	\$ 9,897.8	\$ 8,466.3	\$ 2,215.0		\$ 15.98
EnergyWise MultiFamily	1.88	\$ 3,802.2	\$ 1,677.5	\$ 342.0		\$ 7.91
Home Energy Reports	1.97	\$ 880.4	\$ 447.9	\$ -		\$ 3.88
Residential New Construction	0.63	\$ 901.7	\$ 737.6	\$ 695.2		\$ 14.77
Comprehensive Marketing - Residential			\$ 73.7			
Community Based Initiatives - Residential			\$ 39.0			
Residential Demonstration and R&D			\$ -			
<b>Non-Income Eligible Residential Subtotal</b>	<b>1.03</b>	<b>\$ 21,331.5</b>	<b>\$ 13,606.8</b>	<b>\$ 6,397.0</b>	<b>\$ 680.3</b>	<b>\$ 12.41</b>
<b>Income Eligible Residential</b>						
Single Family - Income Eligible Services	2.07	\$ 10,392.3	\$ 5,012.8	\$ -		\$ 27.31
Income Eligible Multifamily	2.62	\$ 7,685.2	\$ 2,932.7	\$ -		\$ 8.16
<b>Income Eligible Residential Subtotal</b>	<b>2.17</b>	<b>\$ 18,077.5</b>	<b>\$ 7,945.5</b>	<b>\$ -</b>	<b>\$ 397.3</b>	<b>\$ 14.63</b>
<b>Large Commercial &amp; Industrial</b>						
Large Commercial New Construction	1.53	\$ 8,130.6	\$ 2,389.2	\$ 2,924.0		\$ 7.50
Large Commercial Retrofit	2.45	\$ 14,213.0	\$ 4,214.0	\$ 1,577.3		\$ 4.18
Small Business Direct Install	1.69	\$ 240.3	\$ 124.4	\$ 17.8		\$ 6.72
Commercial & Industrial Multifamily	3.01	\$ 2,982.6	\$ 918.4	\$ 74.0		\$ 6.37
Commercial Demonstration and R&D			\$ 381.1			
Community Based Initiatives - C&I			\$ 13.0			
Finance Costs			\$ -			
<b>Commercial &amp; Industrial Subtotal</b>	<b>1.96</b>	<b>\$ 25,566.6</b>	<b>\$ 8,040.1</b>	<b>\$ 4,593.1</b>	<b>\$ 383.0</b>	<b>\$ 5.56</b>
<b>Regulatory</b>						
EERMC			\$ 235.5			
OER			\$ 304.2			
<b>Regulatory Subtotal</b>			<b>\$ 539.7</b>			
<b>Grand Total</b>	<b>1.53</b>	<b>\$ 64,975.7</b>	<b>\$ 30,132.2</b>	<b>\$ 10,990.1</b>	<b>\$ 1,460.6</b>	<b>\$ 9.29</b>

Notes:

(1) TRC B/C Test = (Energy + Capacity + Resource Benefits) / (Program Implementation + Customer Contribution + Shareholder Incentive)

Also includes effects of free-ridership and spillover.

(2) For Implementation Expenses derivation, see Table G-3.

**Table G-6  
National Grid  
Summary of 2019 Benefits and Savings by Program**

	Benefits (\$000)			MMBTU Gas Saved	
	Total	Natural Gas	Non-Gas Benefit	Annual	Lifetime
<b>Non-Income Eligible Residential</b>					
EnergyWise	\$20,378.1	\$6,106.8	\$14,271.3	27,806	668,615
Energy Star® HVAC	\$12,366.4	\$4,277.3	\$8,089.1	27,960	476,141
EnergyWise Multifamily	\$6,527.4	\$2,307.0	\$4,220.4	16,043	255,276
Home Energy Reports	\$1,931.2	\$830.0	\$1,101.2	115,520	115,520
Residential New Construction	\$2,223.0	\$879.8	\$1,343.2	4,741	96,976
<b>Non-Income Eligible Residential SUBTOTAL</b>	<b>\$43,426.2</b>	<b>\$14,401.0</b>	<b>\$29,025.2</b>	<b>192,069</b>	<b>1,612,528</b>
<b>Income Eligible Residential</b>					
Single Family - Income Eligible Services	\$14,329.1	\$1,680.6	\$12,648.5	9,178	183,560
Income Eligible Multifamily	\$11,714.1	\$3,255.0	\$8,459.2	20,487	359,611
<b>Income Eligible Residential SUBTOTAL</b>	<b>\$26,043.3</b>	<b>\$4,935.6</b>	<b>\$21,107.6</b>	<b>29,665</b>	<b>543,171</b>
<b>Commercial &amp; Industrial</b>					
Large Commercial New Construction	\$14,996.9	\$5,478.5	\$9,518.5	42,536	708,462
Large Commercial Retrofit	\$25,522.7	\$10,535.7	\$14,987.0	155,049	1,385,654
Small Business Direct Install	\$407.8	\$157.9	\$249.9	2,559	21,163
Commercial & Industrial Multifamily	\$4,444.3	\$1,289.4	\$3,154.9	10,829	155,667
<b>Commercial &amp; Industrial SUBTOTAL</b>	<b>\$45,371.7</b>	<b>\$17,461.5</b>	<b>\$27,910.2</b>	<b>210,974</b>	<b>2,270,945</b>
<b>TOTAL</b>	<b>\$114,841.2</b>	<b>\$36,798.1</b>	<b>\$78,043.1</b>	<b>432,708</b>	<b>4,426,644</b>

**Table G-7  
National Grid  
Comparison of 2019 and 2018 Goals**

	Proposed 2019		Approved 2018	Difference
	Annual Energy Savings (MMBTU Natural Gas)	Planned Unique Participants	Annual Energy Savings (MMBTU Natural Gas)	Annual Energy Savings (MMBTU Natural Gas)
<b>Non-Income Eligible Residential</b>				
EnergyWise	27,806	2,300	26,787	1,019
Energy Star® HVAC	27,960	1,830	27,513	446
EnergyWise Multifamily	16,043	4,000	12,069	3,975
Home Energy Reports	115,520	107,414	77,220	38,300
Residential New Construction	4,741	313	3,117	1,624
<b>Non-Income Eligible Residential SUBTOTAL</b>	<b>192,069</b>	<b>115,858</b>	<b>146,706</b>	<b>45,363</b>
<b>Income Eligible Residential</b>				
Single Family - Income Eligible Services	9,178	820	12,620	-3,442
Income Eligible Multifamily	20,487	3,500	16,222	4,265
<b>Income Eligible Residential SUBTOTAL</b>	<b>29,665</b>	<b>4,320</b>	<b>28,842</b>	<b>823</b>
<b>Commercial &amp; Industrial</b>				
Large Commercial New Construction	42,536	187	42,764	-229
Large Commercial Retrofit	155,049	70	186,780	-31,731
Small Business Direct Install	2,559	65	3,059	-500
Commercial & Industrial Multifamily	10,829	2,289	6,643	4,186
<b>Commercial &amp; Industrial SUBTOTAL</b>	<b>210,974</b>	<b>2,611</b>	<b>239,246</b>	<b>-28,273</b>
<b>TOTAL</b>	<b>432,708</b>	<b>122,789</b>	<b>414,795</b>	<b>17,913</b>

**Notes:**

- (1) Participants can participate in more than one program, for example Home Energy Reports and EnergyWise.
- (2) Planned 2019 participation takes into account net-to-gross and estimates unique participation by taking into account 2017 unique customer accounts to savings ratios. Therefore the number of planned measures may be more than the planned participants. For measure counts please view the widgets tables at the end of the Residential and C&I text sections. Table G-7 no longer includes a comparison to the previous year's participation. Due to the way unique participation is calculated it is not possible to compare year-over-year results.

**Table G-8  
National Grid  
Avoided Costs Used in 2019 Benefit-Cost Model**

Year	RESIDENTIAL				COMMERCIAL & INDUSTRIAL		
	Non Heating	Hot Water	Heating	All	Non Heating	Heating	All
2019	4.59	6.48	7.83	7.20	5.47	6.95	6.30
2020	5.51	7.26	8.56	7.97	6.33	7.71	7.11
2021	6.44	8.20	9.50	8.91	7.27	8.66	8.05
2022	6.38	8.12	9.42	8.83	7.20	8.58	7.97
2023	6.39	8.12	9.42	8.83	7.21	8.58	7.98
2024	6.48	8.20	9.50	8.91	7.29	8.66	8.06
2025	6.50	8.21	9.51	8.92	7.31	8.67	8.08
2026	6.57	8.28	9.58	8.99	7.38	8.74	8.15
2027	6.61	8.31	9.60	9.02	7.41	8.77	8.18
2028	6.73	8.43	9.72	9.14	7.53	8.88	8.29
2029	6.84	8.53	9.81	9.24	7.64	8.98	8.40
2030	6.90	8.58	9.87	9.29	7.70	9.04	8.45
2031	7.06	8.74	10.02	9.45	7.86	9.19	8.61
2032	7.08	8.74	10.03	9.45	7.87	9.20	8.62
2033	7.02	8.68	9.96	9.39	7.81	9.14	8.56
2034	6.93	8.58	9.86	9.29	7.71	9.04	8.46
2035	6.96	8.60	9.87	9.31	7.74	9.06	8.48
2036	7.00	8.63	9.90	9.34	7.77	9.09	8.51
2037	7.04	8.66	9.93	9.37	7.81	9.12	8.55
2038	7.08	8.70	9.96	9.40	7.85	9.15	8.58
2039	7.12	8.73	9.99	9.43	7.88	9.19	8.62
2040	7.16	8.76	10.03	9.47	7.92	9.22	8.65
2041	7.20	8.79	10.06	9.50	7.96	9.25	8.69
2042	7.24	8.83	10.09	9.53	8.00	9.28	8.72
2043	7.28	8.86	10.12	9.56	8.03	9.32	8.76
2044	7.32	8.89	10.15	9.60	8.07	9.35	8.79
2045	7.36	8.93	10.18	9.63	8.11	9.38	8.83
2046	7.41	8.96	10.21	9.66	8.15	9.42	8.86
2047	7.45	8.99	10.24	9.70	8.19	9.45	8.90

From 2018 Avoided Cost Study Update  
Appendix C for Southern New England

**Table G-9  
National Grid  
2019 Targeted Shareholder Incentive**

Incentive Rate: 5.00%

	(1)	(2)	(3)	(4)	(5)
Sector	Eligible Spending Budget \$(000)	Target Incentive \$(000)	Target Savings Goal (MMBTU)	Threshold Savings (MMBTU)	Target Incentive Per Annual MMBTU
Income Eligible Residential	\$7,946	\$397.3	29,665	22,249	\$13.39
Non-Income Eligible Residential	\$13,607	\$680.3	192,069	144,052	\$3.54
Commercial & Industrial	\$7,659	\$383.0	210,974	158,230	\$1.82
Total	\$29,211	\$1,460.6	432,708	324,531	\$3.38

**Notes:**

- (1) Eligible Spending Budget excludes EERMC, OER, Pilots, and Shareholder Incentive. See Table G-3 for details.
  - (2) Equal to the incentive rate (5.0%) x Column (1).
  - (3) See Table G-7
  - (4) 75% of Column (3). No incentive is earned on annual MMBTU savings in the sector unless the Company achieves at least this threshold level of performance.
  - (5) Column (2)\*1000/Column (3). This illustration is for achieved savings equal to the savings target. The incentive earned per MMBtu will vary with the percent of the savings target achieved
- The shareholder incentive will be calculated as follow, where SB is the Spending Budget in the sector
- From 75% of savings to 100% of savings: Shareholder Incentive = SB x (0.15 x % of savings achieved – 0.10)
  - From 100% of savings to 125% of savings: Shareholder Incentive = SB x (0.05 x % of savings achieved)

**Table G-10**  
**National Grid**  
**Revolving Loan Fund Projections**

**Large C&I Revolving Loan Fund**

<b>(1)</b>	<b>Total Loan Fund Deposits Through 2018</b>	<b>\$ 3,071,678</b>
(2)	Current Loan Fund Balance	\$ 1,874,474
(3)	Projected Loans by Year End 2018	\$ 615,000
(4)	Projected Repayments by Year End 2018	\$ 249,895
<b>(5)</b>	<b>Projected Year End Loan Fund Balance 2018</b>	<b>\$ 1,509,369</b>
<hr/>		
(6)	2019 Fund Injection	\$ -
<b>(7)</b>	<b>Projected Loan Fund Balance, January 2019</b>	<b>\$ 1,509,369</b>
(8)	Projected Repayments throughout 2019	\$ 500,000
(9)	Estimated Loans in 2019	\$ 1,100,000
<b>(10)</b>	<b>Projected Year End Loan Fund Balance 2019</b>	<b>\$ 909,369</b>

Notes

- 1 Funding injections since loan funds began.
- 2 Current Loan Fund Balance is through July 2018
- 3 Projected Loans by Year End 2018 is estimated based on current commitments
- 4 Projected Repayments by Year End 2018 is estimated based on projected loans by year end and repayment schedules
- 5 Equal to (2) - (3) + (4)
- 6 Fund Injection, as budgeted on E-2
- 7 Equal to (5) + (6)
- 8 Assumption based on average repayments over 12 months; repayments accumulate over time and may vary widely.



## 2019 Bill Impacts

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### Summary

National Grid has performed an analysis of the electric and gas bill impacts resulting from the proposed 2019 Energy Efficiency Program Plan. Bill impacts are distinct from rate impacts because they model the long term effects of efficiency programs on annual customer bills by aggregating rate and consumption changes. In the electric bill impact analysis, rate impacts are modeled by mapping EE programs to rate classes and estimating changes in both delivery service rates and supply costs due to the energy efficiency (EE) program charge proposed in the Plan. Consumption impacts are predicted from proposed participation and energy efficiency savings. Where possible, other effects of energy efficiency beyond direct energy savings – such as price suppression and avoided infrastructure investments – are also included. In the gas bill impact analysis, rate impacts for different sectors account for the EE charge, while consumption impacts are modeled based on predicted participation and energy savings in the 2019 plan.

### Key Findings

Key findings did not change dramatically from last year to this year. The key findings of the bill impact analysis are:

- Most customers are participating in EE programs.
- High participation means that over the lifetimes of the programs proposed for 2019, the average Rhode Island customer's (participants and non-participants combined) bill will be less than if there were no programs. Overall, rates may increase, but energy savings from participation in EE programs results in bill savings that offset the costs of the EE program charge and revenue recovery.
- Higher values for electric energy and capacity DRIPE led to lower long term electric rate increases across all rate classes than in 2018, including long term rate decreases for medium (G-02) and large (G-32 ,G-62) C&I customers.

### Electric Bill Impact Methodology

The electric bill impact models used to generate the electric results were adapted from models originally built by Synapse Energy Economics on behalf of the Division of Public Utilities and Carriers in 2013. These models are distinct from the traditional electric bill impacts models the

Company presents in Rates proceedings before the PUC. The new models analyze two cases: the fulfillment of the 2019 Plan and the absence of an efficiency plan in 2019. This comparison isolates the effects of the proposed 2019 EE program charge and Fully Reconciling Funding Mechanism. It assumes energy efficiency plans have been implemented before 2019 but will not be offered starting in 2019. The analysis also incorporates how system-wide reduction in energy consumption affects the different elements of rates such as transmission, distribution, and commodity charges.

Five separate electric models were developed, one for each of the main customer segments: Residential, Income Eligible, Small Commercial, Medium Commercial, and Large Commercial and Industrial. For all of the electric models, the key inputs are the net planned participation and savings numbers from Table E-7 in Attachment 5.<sup>1</sup> The models combine these data with rate class information to determine the benefits to customer bills from program participation. Table 1 below shows the mapping of efficiency programs to rate classes for the five models.<sup>2</sup> The diversity of the commercial customer profile means that customers from multiple rate classes can participate in any commercial program. Assumptions for these rate classes were made based on historical program participation data.<sup>3</sup>

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<sup>1</sup>In 2017, there were four Bill Impact models in total. In 2018, there were five models – the addition was the C&I Medium Commercial (G02) model. In 2017, medium commercial customers were split between the small and large commercial models, now they are differentiated. This change allows for a more realistic depiction of bill impacts because there is a wide array of usage among commercial customers and having more groupings helps illustrate typical impacts.

<sup>2</sup> Delivery service rate docket used in the analysis are R.I.P.U.C No. 2100 for basic residential rate, R.I.P.U.C No. 2101 for low-income residential rate, R.I.P.U.C No. 2104 for small C&I rate, R.I.P.U.C No. 2139 for medium C&I rate, R.I.P.U.C No. 2147 & 2141 for large C&I rate. Standard Offer Service rates used in the analysis are R.I.P.U.C. No. 2096 A-06 & A-16 total commodity charge for standard and low income residential rate group, C-06 total commodity charge for small C&I rate group, C-06 total commodity charge for small C&I rate group and G-32 total commodity charge for large C&I rate group.

<sup>3</sup> Savings and participation modeled by C&I rate classes is partitioned and estimated based on historical data.

Table 1: Electric Rate and Program Mapping

Bill Impact Model	Rate Class(es)	Efficiency Programs
Residential Electric	A-16	Home Energy Reports
		EnergyStar HVAC
		EnergyWise Multifamily
		EnergyStar Lighting
		Residential Consumer Products
Income Eligible Electric	A-60	Income Eligible Single Family
		Income Eligible Multifamily
		Home Energy Reports
		EnergyStar Lighting
Small Commercial	C-06	Small Business Direct Install
		Large Commercial New Construction
		Large Commercial Retrofit
Medium Commercial	G-02	Small Business Direct Install
		Large Commercial New Construction
		Large Commercial Retrofit
Large Commercial	G-32, G-62	Small Business Direct Install
		Large Commercial New Construction
		Large Commercial Retrofit

Explanation of Electric Bill Impact Results

The results of the models are shown in Tables 2 through 6, and some highlights of the results are presented after the Tables. The columns in the Tables are as follows:

- Long-term rate impacts are defined as the average rate increase percentage from 2019 to 2039 (positive numbers indicate rate increase).
- Typical energy savings refer to the average percentage of energy savings to total annual consumption from 2019 to 2039 (positive numbers indicate electricity consumption reduction).
- Typical bill savings are defined as average percentage of bill decrease to total customer bill from 2019 to 2039 (positive numbers indicate electricity bill reduction).

The long-term rate impacts, typical energy savings, and typical bill savings are shown for average participants in energy efficiency programs, non-participants, and average customers within each of the five main customer segments. Average customers combine the bill impacts of EE participants and non EE participants to show the impacts of all customers combined. For the 2019 Bill Impact analysis the key finding is that, over the lifetimes of the programs proposed

for 2019, the average Rhode Island customer’s (participants and non-participants combined) bill will be less than if there were no programs.

**Table 2: Residential Bill Impact Analysis – A16 (2019 EE Plan vs. No EE)**

Residential	Long-Term Rate Impacts	Typical Energy Savings	Typical Bill Savings
	(% of Total Rate)	(% per Participant)	(% of Total Bill)
Average Participant	0.11%	2.30%	1.69%
Non-Participant	0.11%	0.00%	-0.11%
Average Customer	0.11%	2.18%	1.60%

**Table 3: Income-eligible Bill Impact Analysis – A60 (2019 EE Plan vs. No EE)<sup>4</sup>**

Income-Eligible	Long-Term Rate Impacts	Typical Energy Savings	Typical Bill Savings
	(% of Total Rate)	(% per Participant)	(% of Total Bill)
Average Participant	0.94%	5.01%	3.56%
Non-Participant	0.94%	0.00%	-0.94%
Average Customer	0.94%	4.70%	3.28%

**Table 4: Small Commercial Bill Impact Analysis – C06 (2019 EE Plan vs. No EE)<sup>5</sup>**

Small Business	Long-Term Rate Impacts	Typical Energy Savings	Typical Bill Savings
	(% of Total Rate)	(% per Participant)	(% of Total Bill)
Small C&I Participant	0.21%	20.92%	22.85%
Non-Participant	0.21%	0.00%	-0.21%
Average Customer	0.21%	1.90%	1.69%

**Table 5: Medium Commercial Bill Impact Analysis – G02 (2019 EE Plan vs. No EE)**

	Long-Term Rate Impacts	Typical Energy Savings	Typical Bill Savings
	(% of Total Rate)	(% per Participant)	(% of Total Bill)
Medium C&I Participant	-0.40%	11.14%	11.50%
Non-Participant	-0.40%	0.00%	0.40%
Average Customer	-0.40%	1.88%	2.24%

<sup>4</sup> Home Energy Reports and Energy Star Lighting participation and savings are split between standard residential and income-eligible customers, since these measures reach all residential customers. For analysis purposes, it is assumed that income-eligible customers account for 10% of participation and 10% of savings in the two programs.

<sup>5</sup> For 2019, the small business (C-06 rate) customer count has been refined to better estimate customers. The number of accounts on the C06 rate is greater than the number of customers, for example there are many accounts for cell towers, pumps, etc. that belong to one customer. This is an estimate based on the best data currently available to the Company.

Table 6: Large Commercial & Industrial Bill Impact Analysis – G32, G62 (2019 EE Plan vs. No EE)

Commercial & Industrial	Long-Term Rate Impacts	Typical Energy Savings	Typical Bill Savings
	(% of Total Rate)	(% per Participant)	(% of Total Bill)
Large C&I Participant	-1.01%	4.45%	5.41%
Non-Participant	-1.01%	0.00%	1.01%
Average Customer	-1.01%	2.47%	3.46%

On the residential side, rates increase for all rate classes. For all rate classes non-participant bills increase slightly, while participant and average customer bills go down. The decreased average customer bills demonstrate that the scale of the energy savings due to program participation outweighs the incremental costs to implement the program. On the commercial side, long-term rates increase slightly for small C&I customers, and decrease for medium, and large C&I customers. Overall, long term rate impacts decrease across all rate classes from 2018 to 2019. A key driver in this decrease is the application of updated avoided energy supply component values from the “Avoided Energy Supply Components in New England: 2018 Report” (2018 AESC Study) see EM&V attachment 3 for more details. The study found higher values for energy and capacity DRIPE. For Small, Medium, and Large Commercial customers, bills decrease for all customers (participants and non-participants), with the exception of a 0.21 rate increase for non-participant small business customers.

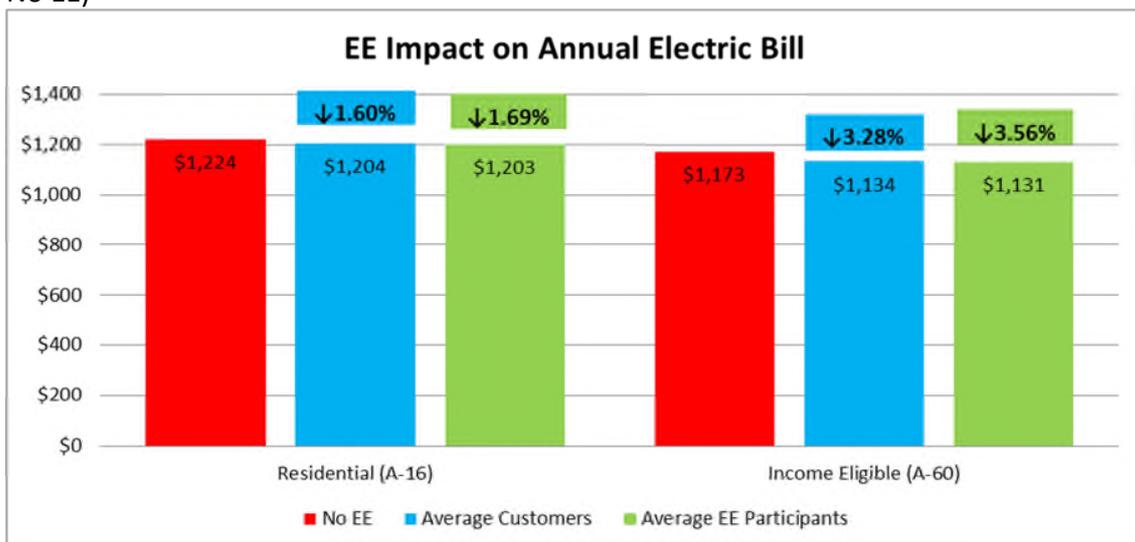
- *Residential long-term rate impacts:* EE programs bring system benefits in terms of avoided infrastructure investment in generation, transmission, and distribution in the long-run. These avoided investments will ultimately flow through rates and offset the short-term contribution of the EE program charge to 2019 rate (from 5-9%, depending on rate class) and bring the long-term rate increase down to 0.11% for standard residential customers and 0.94% for income-eligible residential customers.
- *Small, Medium, and Large C&I long-term rate impact:* avoided infrastructure costs flow through rates and offset the EE program charge for 2019 and beyond, leading to a 0.23% increase in rates for small C&I customers, a 0.40% rate decrease for medium C&I customers, and a 1.01% rate decrease for large C&I customers through 2039.
- *Average participant bill savings:* the proposed EE programs will bring bill savings to participants in all rate groups. Specifically, typical bill savings are 1.69% for standard residential participants, 3.56% for income-eligible residential participants, 22.85% for

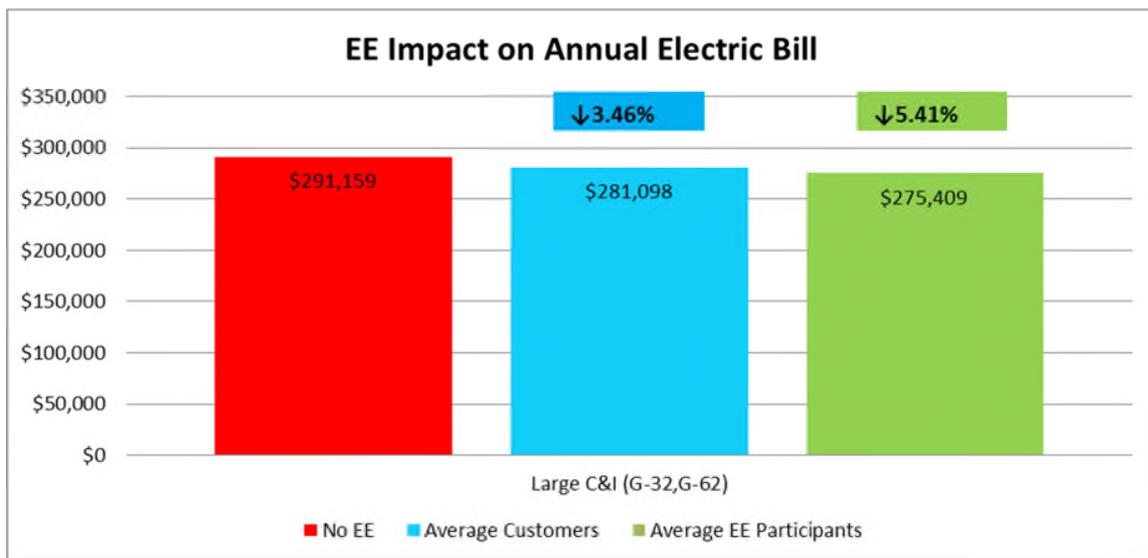
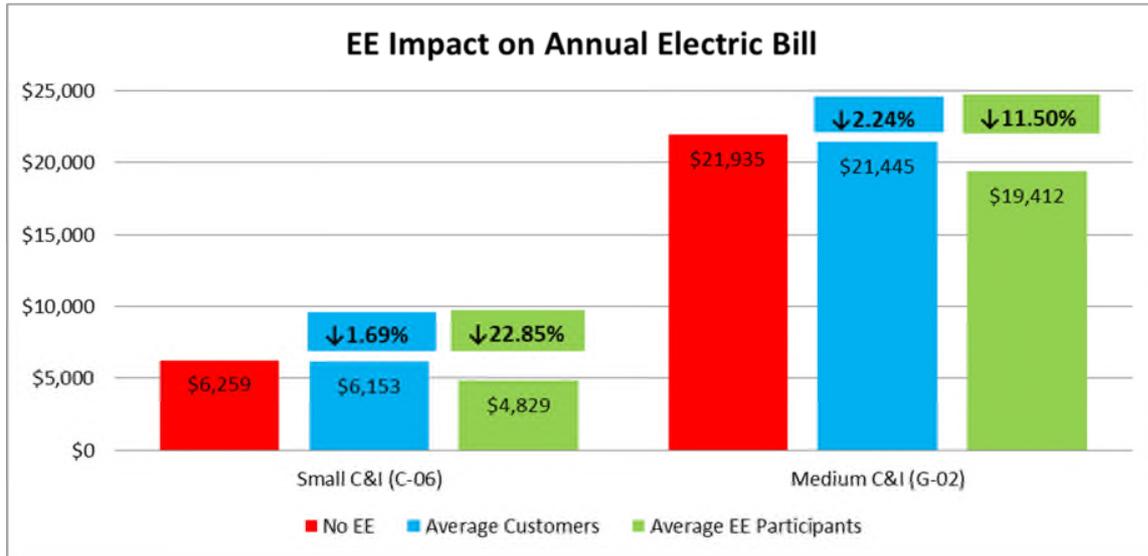
small C&I participants, 11.50% for medium C&I participants, and 5.41% for large C&I participants (Tables 2-6).

- For the 2019 Bill Impact Analysis, Commercial participation by rate class is assumed to be similar to 2016 data.
- *Average customer typical bill savings:* among all participants and non-participants, typical bill savings is 1.60% for standard residential customers, 3.28% for income-eligible residential customers, 1.69% for small C&I customers, 2.24% for medium C&I customers, and 3.46% for large C&I customers, indicating that the proposed EE programs will bring net benefits to all types of electric customers in Rhode Island (Tables 2-6).

Figure 1 shows an example of electric bill reduction for average residential, income-eligible, small C&I, medium C&I and large C&I customers and participants. Bills are calculated based on average annual consumption of a typical customer in Rhode Island (residential and low-income: 6000 kWh; small C&I in C-06 rate group: 33,000 kWh, medium C&I in G-02 rate group: 158,400 kWh, large C&I in G32 and G62 rate groups: 2.34 million kWh). In the figures below, the rates are the same as rates used in the bill impact analysis above. This illustration is different from traditional incremental bill impacts because it shows the long-term bill impact of the proposed EE programs and accounts for the measure life of the energy efficiency measures.

Figure 1: Example of Typical Participant and Customer Annual Electric Bill Impact (2019 EE Plan vs. No EE)





Gas Bill Impact Methodology

The natural gas bill impacts were analyzed by adapting an existing gas bill impact model used by the Company in dockets 4846 and 4872.<sup>6</sup> The updated model analyzes the effects of the 2019 Plan by looking at a change in average consumption due to energy efficiency. The adapted gas models do not account for efficiency’s effects on future gas rates. They only look at direct energy savings for the rate classes that best map to the four efficiency customer segments: Residential, Income Eligible, Small Business, and Large Commercial and Industrial. The table below shows the mapping of rates to customer segments.<sup>7</sup>

Table 6: Gas Rate Mapping

Bill Impact Model	Rate Class(es)
Residential Gas	Residential Heating
Income Eligible Gas	Residential Heating – Low Income
Small Commercial Gas	C&I Small
Large Commercial Gas	C&I Medium, Large Low Load, Large High Load, Extra Large Low Load, Extra Large High Load

Explanation of Gas Bill Impact Results

The proposed EE programs lead to reduction in participant bills. Moreover, the annual bills for average customers (participants and non-participants combined) are also projected to decrease for all four rate groups (residential heating, low-income heating, small commercial and large commercial). The detailed bill reduction percentages are shown in Table 7. The columns in the Tables are as follows:

- The rate impact is calculated as percent increase in rates due to EE (positive numbers indicate rate increase).
- The participant bill savings is defined as percent change in participant bill over the lifetime of the EE programs (positive numbers indicate participant bill decrease).

<sup>6</sup> Proposed DAC rates are in Docket 4846 and proposed GCR rate are in Docket 4872.

<sup>7</sup> The analysis uses residential and income eligible heating to represent the two groups. As of August 2018, residential heating represents 92% of standard residential customers and income eligible heating represents 98% of income eligible customers.

- The average customer bill savings is expressed as the percent change in total bill for average customers (participants and non-participants combined and positive numbers indicate average customer bill decrease).

Table 7: RI Gas Bill Impact Analysis

Rate Group	Rate Impact (% of 2019 Total Rate)	Average Participant Bill Savings (as a % Change in 2019 Bills)	Average Customer Bill Savings (as a % Change in 2019 Bill)
Residential Heating	4.68%	1.12%	0.64%
Low Income Heating	4.68%	23.70%	5.14%
Small Commercial	3.18%	5.99%	0.02%
Large Commercial	3.43%	5.49%	0.32%

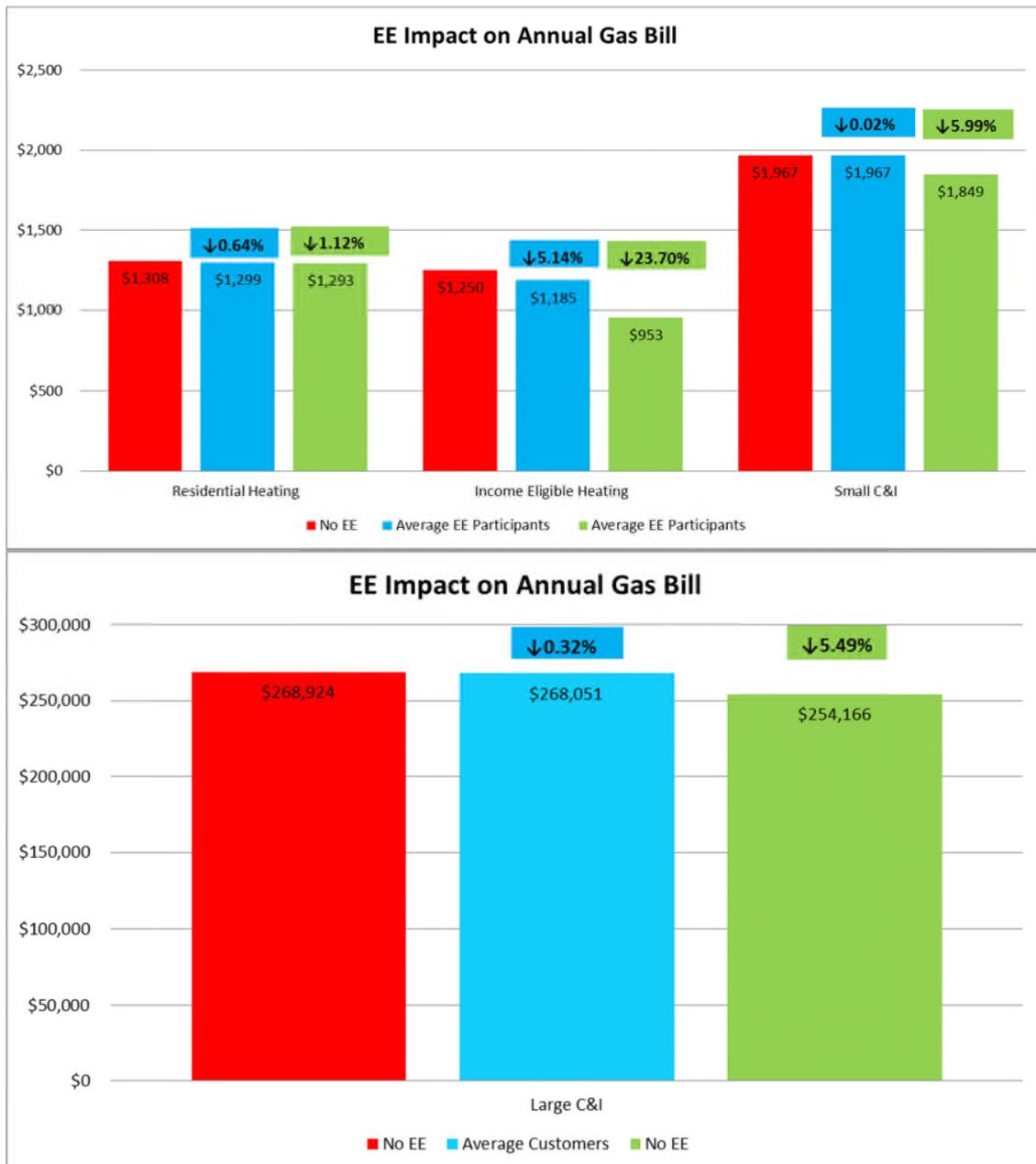
- The total EE contribution to the 2019 gas rate is 4.68% for residential rates and, 3.18 for small C&I rates, and 3.43% for large C&I rates.
- Typical bill savings is 1.12% for standard residential participants, 23.70% for income-eligible residential participants, 5.99% for small C&I participants, and 5.49% for large C&I participants (Table 7).<sup>8</sup>
- The average customers in all rate groups will experience bill decrease (0.64% for standard residential customers, 5.14% for income-eligible residential customers, 0.02%<sup>9</sup> for small C&I customers, and 0.32% for large C&I customers), indicating that the proposed EE programs will bring net benefits to all types of gas customers in Rhode Island (Table 7).

Figure 2 shows an example of gas bill reduction for average residential heating, income-eligible heating, small C&I, and large C&I customers and participants. Bills are calculated based on average annual consumption of a typical customer in Rhode Island (standard residential: 845 therms, low-income residential: 845 therms, small C&I: 1,277 therms, large C&I: 359,745 therms).

<sup>8</sup> The difference in bill reduction percentage between standard residential and income-eligible participants is mainly driven by Home Energy Reports for standard residential customers. Home Energy Report brings less direct energy savings to participants. This analysis assumes Home Energy Reports are offered to standard residential customers.

<sup>9</sup> In 2019 participants in the C&I Multifamily program began to be counted on the account level for the Bill Impacts Analysis instead of individual level. This more accurately represents the number of large commercial customers participating in the program.

Figure 2. Example of Annual Gas Bill Impact on Typical Participant and Customer (2019 EE Plan vs. No EE)





## 2019 Pilots

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### Summary

In 2019 all residential and commercial pilots will be included in this new attachment. The Company has redefined what it considers a pilot in accordance with the Docket No. 4600-A PUC Guidance Document.

Pilot: As defined in the Docket 4600-A Guidance Document, “A pilot is a small scale, targeted program that is limited in scope, time, and spending and is designed to test the feasibility of a future program or rate design. It is incumbent upon the proponent of a pilot to define these limits in a proposal for PUC review. Ideally, a pilot can provide net benefits and achieve goals, but the primary design and value of a pilot is to test rather than to achieve.”<sup>1</sup>

This attachment summarizes each pilot and describes the manner in which it advances, detracts, or remains neutral on achieving the Docket 4600 goals for the electric and gas system.

Pilots are designed to explore technologies and approaches to energy management not included in the core energy efficiency programs (Residential, Commercial and Industrial, and Multifamily).

Pilots enable the Company to test technologies, new energy management strategies, customer adoption and cost effectiveness of emerging and new technologies. If a pilot is successful for commercialization, new programs and measures may be added to existing core programs.

For actions in the Plan that do not fall under the Docket 4600-A definition of pilots, the Company proposes the following definitions for demonstrations and assessments:

- **Demonstration:** A demonstration tests a new technology or solution that is delivered as part of an existing program where a technical assessment has estimated the savings and determined that the measure is likely to be cost effective. An example of a demonstration was beneficial electrification of heat in the HVAC program in 2018.
- **Assessment:** An assessment tests a measure, a bundle of measures, or a solution, that can be delivered as part of existing program where the savings are not known but will

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<sup>1</sup> Docket No. 4600-A PUC Guidance Document, October 27, 2017. Section V. Pilots.

be explored as part of the assessment. An example of an assessment is automated window shades in the C&I retrofit program.

The following pilots are proposed for 2019 in the Residential, Commercial and Industrial, and Multifamily market segments.

Summaries of proposed 2019 demonstrations and assessments are included within Attachments 1 and 2 as part of the core program descriptions. These categories are expected to contribute savings to the programs in which they are offered. These categories are therefore included as part of a program’s total planned costs, benefits, and savings. These categories are included in the overall cost-benefit ratio of the Plan and they are included in the calculation of the shareholder incentive.

**Commercial and Industrial (C&I) Pilots**

In 2019 the National Grid C&I team will focus on new lighting technologies and lighting go-to-market strategies, industrial technologies and go-to-market approaches, new construction demonstrations as well as demand response demonstrations. Please refer to Attachment 2 Commercial and Industrial Programs, Section 3 in for a detailed list of all demonstrations and assessments. The detailed descriptions for these demonstrations and assessments are under the various programs in the C&I section.

The Company is proposing two C&I pilots for 2019 listed below

<b>Commercial and Industrial Pilots</b>					
	<b>Name</b>	<b>Goals and Scope</b>	<b>Duration</b>	<b>2019 Budget</b>	<b>2019 Savings</b>
1	Pathway to Zero Energy Buildings	Start two to three new Zero Energy Building (ZEB) pilot projects in the 2018-2019 timeframe and test zero energy design, operation and collect customer feedback from building owner, designer and occupants. The goal is to inform the design of a Zero Energy Building Program in 2020-2021	2018-2020	\$178,500	Not determined

2.	Gas DR Pilot	Reduce gas consumption with large commercial customers during the winter season.	2018 (winter)- 2020	\$357,500	300 Dekatherms per hour
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Pathway to Zero Energy Buildings Pilots

In 2018 National Grid initiated a Zero Energy Building (ZEB) pilot to advance interest in the RI building industry for ZEB’s and a path to zero energy buildings. To accelerate these efforts National Grid will continue to focus on four areas to advance ZEB’s in 2019.

1. Education and awareness: This includes educational Forums and Seminars on a bi-annual basis that provide education and information specific to achieving low Energy Use Intensity (EUI) targets in commercial buildings as a pathway to Zero Energy Buildings. These will be coordinated with the residential Zero Energy Building efforts as there are overlaps with projects like multifamily and with the design and building community at large.
2. Marketing: Providing case studies and information on Zero Energy Building strategies for the building industry and owners and developers via various channels, including online and via newsletters.
3. Training: Providing training and access to trainings for building industry professionals and contractors.
4. Zero Energy Building projects: Identifying projects with owners, developers and architects that can achieve Zero Energy targets and providing technical expertise, financial incentives, commissioning and post occupancy verification for these projects, as a way to learn and help design and launch a full Zero Energy Building program in the future.

Early market assessment in 2018 indicates there is interest in the market for ZEB multifamily projects, higher education as well as a potential for K-12 school projects. In 2018 the Company developed criteria for Zero Energy projects as a way to solicit project partnerships with owners, developers and architects and will continue these efforts to identify projects in 2019.

<b>Pathway to Zero Energy Buildings Pilot</b>	
<b>4600 Goals for Electric System</b>	<b>Advances/Detracts/Neutral</b>
Provide reliable, safe, clean, and affordable energy to Rhode Island customers over the long term (this applies to all energy use, not just regulated fuels).	<p>Advances low energy use buildings and clean energy with renewables on site.</p> <p>Provides bill reduction and therefore operational savings due to higher energy efficiency coupled with renewables on site.</p> <p>Provides healthier buildings that are more comfortable.</p> <p>Improvements in customer empowerment and choice</p>
Strengthen the Rhode Island economy, support economic competitiveness, retain and create jobs by optimizing the benefits of a modern grid and attaining appropriate rate design structures.	<p>This pilot has the potential to provide new local job opportunities through the construction activities and on-going site maintenance.</p> <p>Participating in, and acknowledgement of, these programs increases awareness of job opportunities in emerging and sustainable energy sources, which can generate interest in these jobs and create future local jobs in these areas.</p> <p>Creates high performing environments that boost economic growth</p>
Address the challenge of climate change and other forms of pollution.	Pilot advances carbon savings with energy efficiency and renewable energy.
Prioritize and facilitate increasing customer investment in their facilities (efficiency, distributed generation, storage, responsive demand, and the electrification of vehicles and heating) where that investment provides recognizable net benefits.	Investments in Zero Energy Buildings create more value for building owners
Appropriately compensate distributed energy resources for the value they provide to the electricity system, customers, and society.	Neutral – this pilot is neutral on this goal. The Company will explore customer compensation for the locational benefits to the system as ZEB market scale and emerges.

Appropriately charge customers for the cost they impose on the grid.	The current ZEB pilot will not disproportionately impact the grid at the moment. At scale ZEB's have the potential to disproportionately impact (cost) customers who do not have renewables on site. This Company will explore impacts as this market emerges.
Appropriately compensate the distribution utility for the services it provides.	Neutral – this pilot is neutral on this goal.
Align distribution utility, customer, and policy objectives and interests through the regulatory framework, including rate design, cost recovery, and incentive.	This pilot advances this goal by putting incentives towards energy efficiency measures and solutions that helps to achieve the GHG reduction goals of the Resilient Rhode Island Act of 2014 and the Rhode Island GHG Emissions Reduction Plan of 2016.

Gas Demand Response Pilot

National Grid has been utilizing electric Demand Response (DR) to address grid constraints and help provide reliable service to our customers. Until recently, DR for the company customers was limited to the electric market. The Company is currently testing gas DR projects in its NY territory, conducting a study of the potential for gas demand response in MA with Fraunhofer Center for Sustainable Energy, and laying the groundwork for a pilot in RI in that will begin in the winter of 2018 - 2019. The gas DR pilot will continue in the winter of 2019-2020, in Rhode Island. With gas DR the Company will test distribution system benefits, customer adoption of gas DR as well as incentive levels to drive participation. An in-depth study will also be completed to quantify winter demand benefits.

National Grid serves as the gas and electric utility for the majority of RI, which is not the case in MA and NY. Testing gas DR will allow the Company to understand the impact on gas and electric systems, as well as understanding if National Grid's role in the market influences rates of adoption. Finally, the gas DR pilot will involve the installation of data recording hardware that will provide granular usage data for participating customers. This will be useful context for conversations in RI regarding the need for, and potential benefits of, AMI.

The Rhode Island gas DR pilot will begin with selling to customers during the fall of 2018, will operate during the winter of 2018-2019, and will continue during the winter of 2019-2020. Data from the pilot will be evaluated each year with a summary report being produced in 2020. With

gas DR the Company will test distribution system benefits, customer adoption of gas DR as well as incentive levels needed to drive participation.

Customer segment addressed: The gas DR pilot is focused on large, firm commercial and industrial customers, specifically those that have equipment that can be curtailed without creating an unsafe environment. The goal of the project is to test

- Are customers interested in participating in an incentivized Gas Demand Response program?
- If so, what are the acceptable price point values by customer SIC code and equipment type?
- What are the distribution system benefits?
- What is the scalability of the program throughout the pilot service territory?

The gas DR pilot will be evaluated, in the spring/summer of 2019 and 2020 for benefits to the customer and the distribution system and to determine if it has a pathway to be cost effective at scale.

<b>Gas Demand Response</b>	
<b>4600 Goals for Gas distribution System</b>	<b>Advances/Detracts/Neutral</b>
Provide reliable, safe, clean, and affordable energy to Rhode Island customers over the long term (this applies to all energy use, not just regulated fuels).	DR has the potential for many value streams, such as alleviating local distribution system constraints, increasing system flexibility, potentially delaying infrastructure reinforcement projects, and providing a revenue stream for participants.
Strengthen the Rhode Island economy, support economic competitiveness, retain and create jobs by optimizing the benefits of a modern grid and attaining appropriate rate design structures.	DR has the potential for many value streams, such as alleviating local distribution system constraints, increasing system flexibility, potentially delaying infrastructure reinforcement projects, and providing a revenue stream for participants that would support economic growth.
Address the challenge of climate change and other forms of pollution.	While demand response does not directly address climate change, the additional insight into usage due to the increased data resolution provided to participants may create an opportunity for additional energy efficiency projects. Additionally,

	there may be a reduction in carbon due to participation in DR events.
Prioritize and facilitate increasing customer investment in their facilities (efficiency, distributed generation, storage, responsive demand, and the electrification of vehicles and heating) where that investment provides recognizable net benefits.	Neutral
Appropriately compensate distributed energy resources for the value they provide to the gas system, customers, and society.	Neutral – this pilot is neutral on this goal.
Appropriately charge customers for the cost they impose on the grid.	Neutral – this pilot is neutral on this goal.
Appropriately compensate the distribution utility for the services it provides.	Neutral – this pilot is neutral on this goal.
Align distribution utility, customer, and policy objectives and interests through the regulatory framework, including rate design, cost recovery, and incentive.	Gas DR pilot advances this goal by putting incentives towards peak reduction on the gas distribution network that helps to achieve the GHG reduction goals of the Resilient Rhode Island Act of 2014 and the Rhode Island GHG Emissions Reduction Plan of 2016.  There is also an alignment in the sense that customer participation could affect system planning, which could have a larger financial impact for all customers. In this way, participants are incentivized for providing the behavior that matches the goals of the company.

### Residential Pilot Projects

In 2019 the Residential New Construction Team will focus on building the zero energy ready and Passive House markets in Rhode Island. The pilot began in 2018, and will continue into 2019 in an effort to develop professional expertise, test the effectiveness of enhanced

incentives, and test the energy efficiency of projects that achieve zero-energy ready or Passive House certification.

<b>Residential Pilots</b>					
	<b>Name</b>	<b>Goals and Scope</b>	<b>Duration</b>	<b>2019 Budget</b>	<b>2019 Savings</b>
1	Pathway to Zero Energy Homes Pilot	Provide enhanced incentives to projects that achieve zero energy ready or Passive House homes. Continue to support the professional development of the RI building community to become certified zero-energy and/or Passive House certified builders. Test zero energy design and operation and collect customer feedback from project team and occupants. The goal is to inform the design of a Zero Energy Building Program in 2020-2021	2018-2020	\$186,850	Not determined

In 2018, the Company initiated the Zero Energy Homes Pilot to help to accelerate the zero energy market in Rhode Island. This pilot will continue into 2019 in order to build upon the following four main market segments:

1. Education and Awareness
  - a. Stakeholder Forums
  - b. Communications
  - c. Tours
  - d. Home Show
2. Workforce Development
  - a. Zero Energy and Passive House Training
  - b. Marketing
  - c. Project Certification
3. Project Incentives

- a. Components to get to zero energy ready
- 4. Marketing
  - a. Zero Energy in RI – case studies

This pilot intends on funding these segments to test the following:

1. If there will be an increase in zero energy homes as a result of increased number and promotion of trained professionals
2. If there will be additional savings from high efficiency homes plus one of the proposed pathways to zero energy.

<b>Pathway to Zero Energy Buildings Pilot</b>	
<b>4600 Goals for Electric System</b>	<b>Advances/Detracts/Neutral</b>
Provide reliable, safe, clean, and affordable energy to Rhode Island customers over the long term (this applies to all energy use, not just regulated fuels).	<p>Advances low energy use new construction and major renovations and creates the infrastructure for all-electric homes and on-site renewables.</p> <p>Provides bill reduction compared to baseline new construction homes and therefore operational savings due to higher energy efficiency coupled with renewables on site.</p> <p>Provides healthier buildings that are more comfortable.</p> <p>Improvements in customer empowerment and choice</p>
Strengthen the Rhode Island economy, support economic competitiveness, retain and create jobs by optimizing the benefits of a modern grid and attaining appropriate rate design structures.	<p>This pilot has the potential to increase the professional capabilities of the RI residential home building industry.</p> <p>The program will support the advancement of rate design structures by incentivizing all electric homes as well as smart homes.</p> <p>The Program will be marketed through home tours, webinars, mail/email communication, the RI Home Show and collaboration with RI residential industries.</p> <p>Creates high performing environments that boost</p>

	economic growth
Address the challenge of climate change and other forms of pollution.	Pilot promotes carbon savings via all electric homes and building in the infrastructure for electric vehicles (EVs) and photovoltaic energy (PV).
Prioritize and facilitate increasing customer investment in their facilities (efficiency, distributed generation, storage, responsive demand, and the electrification of vehicles and heating) where that investment provides recognizable net benefits.	This Program will facilitate the investment in a zero energy home based on the additional technical design and construction assistance and additional incentives. A zero energy home will also be the foundation for a smart home with innovative technologies for full automation. It will serve the needs of those who want the least amount of reliance on the grid, who want to reduce their carbon footprint and who want to be leaders in the fast paced technology and automation trends.
Appropriately compensate distributed energy resources for the value they provide to the electricity system, customers, and society.	Neutral – this pilot is neutral on this goal. The Company will explore customer compensation for the locational benefits to the system as ZEB market scale and emerges.
Appropriately charge customers for the cost they impose on the grid.	The current ZEB pilot will not disproportionately impact the grid at the moment. At scale ZEB’s have the potential to disproportionately impact (cost) customers who do not have renewables on site. This Company will explore impacts as this market emerges.
Appropriately compensate the distribution utility for the services it provides.	Neutral – this pilot is neutral on this goal.
Align distribution utility, customer, and policy objectives and interests through the regulatory framework, including rate design, cost recovery, and incentive.	This pilot advances this goal by putting incentives towards energy efficiency measures and solutions that helps to achieve the GHG reduction goals of the Resilient Rhode Island Act of 2014 and the Rhode Island GHG Emissions Reduction Plan of 2016.



## **NATIONAL GRID**

### **INNOVATING FOR A SUSTAINABLE AND EFFICIENT ENERGY FUTURE**

A Rhode Island Customer Listening Forum

August 1, 2018 – 9 a.m. to 3 p.m.  
Omni Hotel, Providence, RI

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The following white paper summarizes the purpose and intent of the workshop, approach and feedback from the participants. It captures major themes and re-occurring responses. The report is organized around the major headings and compiles answers to the questions developed during the design process.

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## Summary

On August 1, 2018, National Grid convened “Innovating for a Sustainable and Efficient Energy Future, A Rhode Island Customer Listening Forum” at Omni Hotel in Providence, Rhode Island. The goal of the workshop was to present information on energy efficiency programs, create an environment to solicit open and honest feedback, and to connect with National Grid customers, leaders and businesses. Ninety-two participants attended the workshop (see a full list of attendees in Appendix A). This included 32 participants attending for National Grid. The balance was stakeholders and consumers. This workshop was produced in cooperation with Lighthouse Consulting Group ([www.lighthousecg.com](http://www.lighthousecg.com)).

To focus the activities of the day, National Grid worked with Lighthouse Consulting Group before the workshop to identify discrete workshop objectives:

1. To inform and educate participants on the benefits and successes of Rhode Island’s energy efficiency program and highlight comprehensive energy solutions such as electric vehicles and renewable energy.
2. To create an environment conducive to collecting open and honest feedback on how to improve the company’s energy efficiency programs today and into the future and inform the growth of the company’s energy solutions such as electric vehicles and renewable energy.

These objectives reflect the desire to facilitate the exchange of ideas between National Grid and customers, participants, businesses/organizations, policymakers and vendors/consultants for incorporation into the company’s energy efficiency program planning and implementation for 2019 and beyond. An interactive workshop format was intentionally selected to bring National Grid face-to-face with stakeholders to answer questions, listen to feedback and generate dialogue.

From the comments received at the kiosks and during the report-outs, the following themes emerged. (A complete discussion of these themes is presented later in this report):

**Provide incentives and financing for solar energy** - *National Grid should expand solar incentives and financing options, possibly tying programs to energy efficiency programs*

**Financing and incentives** - *Access to financing options is important to customers, and National Grid should expand incentives offered*

**Income-eligible and hard to serve customers; renters** - *National Grid should clearly justify and communicate rate hikes on customers and focus on electrification of heating and cooling, especially for elderly customers*

**Move toward electrification in transportation, heating and cooling** – *Overall, attendees supported electric vehicle adoption and having National Grid play a role in advancing the electrification of transportation and heating and cooling*

**Improve data quality** - *Data quality is important to meeting National Grid and State energy efficiency goals; National Grid should continue to develop programs that help accurately capture energy consumption and other data for its customers*

**Clarify confusion between program offerings** - *National Grid should work to reduce confusion between program offerings so customers can efficiently access information on programs they are eligible for*

**Marketing and Awareness** - *Customer program awareness is important; National Grid should continue to market programs in new and innovative ways*

**Reduce administrative burden of programs** - *Program delivery speed is important. National Grid should work to improve the efficiency at which its programs are delivered.*

## **Welcome and Opening Remarks/Program Kick Off**

Opening remarks and program kick off were provided by Michael McAteer and Matthew Ray, both from National Grid. The speakers offered background on the broader policy framework for Rhode Island's energy efficiency work, shared their experience of how energy efficiency translates into tangible savings on the ground, and introduced National Grid's energy efficiency themes for the upcoming year.

Michael McAteer discussed the success of National Grid programs over the last decade, which led Rhode Island to rank third among states in energy efficiency according to ACEEE (the American Council for an Energy-Efficient Economy). The programs have resulted in \$1.02 billion in cumulative energy savings. While energy efficiency is supporting jobs, 726 Rhode Island firms are delivering energy efficiency services. For the years 2018-2020, Rhode Island expects to realize an additional \$1.6 billion in benefits, to increase state gross product by \$325 million, and to reduce 3.7 million tons of carbon emissions — the equivalent of taking 800,000 cars off the road for a year. Rhode Island has also made historic strides in renewable energy, being the first state to develop offshore wind with the 30 MW Block Island project, and recently announced another proposed 400 MW to be developed through the Revolution Wind project. For 2018, Rhode Island plans to procure an additional 400 MW of renewable energy.

The second part of opening remarks was dedicated to recognizing the successes of Rhode Island municipalities that have gone beyond in engaging their communities in National Grid programs and reducing their municipality's energy consumption. Awards were presented to the towns of Cumberland, Richmond, North Kingstown and Smithfield.

Next, National Grid kiosk leaders introduced the five kiosk themes, discussing for each kiosk the current and planned program offers, and then posed questions to program attendees. This combination of

providing information and calling for participant questions and offering answers laid the groundwork for future National Grid program plans.

### **Kiosks: An Interactive Listening and Feedback Session**

During the kiosk session, participants were invited to visit each of 12 kiosks to meet National Grid representatives, learn about energy efficiency services in Rhode Island (current and planned), and provide feedback. The kiosks were divided into five themes, each representing a customer or topic group: business, communities, homes, financing, or comprehensive energy solutions. These themes were further subdivided into the following topics:

**Table 1. Themes & Kiosks**

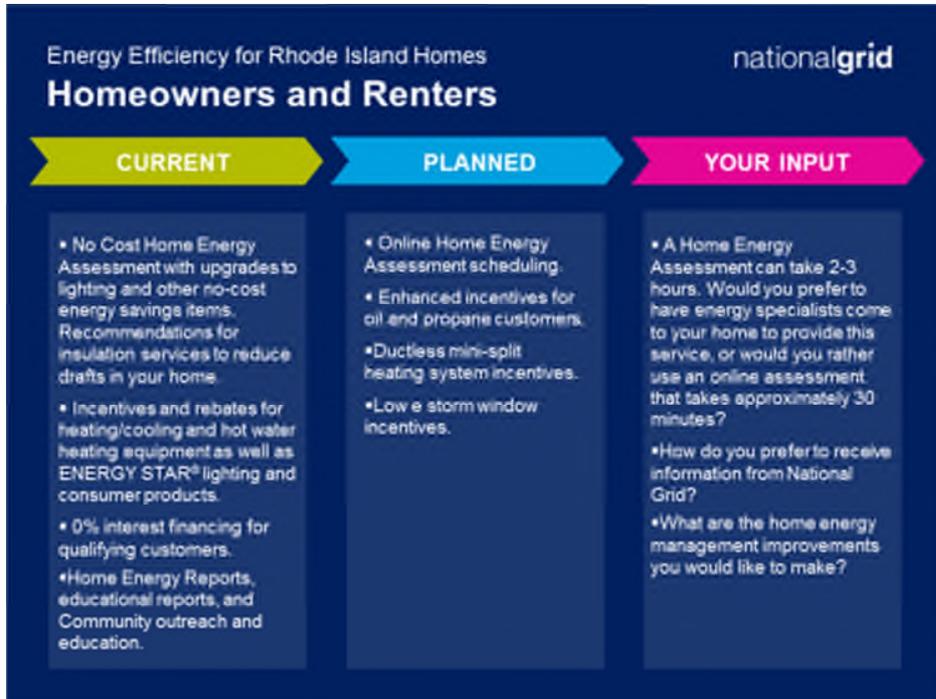
Theme	Kiosk
<b>Business</b>	Small Business
	Large Business
	Multifamily Property Owners and Renters
	Commercial Property Owners and Developers
<b>Communities</b>	Municipalities and Schools
<b>Homes</b>	Income-Eligible and Hard to Reach Customers
	New Homeowners
	Homeowners and Renters
<b>Financing</b>	Finance Offerings
<b>Comprehensive Energy Solutions</b>	Electric Vehicles
	Advanced Metering Functionality
	Renewable Energy and RI System Data Portal

At each respective kiosk, National Grid set up a poster with information about energy efficiency offerings (current and planned) for that topic and a blank foam board where participants could post comment cards. At least one National Grid representative conversant in the topic was stationed at each kiosk to field questions and interact with participants.

The kiosk posters included a summary of services currently provided and services planned for the near future. The posters also included questions that the National Grid team wanted participants to consider. Example questions included:

- How do you prefer to receive information from National Grid?
- Have you heard of National Grid’s small business program?
- Financing can be a major hurdle to customers, but what else stands in the way? How would you approach these issues?

A sample kiosk poster is on page 6; see Appendix B for the full collection of posters.



**Figure 1 - Sample Kiosk Poster**

Participants wrote comments and answered questions on comment cards; a sample of the Participant Comment Card is below.

**Comment Card** **Homeowners and Renters**

  
**Innovating for a Sustainable and Efficient Energy Future**  
  
**A Rhode Island Customer Listening Forum**  
August 1, 2018 | Omni Hotel, Waterplace Ballroom  
1 West Exchange Street, Providence, Rhode Island 02903

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Name: \_\_\_\_\_ Profession: \_\_\_\_\_

**Figure 2 - Sample Comment Card**

### **Reports from Kiosks: What Did We Hear, What Did We Miss?**

National Grid received 116 written comment cards during the kiosk session and many oral comments during in-person conversations with attendees. The number of comment cards submitted varied by kiosk. For example, the “Commercial Property Owners and Developers” kiosk received zero comment cards, while the “Homeowners and Renters” kiosk received almost 30 comment cards. National Grid also received oral comments during the report-out session. After the workshop, National Grid also received comments via an online survey. A full inventory of the written comments is listed in Appendix C, categorized by kiosk.

Participants submitted a wide variety of comments. In many cases, comment cards submitted to a kiosk did not necessarily pertain to that specific kiosk; some of these unrelated comments addressed a different kiosk or none of the kiosks at all. Some comments addressed issues that are not under the purview of National Grid. Therefore, it is important for National Grid to review the individual comments and evaluate which program the comment applies to, and if the comment does not apply to National Grid at all, recommend what entity should address the issue. However, the large majority of comments offered did offer real, concrete insight into how National Grid’s energy efficiency programs are perceived, used, and could be improved. These comments are clearly driven by customers’ experiences. The volume and quality of comments received show the event achieved the objective of creating “a forum that allows for honest and open feedback about the energy efficiency in Rhode Island.”

During the afternoon session, National Grid representatives from each kiosk reported back to the forum participants. The goal was to ensure the National Grid team heard participants' feedback correctly, to give workshop attendees the chance to fill in any gaps, to address areas that were missed, or to offer more ideas.

Each team of kiosk volunteers combined the comments from both the cards and conversations into a three to five bullet-point PowerPoint slide. The slides summarized common, recurring themes for each kiosk. These are presented in Appendix D. Below, broad themes that cut across the different kiosks are presented. **The parenthetical citations in this section refer to the number of the corresponding comments as listed in Appendix C.**

### **Provide incentives and financing for solar energy**

*National Grid should expand solar incentives and financing options, possibly tying programs to energy efficiency programs.*

Some workshop attendees emphasized connecting energy efficiency incentive and financing programs with solar incentive and financing programs (73, 84, 110). This would create a one stop shop for energy efficiency and renewable programs. Attendees requested zero percent financing on solar energy and expanded offerings to finance solar energy through National Grid programs (61, 62). Based on various questions from the comment session, National Grid could provide information on solar panels and the process of installation (60). One attendee also suggested outreach efforts to small and medium businesses to educate on the potential savings (67), and another suggested supporting community solar (97).

"How would one determine the size solar system for my house to reduce energy cost? What grants are available for homeowners looking to install solar panels?" - Allen Fraser / Homeowner

### **Financing and incentives**

*Access to financing options is important to customers and National Grid should expand the incentives offered.*

Financing was, of course, tied to many of the kiosk themes. Many attendees agreed that zero percent financing in various forms should stay, even if incentives go down — meaning prioritize financing over incentives. The call for zero percent financing was reiterated many times (106). Attendees did suggest alterations to some of the financing programs, including tying financing to payback period (52), offering zero percent financing on more projects (106), rate reductions for building owners committed to energy efficiency savings (109), and on-bill repayment for more programs (116).

"Offer 0% financing more but make the term the same months as payback, i.e. payback is 37 months make loan 37 months" - Dan Broder / Customer

Several attendees said that, in general, they would also like to see expanded incentives (9, 10). A few expressed dissatisfaction with the amount of incentives after completing an energy efficiency audit (8, 51) or with the rebate program (B2). Another suggestion was to increase the maximum cut-off for finance qualification to 300kw (53). One attendee suggested broadening the scope of the multifamily program, making it more holistic, looking at transportation (EV charging), water and energy efficiency, metering and solid waste systems (49).

Educating customers on incentive and financing programs was a concern of many attendees. Also, many attendees asked questions about incentives and financing available to them, indicating a lack of awareness (12, 17, 18, 37). National Grid should continue to educate customers and spread awareness of its financing and incentives programs (6, 7, 9) through new approaches (14, 25).

Attendees agreed, for all segments, that incentives for advanced metering is a valuable and important next step. Another next step is to integrate renewable and energy efficiency incentives and financing offerings.

**Income-eligible and hard to serve customers; renters**

*National Grid should clearly justify and communicate rate hikes on customers and focus on electrification of heating and cooling, especially for elderly customers.*

Some attendees were concerned with the impact of rate hikes on income-eligible customers and those making just above the income-eligible bracket. They suggested that the rate hike would result in more shut-offs. They also suggested that rate hikes need to be clearly justified and clearly communicated to customers (5, 20, 34). One attendee suggested doing away with shut-offs for residential customers (A4, B5), and another suggested instituting “lifeline rates”, which are lower rates for the first essential amount of energy used in a household (33, A5).

Following a recent rate hike announcement, this listening forum provided members of the public with the opportunity to share their concerns with National Grid representatives (16, 34). Public concerns were recorded and are included in this document.

Various attendees suggested that income-eligible programs should focus exclusively on electrification of heating and cooling. They suggested that not only is heat pump heating more efficient, the added cooling is important for many residents, especially elderly, where cooling could save lives (26, 31, A1, A2). National grid should move away from low-hanging fruit to more deep retrofits (105).

Another concern focused on the landlord/renter split,

*“Electric resistance should only be replaced by heat pumps. The added cooling is critical for many of the residents, especially elderly. It could save their lives. Need to figure out how to reach landlords. Partner with cities to enforce health and safety codes.” - Leah B. / Sustainability*

asking what can be done to ensure renters are reached (13, A3). National Grid should provide greater outreach to renters, so they know what programs are available to them (14, 15). According to one attendee, Providence is more than 50 percent renter occupied, meaning that addressing the landlord/renter split incentive is important to reaching Rhode Island's energy consumption goals.

### **Move toward electrification in transportation, heating and cooling**

*Overall attendees supported electric vehicle adoption and having National Grid play a role in advancing the electrification of transportation and heating and cooling.*

A major theme of the day transition toward electric vehicles (EVs) and the expansion of the charging infrastructure needed to support the electrification in transportation and in heating and cooling.

EVs were a major focus. Many attendees agreed that National Grid should do more to promote and encourage EV adoption and support the expansion of charging infrastructure. They expressed the need for National Grid to raise awareness of EVs, encourage off peak charging, expand infrastructure and develop new ideas for the future as important to National Grid's and the state's energy efficiency goals.

*"Being able to inform and educate customers about all the charging infrastructure, using multiple forms is a must!" – Allison Callahan*

Many attendees brought up the need to raise EV awareness, suggesting National Grid should help educate consumers on EVs including total cost of ownership (85, 88) and available makes and models (82, 88), developing a charging station smart phone application (90, 88), and helping to educate dealers (82, 88). Many attendees also agreed that incentives should be increased (84), including the development of off-peak charging rates (89, 92) and bringing back the state incentive for electric vehicles (89). Also suggested was that National Grid should look at alternative incentives for EV purchases (84, 88, 89). A few attendees suggested the Rhode Island gas tax needs to be increased to disincentivize the purchase of gasoline and diesel vehicles (82, 91).

Some attendees recommended that Rhode Island needs more EV charging infrastructure, including charging stations where customers pay to charge their vehicle (92). One attendee also suggested National Grid help educate landlords on EV charging (87, A8). Overall, attendees suggest that National Grid should play a part in changing the perception of EVs from them being expensive and "elitist" to being competitive in cost to internal combustion engines (83, 89).

Many attendees also commented on the electrification of public transportation and the expansion of electric bike infrastructure in Rhode Island and suggested the state should be considering transportation needs from a more comprehensive perspective (e.g., electrification of vehicles, bike lanes, public transit) (93, 94, 96, A9).

Participants suggest that National Grid should only incentivize the use of heat pump heating and cooling in energy efficiency programs (26, A6). Heat pump heating and cooling is considered more efficient than traditional boiler or furnace heating. In income-eligible programs, heat pump technology should be the only heating and cooling that National Grid is investing in.

Future electrification programs and research should look at fleet conversions and financing road infrastructure through alternative means to the gas tax (95).

### **Improve data quality**

*Data quality is important to meeting National Grid and State energy efficiency goals. National Grid should continue to develop programs that help accurately capture energy consumption and other data for its customers*

Many attendees agreed that quality of data and data reporting was important to reaching energy efficiency goals. Attendees representing communities were concerned with the quality of the data used in proving energy savings and justifying energy efficiency investments. In general, there was concern with estimated meter readings versus actual meter readings (100). Accurately measuring energy consumption, according to attendees, is important to proving energy savings.

*“Consider enhanced data analytics programs for some of the larger municipalities and universities (e.g., Brown is using Skyspark). Consider enhanced metering (real time) with incentives that will allow municipalities, schools, universities greater visibility into their energy usage, ultimately leading to additional EE [energy efficiency] measures.” - Ron Gillooly / Leidos*

Community representatives see advanced metering as a way to improve data collection (99, A10). Advanced metering, according to attendees, will also help better manage municipal facilities (99, 100). It was also suggested that advanced data collection would help customers from large building managers to small business owners in justifying energy efficiency (45). Some attendees suggested real time data would help them better manage their facilities (45, 77).

Many attendees suggested that homeowners would benefit from advanced metering because it would help homeowners understand which appliances use the most energy and when (75, 76). A few attendees also requested specific information be included on their bill (6, 28), including energy consumption per person in household (28).

Other forms of data collection were also suggested. Municipal government attendees suggest that heat maps need to be created to help community managers plan where to focus outreach and education (105). Overall, attendees agreed that advanced metering and additional data collection is a next step in managing buildings and residences.

### **Clarify confusion between program offerings**

*National Grid should work to reduce confusion between program offerings, so customers can efficiently access information on programs they are eligible for.*

A major theme of the day was clarifying program offerings. According to many attendees, there is confusion about which customers qualify for which programs (54). National Grid offers many programs for a variety of customer types. Attendees suggested the following strategies: establish a National Grid office for in-person customer services, questions and bill payment (24); coordinate program offerings between Rhode Island and Massachusetts, so there is less confusion on what is offered in Rhode Island (111); and reorganize the website, so information is easy to find.

*“We are seeing an increase in mixed use new construction and renovation projects in RI. It can be confusing to know what programs are available to the commercial space (e.g., first floor retail below 4 floors of residence). Especially if retail space is fitted out for a specific use months or years after the construction is complete.” - Anonymous*

Some attendees raised the issue of financing offerings as a major area of confusion (113, 115, A12). A few described the website as being insufficient in explaining which programs apply to different customer bases (23). Attendees suggested having clearer information available online, including best practices for all customers (44). The suggestion was made to create a best practice guide for energy efficiency contractors to help contractors connect their clients with financing options (48, 108). Finally, attendees expressed the need to clarify multi-use property incentives and financing options.

### **Marketing and awareness**

*Customer program awareness is important. National Grid should continue to market programs in new and innovative ways.*

Many attendees commented on improving customer awareness of the programs through new marketing strategies. They suggested National Grid should continue to build on marketing efforts aimed at integrating various involved stakeholders (55, 56, 107). For example, supporting communities in marketing various National Grid programs. Attendees suggested many ways marketing can reach new energy efficiency customers. Strategies suggested can be integrated into current marketing efforts, including reaching out to neighborhood councils.

*“I have not heard of the small business program. It might help to feature some small businesses in your newsletter and other channels to spread awareness. Video is also a great medium.” - Robert Beadle*

Attendees suggested using small business success stories to promote programs to small businesses (56, 114). Another suggestion was for National Grid to better use social media as a platform.

### **Reduce administrative burden of programs**

*Program delivery speed is important. National Grid should work to improve the efficiency at which its programs are delivered.*

Across many of the kiosks, participants agreed that program delivery could be more efficient — to improve customer experience and increase the number of customers using National Grid programs.

Homeowners said home energy audits take too much time from the point of the first phone call to the energy audit completion (11, 13). After audit, one homeowner did not know what to do next (8). Business owners and building managers also discussed the speed at which programs were completed (41, 42, 43, 112). Some attendees suggested faster processing and approval of customer applications (42, 43), and others suggested National Grid support resources (such as interns) to help with paperwork (41). On the other hand, attendees were happy with the quality of in-person customer service. For new construction homes, one attendee suggested expediting the interconnection of zero energy homes (36).

*“When we had our home assessment we were left a list of incentives but no information on what or how we should proceed. It would be helpful to have a point person “General Contractor” to organize and prioritize the projects so that there is an actual plan on how to proceed. Otherwise we don’t get anything done.” –  
Anonymous*

## **Major Conclusions and Summary**

This report summarizes the outputs of a successful forum. Its outputs will be used to influence National Grid’s efforts to improve energy efficiency services in Rhode Island in 2018 and beyond. This section summarizes the major conclusions and recommendations for each of the report’s themes areas. While not every suggestion made at the workshop is included, what follows captures those most commonly expressed.

**Provide incentives and financing for solar energy** - *National Grid should expand solar incentives and financing options, possibly tying programs to energy efficiency programs.*

**Financing and incentives** - *Access to financing options is important to customers and National Grid should expand incentives offered.*

**Income-eligible and hard to serve customers; renters** - *National Grid should clearly justify and communicate rate hikes on customers and focus on electrification of heating and cooling, especially for elderly customers.*

**Move toward electrification in transportation, heating and cooling** – *Overall, attendees supported electric vehicle adoption and that National Grid should play a role in advancing the electrification of transportation and heating and cooling.*

**Improve data quality** - *Data quality is important to meeting National Grid and State energy efficiency goals. National Grid should continue to develop programs that help accurately capture energy consumption and other data for its customers.*

**Clarify confusion between program offerings** - *National Grid should work to reduce confusion between program offerings, so customers can efficiently access information on programs they are eligible for.*

**Marketing and awareness** - *Customer program awareness is important. National Grid should continue to market programs in new and innovative ways.*

**Reduce administrative burden of programs** - *Program delivery speed is important. National Grid should work to improve the efficiency at which its programs are delivered.*

## **Workshop Delivery**

This workshop was designed and delivered in partnership with Lighthouse Consulting Group. For more information about Lighthouse and its event and facilitation services, visit its website: [www.lighthousecg.com](http://www.lighthousecg.com).

This report, in its entirety, is available at [www.rieermc.ri.gov](http://www.rieermc.ri.gov). If you have comments, suggestions, or ideas after reviewing the report, please email: [john.richards@nationalgrid.com](mailto:john.richards@nationalgrid.com).

**Appendix A: Attendees**

<i>First Name</i>	<i>Last Name</i>	<i>Affiliation</i>
Laurie	Acone	National Grid
Steve	Ahlquist	UpriseRI
Kimberly	Ash	
Michael	Baer	Rhode Island Infrastructure Bank
Leah	Bamberger	Director of Sustainability
Robert	Beadle	RI Office of Energy Resources
Juliana	Berry	Richmond
Bruce	Borowsky	Democratic Socialists of America
Justin	Boyan	Climate Action Rhode Island
Dan	Brodeur	CRH Americas
Don	Bruen	Eagle Electric
Allison	Callahan	Rhode Island Department of Environmental Management
Wendy	Carriero	National Grid
Linda	Carter	CEP
David	Crocker	Rhode Island School of Design
Robert	Darley	US Navy NUWC
Jared	DeSousa	National Grid
Jeff	Diehl	RI Infrastructure Bank
Mark	Dipetrillo	National Grid
Kimberly	Dipietro	
Ishaga	Disgana	National Grid
Jeff	Dunham	National Grid
Jed	Ferris	National Grid
Gail	Fisher	
Daniel	Fisher	
Ryan	Foley	URI Energy Fellow
David	Fontes	Middletown School District
Shirley	Francis-Fraser	
Allen	Fraser	
Kathleen	George	National Grid
Carrie	Gill	Office of Energy Resources
Ron	Gillooly	Leidos
Sidney	Goode	RHODES TECHNOLOGIES
Brian	Goray	PACE Equity, LLC
Lindsey	Goulet	Energy Source
Vin	Graziano	RISE Engineering
Mike	Guerard	Optimal Energy
Rachel	Henschel	National Grid
Christy	Hetherington	State of RI/Department of Attorney General
Alice	Hourihan	National Grid
Malinda	Howard	
Raymond	Hull	State RI Representative
Janet	Isserlis	
Brian	Kearny	RISE

Mark	Kravatz	Optimal Energy
Ted	Kresse	National Grid
Courtney	Lane	National Grid
Jannine	LaPete	RISE Engineering
Angela	Li	National Grid
Brandon	Lopes	National Grid
Katie	MacIntyre	National Grid
Shevaugn	Mackinnon	
Donna	MacRae-Daigle	RI Attorney's General Office
Kevin	Maloney	North Kingstown
Adam	Markopoulos	National Grid
Michael	McAteer	National Grid
Ethan	McIntosh	
Zack	McKanna	Naval Undersea Warfare Center
Maureen	McManus	NuGen Capital Management, LLC
Erin	Motta	National Grid
James	Murphy	RI College
William	Murray	Cumberland
Hannah	O'Connor	Optimal Energy
Shigeru	Osada	
Pam	Palumbo	National Grid
Karen	Pinch	Richmond
Rachel	Pinnons	CLEAResult
Chris	Powell	EERMC Council
Bill	Pratt	Utilidata, Inc
Alex	Quintal	Leidos Engineering
Matt	Ray	National Grid
John	Richards	National Grid
Ben	Rivers	National Grid
Laura	Rodormer	National Grid
Mike	Rossacci	National Grid
Randy	Rossi	Smithfield
Tim	Roughan	National Grid
Paul	Russell Salk	National Grid
Kai	Salem	People's Power & Light
Rachel	Sholly	
Mark	Siegal	National Grid
Jorge	Sousa	National Grid
Lori	Spangler	National Grid
Judy	Torrissi	National Grid
Cassandra	Vickers	National Grid
Hank	Webster	Acadia Center
Jennifer	Wheelehon	
Carol	White	Leadership - National Grid
Chon	Wong	Care Technology LLC
Belinda	Wong	
Jason	Young	A/Z Corporation

## Appendix B: Kiosk Posters

National Grid presented the posters shown in this section to workshop attendees during the public listening session. National Grid representatives displayed the posters next to public comment boards; workshop attendees could use comment cards to comment on current and planned programs or answer questions provided by National Grid.

**Theme: Homes Kiosk: Homeowners and Renters**

Energy Efficiency for Rhode Island Homes  
**Homeowners and Renters**  
nationalgrid

**CURRENT**      **PLANNED**      **YOUR INPUT**

- No Cost Home Energy Assessment with upgrades to lighting and other no-cost energy savings items. Recommendations for insulation services to reduce drafts in your home.
- Incentives and rebates for heating/cooling and hot water heating equipment as well as ENERGY STAR® lighting and consumer products.
- 0% interest financing for qualifying customers.
- Home Energy Reports, educational reports, and Community outreach and education.

- Online Home Energy Assessment scheduling.
- Enhanced incentives for oil and propane customers.
- Ductless mini-split heating system incentives.
- Low e storm window incentives.

- A Home Energy Assessment can take 2-3 hours. Would you prefer to have energy specialists come to your home to provide this service, or would you rather use an online assessment that takes approximately 30 minutes?
- How do you prefer to receive information from National Grid?
- What are the home energy management improvements you would like to make?

Kiosk: Income Eligible and Hard to Reach Customers

**Energy Efficiency for Rhode Island Homes**  
**Income Eligible and Hard to Reach Customers**

nationalgrid

CURRENT	PLANNED	YOUR INPUT
<ul style="list-style-type: none"> <li>No-cost energy efficiency assessment of home as well as assessment of home appliances.</li> <li>No-cost solutions for weatherization and replacement of energy inefficient heating and cooling systems and appliances.</li> </ul>	<ul style="list-style-type: none"> <li>Adding a new heating replacement solution for electric resistance heat.</li> <li>Increasing the number of people on the income eligible rate in order to provide the customers eligibility to participate in the Income Eligible Program.</li> </ul>	<ul style="list-style-type: none"> <li>What could National Grid do to make the Income Eligible Home Energy Assessment process easier for customers to participate?</li> <li>If National Grid asked you to respond to a survey prior to the home energy assessment or appliance assessment in order to streamline the process, would you do it?</li> <li>What if the survey results provided the opportunity to have eligible systems/appliances replaced the same day?</li> </ul>

Kiosk: New Homeowners

**Energy Efficiency for Rhode Island Homes**  
**New Homeowners**

nationalgrid

CURRENT	PLANNED	YOUR INPUT
<ul style="list-style-type: none"> <li>Residential New Construction and major renovation design support and modeling.</li> <li>Technical field inspections and support.</li> <li>Incentives for energy efficiency of building envelope and heating/cooling systems.</li> </ul>	<ul style="list-style-type: none"> <li>Zero Energy Home Program.</li> <li>Contractor training to increase the resources for Passive House and Zero Energy Homes.</li> <li>Tours of high efficiency homes.</li> </ul>	<ul style="list-style-type: none"> <li>What is best way to reach homeowners to educate about the Zero Energy Homes?</li> <li>If you were embarking on building a new house or doing major rehabilitation to your house, would you make it energy efficient if you received incentives?</li> <li>Would you make your home energy efficient if you didn't receive incentives but received a lot of technical support through the process?</li> </ul>

Theme: Communities Kiosk: Municipalities and Schools

The infographic is titled "Energy Efficiency for Rhode Island Customers Municipalities and Schools" and features the National Grid logo. It is organized into three columns: "CURRENT", "PLANNED", and "YOUR INPUT".

CURRENT	PLANNED	YOUR INPUT
<ul style="list-style-type: none"><li>• Incentives (5-40% of project cost) for lighting, controls, energy management systems, gas equipment, insulation, and more.</li><li>• No cost or obligation energy audits.</li><li>• Financing options – 0% interest for up to 5 years (limited funding).</li><li>• All municipal entities are eligible.</li></ul>	<ul style="list-style-type: none"><li>• Expanded list of energy conservation measures with custom incentives up to \$ .30 per kWh saved.</li><li>• Gas measures can receive up to \$1.50 per therm saved as an incentive.</li><li>• Energy Audits are coordinated with the RI Infrastructure Bank and Office of Energy Resources for funding options.</li></ul>	<ul style="list-style-type: none"><li>• Have you heard of National Grid's municipal program?<ul style="list-style-type: none"><li>• If yes, and you've participated, would you refer a friend?</li><li>• If yes, but you haven't participated, what were the barriers?</li></ul></li></ul>

Theme: Business Kiosk: Small Businesses

Energy Efficiency for Rhode Island Businesses nationalgrid

## Small Businesses

**CURRENT**

**PLANNED**

**YOUR INPUT**

<ul style="list-style-type: none"> <li>• Incentives (up to 70% of project cost) for lighting, controls, refrigeration, energy management systems, gas equipment, insulation, and more.</li> <li>• Financing options – 0% interest for 2 years, or 15% pre-payment bonus.</li> <li>• Eligibility requirement of monthly demand less than 200 kW.</li> <li>• Option to work with your own electrician and/or materials suppliers.</li> </ul>	<ul style="list-style-type: none"> <li>• New approaches for micro businesses.</li> <li>• Refreshing our Main Streets approach to support municipalities in the Community Initiative.</li> <li>• Extending finance terms for businesses who engage in the installation measures in addition to lighting to achieve at least neutral cash flow.</li> </ul>	<ul style="list-style-type: none"> <li>• Have you heard of National Grid's small business program? <ul style="list-style-type: none"> <li>• If yes, and you've participated, would you refer a friend?</li> <li>• If yes, but you haven't participated, what were the barriers?</li> <li>• If no, please write down your name, organization name, and contact info. We'd love to fill you in!</li> </ul> </li> <li>• If you are a SMB would you consider changing your signage to a more efficient option if brightness could be maintained? Night controls?</li> </ul>
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Kiosk: Large Business

Energy Efficiency for Rhode Island Businesses nationalgrid

## Large Businesses

**CURRENT**

**PLANNED**

**YOUR INPUT**

<ul style="list-style-type: none"> <li>• Benchmark/baseline building energy use, identify energy efficiency opportunities. Services include engineering assistance, technical assistance studies and energy audits.</li> <li>• Implementation plan for installing opportunities.</li> <li>• Incentives for lighting, HVAC, chillers, gas heating and hot water and more.</li> <li>• Instant discounts at suppliers for lighting and controls, HVAC, pumps and more.</li> <li>• Multiyear energy planning for large institutions (e.g. universities, hospitals).</li> <li>• Financing including on-bill, third party no interest financing.</li> <li>• Offerings for restaurants, grocery stores, industrial customers, municipalities.</li> </ul>	<ul style="list-style-type: none"> <li>• Automated upload to portfolio manager that streamlines benchmarking for customers.</li> <li>• Faster and more efficient processing for project applications.</li> <li>• Expansion finance products tailored for customers.</li> <li>• Reduction of peak load/demand response offering for customers.</li> <li>• Tailored offerings by business type (e.g., hospitality, multifamily).</li> <li>• Expanded instant discounts at suppliers for more measured HVAC &amp; commercial kitchen equipment.</li> <li>• Integration of Renewables, battery storage and EV's into offerings.</li> </ul>	<ul style="list-style-type: none"> <li>• What priorities do your businesses have in their next 2-5 years, for decision-making in your business?</li> <li>• What relationship do you have with your energy user/footprint at the moment?</li> <li>• What are you currently doing to innovate in your business offerings?</li> <li>• How do you finance your business operations?</li> <li>• What payback period do you expect for energy efficiency?</li> <li>• If you have participated in National Grid's programs before, how has your experience been?</li> </ul>
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Kiosk: Commercial Property Owners and Developers

The graphic is a dark blue rectangular panel with white and colored text. At the top left, it reads "Energy Efficiency for Rhode Island Businesses" and "Commercial Property Owners and Developers". At the top right is the "nationalgrid" logo. Below the title is a horizontal flow diagram with three colored arrows: a yellow arrow labeled "CURRENT", a blue arrow labeled "PLANNED", and a pink arrow labeled "YOUR INPUT". Each arrow points to a corresponding column of text. The "CURRENT" column lists services, incentives for design, instant discounts at suppliers, and instant rebates. The "PLANNED" column lists assistance for developers, Passive House construction, financing for new construction, integration of renewables, faster processing, and lighting incentives. The "YOUR INPUT" column contains three survey questions.

Energy Efficiency for Rhode Island Businesses  
nationalgrid  
**Commercial Property Owners and Developers**

**CURRENT**

- Services include setting up energy targets for projects, engineering assistance and energy audits, verification services.
- Incentives for comprehensive design that reduces energy use above code, for measure: indoor/outdoor lighting controls, HVAC, gas heating and hot water, steam traps, energy management systems, programmable thermostats.
- Instant discounts at suppliers for select LED & fluorescent tube lighting
- Instant rebates for efficient equipment when converting from oil to gas.

**PLANNED**

- Assistance for developers/owners on setting up energy targets for projects, including structuring RFP's that address energy goals.
- Passive House construction trainings, webinars and forums for the building industry as a path to achieve ultra efficient buildings (Zero Net Energy use).
- Financing for New Construction projects.
- Integration of renewables and electric vehicle infrastructure in new construction projects.
- Faster and more efficient processing for project applications.
- Lighting and controls incentives to be offered as fixed \$ per square foot.

**YOUR INPUT**

- What are your top priorities as you build a new commercial space?
- Do you think there is value in being able to market property as "green"?
- How can National Grid make your energy efficiency experience better?
- Would you be interested in being a test case for National Grid's "Zero Net Energy demonstrations" launch?

Kiosk: Multifamily Property Owners & Renters

Energy Efficiency for Rhode Island Homes and Businesses nationalgrid

## Multifamily Property Owners and Renters

CURRENT	PLANNED	YOUR INPUT
<ul style="list-style-type: none"> <li>No-cost, comprehensive assessment of facility and units with recommended energy efficiency upgrades.</li> <li>Incentives for insulation, air sealing, lighting, appliances, and HVAC equipment.</li> <li>Income Eligible customers and affordable housing providers receive enhanced incentives.</li> <li>Online condo portal for selection of energy efficiency measures.</li> </ul>	<ul style="list-style-type: none"> <li>Single point of contact for new construction and retrofit customers to make participation easier than ever.</li> <li>Focus on retrofit opportunities for electric heat customers.</li> <li>Coordinate with Small Business program to serve non-profit group homes and senior housing.</li> <li>Relaxed participation rules for individual condominium owners.</li> </ul>	<ul style="list-style-type: none"> <li>Have you heard of National Grid's Multifamily Retrofit Program?</li> <li>If renter/condo owner: <ul style="list-style-type: none"> <li>Have you tried to participate in the program?</li> <li>What is the one measure you would like for your unit?</li> </ul> </li> <li>If facility owner/developer: <ul style="list-style-type: none"> <li>What is the one measure you would like for your property?</li> <li>What would help you participate?</li> </ul> </li> </ul>

Theme: Finance

Kiosk: Finance Offerings

Energy Efficiency for Rhode Island Customers nationalgrid

## Finance Offerings

CURRENT	PLANNED	YOUR INPUT
<p><b>Efficient Building Fund (Gov.)</b></p> <ul style="list-style-type: none"> <li>Offers low interest rates and long terms plus the ability to finance energy efficiency and solar.</li> </ul> <p><b>C-PACE (Virtually All Customers)</b></p> <ul style="list-style-type: none"> <li>Offers 100% financing, often cash flow positive on Day 1, and able to finance energy related deferred maintenance (ex. roof and solar). Frequently considered "off book".</li> </ul> <p><b>Ascentium (All Customers)</b></p> <ul style="list-style-type: none"> <li>Offers fast approval process for up to \$250k, as well as leases.</li> </ul> <p><b>On-Bill Repayment (All Customers)</b></p> <ul style="list-style-type: none"> <li>Offers short term, zero interest financing, but has limited funds.</li> </ul> <p><b>HEAT Loan(Residential Customers)</b></p> <ul style="list-style-type: none"> <li>Loans up to \$25,000 for energy efficiency at 0% interest. Payback term up to 7 years.</li> </ul>	<ul style="list-style-type: none"> <li>Increase market awareness surrounding the benefits of C-PACE</li> <li>Create and publish easy to follow decision tree/tool that shows customers the appropriate mechanisms for them.</li> <li>Researching ways to return money to the OBR fund more quickly.</li> </ul>	<ul style="list-style-type: none"> <li>Financing can be a major hurdle customers but what else stands in the way? How would you approach these issues?</li> <li>What are the most effective ways for you to learn about finance?</li> <li>What are the two most important attributes for a financing mechanism to have in your organization?</li> <li>For residential customers - what energy management solutions are you interested in financing?</li> </ul>

**Theme: Comprehensive Energy Solutions**

Kiosk: Renewable Energy and RI System Data Portal

Comprehensive Energy Solutions for Rhode Island Customers **nationalgrid**  
**Renewable Energy and the Rhode Island System Data Portal**

CURRENT	PLANNED	YOUR INPUT
<ul style="list-style-type: none"> <li>•The Renewable Energy (RE) Growth Program pays up to 32.25¢/kWh for solar, wind, anaerobic digestion, or hydropower generation, depending on the term, technology, and other factors.</li> <li>•The program aims to install 160 MW of renewable energy nameplate capacity from 2015-2019 with an additional 40MW annually through 2029.</li> <li>•The Rhode Island System Data Portal launched in 2018 and will allow solution providers to identify what parts of the grid are available for development.</li> </ul>	<ul style="list-style-type: none"> <li>•National Grid is currently in negotiations with Deepwater Wind for a Power Purchase Agreement of 400 MW for the Revolution Wind offshore wind project.</li> <li>•In 2018 National Grid also plans to issue a Request for Proposals for up to 400 MW of renewables (solar, land-based wind, offshore wind, etc.) in Rhode Island.</li> <li>•Solution providers have opportunities to learn about and test the Rhode Island System Data Portal to assist with project planning.</li> </ul>	<ul style="list-style-type: none"> <li>•Are you interested in installing solar on your home or business?</li> <li>•If so, what questions do you have about this?</li> <li>•Have you heard about the Rhode Island Solar Marketplace?</li> <li>•Have you heard about the Rhode Island System Data Portal?</li> <li>•If you are a solution provider in Rhode Island, what can National Grid do to improve the Rhode Island System Data Portal?</li> </ul>

Kiosk: Electric Vehicles

Comprehensive Energy Solutions for Rhode Island Customers nationalgrid

## Electric Vehicles

CURRENT	PLANNED	YOUR INPUT
<p>National Grid partners with Rhode Island businesses:</p> <ul style="list-style-type: none"> <li>• Installed 45+ charging stations available for public use.</li> <li>• Locations such as state facilities/parks, restaurants, retail stores, colleges/universities, hospitals and TF Green Airport.</li> </ul>	<p>National Grid continues to support EV adoption:</p> <ul style="list-style-type: none"> <li>• Encouraging off-peak charging at home.</li> <li>• Increasing the number of charging stations.</li> <li>• Consumer outreach and education efforts.</li> <li>• Supporting electrification of Rhode Island business customers' vehicle fleets.</li> </ul> <p>* Pending Regulatory Approval</p>	<ul style="list-style-type: none"> <li>• How can Rhode Island increase the number of EVs on the roads?</li> <li>• How can National Grid support EV adoption?</li> <li>• What specific aspects of EVs might National Grid focus on? For example, by increasing the number of charging stations or bringing electricity to the stations.</li> </ul>

Kiosk: Advanced Metering Functionality

Comprehensive Energy Solutions for Rhode Island Customers nationalgrid

## Advanced Metering Functionality

CURRENT	PLANNED	YOUR INPUT
<ul style="list-style-type: none"> <li>• Current metering based on Automatic Meter Reading (AMR) technology.</li> <li>• Advanced Metering Functionality (AMF) is being considered as part of the Power Sector Transformation Initiative.</li> <li>• The Company proposes to install approximately 515,000 bi-directional electric AMF meters along with a flexible two-way communication system.</li> <li>• Proposal currently under review by RI PUC.</li> </ul>	<p>• Upon Regulatory approval, proceed with AMF Deployment featuring state-of-the-art hardware and software platforms.</p> <p>• Customer Benefits:</p> <ul style="list-style-type: none"> <li>• Access to various time varying pricing options to manage electric bill costs.</li> <li>• Improved outage detection and faster outage restoration.</li> <li>• Access to energy efficiency and renewable services tailored to usage.</li> <li>• More efficient use of the distribution system that creates consumer savings.</li> </ul>	<ul style="list-style-type: none"> <li>• What features about Advanced Metering do you think will be most beneficial for you?</li> <li>• For residential customers, what potential future features are most engaging?</li> <li>• Choice in rates</li> <li>• Understanding where energy is consumed in the house (via load disaggregation)</li> <li>• Smart home integration</li> <li>• Other?</li> </ul>

**Appendix C: Comments**

Here we provide all comments received during the kiosk session, the oral comments report out session, and comments received via an online survey. Comments received during the oral comment period are labelled with an A and then number and comments received via online were labelled with a B and then number.

<b>Theme: Homes</b>	
<b>Kiosk: Homeowners and Renters</b>	<b>Comments:</b>
1.	Had an energy audit completed and installed, new light bulbs, power strip to turn off TV and computers. Process was very good. I need to have attic insulation added and sealed from drafts. (Ron DiSandro- Electrical Engineer )
2.	Place where people can pay their bill in person without being charged by a 3 <sup>rd</sup> party. (St. Rep. Raymond Hull)
3.	Important to use the behavioral change model for long lasting energy efficiency changes. Incentives in the form of money and rebates will often be shore-lived once it is handed out and people will once again go back to their wasteful ways. I think much more money and time needs to go into creating behavioral change models for long lasting changes to amount of energy that is consumed. And STOP calling “natural” gas a clean energy solution and a bridge fuel! (Kendra Anderson- Climate Action RI)
4.	For those of us who do not want to bother with AC, National Grid should offer advice on how to use fans, do window management and other ideas to keep things cooler without AC.
5.	National Grid needs to do a better job educating people about why they have rate hikes.
6.	Highlight energy efficiency charge on bill; yearly/biannually report on how much homeowners are investing in EE fund. Create ownership of program. (Eric Kretsch-LCG)
7.	What grants do you have to install mini splits in homes? What incentives? (Shirley Fraser-Homeowner)
8.	When we had our home assessment we were left a list of incentives but no information on what or how we should proceed. It would be helpful to have a point person “General Contractor” to organize and prioritize the projects so that there is an actual plan on how to proceed. Otherwise we don’t get anything done.
9.	Will there be incentives/rebates for ductless mini-splits as an additional heat/cooling source for homeowners who also plan to retain oil/gas

	boilers. System is not at end of useful life but sometimes only one zone of house needs warming/cooling and mini-split would be more efficient and electric. (Hank-Attorney)
10.	Free Nest Thermostats
11.	I recently got a home assessment and it was helpful. I didn't realize I needed a new assessment every 3-5 years. Also it took a long time from scheduled call to an appointment. It took even longer to get the improvements installed. Find a way to decrease wait times, please. (Robert Bendle-Public Relations)
12.	What is National Grid offering for solar? Are there grants for financing available?
13.	It was very difficult to schedule my home delivery audit, so I'm happy to see online scheduling is planned. I appreciated (and use) the LED bulbs and the Smart Strip. I'm a renter and would I could assign a portion of saving to repayment directly on my bill, my landlord isn't willing to make those improvements, but a more discounted price could help change her mind. I wish National Grid's website on efficiency incentives was easier to understand and navigate (efficiency Vermont has a very easy to use website that's also super educational. Please continue to offer incentives!
14.	I would prefer someone come to my home then doing an online assessment. I wouldn't trust the online one. Need new ways of getting the word out to renters to let them know they can initiate this process. Many landlords are checked out and only do the bare minimum.
15.	Work with local universities to let college students and their landlords know about the free home assessment. College student's electric bills are high.
16.	Even with energy efficient homes, energy costs too much with National Grid. 20% rate increase is too expensive will result in shut offs. (George Wiley Center)
17.	What financing and rebates are available for changing an old gas furnace to on demand heating and hot water?
18.	What grants do you have to help homeowners install solar panels and mini splits. (Shirley & Alan Fraser- Homeowners)
19.	NG renter- No gas. How does NG make any distinction between its energy practices and those of arcadia? I'm fortunate to be able to pay more for electricity, but how can customers of all incomes participate more fully in such services. (Janet Isseriss –Educator)
20.	How does NG address perceptions of its rate hikes and general presence as corporate and uninterested in community wellbeing? (Janet Isseriss-Educator)

21.	Home available for tours (Joel Gates – Homeowner)
22.	What do you recommend as a response to the numerous sales pitches we get for solar installation pitched as a collaboration with National Grid?
23.	It's hard to find information on your website. Can you do anything to improve ease of use?
24.	National Grid's predecessor, Providence Energy started Grow Start RI to try to concentrate development in downtowns and built up areas instead of sprawl. But the downtown Providence office is gone and there is not even a place downtown to pay a utility bill. Grid should have a downtown office for customer service to encourage more energy efficient as Smart Grow intended. (Barry Schiller)
25.	Develop a new homeowner's kit to let customers know about National Grid's entire products and services portfolio. National Grid could partner with manufacturers, retailers to offer additional discounts on qualifying product measures. (Dan Krasowsky- Energy Efficient Services Consultant/Vendor)
26.	YES to ductless mini-splits. Online scheduling-renter specific program-they should get free LED's and programmable thermostats. Phase out all natural gas heating incentives. Give customers choice/foster competition in have energy upgrades. Give people option for on-line assessment, but don't phase out in-person. On land propane should only be replaced with heat pumps. The planet is warming we need more AC! (Leah Bamberger – PVD Sustainability)
27.	Like the direction we're moving.
28.	The energy report- is there a way to get it more tailored to the number of people who reside in the home? I no longer get (per my request) as how can you compare the same size home with four people to one with two? It also seems when you try to be more efficient the bill doesn't go down much or there is a rate increase.
B1.	The generation interconnection process continues to be arbitrary and burdensome with no utility accountability and no true avenue for timely or effective appeal or issues resolution process. (David Turner – Tangent Energy Solutions) <i>(Online Comment)</i>
B2.	I bought an energy efficient AC window unit last year and sent in the receipt for my rebate but they said I did not have the correct model number. (Tim Faulkner) <i>(Online Comment)</i>
B3.	I have installed solar panels on two homes in Providence. National Grid limits the capacity of the panels based upon past consumption -- but in the case of the second home, the consumption was based on the past owners (since we installed the panels shortly after purchasing the home). They lived in Florida for 1/2 year so consumption pattern was not accurate, and

	our system is too small. (John Marsten) <i>(Online Comment)</i>
B4.	Does National Grid offer air conditioning assistance, like the no interest loan I received from Navigate Credit Union, and a reduced price like they did for the insulation that was installed in my home a few years ago? (Joe Pomoransky) <i>(Online Comment)</i>
<b>Kiosk: Income Eligible and Hard to Reach Customers</b>	
<b>Comments:</b>	
29.	What does “hard to reach” mean? Language barrier trust issues, people think it’s a scam. Need to increase the program in this sector as there are a lot of people that this can hurt.
30.	What are the income levels? Why isn’t everyone eligible? We pay the surcharge why can’t we get the benefit?
31.	Electric resistance should only be replaced by heat pumps. The added cooling is critical for many of the residents, especially elderly. It could save their lives. Need to figure out how to reach landlords Partner with cities to enforce health and safety codes. (Leah B.- Sustainability)
32.	How do you make the leap from renters interested in EE to (absentee) landlords? (Kai Salem- PPRL Energy Associate)
33.	It’s not that easy to judge “low income” especially with the large underground economy. National Grid should consider as a strategy the idea of “lifeline” rates. The first essential amount of electricity used is very low with much higher marginal rates beyond. That should both protect real low income customers and save everyone the incentive to conserve. (Barry Shiller- Retired )
34.	No rate hike!
A1.	Income eligible heating replacement prioritizing elderly and low income homes. <i>(Oral Comment)</i>
A2.	Heat pumps for elderly in particular, replacing natural gas, electric baseboard, and fuel oil heating systems. <i>(Oral Comment)</i>
A3.	Tie landlord incentive to reduced rate or tax break, if they pursue energy efficiency <i>(Oral Comment)</i>
A4.	Doing away with shutoff for residential customers; clear & transparent decision made regarding shutoffs <i>(Oral Comment)</i>
A5.	Lifeline rates; 1 <sup>st</sup> minimum usage at low rates then escalate. This will incentivize conservation. <i>(Oral Comment)</i>
B5.	Eliminating shutoffs for all economically vulnerable households. Thank you

	for the opportunity to voice my concerns. (Bruce Borowsky – Providence Democratic Socialists of America) <i>(Online Comment)</i>
<b>Kiosk: New Homeowners</b>	<b>Comments:</b>
35.	Mandate fossil free homes- electric heat pumps and gas is not needed! Passive home design principles. Solar and geothermal. (Justin Boyan-Computer Scientist)
36.	Expedited interconnection for zero energy homes. Limit/phase out energy efficiency incentive and financing for new construction/large renovations that aren't going for ZEB status. Lots of training and education. (Leah Bamberger, PVD Sustainability)
37.	Regarding major renovations-would be interested in knowing more about incentives. Would want to make energy efficient and those incentives are motivating. How do you educate builders, contractors, as well as the consumer?
38.	Support retro commissions on new construction.
A6.	Stop permitting natural gas heating, move all toward electrification.
<b>Theme: Marketing &amp; Communication (not an official theme)</b>	<b>Comments:</b>
39.	Stop calling "natural" gas and LNG clean energy. It is NOT and continues the dangerous reliance on fossil fuels. (Kendra Anderson- President Climate Action RI)
40.	Reach homeowners through neighborhood councils and social media. (Stacey Hobart-Non-profit )
<b>Theme: Business</b>	
<b>Kiosk: Large Businesses</b>	<b>Comments:</b>
41.	Most of projects need a 2-4 year payback. The greatest challenge is a lack of internal resources that can help move these projects forward. Doing the analysis and creating proposals from Rise and NG is great. With all the dialing distractions due to business needs it becomes difficult to move projects forward. Maybe NG can have resources or interns that can help manage these projects & partner with companies. (Ron DiSandro, Product Manager)
42.	How do you plan to implement faster processing and approval of custom applications? Often times it currently takes 2-4 weeks or more! Alex (Quintal, Energy Advisor)

43.	Minor frustration: It takes too long to get into the formal TA study. Going well: very personal attention from Chandra Bilsky keeps us focused on the “prize” at the end of the tunnel. Single source focus (like Chandra) keeps us looking for additional low hanging fruit. (Sid Goode, Mechanical Engineer)
44.	Clearer info online about programs and incentives available. Work with local planning depts. To make sure developers are aware of and utilizing incentives. Require commercial property owners to use PM & report data to National grid. Phase out natural gas incentives (Leah Bamberger, PVD sustainability )
45.	Consider offering enhanced (real time) metering with incentives and claim savings based on industry studies. The enhanced metering will enable greater visibility into customer usage fostering additional EE projects. Improve P4P program with funding upfront to enable data analytics software such as KGS buildings Amgen example. (Ron Gillooly, Leidos)
46.	We need deep MBX both energy & DDC/EMS to identify & correct energy waste as a standalone program in RI and beyond. Lowest cost/KWH saved! (Chris Powell, EERMC Chair)
47.	National Grid should offer large site level II energy use and which set up project plans for 1-3 years (share cost of audits with credits back to customer through projects. (Dan Broder, Customer Energy Manager)
48.	More guidelines for best practices for energy efficiencies per building type for lighting, EMS, and HVAC so companies know what they want when choosing a project expediter. (Lindsey Goulet, Energy auditor)
B6.	I have heard that National Grid is making great strides in sustainability. We would like to help by aggregating large numbers of churches. (Steve MacAusland) <i>(Online Comment)</i>
B7.	Very informative (Don Bruen – Eagle Electric) <i>(Online Comment)</i>
<b>Kiosk : Multifamily Property Owners and Renters</b>	
<b>Comments:</b>	
49.	Broaden the scope of the MF program for larger sites to include all aspects of energy and resource use: All building systems, water efficiency, renewables, transportation (EV), metering, and solid waste/recycling. (Vin & Beca)
50.	Need better ways to get landlords to participate. Will likely have to use stick vs. just a carrot. Large multi families should have to disclose energy use. Partner W/ muni government to target problem properties. (Bamberger, PVD Sustainability )

<b>Kiosk: Small Businesses</b>	<b>Comments:</b>
51.	I represent a non-profit that rents a space attached to other buildings. We had an energy audit but the only thing that ended up being affordable was replacing three fluorescent lights with LED's. I was hoping to get LED's for our many recessed lights and halogen lights (that use so much energy) but the LED's were too expensive to justify. We were told they didn't have incentives to replace the halogens. We were also told there weren't incentives for heating measures at all.
52.	Offer 0% financing more but make the term the same months as payback. i.e. payback is 37 months make loan 37n months. (Dan Broder, Customer)
53.	Increase max cost off of 200 kw to 300 kw (like Mass). Make programs line up with other states. (Dan Border, Customer)
54.	We are seeing an increase in mixed use new construction and renovation projects in RI. It can be confusing to know what programs are available to the commercial space (e.g. first floor retail below 4 floors of residence). Especially if retail space is fitted out for a specific use months or years after the construction is complete.
55.	Yes to integration with community program! Need to work with property owners. (Leah Bamberger)
56.	I have not heard of the small business program. It might help to feature some small businesses in your newsletter and other channels to spread awareness. Video is also a great medium. (Robert Beadle, public relations)
57.	How can NG work directly, provide grant to small business Rhode island based LED manufacturer to implement patented LED lighting system? (Belinda)
A7.	Small businesses that don't qualify for incentive program could participate in large commercial incentive programs <i>(Oral Comment)</i>
<b>Theme: Comprehensive Energy Solutions</b>	
<b>Kiosk: Renewable Energy and the Rhode Island System Data Portal</b>	<b>Comments:</b>
58.	What is NG doing to be sure that our power grid is protected from hackers?
59.	I've already shared the Data Portal with someone who was very appreciative of the info & transparency (Charlie Gill / OER)

60.	How would one determine the size solar system for my house to reduce energy cost? What grants are available for homeowners looking to install solar panels? (Allen Fraser / Homeowner)
61.	I would like to see more community solar farms built and the energy offered to local residential customers. I'd prefer this to having solar installed on my roof or property. Concerns about roof issues, long term costs/financing/etc. (Ron DiSandro)
62.	Why does the money run out every year for bringing residential solar to homes by making it totally affordable? More creative plans need to be made to avoid clear cutting projects. (Kendra Anderson / President – Climate Action RI)
63.	Consider using portal data for targeted EE with enhanced incentives. Consider using portal for initial storage deployments, perhaps an opportunity to utilize the portal to create a demonstration project utilizing block chain. (Ron Gillooly / Leidos)
64.	Time of use pricing is a must. I would like to invest in battery storage or hydrogen storage (fuel cells) for home back-up power. To make the C.A. make sense, I would like N.G. to use my storage (also E.U.) for peak events and I would be compensated of course. (Joel Gates/ retired)
65.	Please avoid the phrase “clean energy” which encourages many to think there is no need to conserve. There is no such thing in RI we know of woodland destruction from solar “farms”, the destruction path of transmission lines to bring hydro power from Quebec to N.E., birds and bats killed by wind turbines, plus the manufacture and disposal of renewable equipment.
66.	Don't use renewable energy as an excuse to raise the rates again. People want to know that these programs will affect cost.
67.	Education of small/medium businesses – work with chambers and assoc. groups. Bite size tips for newsletters, education sessions – need to sell the \$\$ savings side to motivate attendance. (Jennifer/ Central RI Chapter)
68.	This type of technology will be very helpful for solar developing. Thank you for the hard work. (Mo McManus / Nugen Solar)
69.	RI data portal tool could help the state, state partners, fleets interested in EV charging infrastructure to quickly identify areas/locations to focus investments (in a more cost effective manner) (Allison Callahan/DEM- air quality specialist)
70.	Do you have plans to investigate battery storage technology to link w/solar installations? I know NG in MA is starting to work on this (Alex Quintal/ Energy advisor)

71.	Integrating RE to EE charges into one program so you can seamlessly incent EE/RE projects together
72.	Care technology RI LED light manufacturer allows our lights directly power and back up battery by solar panel and access solar power can then boost up for NG. This saves additional 40% of energy because it eliminates converting solar power to AC 120 volts or 277 volts and then back down to DC to power LED lights (very efficient) (Chon Meng Wong/ Care technology/ engineer/inventor President)
B8.	Many neighbors and friends have voiced their concern with these third party vendors which go door to door signing people up for their energy service. They are not fully explaining how the process works between them and National Grid as well as cost. After several months many people report their bills going very high and are also disappointed by the distribution fees. While I realize NG is not responsible for these energy companies you do have to deal with the billing and transfer when they are not satisfied. Thank you and I commend NA for keeping us engaged and focused on clean energy. (Angel Williams) <i>(Online Comment)</i>
<b>Kiosk: Advanced Metering Functionality</b>	
	<b>Comments:</b>
73.	Reduce barrier between renewables and EE and create a seamless comprehensive offering.
74.	What you need is a power strip that shuts off with a remote control or can interface with your TV remote > connect with cable/satellite companies
75.	This is so cool and innovative. As the industry changes, adding congestion on the grid and helping customers know their solar power potential will be critical. (Stacey H / cems director)
76.	This would be a great tool for homeowners to use to analyze load data to better understand which appliances use the most energy and when. Also, choice of power generation type would be good for environmental conscious consumers. ( DI Sandro/ Electrical engineer /Production manager)
77.	We need real time data 24/7 on web based system!!!! Helps manage our facility better (Dan Brodeur / customer)
78.	We need grid modernization but I am very concerned about who pays for it. Wealthy homeowners w/ smart homes, EV's and solar will have no issue gaining the meters and saving money while rates go up. Low income, renters will not have those options. (Leah Bramberger/ PVD sustainability)

79.	Need more data KW, KWH, KVA, power factor, KVAR, etc. in real time 24/7 on web based system (Dan Brodeur/ customer)
89.	We are a sensor supplier to NGrid in MA and NY and would like to assist with needs for sensors in RI as well. (Mark Federle – QuinetiQ North America) <i>(Online Comment)</i>
<b>Kiosk: Electric Vehicles</b>	
<b>Comments:</b>	
80.	Opportunity to add EV component/outreach program to the RI energy challenge? For example, Host 1-3 public facing info events @town mtg, school board, faith based org., community events, etc.
81.	Why I resist an electric car: How so I make a long trip to VT where there are NO charge stations? I would be embarrassed to ask my Dad (who I am visiting) to charge from his outlet. Will it be ultimately cheaper than a gas car? Is it really cleaner if the power still comes from gas power plants? (Robert Beadle / Public relations)
82.	The biggest and most effective way to get EVs on the road is to de-incentivize the sale of fossil fuel consuming cars. I own a bolt which I am very happy with. The buying process was the worst I've ever gone through. (Kendra Anderson/ President- Climate action RI)
83.	Solar carport w/ battery storage at charging stations Service vehicles for NG can be EVs good for environment/ helps change public perception Continue w/letting people know the benefits of charging off peak.
84.	Work w/ solarize RI and EVs. If you put solar on your house and have an EV you should get extra benefits
85.	Being able to inform & educate customers about all the charging infrastructure using multi forms of media is a MUST! (Allison Callahan/ DEM air quality specialist)
86.	One concern over EVs is that their widespread use will keep the dirties part of the grid going longer than it would otherwise (Barry Schiller/ retired)
87.	Renters- I have a PHEV and my landlord doesn't let me charge. Even though it's just trickle charging. He thinks the load will damage the house. (Kai Salem / People's Power & Light)
88.	Education of dealers > incentives for them to sell if this is a priority. Better resources/education od consumers > state incentives come back!! Federal rebate > \$\$

89.	NG work to reinstitute RI State incentive (rebate). Encourage off peak charging BUT time of use pricing needs to be adopted otherwise there is no incentive! Educate through outreach (emails, social media, EV showcases). Not sure of the correct approach but, “elitism” seems to surround EVs. It’s all about price for many, but the overall cost can be lower or at least competitive with ICE vehicles. How do we advance that message? (Joel Gates/ Retired)
90.	I wonder what kind of sharing programs are in RI that would adopt EV’ as part of their fleet. Need an app that leads people to realizing charging – maybe that exists. (Stacy H. / Non-profit)
91.	Carbon pricing- consumers will switch to EVs only when gas is taxed at a rate that accounts for the social cost of carbon pollution, and the proceeds are used to help everyone switch to EV’s. Also, ban fossil fuel vehicles! (Justin Boyan/ Computer scientist)
92.	More charging stations of course, but customers should still pay for energy use. Off peak charging rates- important!
93.	NG should encourage other forms of electric transportation by reaching out to RIPTA which should be electrifying its fleet and has some VW settlement \$\$ to get this started. They need advice, charging stations, etc. (Barry Schiller / retired)
94..	NG should reach out to providers of electric assisted bikes involved in bike sharing and e-bike dealers to see what can be done to facilitate re-charging, promotion, etc.( Barry Schiller / retired)
95.	NG and other EV advocates have to work on a politically realistic way to pay for roads (and replace the part of the gas tax that RIPTA gets) since the gas tax will be less and less a funding source. ( Barry Schiller / retired)
96.	NG to reach out to RIDOT (Steve Devine) & MBTA to see what can be done to facilitate rail electrification (Barry Schiller / retired)
A8.	Renters ability to charge EV; landlord is not aware or not educated on benefits to their renters. ( <i>Oral Comment</i> )
A9.	Bussing should be electrified, along with commuter rail and Amtrak; huge benefit in reducing carbon emissions. ( <i>Oral Comment</i> )
<b>Theme: Communities</b>	
<b>Kiosk: Municipalities and Schools</b>	<b>Comments:</b>

97.	Support community solar/other renewables
98.	LEED certified buildings are great but there are a lot of “stuff/technology” in them so a few years after they are built they cost a lot to operate. How can we decrease these costs?
99.	Consider enhanced data analytics programs for some of the larger municipalities and universities (e.g. Brown is using Skyspark). Consider enhanced metering (real time) with incentives that will allow municipalities, schools, universities greater visibility into their energy usage ultimately leading to additional EE measures. (Ron Gillooly, Leidos)
100.	How do we ensure the consistency of actual meter reads? Estimated reads hinder our ability to compare data points. (Jim Murphy, Sustainability Coordinator)
101.	Many universities have old buildings (takes money to take them down/build new ones) give benefits to these universities who want to retrofit all these old buildings
102.	Help cities with code assessment and enforcement! (Leah Bamberger, Sustainability)

103.	Incorporate new construction projects into community energy challenges. (Rachel)
104.	It's really important to me that my tax dollars aren't wasted on inefficiency! Please keep reaching out to towns/schools! Efficiency also has health, learning, productivity and other benefits that grid should more clearly communicate/publicize!
105.	Create heat map of where audits are happening so cities can help plan; Offer staff support for cities to help with outreach and education and municipal energy management; Structure incentives so we can get out of low-hanging fruit – we need to deep retrofits; Help us with project design; We need upfront money to get projects ready; We cannot rely on volunteers because that will leave out less affluent communities who don't have that capacity; Also, need better programs for renters. Providence is almost 50% renter occupied. We will never get to our goals unless we encourage renters and landlords; Require large properties to use PM and benchmark building if they get incentives. This information should be public! (Leah Bamberger, Sustainability/City of Providence)
A10.	Create ways to streamline access to community data.
<b>Theme: Financing</b>	
<b>Kiosk: Financing Options</b>	<b>Comments:</b>
106.	Offer 0% <u>on bill</u> financing for more projects even if incentives go down on project, give customer the option...more incentives or 0% financing. - (Dan Brodeur, Customer)
107.	If the Efficient Building Fund and C-PACE are such attractive programs (cash flow positive from day 1), why have so few businesses taken advantage of them? IDEA: mandate participation by large commercial property owners. - (Justin Boyan)
108.	A way of showing a large business customer what they need to look for in a project expediter. Best practices and right questions to ask for what their needs are. Why National Grid gives rebates/incentives for projects and where does it come from. - (Lindsey Goulet, Energy Source)
109.	Can National Grid offer a reduced rate to building owners who commit to EE requirements? Or at least for the limit year to help offset the upfront costs? - (Rachel)
110.	How can we combine Deep low Carbon Solutions with Financing alternatives that allow positive cash flow and is marketed and communicated to customers, especially low/moderate income and small business with one stop shopping via a call center? - (Chris Powell, EERMC Chair)

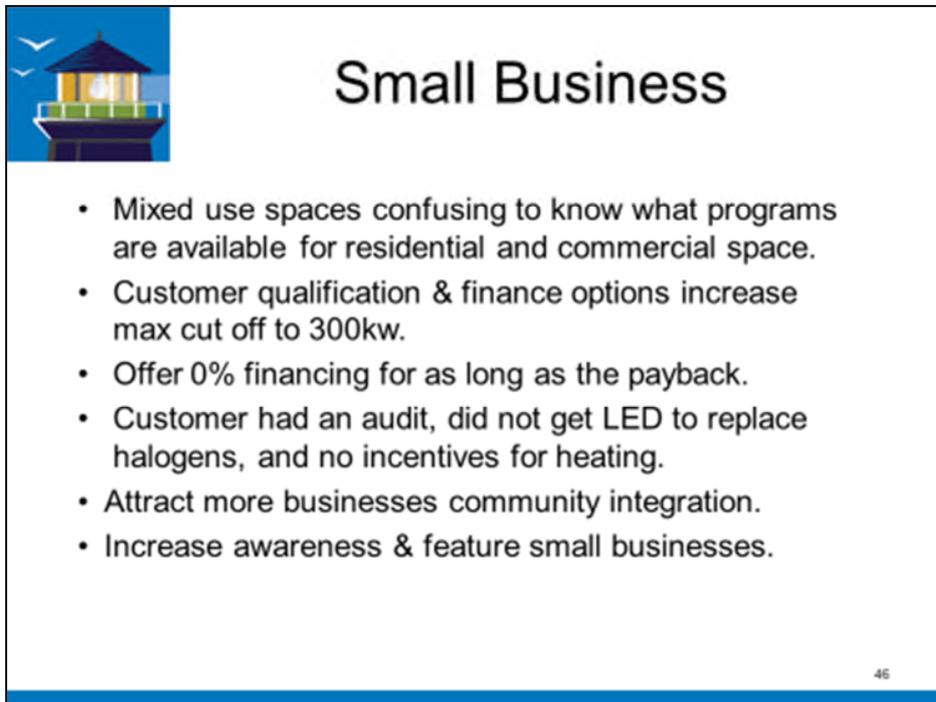
111.	Similar program offerings for MA + RI would eliminate confusion for customers and contractors who live and work in multiple states. - (Janine LaPete, Loan administrator RISE)
112.	CPACE has been a big topic recently in RI. What are your plans to market this to customers, and make it easy to understand and utilize. My experience is CT is that it takes a lot of time/effort for approval and customers do not understand it. - (Alex Quintal, Energy Advisor)
113.	More information about energy efficiency programs (finance) needs to be clearly communicated to ordinary customers! Just having it on the website is not enough!
114.	One way to increase the number of companies in programs is to feature them in articles and profiles and newsletters, websites, so that they feel good and share the article with their networks/friends. It is an advanced form of word-of-mouth marketing. - (Robert Beadle, Public Relations)
115.	How/can National Grid work more proactively to inform the public about its Heat Loan program? Are energy advocates (such as George Riley center staff and constituents aware of the program and its eligibility parameters? - (Janet Isserus, Adult Educator)
116.	As a resident I would really appreciate on-bill repayment for small improvements (eg. insulation, especially at 0% interest). It would also be amazing if a percentage of expected energy saving could go to a repayment, so that my bill would always be lower than it would have been
A12.	What is CPAC? Mechanism for financing commercial products, it is based on the financial health of the building.

**Appendix D: Report-Out Presentations**

After the public listening session, National Grid Volunteers gathered public comment cards and reported out to the attendees in an afternoon report out session. Here we provide the report out slides presented to session attendees.

**Theme: Business**

Kiosk: Small Business



The slide features a blue header bar at the top. On the left side of the header is an icon of a lighthouse with a yellow light and two white birds flying above it. To the right of the icon, the title "Small Business" is written in a large, black, sans-serif font. Below the title is a bulleted list of six items. The slide has a white background and a blue footer bar at the bottom right corner containing the number "46".

## Small Business

- Mixed use spaces confusing to know what programs are available for residential and commercial space.
- Customer qualification & finance options increase max cut off to 300kw.
- Offer 0% financing for as long as the payback.
- Customer had an audit, did not get LED to replace halogens, and no incentives for heating.
- Attract more businesses community integration.
- Increase awareness & feature small businesses.

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Kiosk: Large Business



## Large Business

- Custom projects challenges businesses lack of internal resources that make projects more forward.
- Takes too long to get formal TA study
- Want faster processing and approval of customer applications
- Clearer communication on all channels about incentives
- Offer advanced metering to enhance customer ability via greater visibility

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Kiosk: Multifamily Property Owners and Renters



## Multifamily Property Owners

- Broaden scope of multifamily program all building systems to include transportation (EV), water efficiency, metering, solid waste
- Better ways to encourage landlord participants by possibly patterning with municipalities/Govt.

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**Theme: Communities** Kiosk: Municipalities and Schools



## Municipalities and Schools

- Concerns with actual reads vs. estimated reads to prove out energy savings
- Offerings for enhanced metering
- Assistance with funds to help with energy efficiency outreach (coordinator, heat map for data)
- Bring attention to non energy efficiency benefits (health, learning, productivity, etc.)
- Offer more assistance with solar and other renewables within communities

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**Theme: Homes** Kiosk: Income Eligible and Hard to Reach Customers



## Income eligible and hard to reach customers

- Communication between renters and landlords.
- Incentive levels.
- Integrity of IES based on reported household income. How does National Grid achieve this?
- No rate hike.

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Kiosk: New Homeowners



## New Homeowners

- Theme should be New Construction, renovations and additions.
- More incentives for Zero Energy Home and Passive House.
- Help with financing.

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Kiosk: Homeowners and Renters



## Homeowners and Renters

- National Grid office for in person customer service, questions and bill payment.
- Incentives and financing for Solar energy.
- Include Solar information on National Grid Energy Efficiency website.
- Incentives for mini splits when not the main heating source.

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Theme: Financing

Kiosk: Finance Offerings



## Finance Offerings

- Increase financing awareness; marketing, clear communications to ordinary customers.
  - Website is insufficient
  - CPACE is a "big topic"
- Mandate participation in CPACE.
- Support PIPP.
- Harmonize offerings between RI and MA so it is less confusing between states.
- Offer 0% financing on projects even if incentive goes down; more financing.
- Residential solar financing.
- Guidance (website maybe) to contractors who are helping business with audits and projects.

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Theme: Comprehensive Energy Solutions

Kiosks: Electric Vehicles



## Electric Vehicles

- Education: Raise EV awareness
  1. Total cost of ownership
  2. Charging app
  3. Available makes and model
  4. Dealer education
- Incentives
  1. Off peak charging rate
  2. Bring back RI site incentive
  3. Tax gas at rate that reflects social costs of pollution and use proceeds to incent EV adoption
- Charging Infrastructure
  1. More charging infrastructure
  2. Offer EV's with solar
  3. Address landlord/renter charging infrastructure
- Future
  1. Fleet Conversion and integrated into transportation sector
  2. Look into financing road infrastructure in the future

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Kiosk: Advance Metering Functionality



### Advanced Metering Functionality

- Consideration of rate design; Time of use rates
- Analyzing load data in homes to determine which appliance uses most energy and transparent rate usages
- Reduce barriers between Renewable Energy and Energy efficiency projects to create a seamless comprehensive offering
- Real time web based data access to help manage facilities better
- Making sure that low income homes have access to equitable features of the new programs enabled by AMF

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Kiosk: Renewable Energy and RI System Data Portal



### Renewable Energy & RI system data portal

- Portal update frequency, since this is annual would like to see this on a monthly availability schedule for developers
- Data portal location incentives
- Investigate battery storage technology linked to solar
- Use LED power sources to directly backup solar energy to save on conversion costs
- What is NG doing to secure this system from cyber hackers
- Customer commented on sharing this portal and very appreciative of the info & transparency

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