

2022 Pilots, Demonstrations and Assessments

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1. Introduction

The Company invests in pilots, demonstrations and assessments to research and develop new measures, solutions and offerings to expand energy efficiency choices and benefits to customers. The Company continues to implement new measures and solutions that were proposed in the 2021 Annual Plan and has proposed additional demonstrations and assessments for the 2022 Annual Plan. The Company has developed a framework to assess and test new innovations for the energy efficiency and active demand response portfolios and used this framework to develop the solutions included in the 2022 Annual Plan.

Process: The Company has developed a standard process by which it tests all new ideas and determines if the idea merits a pilot, demonstration, or assessment. Each idea is first assessed in the **Intake** stage to determine if the solution can be offered through the energy efficiency or demand reduction programs and if it is commercially available. The application of the idea, target customers, context of existing programs and offerings, initial identification of market barriers that the idea addresses or faces, and preliminary savings potential are developed in the **Concept** stage. Ideas in these two early stages of review make up the Innovation Pipeline of ideas that is continually moving as new ideas are examined and promising ideas are further vetted and launched into the portfolio.

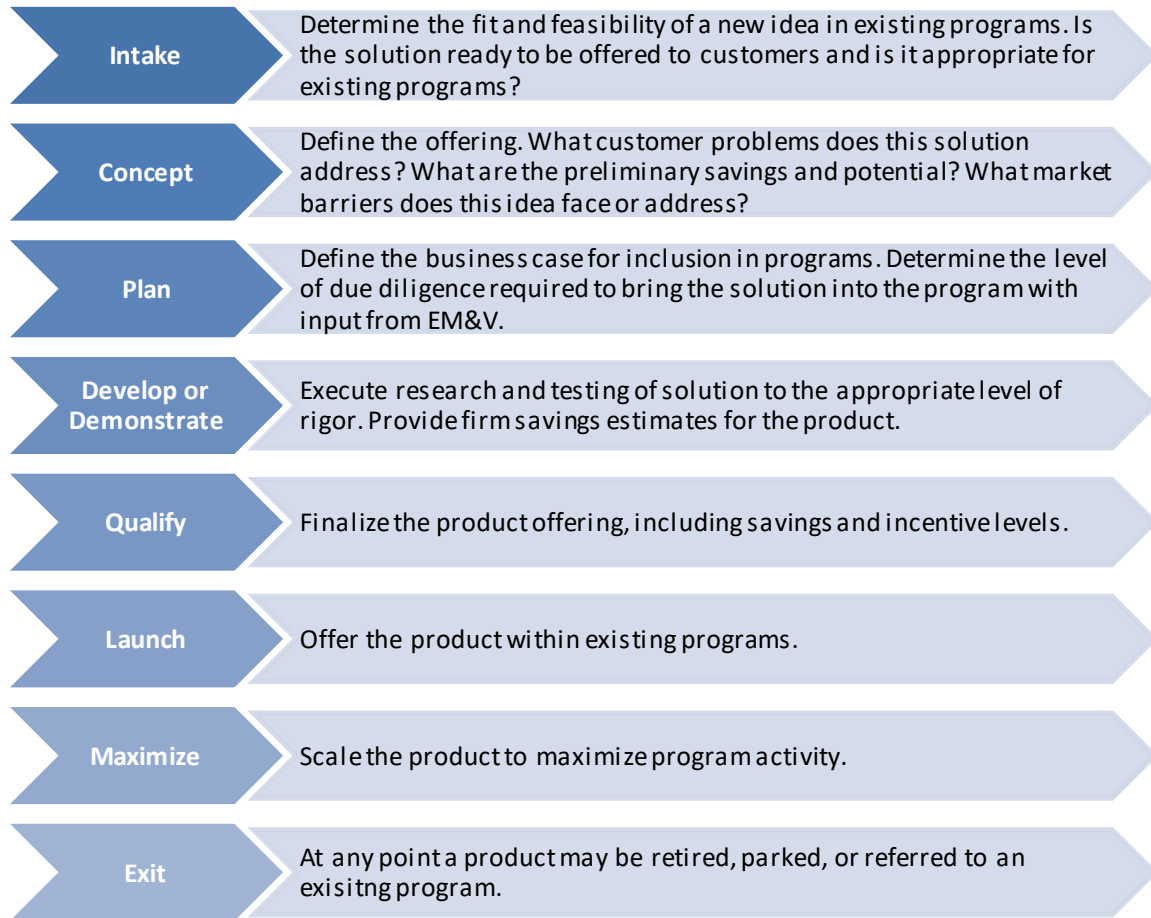
The Concept stage necessitates preliminary research and analysis of the product, which will inform the **Plan** stage. Key decisions of how to progress with the solution are made during the Plan stage, including if a pilot, demonstration, or assessment is required to develop the idea and, if so, whether an independent or vendor evaluation approach should be taken. The new ideas included in Section 4 are all in the plan stage of development and recommended for a pilot, demonstration, or assessment beginning in 2022. The decisions around what type and rigor of testing required for each item will be made with input from the National Grid Evaluation Measurement & Verification (EM&V) team, EERMC Consultants, and OER.

The planned pilot, demonstration, or assessment will be executed in the **Develop or Demonstrate** stage. Updates will be provided to the stakeholder teams on a quarterly basis.

Once the develop or demonstration stage is complete, the offering will be finalized and launched through the **Qualify, Launch, and Maximize** stages. During these stages, the product will be handed off to the CEM, vendor, and implementation teams who will manage the product as part of the Company's energy efficiency portfolio.

During any of the above stages it is possible for the idea to **Exit** the process. The product may be **Retired** if it does not fit into our programs or if there is no viable business case. The product may be **Parked** if the policy or infrastructure required for the idea to be successfully delivered to

customers is not available, but may be in the near term. Finally, the product may be **Referred** directly to the programs if the idea is expected to produce reliable savings, fits readily into an existing program or measure, and the receiving program has the capability to finalize savings and incentives.



Innovation Pipeline: The process outlined above is designed to bring in as many ideas as possible and quickly determine to what extent the Company should invest resources in developing the idea. The pilots, demonstrations, and assessments discussed here have already been identified as ideas that should be further explored and tested, but it's possible that additional ideas from the Innovation Pipeline will emerge for additional, immediate analysis through 2022. To ensure those emerging ideas can be quickly and efficiently vetted, the Company has set aside budget to assess approximately two ideas in each sector. Promising ideas may progress to a demonstration or as a program measure in the following year.

Evaluation: It is to be expected that each idea passing through this process will have a different set of requirements and research questions that must be answered prior to qualification and inclusion in programs. Depending on the characteristics of the idea, the expected program delivery pathway, and the nature of the uncertainty around the idea, the Company plans for different approaches to evaluate the idea during a pilot, demonstration, or assessment. For example, a low touch residential product that we expect to deliver through an upstream program requires a very different analysis than a high touch industrial measure with few potential customers across the state.

The Customer Energy Management Growth and Development team will recommend a research plan for each pilot, demonstration, or assessment approved through the planning process. The team will solicit input from the Company's EM&V team, OER, and EERMC consultants on whether the research requirements can be best met through an independent evaluation, a vendor evaluation, or an internal review. These approaches are further discussed in the next section.

2. Definitions

The Company, using guidance from the PUC, has outlined three separate pathways that may be used to assess ideas in the Innovation Pipeline: Pilot, Demonstration, or Assessment. It is assumed that any idea selected for a Pilot Demonstration, or Assessment has been vetted through the Intake and Concept stages outlined above. Ideas are vetted for fit and feasibility, commercial availability, and documented preliminary recommendations of characteristics like target customer, market barriers, magnitude of potential savings, and delivery pathway. A pipeline idea will only be recommended as a pilot, demonstration, or assessment if there are clearly articulated research goals that cannot be answered without a concerted research effort.

The Company has three research pathways that can be applied during a pilot, demonstration, or assessment: Independent Evaluation (highest rigor), Vendor Evaluation, or Internal Review (lowest rigor). The research pathway will be chosen depending on the needs and potential of a Pilot, Demonstration, or Assessment.

Table 1. Definitions: Pilots, Demonstrations and Assessments			
	Pilot	Demonstration	Assessment
Defining Characteristics	<ul style="list-style-type: none"> • May result in independent program • Long term and comprehensive engagement required to test and develop offering • Market capabilities may need to be developed 	<ul style="list-style-type: none"> • Technology requires information gathering and field installations 	<ul style="list-style-type: none"> • Technology addresses program need that can't be met with other, more certain solutions • Technology does not have a robust basis for energy savings
Cost effective savings information	Unknown or limited	Estimated savings	Unknown or limited
Evaluation Options*	Vendor or Independent	Vendor or Independent	Vendor, Independent, or Internal Review
Savings contribution to shareholder incentive	No	Yes	No
Cost recovery from SBC	Yes	Yes	Yes

* Each evaluation option will include input from EERMC and OER. Evaluation option selection based on factors such as uncertainty of savings, scope of offering, and whether technology is considered a pilot, demonstration, or assessment

Pilots

In 2019, the Company redefined what it considers a pilot in accordance with the Docket No. 4600-A PUC Guidance Document.

Pilot definition: 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.”¹

This attachment summarizes each pilot and describes the way 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) and that could potentially become a new, standalone program.

Pilots enable the Company to test technologies, new energy management strategies, customer adoption, workforce adoption, and cost effectiveness of emerging and new technologies. While pilots are designed to test standalone programs, pilot results may conclude that a standalone program is not recommended or that certain aspects of the pilot should be offered within existing programs. It is likely that pilots will require a long term commitment and broader set of stakeholder input, given the scope of adding a new core program to the Company portfolio. Savings associated with Pilots will not contribute to shareholder incentives. Pilots may be evaluated with either an independent or a vendor evaluation.

Pilots are likely to be recommended when:

- Solution meets fit and feasibility criteria of the Intake stage
- Solution is well defined in the Concept stage, including estimate of savings and potential
- Solution is unique and robust enough to operate as a standalone program
- Long term and comprehensive engagement required to determine the benefits and structure of a potential standalone program
- Market capabilities may need to be built before the program can be successful

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

Demonstrations

Where a pilot will test the feasibility of a new program outside of the existing core programs, a demonstration will test the feasibility of a new product or offering for inclusion in existing programs. It is generally expected that demonstrations will be less time and resource intensive than pilots, since generally there is greater certainty around a narrow, incremental idea added to a program rather than a totally new set of offerings. Savings associated with demonstration

¹ Docket No. 4600-A PUC Guidance Document, October 27, 2017. Section V. Pilots.

projects may contribute to shareholder incentives. Demonstrations may be evaluated with either an independent or a vendor evaluation.

Demonstrations are likely to be recommended when:

- Solution meets fit and feasibility criteria of the Intake stage
- Solution is well defined in the Concept stage, including estimate of savings and potential
- Expected that the solution requires information-gathering and field installations
- Solution has a robust basis for energy savings

Assessments

Assessments will be deployed for solutions that address a particular gap or program need but have significant uncertainty around the effectiveness or potential of the solution to realize savings. Because of the uncertainty, assessments will not include field demonstrations or customer installations. Instead, assessments will focus on information gathering to equip Company staff to make a more informed decision of whether and how to proceed with the idea. It is possible that an assessment could recommend further demonstration of the idea or determine the solution should exit the review process. Savings associated with assessments may not contribute to shareholder incentives. Assessments may be evaluated with an independent evaluation, vendor evaluation, or internal review.

Assessments are likely to be recommended when:

- Solution may have questions of fit and feasibility in the Intake stage
- Solution addresses a program need that can't be met with other, more certain options
- Solution does not have a robust basis for energy savings

Evaluation Pathways

Three evaluation pathways are available to determine the appropriateness of a particular solution for inclusion in the programs. The evaluation approach will be determined based on considerations such as the uncertainty of the savings, scope of the offering, market barriers, and whether the technology is considered under a pilot, demonstration, or assessment.

Independent evaluations will apply the greatest level of rigor to the pilot, demonstration, or assessment and will require broad coordination between teams. The CEM Growth and Development team will participate in the planning and review process, but the evaluation itself is subject to the procurement process, oversight, and methods outlined in Attachment 3. The third-party evaluator will develop the evaluation plan prior to customer installations to ensure the number and condition of customer installations are appropriately rigorous. The third-party evaluator may not necessarily perform customer installations, but they will be involved to the

extent required to ensure appropriate metering and customer feedback needed for the final analysis.

An independent evaluation is likely to be recommended if:

- Solution is expected to contribute significant savings towards program savings goals
- The pilot, demonstration, or assessment analysis must consider population level analysis, as opposed to site specific analysis, to answer research questions
- There are policy or baseline questions that should be addressed through the evaluation framework

Vendor evaluations will be managed by the CEM Growth and Development team from beginning to end with a single vendor completing all tasks of the evaluation. Vendor evaluations may be applied to a pilot, demonstration, or assessment. This evaluation pathway will engage a vendor to provide initial research on market readiness, market barriers, customer interest, and work in other territories, before they assess, install, and analyze the results of the technology. The vendor must not have a financial interest in the outcome of the pilot, demonstration, or assessment and must have the necessary engineering, research, or M&V experience to evaluate the idea in an unbiased manner. The vendor will provide recommendations for including the technology in the programs and key information to inform deployment of the offering such as target customers, market barriers, savings methodology, and best practices for installations and commissioning. The key differences between a vendor evaluator and independent evaluator related to oversight, since the independent evaluator is subject to the RI EM&V, and vendor procurement, since independent evaluators are subject to procurement processes in Attachment 3.

A vendor evaluation is likely to be recommended if:

- Solution will not contribute significant savings towards program savings either because it has a niche application or the savings are relatively small
- Solution is expected to be delivered through a custom pathway with site specific information inputs available during program delivery

Finally, an **Internal review** may use internal resources, primarily the CEM Growth and Development team, to explore a product through an Assessment. Internal reviews will not be applied to pilots, which require external capabilities, or demonstrations, which must maintain the integrity of the savings that may contribute to the shareholder incentive. An internal review will focus on key questions of uncertainty or policy related to the technology. The internal review can draw on available external resources and data, but will perform the research, analysis, and recommendations internally.

An internal review is likely to be recommended if:

- Solution is examined as an Assessment
- Research questions can be answered without customer installations
- Research can be delivered with internal resources and external resources that already available without procurement processes (such as ESource)

3. Summary of Pilots, Demonstrations and Assessments

The following pilots’ demonstrations and assessments are proposed for 2022 in the Commercial, Industrial, and Residential sectors. Savings estimates are approximate and only include primary fuel savings for the target customer population.

Table 2. Electric Commercial and Industrial Demonstrations and Assessments							
Classification	Fuel	Name	C&I Programs	Duration	Budget*	Savings Estimation	Evaluation
Demonstrations							
Industrial	Dual	Continuous Energy Improvement (CEI)	C&I Retrofit	2018-2022	\$ 197,867	460 MWh (projected for 2022)	Vendor
Lighting	Dual	Network Lighting Controls Plus HVAC (NLC+)	C&I Retrofit	2020-2022	\$ 123,680	1.44 kWh/SF	Vendor
HVAC	Dual	Kitchen Exhaust	C&I Retrofit	2020-2022	\$ 40,611	27 MWh (potential)	Vendor
	Dual	Smart Valves	C&I Retrofit	2021-2022	\$ 96,913	300 MWh (projected for 2021)	Vendor
	Dual	Air Curtains	C&I Retrofit	2022	\$ 96,483	14 MWh (potential)	Vendor
	Dual	Automated RTU Optimization	Allocated	2022-2023	\$ 18,460	115 kWh/ton cooling	Independent
Innovation Pipeline**	Elec.	Innovative Electric	Allocated	2022	\$ 30,766	To be estimated	To be determined
Assessments							
Active Demand Response	Elec.	Bridges to Demand Response	C&I Retrofit	2022	\$ 24,613	Unknown	Internal Review
HVAC	Elec.	Rightsizing RTUs	Allocated	2022	\$ 12,306	Unknown	Internal Review
Total Electric C&I Demonstration					\$ 604,780		
Total Electric C&I Assessments					\$ 36,919		

Note:

*Budgets indicated in this table include, evaluation, incentives, program administration, sales, marketing, technical assistance and training (if applicable). Pilots and Assessments budgets are not included in Performance Incentive calculations.

** Innovation budgets are for demonstrations that present opportunities during the plan term. Budget and savings estimates will be developed when the demonstrations are identified.

Table 3. Gas Commercial and Industrial Pilots, Demonstrations and Assessments							
Classification	Fuel	Name	C&I Programs	Duration	Budget*	Savings Estimation	Evaluation
Pilot							
Active Demand Response	Gas	Gas Demand Response Pilot	N/A	2022	\$ 265,549	27,520 Therms (projected for 2022)	Vendor
Demonstrations							
Industrial	Dual	Continuous Energy Improvement (CEI)	C&I Retrofit	2018-2022	\$ 93,114	3,133 Therms (projected for 2022)	Vendor
HVAC	Dual	Network Lighting Controls Plus HVAC (NLC+)	C&I Retrofit	2020-2022	\$ 60,917	0.012 Therms/sqft	Vendor
	Dual	Smart Valves	C&I Retrofit	2021-2022	\$ 32,304	23,000 Therms (projected for 2021)	Vendor
	Dual	Kitchen Exhaust	C&I Retrofit	2020-2022	\$ 82,453	67,000 Therms (potential)	Vendor
	Gas	Gas Heat Pumps	C&I New Construct-ion	2021-2022	\$ 221,516	15,000-20,000 Therms (for a 400-600 mbh unit)	Vendor
	Dual	Air Curtains	C&I Retrofit	2022	\$ 96,483	252 MMBtu (potential)	Vendor
	Dual	Automated RTU Optimization	Allocated	2022-2023	\$ 18,460	10-20%	Independent
Innovation Pipeline**	Gas	Innovative Gas	Allocated	2022	\$ 30,766	To be estimated	To be determined
Assessments							
HVAC	Dual	Rightsizing RTUs	Allocated	2022	\$ 12,306	Unknown	Internal Review
Total Gas C&I Pilots					\$ 265,549		
Total Gas C&I Demonstrations					\$ 636,013		
Total Gas C&I Assessments					\$ 12,306		

Note:

*Budgets indicated in this table include, evaluation, incentives, program administration, sales, marketing, technical assistance and training (if applicable). Pilots and Assessments budgets are not included in Performance Incentive calculations.

** Innovation budgets are for demonstrations that present opportunities during the plan term. Budget and savings estimates will be developed when the demonstrations are identified.

3. Summary of Pilots, Demonstrations and Assessments

Table 4. Electric Residential Demonstrations and Assessments							
Classification	Fuel	Name	Residential Program	Duration	Budget*	Savings Estimation	Evaluation
Demonstration							
HVAC	Dual	New Air Sealing and Insulation Products	EnergyWise	2021-2022	\$ 24,613	0.05 kWh/sqft	Vendor
**Innovation Pipeline	Elec.	Innovation Electric	Allocated	2020	\$ 30,766	To be estimated	To be determined
Assessments							
New Construction	Elec.	Closing the Gas Gap for All Electric Homes	RNC	2022	\$ 24,613	Unknown	Internal Review
Total Electric Residential Demonstration					\$ 55,379		
Total Electric Residential Assessments					\$ 24,613		

Note:

*Budgets indicated in this table include, evaluation, incentives, program administration, sales, marketing, technical assistance and training (if applicable). Pilots and Assessments budgets are not included in Performance Incentive calculations.

** Innovation budgets are for demonstrations that present opportunities during the plan term. Budget and savings estimates will be developed when the demonstrations are identified.

Table 5. Gas Residential Demonstrations and Assessments							
Classification	Fuel	Name	Residential Program	Duration	Budget*	Savings Estimation	Evaluation
Demonstrations							
HVAC	Dual	New Air Sealing and Insulation Products	EnergyWise	2021-2022	\$ 73,839	0.1 Therm/sqft	Vendor
	Gas	Gas Heat Pumps	HVAC	2021-2022	\$ 98,452	250 Therms/unit	Independent
Innovation Pipeline**	Gas	Innovation Gas	Allocated	2022	\$ 30,766	To be estimated	Independent
Total Gas Residential Demonstration					\$ 203,056		

Note:

*Budgets indicated in this table include, evaluation, incentives, program administration, sales, marketing, technical assistance and training (if applicable). Pilots and Assessments budgets are not included in Performance Incentive calculations.

** Innovation budgets are for demonstrations that present opportunities during the plan term. Budget and savings estimates will be developed when the demonstrations are identified.

4. Commercial and Industrial Pilots, Demonstrations and Assessments

4.1 Commercial and Industrial Pilots

a. Gas Demand Response

Pilot Stage: Develop or Demonstrate

Innovation Overview: The Company has been utilizing electric Demand Response (DR) to address grid constraints and help provide reliable service to our customers for a number of years. During the winter of 2018/19, the Company launched a Peak Period Gas Demand Response (PPDR) pilot offering, which incentivizes customers to shift their usage outside of the peak-period of the gas system (6AM-9AM from November 1st to March 31st). This pilot targeted commercial and industrial customers who have intra-day flexibility of their natural gas usage. Customers in this pilot would be able to provide their demand reduction via either fuel-switching or demand control (e.g. thermostat setback). In 2019/20, the company added the Expanded Demand Response (EDR) offering, which targeted large customers that could achieve 24 hour gas reductions, primarily with back-up heating. At the close of the 2020/21 season, the company had two participants in the PPDR pilot offering and two in the EDR pilot offering.

With gas DR, the Company will test supply and/or distribution system benefits, reduction of gas system peak demand via a reduction in overall natural gas consumption, customer adoption of gas DR and incentive levels to drive participation. An in-depth study, Gas Peak Demand Savings, will get underway in 2020 and will quantify winter demand benefits. Testing Gas DR will allow the Company to understand the impact on gas systems and whether National Grid's role in the market has influenced market adoption.

The Company plans to target 40-50 dekatherms (DTh) of hourly peak reduction in the winter of 2021/22, with the below stated DR offerings. The Company continues to expect that the majority of these peak reduction savings will come from customers participating in the full day Extended Demand Response (EDR) pilot offering, with the remainder from customers participating in Peak Period Gas Demand Response (PPDR) pilot offering. These demand reduction pilot offerings are described in detail below. The above stated target is dependent on enrollment levels and setting an appropriate incentive level to drive participation.

Customer segment addressed: The gas DR pilot offerings are focused on large, firm commercial and industrial customers, specifically those with gas equipment that can be curtailed without creating an unsafe environment. The goal of the project is to test the following:

- Are customers interested in participating in an incentivized Gas Demand Response program?
- If so, what are the acceptable price point values by customer business type and equipment type?
- What are the supply and/or distribution system benefits?
- What is the scalability of the program?
- Can customers that temporarily shift their gas usage outside of peak hours maintain some daily gas usage reductions?

Pilot Delivery: The gas DR pilot involves the installation of data recording hardware that provides granular usage data for participating customers. Data from the pilot will be evaluated each year.

Peak-Period Demand Response (PPDR): For winter 2021/22, the Company expects to increase participation in PPDR by adding one to two new customers on top of the two customers that participated in 2020/21. Many pilot parameters will remain similar to the terms of the pilot offering launched during the winter of 2020/21:

- National Grid can only call a limited number of event during a given winter.
- Customer participation in this pilot offering and the called events will be compensated via direct incentive payments, not in the form of a reduced rate.
- While enrolled customer participation in called events will be mandatory, this participation will be enforced through contractual structures and financial incentives— National Grid will not maintain a unilateral right to disrupt gas service to participating customers during called events.

Incentive Structure: As was the case in prior years, customer compensation for participation in the PPDR pilot offering will be based on a combination of ‘reservation’ and ‘energy’ payments. Each of these rates will be standard offers to all customers, though customer earning opportunity will vary based on the volume of peak hour Dth reduction that each customer can commit to and deliver. The Company will continue to utilize a rolling performance rating that measures customer reliability and limits payments to non-performing resources.

Extended Demand Response (EDR): For the winter of 2019/20, the Company developed an offering for an Extended Demand Response pilot, which provided a meaningful reduction in the peak load requirement in the system. The EDR pilot offering incentivized customers with inter-day flexibility of their natural gas usage, or the existing ability to switch their heating fuel from natural gas to another fuel source for a full day period.

The basic parameters of this pilot offering match those of the PPDR pilot offering. However, in the EDR offering, the duration of each event would be 24 hours (10AM on day 1 until 10AM on day 2, Nov. 1st through March 31st). Customers in the EDR pilot offering are expected to achieve their committed demand reductions via fuel-switching. Limitations will also be put in place that will limit the number of consecutive days on which any individual customer could be called to participate in the EDR pilot offering. National Grid will have the right to call up to 6 events during the winter at the stated incentive rate.

The EDR pilot offering will provide incentives for customers who can eliminate their usage on a given day by switching to an alternative source (most typically a delivered fuel option) to meet their energy needs.

Incentive Structure: Customer compensation for participation in the EDR pilot offering will be based on the same combination of ‘reservation’ and ‘energy’ payments outlined in the PPDR pilot offering description, set at different levels for each pilot offering. Each of these rates will be standard offers to all customers, though customer earnings opportunity will vary based on the volume of peak hour DTh reduction that each customer can commit to and deliver. As with the PPDR pilot offering, the EDR ‘reservation’ incentives will be subject to a performance rating based on a measurement of customer reliability.

Evaluation: Vendor Evaluation

Changes in 2022: The Gas Peak Period Demand Response and Extended Demand Response pilot offerings will continue in the winter of 2021/22. The Company plans to retain current levels of enrollment in the EDR offering and slightly increase participation in the PPDR pilot offering. The addition of the previously mentioned performance rating will ensure that incentives paid by the company are aligned with the delivered reliability of customer resources.

Table 6: Docket 4600 Goals - Gas Demand Response	
4600 Goals for Gas distribution System	Advances/Detracts/Neutral
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 – this pilot is neutral on this goal
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.

4.2 Commercial and Industrial Demonstrations

The Company has prioritized two new demonstrations in 2022, as well as the continuation of five demonstrations included in prior years.

a. Strategic Energy Management (SEM)/Continuous Energy Improvement (CEI)

Demonstration Stage: Develop or Demonstrate

Innovation Overview: Strategic energy management (SEM), renamed Continuous Energy Improvement 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 operation and maintenance measures in the short-term, pursue capital measures in the medium-term, and establish a culture of continuous improvement in its energy performance over the long-term. This last part is of critical importance in the testing of this initiative.

Target Customer and Program Fit: Manufacturing and wastewater customers.

Prior Efforts: In 2019, National Grid and its implementation partner, Cascade Energy, recruited seven sites to participate in the SEM demonstration. In addition, there are four wastewater sites from Rhode Island who are participating in the Massachusetts mixed manufacturing and wastewater SEM cohort. The energy models were developed during the summer of 2019. Six workshops have been held along with numerous activities, such as energy treasure hunts, where teams walk around buildings looking for quick ways to save energy. Customer participation has been consistent and enthusiastic.

In 2020, the Continuous Energy Improvement demonstration focused on identifying operation and maintenance energy savings while also providing energy management coaching to facility operators and building managers. In 2020, three of the seven customers participating in the Rhode Island cohort were able to claim gas and four of the seven customer claimed electric savings. The gas savings totaled over 165,000 net therms, however, approximately 74% of the savings came from a single customer. The electric savings amounted to roughly 1,540,000 net kWh with approximately 72% of the total savings coming from one customer.

For 2021, two of the seven customers in the Rhode Island cohort claimed gas saving that amounted to over 133,500 net therms. The 2021 electric results are expected to be calculated in the fall of 2021.

In 2022, the Company and its implementation partner, Cascade Energy, will look to conclude the Continuous Energy Improvement/Strategic Energy Management demonstration. Learnings and findings from this demonstration will be incorporated into other program offerings such as ESPO and the Industrial Initiative.

Demonstration Delivery: The Company and its vendor are working closely with the customer cohort to identify energy savings opportunities at their facilities. Savings are derived from a site-specific regression model that considers 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.

Evaluation: Independent evaluation

b. Network Lighting Controls Plus HVAC

Demonstration Stage: Develop or Demonstrate

Innovation Overview: Network Lighting Control Plus HVAC (NLC+) go beyond traditional advanced lighting controls. NLC+ systems have the hardware and software capabilities to act as a simple, stand-alone energy management system or to interface seamlessly with more sophisticated existing building systems. In either case, local, granular occupancy and other sensing data from the NLC+ system facilitates additional savings from HVAC, plug loads, and complete energy management. This technology could be implemented as a retrofit to existing buildings, or as a component of a comprehensive new construction project. The most significant challenge in realizing savings for these projects is the integration of HVAC controls, the commissioning of the system, and conveying the cumulative value of this approach with customers. A successful program offering must support the commissioning process.

Target Customer and Program Fit: Initial customer segments to be considered for this analysis are offices, schools/universities, industrial, retail and hospitals.

Prior Efforts: The NLC+ demonstration was initiated in 2020. Phase I of the research, which concluded in July 2020, included a market readiness assessment for this technology. Twenty-two interviews were completed with a collection of lighting and HVAC industry representatives, customers, and internal program staff. Interviews identified barriers and opportunities for NLC+ in Rhode Island.

Phase II of the research began in 2020 and includes customer installations and M&V efforts. Phase II will continue into 2022 due to the longer than anticipated time required to recruit customers for the demonstration and long lead times of the lighting projects. At the time of

writing, one project is expected to move forward and a number of additional leads are being processed.

Demonstration Delivery: The demonstration is focused on the potential of integrating lighting and HVAC controls through the networked lighting controls system. The most significant barriers identified in the Phase I research were related to the integration of the two systems, including bridging the siloed lighting and HVAC trades. Phase II of the demonstration will include up to four customer installations. The goal of the installation will be to investigate the energy and non-energy benefits of projects, pain points in commissioning the projects, and knowledge gaps that may hinder fully realizing expected HVAC savings. Finally, Phase II will recommend if and how this technology can be included in the energy efficiency programs.

Evaluation: Vendor evaluation

c. Kitchen Exhaust

Demonstration Stage: Develop of Demonstrate

Innovation Overview: Many kitchen exhaust hoods operate with manual switches, some running all kitchen hours or even 24/7. Three measures have been considered over the course of this demonstration: demand control ventilation, energy recovery, and electrostatic filtration. These three different measures can potentially be implemented together to comprehensively reduce the level of energy required to operate a commercial kitchen. Demand control ventilation (DCV) reduces the amount of exhaust air, and corresponding make up air, by monitoring the temperature or particulates of the exhaust air and only running when required. Energy recovery can offset water heating for dishwashers by utilizing heat in kitchen exhaust. Electrostatic filtration systems offer a lower pressure drop alternative to traditional exhaust filtration systems.

Only the electrostatic filtration measure is planned to continue into 2022.

Target Customer and Program Fit: These three measures are appropriate for customers with large commercial kitchens such as restaurants and hotels, especially for kitchens with long hours of operation. Energy recovery is most appropriate for customers with simultaneous cooking and dishwashing. Electrostatic filtration systems are most appropriate for customers with local codes or requirements for kitchen exhaust pollution control, common in dense urban areas.

Prior Efforts: The Kitchen Exhaust demonstration began in 2020. Phase I of the demonstration, completed in 2020, identified the savings potential for each of the individual measures and for a combined, comprehensive package. The demonstration identified ideal candidates, current

market conditions, and barriers to realizing energy savings. This initial research performed 8 interviews with trade allies, manufacturers, and customers.

After Phase I, the demand control ventilation was referred to the programs for immediate deployment through the custom pathway. This technology has been deployed successfully in the programs and did not require additional M&V.

The energy recovery product did generate customer interest for on-site installations, but due to some delays in the product development and manufacturing the vendor was unable to perform installations in 2021. The Company will revisit energy recovery in the future when the product is commercially available.

The Company is actively working to recruit customers for installations of the electrostatic filtration measure in 2021. The recruitment process has been complicated by the pandemic and the relatively narrow target customer group.

Demonstration Delivery: The Phase I findings of this demonstration were promising and support moving forward with customer installations for electrostatic filtration and for energy recovery. The Company supports moving kitchen hood DCV directly to program implementation given the savings potential and prior experience with the technology.

Phase II was planned to proceed with up to five installations, however, given customer recruitment and manufacturing delays the Phase II scope has narrowed to 1-2 installations of the electrostatic filtration system.

Evaluation: Vendor evaluation

d. Smart Valves on Chilled Water Systems

Demonstration Stage: Develop or Demonstrate

Innovation Overview: Pressure-independent control valves, or smart valves, can be used to replace existing two- and three-way valves on chilled water systems to control chilled water entering the air handlers. The valves include built in pressure regulators that stabilize flow through a range of pressure, allowing stable flow control under a variety of system conditions. The local controller is mounted directly on the valve itself and can report back to the building BAS where the data can be used for additional analysis such as fault detection, energy monitoring, and real time performance. Smart valves will most often result in electric savings by reducing pumping and preventing overcooling, but can yield gas savings when installed in gas absorption chiller systems.

Target Customer and Program Fit: Customers with chilled water systems and air handlers.

Prior Efforts: This demonstration began in 2021 with a single customer installation and M&V beginning in the spring and into the summer.

Demonstration Delivery: In 2021 the Company began work to recruit three customers to participate in the demonstration project, including smart valve installation and M&V. One customer with two projects in separate buildings has already had the product installed. The demonstration will identify target customers for the technology, market barriers and solutions, investigate how smart valves may be used as part of a broader chilled water plant optimization project, and potentially make recommendations on energy savings estimates.

Evaluation: Vendor evaluation

e. Gas Heat Pumps

Demonstration Stage: Develop or Demonstrate

Innovation Overview: Gas Heat Pumps are a technology that, according to manufacturers, can be twice as efficient as conventional boilers, resulting in fuel savings. Gas Heat Pumps are ideal for facilities with simultaneous need for heating and cooling including athletic facilities, pools, food and beverage processing plants, hotels, and multi-unit residential buildings.

Target Customer and Program Fit: Large commercial customers with existing conventional boilers and simultaneous need for heating and cooling.

Prior Efforts: The Gas Heat Pump demonstration was initiated in 2020 and included preliminary research into available technologies and their applications. In 2021, the Company screened the technology against various baselines and for various sized commercial customers, comparing absorption- and compression-driven technologies. The Company will explore the performance of gas heat pumps at small commercial sites, compared to other gas and electric HVAC options.

Demonstration Delivery: The Company will install gas heat pumps at three to four customer sites.

Evaluation: Vendor Evaluation

f. Air Curtains

Demonstration Stage: Concept

Innovation Overview: A top priority of those looking to conserve energy is to seal the building envelope as much as possible. This can be difficult in spaces where there is a high amount of foot traffic between a conditioned space and an unconditioned space. Air curtains create a seamless

air barrier over an exterior opening to separate an indoor and outdoor space. This barrier serves to limit heat transfer between the two environments, thus reducing heating/cooling load on the HVAC system.

Target Customer and Program Fit: This technology will most likely be a benefit to industrial customers with large overhead doors where there is high foot traffic. There is potential that this technology can also benefit smaller industrial and commercial customers with areas of high foot traffic. In addition, this technology has been utilized in refrigeration applications, and could be utilized in large industrial refrigerated warehouses and smaller coolers with high foot traffic.

Prior Efforts: No prior efforts have been undertaken to include air curtains as a prescriptive measure. There is a limited history of air curtains being included in prior custom projects.

Demonstration Delivery: The Company would demonstrate the effectiveness of air curtains in a few difference scenarios, as there are several applications of the technology. Primarily, demonstrating capability in a large industrial setting separating a conditioned indoor space and an unconditioned outdoor space, a small commercial application separating a conditioned indoor space and an unconditioned outdoor space, and refrigerated spaces both large and small.

Evaluation: Vendor Evaluation

g. Automated RTU Optimization

Demonstration Stage: Concept

Innovation Overview: The Company is looking for new ways for customers to improve control of their HVAC systems to realize energy savings and improve comfort. One such approach is automated systems optimization, in which software analyzes and modifies the control of equipment automatically. This demonstration project will examine the SwarmStat™ product, which can be deployed for smaller customers with 2 or more RTUs controlled by smart thermostats and no existing EMS. This product is of particular interest since it allows simple, enhanced controls for small to medium customers with minimal upfront investment.

Target Customer and Program Fit: Customers with 2+ RTUs and no building automation or energy management system.

Prior Efforts: No prior efforts have been undertaken for this measure.

Demonstration Delivery: The Company will work with an independent evaluator to assess gas and electric savings realized by automated optimization software. The Company expects the demonstration to include a pre/post analysis of energy consumption for 10-15 customers. The demonstration will be used to develop deemed savings estimates.

Evaluation: Independent Evaluation

4.3 Commercial and Industrial Assessments

The Company has proposed two new C&I assessments for 2022.

a. Building Flexibility through Demand Response

Demonstration Stage: Concept

Innovation Overview: Growing and optimizing Rhode Island’s portfolio of demand response-ready assets is crucial for its climate goals, while creating a valuable revenue stream for building operators. A previous assessment identified opportunities to seed DR capability with HVAC systems through incentivizing communications and controls; this continued research expands on this work by investigating how overall building load flexibility can be achieved, not limited to HVAC systems. Furthermore, the assessment will investigate other existing programmatic routes by which load flexibility can be added to a building, such as through the course of EMS and BAS upgrades and monitoring-based or continuous commissioning projects.

Target Customer and Program Fit: Increasing building flexibility and expanding access to demand response revenue streams is broadly applicable across customers of various sizes and in various commercial and industrial sectors. The assessment will particularly seek to understand barriers to accessibility for customers typically underserved by participation in demand response programs. **Prior Efforts:** This work will expand on previous research in the 2021 assessment, “HVAC Automation for Demand Response”.

Assessment Delivery: The Company will investigate various existing programs which create building flexibility through pathways such as monitoring-based/continuous/retro-commissioning, energy audits, or others to be identified, through interviewing curtailment providers, program managers, contractors, and other relevant DR-enabling parties. The assessment will seek to quantify potential benefit and impact of various flexibility-enabling pathways across customer segments.

Evaluation: Internal Review

b. Software and Hardware Solutions for Rightsizing RTUs

Demonstration Stage: Concept

Innovation Overview: Along with installing more efficient HVAC equipment customers can avoid energy consumption over time by rightsizing their equipment at the time of design or

specification. Equipment is often oversized to ensure occupant comfort, but the same levels of comfort can be provided with appropriately sized and controlled equipment.

This assessment will explore developing an approach for identifying rightsizing opportunities and estimating incremental savings through rightsizing equipment. Two potential opportunities are rightsizing when an older oversized system is replaced or switching from whole-building heating to spot heating. Further, the Company will explore how software can be used to encourage rightsizing, either by more effective control of smaller equipment or by establishing that existing equipment is oversized.

Target Customer and Program Fit: All commercial and industrial customers

Prior Efforts: There have been no prior efforts to systematically consider rightsizing in the C&I sector. The residential programs have offered downsizing HVAC system incentives for some time.

Assessment Delivery: The assessment will establish a protocol for when and how rightsizing should be considered. This will include discussions with market actors to understand how equipment is typically sized and barriers to more appropriate sizing for new installations and for time of replacement installations. The Company will include discussions with the EM&V team about savings and baseline documentation. The assessment will make recommendations on whether rightsizing should be considered within the prescriptive HVAC offerings or only on a custom basis.

Evaluation: Internal Review

5. Residential Pilots, Demonstrations, and Assessments

5.1 Residential Pilots

The Company does not propose any new or continued Residential Pilots for 2022.

5.2 Residential Demonstrations

The Company is continuing two demonstrations for the Residential sector in 2022.

a. New Air Sealing and Insulation Products

Demonstration Stage: Develop or Demonstrate

Innovation Overview: Several new technologies claim improvements to infiltration and insulation of homes. The two technologies of focus in this demonstration are sprayed-in air-sealing and injection foam for residential and multifamily buildings.

Vendors such as AeroBarrier operate in both new construction and renovations, offering a waterborne acrylic sealing fluid, which is sprayed into homes, covering surfaces and filling gaps up to one-quarter inch in width. Aerobarrier performs this service alongside a blower door test to monitor leakage as the spray seals gaps.

Building envelope materials offers a polyurethane foam which can be injected into building cavities to improve R-value. The conventional limitation for this technology has been the risk of toxicity and hazardous particulates, but the manufacturer of this technology believes they have solved this problem.

Target Customer and Program Fit: Both technologies have the potential to significantly improve the heating and cooling efficiency of under-insulated buildings; target customers will be single-family homes, particularly those that are under-insulated.

Demonstration Delivery: The Company will work with the residential implementation vendor to identify several residential single-family sites with a need for improved insulation and will work with the two vendors to deploy their systems at those sites. Six homes in total will participate, two each with the individual technologies and two with both deployed.

Prior Efforts: The demonstration began in 2021. The Company screened the processes for residential customer cost and benefit and determined applicable customer characteristics. The Company also interviewed vendors to determine pricing and feasibility, scoping out project deliverables; the demonstration will be executed in 2021 following vendor proposals and finalization of work and evaluation schedule.

Evaluation: Vendor Evaluation

b. Gas Heat Pumps

Demonstration Stage: Develop or Demonstrate

Innovation Overview: The innovation potential for gas heat pumps is similar for a residential context as it is for a commercial or industrial context, as described previously in section 4.2.e. Gas heat pumps may offer efficiency improvements over conventional gas boiler or furnace technologies and can provide both heating and cooling from a single piece of equipment.

Target Customer and Program Fit: Target customers are existing gas customers. Sites will include both hydronic and ducted heating distribution systems.

Demonstration Delivery: This demonstration will validate cost and performance for gas heat pumps at two to three residential single-family customer sites, as well as two to three multifamily building installations. The demonstration will identify homes with gas furnaces or boilers, installing a mix of heating and heating-plus-cooling systems. Existing gas meters will provide comparison against prior gas consumption; the evaluation of gas heat pump performance in cold temperatures will be crucial.

Prior Efforts: The Company has previously assessed the applicability of gas heat pumps to C&I customers. In 2021, The Company screened the possible measure for cost-effectiveness and evaluated the commercial availability of residential-scale gas heat pumps. The Company is currently planning a 2022 timeframe for testing and evaluation of the heat pumps with a gas heat pump manufacturer.

Evaluation: Independent evaluation will be engaged to determine baseline, evaluate performance, and assess potential within residential customer base, with input from the Company's EM&V team.

5.3 Residential Assessments

The company proposes one new Residential Assessment for 2022.

a. Closing the Gas Gap for All Electric Homes

Demonstration Stage: Concept

Innovation Overview: While there are all electric options for many appliances and systems within a home, builders often still connect new construction homes to gas to serve gas cooking and fireplaces. In order to further advance the development of all electric homes in Rhode Island, the Company must address these end uses. The goal of this assessment will be to examine how the programs can promote new construction of all-electric buildings (without a gas connection) in part through incentivizing the electric alternative of these particular appliances. Possible outcomes include recommendations for standalone measures or for alternative incentive mechanisms to broadly incentivize all-electric homes.

Target Customer and Program Fit: This assessment will consider customers buying new homes and builders of new homes, across single-family and multi-family new construction.

Assessment Delivery: This assessment will examine high efficiency options for electric ovens, induction cook tops, and electric fireplaces as an alternative to less-efficient electric equipment

or gas equipment. The assessment will also identify non-monetary barriers to all electric homes (such as customer preference) and ways the programs can help overcome those issues.

Prior Efforts: There are no prior efforts.

Evaluation: Internal review