Andrew Marcaccio
Senior Counsel

November 12, 2021

VIA ELECTRONIC MAIL

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

RE: Docket 5189 – 2022 Annual Energy Efficiency Program Plan
Responses to PUC Data Requests - Set 1 (Complete Set)

Dear Ms. Massaro:

On behalf of The Narragansett Electric Company d/b/a National Grid ("National Grid" or the "Company"), attached please find the electronic version of the Company's complete set of responses to the Public Utilities Commission's ("PUCs") First Set of Data Requests in the above referenced docket.[1] Bates stamp has been applied to the attached electronic version.

Additionally, the Company is including a copy of its Motion for Protective Treatment of PUC 1-107 and PUC 1-141 previously submitted with batch 3 of its responses on November 5, 2021.

Thank you for your attention to this filing. If you have any questions or concerns, please do not hesitate to contact me at 401-784-4263.

Sincerely,

Andrew S. Marcaccio

Enclosures

cc: Docket 5189 Service List
John Bell, Division
Margaret Hogan, Esq.
Jon Hagopian, Esq.

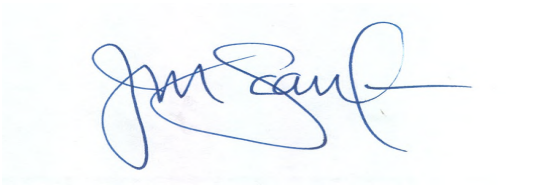
[1] Per the Commission's request, the Company is providing one copy of this transmittal for the Commission's file in this docket and six (6) copies, 3-hole punched for the Commission.

280 Melrose Street, Providence, RI 02907
T: 401-784-4263 ■ andrew.marcaccio@nationalgrid.com ■ www.nationalgrid.com

Certificate of Service

I hereby certify that a copy of the cover letter and any materials accompanying this certificate was electronically transmitted to the individuals listed below.

The paper copies of this filing are being hand delivered to the Rhode Island Public Utilities Commission and to the Rhode Island Division of Public Utilities and Carriers.



_____ November 12, 2021

Joanne M. Scanlon Date

Docket No. 5189 - National Grid – 2022 Annual Energy Efficiency Program
Service list updated 10/27/2021

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STATE OF RHODE ISLAND
PUBLIC UTILITIES COMMISSION

THE NARRAGANSETT ELECTRIC CO. D/B/A NATIONAL GRID'S 2022 ANNUAL ENERGY EFFICIENCY PLAN	)	DOCKET NO. 5189

MOTION OF THE NARRAGANSETT ELECTRIC COMPANY D/B/A NATIONAL GRID FOR PROTECTIVE TREATMENT OF CONFIDENTIAL INFORMATION

The Narragansett Electric Company d/b/a National Grid ("National Grid" or the "Company") hereby respectfully requests that the Public Utilities Commission ("PUC") grant protection from public disclosure certain confidential information submitted by the Company in the above referenced docket. The reasons for the protective treatment are set forth herein. The Company also requests that, pending entry of that finding, the PUC preliminarily grant the Company's request for confidential treatment pursuant to 810-RICR-00-00-1.3(H)(2).

The records that are the subject of this Motion that require protective treatment from public disclosure is the Company's confidential responses to PUC 1-107 ("PUC 1-107") and PUC 1-141 ("PUC 1-141") which was filed by the Company on November 5, 2021 in response to the First Set of Data Requests issued by the Public Utilities Commission ("PUC") in the above-referenced docket. National Grid requests protective treatment of PUC 1-107 and PUC 1-141 in accordance with 810-RICR-00-00-1.3(H) and R.I. Gen. Laws § 38-2-2-(4)(B).

I. LEGAL STANDARD

For matters before the PUC, a claim for protective treatment of information is governed by the policy underlying the Access to Public Records Act ("APRA"), R.I. Gen. Laws § 38-2-1 et seq. See 810-RICR-00-00-1.3(H)(1). Under APRA, any record received or maintained by a state or local governmental agency in connection with the transaction of official business is considered

public unless such record falls into one of the exemptions specifically identified by APRA. See R.I. Gen. Laws §§ 38-2-3(a) and 38-2-2(4). Therefore, if a record provided to the PUC falls within one of the designated APRA exemptions, the PUC is authorized to deem such record confidential and withhold it from public disclosure.

II. BASIS FOR CONFIDENTIALITY

PUC 1-107 and PUC 1-141, which are the subject of this Motion, are exempt from public disclosure pursuant to R.I. Gen. Laws § 38-2-2(4)(B) as "[t]rade secrets and commercial or financial information obtained from a person, firm, or corporation that is of a privileged or confidential nature." *The Attorney General's Guide to Open Government in Rhode Island 6th Edition*[1] provides guidance as to the scope of R.I. Gen. Laws § 38-2-2(4)(B)'s applicability. It states that:

> If a request is made for financial or commercial information that a person is obliged to provide to the government, it is exempt from disclosure if the disclosure is likely either: (1) to impair the government's ability to obtain information in the future, or (2) to cause substantial harm to the competitive position of the person from whom the information was obtained. If a request is made for financial or commercial information that is provided to the government on a voluntary basis, it is exempt from disclosure if the information "is a kind that would customarily not be released to the public by the person from whom it was obtained." The Providence Journal Company v. Convention Center Authority, 774 A.2d 40 (R.I. 2001).

PUC 1-107 and PUC 1-141 consist of financial and commercial information. National Grid would customarily not release this information to the public. The Company's submission of PUC 1-107 and PUC 1-141 stems from data requests issued by the PUC in the above-referenced docket. Accordingly, National Grid is providing PUC 1-107 and PUC 1-141 to fulfil its regulatory responsibilities. Therefore, PUC 1-107 and PUC 1-141 are exempt from public disclosure "if the

[1] http://www.riag.ri.gov/Forms/AGguidetoopengovernment.pdf

disclosure is likely either: (1) to impair the government's ability to obtain information in the future, or (2) to cause substantial harm to the competitive position of the person from whom the information was obtained." See *The Attorney General's Guide to Open Government in Rhode Island 6th Edition*, p. 22.

The release of PUC 1-107 and PUC 1-141 is likely to cause substantial harm to the competitive position of National Grid. PUC 1-107 and PUC 1-141 contain commercially sensitive market information including projected costs associated with 19 different energy efficiency studies (PUC 1-107) and projected costs associated with verifying certain customer household income levels (PUC 1-141). The Company plans to procure the services of various vendors to draft these studies and verify these income levels. Disclosure of the projected costs could negatively impact the Company's customers because the prospective vendors will have access to the projected costs and could structure their bids so that they bid up to the projected cost when they would have otherwise bid lower amounts or the prospective vendors could use the projected costs as leverage in contract negotiations.

III. CONCLUSION

For the foregoing reasons, the Company respectfully requests that the PUC grant this motion for protective treatment of PUC 1-107 and PUC 1-141.

[SIGNATURE PAGE FOLLOWING]

Respectfully submitted,

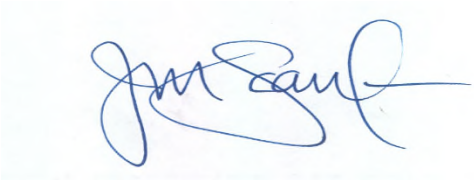
NATIONAL GRID
By its attorney,

Andrew S. Marcaccio (#8168)
National Grid
280 Melrose Street
Providence, RI 02907
(401) 784-4263

Dated: November 5, 2021

CERTIFICATE OF SERVICE

I hereby certify that on November 5, 2021, I delivered a true copy of the foregoing Motion via electronic mail to the parties on the Service List for Docket No. 5189.



Joanne M. Scanlon

PUC 1-1
Gas Overspend

Request:

Referencing Table G-1 and Bates page 22, National Grid projects a negative fund balance of $5,076,096 for the 2021 year-end gas fund balance. National Grid projects an overspend of $4,447,232 of the 2021 gas portfolio implementation budget. Please explain how the negative fund balance was calculated.

Response:

Please see Attachment PUC 1-1-1

The fund balance calculation is derived as follows:

A. Start of Period Fund Balance = $6,724,466*
B. Add the sum of the actual monthly revenue through Aug 2021 and the estimated monthly revenue for Oct-Dec based on internal volume forecasts - $27,310,779**
C. Add the sum of the actual monthly expenses through Aug 2021 and the estimated monthly expenses for Oct-Dec based on Program Manager forecasts - $37,722,432***
D. Cash Flow Over or (Under) equals the Sum of (B-C) – ($10,411,653)
E. End of Period Balance before Interest equals (A-D) – ($3,687,188)
F. Add Interest (calculated based on the Bank of America Prime Rate of 3.25% less 2 basis points =1.25%) - $95,425
G. End of Period Balance After Interest equals (E+F) – ($3,591,763)
H. Projected 2021 Incentive - $1,484,333
I. Ending Balance After Incentive equals (G-H) – ($5,076,096)

*Beginning Fund Balance Jan 1, 2021

**Revenue includes Unbilled and Uncollectible RIG revenue

*** The projected $4,447,232 overspend is incorporated into this amount.

Prepared by or under the supervision of: Annette Dennis and John Richards

National Grid

TABLE 1

OVERALL ANALYSIS OF ENERGY EFFICIENCY FUND BALANCE

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	TOTAL
1. Start Of Period Balance	$6,724,466	$11,890,550	$14,637,422	$14,093,181	$12,860,460	$11,496,507	$6,724,466
2. Revenue	$5,172,066	$3,945,520	$3,673,496	$2,191,153	$1,597,978	$985,684	$17,565,897
3. Monthly EE Expenses	$15,672	$1,212,458	$4,232,692	$3,437,905	$2,974,611	$2,856,431	$14,729,770
4. Cash Flow Over/(Under)	$5,156,394	$2,733,062	($559,197)	($1,246,752)	($1,376,633)	($1,870,747)	$2,836,127
5. End Of Period Balance Before Interest	$11,880,860	$14,623,612	$14,078,225	$12,846,429	$11,483,827	$9,625,759	$9,560,593
6. Interest	$9,690	$13,809	$14,956	$14,031	$12,679	$11,001	$76,167
7. End Of Period Balance After Interest	$11,890,550	$14,637,422	$14,093,181	$12,860,460	$11,496,507	$9,636,760	$9,636,760

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	YEAR END TOTAL
8. Start Of Period Balance	$9,636,760	$8,006,190	$7,048,653	$3,245,874	($242,133)	($2,583,919)	$6,724,466
9. Revenue	$683,679	$754,778	$929,131	$1,247,699	$2,396,955	$3,732,640	$27,310,779
10. Monthly EE Expenses	$2,323,434	$1,720,152	$4,737,269	$4,737,269	$4,737,269	$4,737,269	$37,722,432
11. Cash Flow Over/(Under)	($1,639,755)	($965,374)	($3,808,138)	($3,489,571)	($2,340,314)	($1,004,629)	($10,411,654)
12. End Of Period Balance Before Interest	$7,997,006	$7,040,816	$3,240,515	($243,697)	($2,582,448)	($3,588,548)	($3,687,188)
13. Interest	$9,184	$7,837	$5,359	$1,564	($1,471)	($3,215)	$95,425
14. End Of Period Balance After Interest	$8,006,190	$7,048,653	$3,245,874	($242,133)	($2,583,919)	($3,591,763)	**($3,591,763)**
15. 2021 Incentive							**$1,484,333**
16. Ending Balance after Incentive							**($5,076,096)**
17. Income Eligible Subsidization							**$0**
18. Ending Balance after Subsidization							**($5,076,096)**

1. Previous year's ending balance
2. Business Objects queries for revenues
3. SAP queries for expenses
4. Line 2 minus Line 3
5. Line 1 plus Line 4
6. Interest applied
7. Line 5 plus Line 6
8. Previous month's ending balance
9. Business Objects queries for revenues
10. SAP queries for expenses
11. Line 9 minus Line 10
12. Line 8 plus Line 11
13. Interest applied
14. Line 12 plus Line 13
15. Estimated 2021 Incentive plus prior period true-ups

PUC 1-2
Gas Overspend

Request:

Referencing Bates page 37, the Company writes "in June, the Company recognized that continuing to serve gas residential customers who have executed weatherization contracts as part of the EnergyWise Single Family program would result in a projected overspend." Provide an estimate of the number of customers who received weatherization services through the EnergyWise Single Family program after that June realization, as well as an estimate of the costs National Grid will have incurred for this work between June and the end of 2021.

Response:

From June 2021 through October 27, 2021, the number of customers who received weatherization services through the gas EnergyWise (single family) program was 928. The Company also anticipates an additional 805 customers will be serviced through the end of 2021.

In total, the Company anticipates serving 1,733 customers between June and the end of 2021 with associated costs of $9,856,117.

Prepared by or under the supervision of: Angela Li

PUC 1-3
Gas Overspend

Request:

Referencing Bates pages 37-8, please provide a detailed explanation of the steps that the Company took after realizing in June that it was on track to overspend in the EnergyWise Single Family program (i.e., what incentives were reduced, by how much, and as of what date).

Response:

Following the identification that the Company was on track for an overspend in the EnergyWise gas single family program, the Company took the following steps:

- The Company honored the contracts and weatherization action plans that were executed by June 17, 2021.
- Beginning on June 17, 2021, for effect through the end of the program year, the Company reduced the incentive for customers taking part in the program from 75% to 50%.
- Beginning on or around June 24, 2021, the Company reduced the per project incentive cap for customers taking part in the program from $15,000 to $4,000.
- In late June, the Company shifted to passive marketing, such as paid search, with the exception of already committed campaigns.
    - Examples of marketing campaigns that proceeded included the classic homes campaign which promoted weatherization, low-E storm windows, and refrigerator recycling. The company also maintained marketing of EnergyWise for municipalities on Aquidneck Island, given long-term gas capacity constraints on the Island.
- The Company's program managers worked in coordination to better understand portfolio spending to try and identify where there could be funds available to transfer to EnergyWise.
- The Company reduced less urgent spending in other programs to offset spending in the EnergyWise gas single family program. For example, in the residential HVAC program, the Company was planning to introduce an enhanced incentive opportunity. This was ultimately not activated so that lack of spending could offset the spending in the EnergyWise gas single family program.

Prepared by or under the supervision of: Angela Li

PUC 1-4
Gas Overspend

Request:

The Company attributes the 2021 overspend in the EnergyWise Single Family program in part to Covid-related "workforce constraints" that date back to 2020. Please describe what the Company understood about these "workforce constraints" in June 2021, as they relate to the EnergyWise Single Family program.

Response:

In 2020, the EnergyWise program suspended services from March 17, 2020 – July 2020. During this time, most weatherization contractors furloughed or, in other cases, laid off employees. When the energy efficiency programs resumed operations, weatherization contractors found that a significant portion of their employees had moved to other employment opportunities.

The Company's lead vendor for the EnergyWise Single Family program has estimated that the available weatherization workforce in July was only around 30% of pre-COIVD capacity levels. Workforce capacity through the end of 2020 was approximately 30% lower than pre-COVID levels, as contractors reported concerns with potentially experiencing another work stoppage and subsequent furlough of employees, and as a result resisted staffing up to pre-COVID levels.

Beginning in the Spring of 2020, the Company increased incentive levels for weatherization projects to 100% of project costs. This 100% weatherization incentive level continued through Q4 of 2020. The goal with the incentive increase was to support residential customers and to build a pipeline of work to demonstrate the program's commitment in providing ample work for weatherization contractors, with a goal of encouraging weatherization contractors to increase staffing to pre-COVID levels.

By June 2021, the Company estimates that the weatherization workforce had increased to 125% of (pre-COVID) 2020 levels. The combination of a backlog of higher cost (i.e. 100% incentive) weatherization jobs that were not completed in 2020 spilling over into 2021, continued strong demand for weatherization services even after reductions in incentive levels, and the increased weatherization project throughput enabled by these increases in weatherization contractor capacity have all resulted in greater than anticipated weatherization volumes in 2021, resulting in the planned overspend in the gas program budget.

Prepared by or under the supervision of: Angela Li

PUC 1-5
Gas Overspend

Request:

Please provide a chart showing the number of measures installed for the EnergyWise Single Family program, on a monhly basis, for the years 2020 and 2021 (indicate actuals for each month in 2021 and estimates for the remainder of 2021.)

Response:

EnergyWise Single Family Gas
Monthly Measures installed in 2020 and 2021

Month	Year	Aerators Gas	Air Sealing Kit (Gas)	Pipe Insulation - Gas	Showerheads Gas	THERMOSTAT	VENTILATION - OTHER	WEATHERIZATION	WiFi Thermostat
Feb	2020	54	18	771	70	284	14,274	183	16
Mar	2020	71	159	1,175	80	517	34,915	391	31
Apr	2020	16	17	199	11	83	6,772	116	4
Jun	2020		8			30		1	31
Jul	2020				2	56	7,515	129	3
Aug	2020	60	6	24	55	79	12,093	177	10
Sep	2020				2	20	6,736	67	3
Oct	2020	188		45	262	205	33,000	324	20
Nov	2020	130		24	148	188	12,811	160	8
Dec	2020	146	124	54	269	503	24,877	306	59
Mar	2021	210	38	96	426	592	43,568	482	16
Apr	2021	93	31	809	167	280	22,969	330	24
May	2021	43	27	693	91	161	26,383	306	9
Jun	2021	110	89	681	202	276	20,669	280	2
Jul	2021	36	90	621	95	144	15,170	235	9
Aug	2021	27		292	97	149	10,756	158	6
Oct (sept)	2021	22	55	531	111	221	24,963	254	15
Oct	2021	*60*	*35*	*400*	*130*	*200*	*18,275*	*269*	*10*
Nov	2021	*60*	*35*	*400*	*130*	*200*	*18,275*	*268*	*10*
Dec	2021	*60*	*35*	*400*	*130*	*200*	*18,275*	*268*	*10*

Numbers in italics are estimates.

Prepared by or under the supervision of: Angela Li

PUC 1-6
Forward Capacity Market

Request:

Forward Capacity Market. Please explain why the Company expects to incur a Financial Assurance penalty in the 2022 program year. In your response, reference the specific provision(s) of ISO-NE's tariff(s) that the Company believes it will be in violation of.

Response:

The Company expects to incur a Financial Assurance penalty because the Company is not able to mark all of its Capacity Supply Obligation (CSO) as commercial. Per the ISO-NE Market Rule 1, Section III.13.1.9. Financial Assurance, "In order to participate in any Forward Capacity Auction, New Generating Capacity Resources (including Conditional Qualified New Resources) and New Demand Capacity Resources shall be required to meet the financial assurance requirements as described in the ISO New England Financial Assurance Policy."

When an organization takes on a CSO upon clearing the primary Forward Capacity Auction (FCA) each February, ISO-NE holds a Financial Assurance for each MW of that CSO until ISO-NE can mark that resource as "fully commercial" – which is the status of a resource that has demonstrated performance at or above its CSO capacity based upon successful ISO-NE audits of the resource's performance. In the event that a lead market participant cannot mark their resource's new CSO as fully commercial by two years after the first capacity commitment period, then the market participant must withdraw any undelivered capacity. In this event, the lead market participant forfeits the Financial Assurance that ISO-NE holds for those MWs, which serves as the penalty.

This is described in Market Rule 1, Section III.13.3.4A Termination of Capacity Supply Obligations, "If a Project Sponsor fails to comply with the requirements of Sections III.13.3.2 or III.13.3.3, or if a Project Sponsor covers a Capacity Supply Obligation for two Capacity Commitment Periods, or if, as a result of milestone date revisions, the date by which a resource will have achieved all its critical path schedule milestones is more than two years after the beginning of the Capacity Commitment Period for which the resource first received a Capacity Supply Obligation, then the ISO, after consultation with the Project Sponsor, shall have the right, through a filing with the Commission, to terminate the resource's Capacity Supply Obligation for any future Capacity Commitment Periods and the resource's right to any payments associated with that Capacity Supply Obligation in the Capacity Commitment Period, and to adjust the resource's qualified capacity for participation in the Forward Capacity Market; provided that,

Prepared by or under the supervision of: Rachel Dugan

PUC 1-6, page 2
Forward Capacity Market

where a Project Sponsor voluntarily withdraws its resource from critical path schedule monitoring in accordance with Section III.13.3.6, no filing with the Commission shall be necessary to terminate the resource's Capacity Supply Obligation. Upon Commission ruling, the Project Sponsor shall forfeit any financial assurance provided with respect to that Capacity Supply Obligation."

https://www.iso-ne.com/static-assets/documents/regulatory/tariff/sect_3/mr1_sec_13_14.pdf

Prepared by or under the supervision of: Rachel Dugan

PUC 1-7
Forward Capacity Market

Request:

On page 33 of pre-filed testimony, National Grid writes "the Company is expected to incur a Financial Assurance penalty of approximately $250,230 on behalf of its energy efficiency resource in the FCM." How was the $250,230 penalty amount (in dollars) derived? Explain how the Company calculated that penalty amount, and provide supporting calculations/data.

Response:

The $250,230 stated on page 33 of the Company's pre-filed testimony was an approximation based upon the best available information at the time. The Company currently estimates that the Financial Assurance Penalty could be closer to $367,148, which is the current financial assurance obligation, though the Company does not expect that this amount will be finalized until mid-December of 2021.

The $367,148 financial assurance obligation was calculated in the same manner as the initially estimated penalty of $250,230. The number was derivied using a simplified version of ISO-NE's Financial Assurance ("FA") Obligation formula shown below, which calculates how much money should be held in association with the kilowatts ("kW") that are not yet deemed fully commercial. The formula is as follows:

*Financial Assurance = kW Subject to Financial Assurance * Timeline Factor * Rate $/kW*

Below are the details of the FA obligation as of the date of the pre-filed testimony.

Resource ID	Resource Name	FCA	kW Subject to FA	Timeline Factor	Rate ($/kW)	FA Obligation
12672	ngrid_ri_fca1_eeodr	FCA14	0	2X	$8.187	$0
12672	ngrid_ri_fca1_eeodr	FCA15	28,739	1X	$8.707	$250,230
Total						$250,230

Prepared by or under the supervision of: Rachel Dugan

PUC 1-7, page 2
Forward Capacity Market

Below are the current details of the FA obligation as of 10/25/2021.

Resource ID	Resource Name	FCA	kW Subject to FA	Timeline Factor	Rate ($/kW)	FA Obligation
12672	ngrid_ri_fca1_eeodr	FCA14	1,884	2X	$8.187	$30,848.62
12672	ngrid_ri_fca1_eeodr	FCA15	38,624	1X	$8.707	$336,299.17
Total						$367,147.79

As can be seen by comparing the tables above, the Company was initially estimating that the FCA14 CSO would become fully commercial and thus would have 0 kW subject to Financial Assurance, and that the FCA15 CSO would have become more commercial, resulting in only 28,739 kW of CSO subject to Financial Assurance from FCA15.

The second table shows the status of the Financial Assurance obligation as of October 25, 2021 with an additional 1,884 kW from the FCA14 CSO and the full 38,624 kW of the FCA15 CSO subject to Financial Assurance.

As mentioned above, the final penalty value will not be known until mid-December. Over the next month and a half, the penalty amount will be reduced should the Company be able to secure commercial status for additional kW from either CSO.

PUC 1-8
Forward Capacity Market

Request:

Does the Company expect the 2022 Financial Assurance penalty to be a one-time occurrence or to persist in future years?

Response:

The Company expects the 2022 Financial Assurance penalty to be a one-time occurrence. In response to new ISO-NE market rules, the Company updated its strategy on procuring capacity supply obligations. Please see the Company's response to PUC 1-12 for additional details on how this strategy will also help mitigate the risk of future penalties.

Prepared by or under the supervision of: Rachel Dugan

PUC 1-9
Forward Capacity Market

Request:

Has the Company previously incurred Financial Assurance penalties on behalf of energy efficiency resources participating in the Forward Capacity Market? If so, please note when the Financial Assurance penalties were incurred by the Company and whether the cost of the penalties was recovered from ratepayers.

Response:

No, the Company has not previously incurred a Financial Assurance penalty on behalf of energy efficiency resources participating in the Forward Capacity Market for Rhode Island.[1]

[1] This response is based on the Company's review of its records. The Company has submitted an ASK-ISO ticket to confirm. The Company will update this response if ISO-NE has any records of a previous penalty.

Prepared by or under the supervision of: Rachel Dugan

PUC 1-10
Forward Capacity Market

Request:

Has the Company previously incurred Financial Assurance penalties on behalf of energy efficiency resources participating in the Forward Capacity Market in any of its other service territories?

Response:

No, the Company has not previously incurred a Financial Assurance penalty in the past for energy efficiency resources participating in the Forward Capacity Market in Massachusetts.[1] However, the Company anticipates that the Massachusetts Electric Company will incur a penalty in 2022 for the same reason that the Company anticipates that the Narragansett Electric Company will incur a penalty in Rhode Island in 2022.

[1] New York does not participate in a FCM that allows for energy efficiency resources. The Company's response as it relates to Massachusetts is based on the Company's review of its records. The Company has submitted an AskISO ticket to confirm. The Company will update this response if ISO-NE has any records of a previous penalty.

Prepared by or under the supervision of: Rachel Dugan

PUC 1-11
Forward Capacity Market

Request:

Regarding the $250,230 Financial Assurance penalty that the Company expects to incur during the 2022 program year, please explain the following:

a. When did the Company first learn that it would be assessed the $250,230 Financial Assurance penalty in 2022?
b. How did the Company learn that it would be assessed the $250,230 Financial Assurance penalty in 2022? In your response, please note whether the Company received any communications from ISO-NE indicating that it was at risk of incurring the penalty, and what those communications stated.

Response:

a. The Company first learned of the potential for incurring a financial assurance penalty in March of 2021. Since then, the Company has continually evaluated and reviewed performance projections in order to refine estimates of the most likely penalty value.

b. The Company became aware of this potential Financial Assurance penalty upon implementing a modified approach to reviewing non-commercial Capacity Supply Obligation commitments and associated financial assurance. This review began after the FCM team received access to the ISO-NE Financial Assurance Management reports, which enhanced the Company's ability to track and estimate potential differences between forecasts and delivered MW. Upon identifying potential deficiencies, the Company employed a more proactive approach to tracking and forecasting potential shortfalls.

   Additionally, the Company held a series of calls with ISO-NE in the spring of 2021, including a call on April 26, 2021 to discuss the commercialization and audit process and on May 11, 2011 to discuss options and timelines for financial assurance.

   Note that the approximate value of $250,230 included in the pre-filed testimony was an estimate based on information that the Company had at the time of the filing. Since that point, the forecast has changed such that the Company now believes that the new estimated penalty will be closer to the Financial Assurance obligation value of $367,147.79 per ISO-NE's Financial Assurance Management system as of October 25, 2021.

Prepared by or under the supervision of: Rachel Dugan

PUC 1-12
Forward Capacity Market

Request:

On page 34 of pre-filed testimony, the Company writes "Our EE FCM participation strategy is changing to mitigate FA risk of future CSOs. New resources will need to be created annually as opposed to being aggregated year over year." Please explain what "new resources will need to be created annually as opposed to being aggregated year over year" means, in the context of National Grid's past FCM participation practice(s),and explain how it will mitigate the risk of additional Financial Assurance penalties?

Response:

In the past, each year, the Company's capacity supply obligations were determined based on the demand reductions planned in the most forward-looking Energy Efficiency program plan that had been approved by the Public Utilities Commission at the time of resource qualification. This process generally included looking three years into the future at forecasted data. Using this strategy and the FCM rules at the time, the Company was able to qualify these additions as new, incremental capacity of EE MW added to the existing FCM resource aggregated year over year.

Starting with Forward Capacity Auction (FCA) 16 (delivery year commencing June 1, 2025 through May 31, 2026), ISO-NE has changed the market rule, such that a new resource will need to be created annually. This means that EE lead market participants like the Company are now required to create a new resource annually during each qualification cycle in June, starting in 2021, to clear in the upcoming FCA the following February.

Incremental increases of new capacity to existing resources is no longer allowed. The Company has adapted to this change in the market rule by refocusing our strategy to a more near-term approach. This new approach entails bidding capacity on an annual basis for which half of the savings data (six months) will be actual installs and only six months of forecasted installs. Whereas, previously the Company was looking at least three years out and those three years consisted of forecasted installs.

This near-term approach adopted by the Company in its role as EE lead market participant will mitigate the risk of future Financial Assurance penalties because the Company will be relying less on forecasted data and more on known, actual data for measures that have already been installed, giving more certainty about the performance that the Company can expect. Employing this new strategy will also help mitigate future Financial Assurance Penalties because there is less reliance on forecasted data.

Prepared by or under the supervision of: Rachel Dugan

PUC 1-13
Forward Capacity Market

Request:

Please describe the Company's Capacity Supply Obligation during the 2022 Energy Efficiency program year. In what capacity zone(s) are the component energy efficiency resources located? Are the Company's energy efficiency resources in Massachusetts and Rhode Island separated in terms of their contribution to the Company's Capacity Supply Obligation? If the Company's energy efficiency resources in Massachusetts and Rhode Island are combined, please explain how the expected Financial Assurance penalty is allocated between Massachusetts and Rhode Island.

Response:

The Company's RI energy efficiency ("EE") CSO during January-May 2022 will be 297.802 MW, and from June-December 2022 it will be 293.374 MW. These MW are all in the Rhode Island capacity load zone. Since the resource is in Rhode Island, the Company's Massachusetts EE resources are excluded from those capacity values.

Prepared by or under the supervision of: Rachel Dugan

PUC 1-14
Forward Capacity Market

Request:

Does the Company bid active demand response resources from its Residential or Commercial ConnectedSolutions programs into the Forward Capacity Market? If no, explain why not. If yes, provide the following information for each program year in which the Company bid active demand response from Connected Solutions into the Forward Capacity Market:

a. Total revenue earned over the program year
b. Total capacity supply obligation for the program year (with notation of the corresponding capacity commitment period)
c. kW capacity of the installed measures that contributed to that year's CSO, grouped by program

Response:

The Company does not bid active demand response resources from its Residential or Commercial ConnectedSolutions programs into the Forward Capacity Market.

For the Residential ConnectedSolutions measures, the thermostats and battery storage systems in the program do not meet ISO-NE's telemetry requirements.[1] Installing the necessary metering to satisfy ISO-NE's telemetry requirements would cause the measure to no longer be cost effective.

For the Commercial ConnectedSolutions measures, the Company's electric meters, even the AMI meters installed at G-32 customers, do not meet ISO-NE's telemetry requirements. Curtailment service providers (CSPs) routinely add additional metering and communications equipment so that the CSP can enroll customers into the ISO-NE's markets. When ConnectedSolutions launched in 2017, there was already a vibrant, competitive market of CSPs enrolling Commercial customers into the wholesale markets. The Company designed the Commercial ConnectedSolutions program to allow customers to earn additional incentives for reducing peak energy use while not displacing or competing against CSPs that enroll Commercial customers into the ISO-NE markets.

[1] ISO-NE Market Rule 1, Section III.8.2.1, at page 129, (2019), https://www.iso-ne.com/static-assets/documents/2014/12/mr1_sec_1_12.pdf.

PUC 1-15
Codes and Standards Technical Support

Request:

When does the Company expect the State of Rhode Island's building code update process to be completed?

Response:

The state Building Code Commission began its review of the next energy code (based upon the 2018 International Energy Conservation Code) in September 2019, with the intent to adopt it in 2020. Its review was delayed due to COVID-19. The updated draft energy code was made available for public review in Q2 of 2021 and was moved to final legislative approval in Q3 of 2021. It is anticipated to take effect by the end of 2021/early 2022 with a concurrency period with the current code in 2022.

Prepared by or under the supervision of: Joshua Kessler

PUC 1-16
Codes and Standards Technical Support

Request:

What is the budget for the Codes and Standards Technical Support initiative in the proposed 2022 Energy Efficiency Plan? Please also provide the annual budget for the Codes and Standards Technical Support initiative dating back to the 2015 annual EE Plan.

Response:

The budget for the 2022 Codes and Standards Technical Support Initiative is $200,000 (see Bates page 89).

The table below shows the annual budget for the Codes and Standards Technical Support initiative for 2015 through 2021.

Year	Total Budget
2015	$550,114
2016	$253,945
2017	$229,790
2018	$232,395
2019	$136,900
2020	$136,900
2021	$149,900
2022	$200,000

Prepared by or under the supervision of: Joshua Kessler

PUC 1-17
Codes and Standards Technical Support

Request:

Explain the methodology the Company will use to identify, measure, and verify incremental savings from the proposed Codes and Standards Technical Support initiative achieved during the 2022 program year.

Response:

In the 2022 program year, savings in the Codes and Standards Technical Support (CSTS) initiative are solely associated with compliance support activities including training (classroom, webinar, and in-field), a "hotline" for project specific inquiries, and development and delivery of tools and resources that help fill market gaps.

The methodology used to identify, measure, and verify incremental savings from the CSTS initiative is documented in the 2022 Rhode Island Technical Reference Manual.[1] The source of the savings methodology is "Rhode Island Code Compliance Enhancement Initiative Attribution and Savings Study."[2] For both Residential and C&I sectors, this study identifies the baseline compliance rate, the improvement in compliance due to the code compliance training initiative, the attribution factor to credit the Company's role in supporting code officials, and the size of the new construction market that would be impacted. It then presents a method for combining all of these factors into the savings claimed by the Company in its annual energy efficiency plans. The Company verifies the savings calculation method with periodic evaluation studies.

[1] http://www.ripuc.ri.gov/eventsactions/docket/1%20PY2022%20RI%20TRM.pdf , pages M-530, M-797, and M-1084

[2] http://rieermc.ri.gov/wp-content/uploads/2018/03/ri-ccei-attribution-and-savings-final-report-12-12-17-clean.pdf

Prepared by or under the supervision of: Joshua Kessler

PUC 1-18
Codes and Standards Technical Support

Request:

Referencing Bates page 87, the Company writes "while active technical support of codes and standards aligns very well with stakeholder goals for this Plan… there is currently no agreed upon mechanism in place for the Company to claim savings for the energy savings resulting from any of the CSTS activities." Later, the Company writes "upon completion of the state's current building code update process, the Company will pursue compensation for code change proposals it developed and submitted in 2019… [and] the Company will also pursue savings credit for the technical guidance it provided in support of the package of appliance and equipment standards adopted by the state in 2021." Regarding these statements, please explain the following:

a) For what specific components of the proposed Codes and Standards Technical Support initiative is the Company proposing to pursue savings credit? Please estimate the scale of the associated savings for each component of proposed work.
b) For what specific components of the proposed Codes and Standards Technical Support initiative is the Company proposing to pursue compensation? Please describe the proposed compensation for each component of proposed work.

Response:

a) 2022 savings credit is associated with Code Compliance Support (trainings, webinars, hotline resource), as has been claimed for previous years as well. The amount of annual savings from this effort in 2022 is projected to be as shown in the following table:

Sector	Electric (kWh)	Gas (MMBTU)
Residential	248,397	1,552
Commercial & Industrial	274,550	358

The paragraph in the request cited on Bates 87 refers specifically to Codes and Standards Updating Support; it should not have said "any" because as indicated above savings credit has been recognized and provided for Compliance Support. The company is not asking for any savings credit in 2022 for Codes and Standards Updating Support because parties have not agreed to an approach for counting savings from Codes and Standards Updating Support. The Company's intent is to pursue agreement with parties on such a method during 2022.

Prepared by or under the supervision of: Joshua Kessler

PUC 1-18, page 2
Codes and Standards Technical Support

b) 2022 compensation is associated with Code Compliance Support, the benefits of which are included in the Commercial New Construction and Residential New Construction programs, in the Electric Commercial/Industrial and Residential sectors, respectively. The benefits, as counted in these sectors, will factor into the PIM calculations for these sectors similar to other program resource benefits.

The paragraph in the request cited from Bates 87 specifically refers to Codes and Standards Updating Support; it should not have said "any" because as indicated above savings credit has been recognized and provided for Compliance Support. The company is not asking for any compensation in 2022 for Codes and Standards Updating Support because parties have not agreed to an approach for counting savings. The Company's intent is to pursue agreement with parties on such a method during 2022.

Prepared by or under the supervision of: Joshua Kessler

PUC 1-19
Codes and Standards Technical Support

Request:

On Bates page 29, the Company writes "with an update to the state energy code (to the 2018 International Energy Conservation Code) projected in early 2022, savings opportunity will be reduced due to rising baselines." Explain and describe how updating the state energy code in 2022 will reduce the Company's savings opportunities.

Response:

The savings resulting from an energy efficiency application is the difference between the baseline consumption and the consumption of the more efficient alternative induced by the program. Updating the state energy code will increase the baseline efficiency requirements for building construction affected by the code. This will decrease the consumption difference (savings) between the baseline efficiency and a more efficient alternative incentivized through the program and thus reduce savings opportunities.

Energy codes increase the baseline for all buildings, not just buildings influenced by the Company's programs and, in this way, they are an effective way to increase savings in the broader market, typically at a lower cost per unit of savings than the Company's traditional new construction programs. It is the Company's contention that, if it has provided research and education to influence the adoption of the new building code in Rhode Island, it should be credited with a share of the broad market savings that will result from code adoption. The broad market savings would be the difference between the old code baseline and new code baseline for all buildings affected by the new code, and not just buildings influenced in the program. The Company seeks to include in future energy efficiency program plans an allocated share of savings from these efforts in order to introduce a new cost efficient source of savings as well as to offset the erosion of savings opportunities in the new construction program that result from rising baselines.

Prepared by or under the supervision of: Joshua Kessler

PUC 1-20
Benefit Cost Analysis

Request:

Please provide schedules similar to E-2, E-5, E-5 Secondary, E-5A, E-6, E-6A, E-6B, and E-8A consisting of only the reallocated $9,154,400 in the Provisional Plan. (Where the reallocation created no change in the original schedules include zeros.)

Response:

Please refer to Attachments PUC 1-20-1 through PUC 1-20-8 for the requested tables. Each table is intended to indicate the reallocated $9,154,400 in the Provisional Plan.

The Company is also providing the Excel version of the referenced Attachments to PUC 1-20.

Prepared by or under the supervision of: Jessica Darling and John Richards

Table E-2 Reallocated $9,154,400 in the Provisional Plan
National Grid
2022 Electric Energy Efficiency Program Budget ($000)

	Program Planning & Administration	Marketing	Cost of services and product rebates/incentives provided to customers	Sales, Technical Assistance & Training	Evaluation & Market Research	Total Performance Incentive	Grand Total
Non-Income Eligible Residential							
Residential New Construction	$0.1	$0.0	$0.0	$0.0	$0.0	$0.0	$0.1
ENERGY STAR® HVAC	$0.4	$0.0	$0.0	$0.0	$0.0	$0.0	$0.5
Energy*Wise*	$2.0	$0.0	$0.0	$0.1	$0.0	$0.0	$2.2
Energy*Wise* Multifamily	$0.4	$0.0	$0.0	$0.0	$0.0	$0.0	$0.4
Residential Consumer Products	$0.3	$0.0	$0.0	$0.0	$0.0	$0.0	$0.3
Home Energy Reports	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Residential ConnectedSolutions	$0.2	$0.0	$0.0	$0.0	$0.0	$0.0	$0.2
Energy Efficiency Education Programs	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Residential Pilots	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Community Based Initiatives - Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Comprehensive Marketing - Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Residential Performance Incentive	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal - Non-Income Eligible Residential	**$3.4**	**$0.0**	**$0.0**	**$0.3**	**$0.0**	**$0.0**	**$3.7**
Income Eligible Residential							
Single Family - Income Eligible Services	$1.7	$0.0	$0.0	$0.1	$0.0	$0.0	$1.8
Income Eligible Multifamily	$0.5	$0.0	$0.0	$0.0	$0.0	$0.0	$0.5
Income Eligible Performance Incentive	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal - Income Eligible Residential	**$2.1**	**$0.0**	**$0.0**	**$0.2**	**$0.0**	**$0.0**	**$2.3**
Commercial & Industrial							
Large Commercial New Construction	($64.9)	$0.0	$2,890.5	$382.1	$0.0	$0.0	$3,207.7
Large Commercial Retrofit	$49.5	$0.0	$4,335.9	$791.0	$0.0	$0.0	$5,176.4
Small Business Direct Install	$9.3	$0.0	$751.4	$2.7	$0.0	$0.0	$763.4
Commercial ConnectedSolutions	$0.6	$0.0	$0.0	$0.3	$0.0	$0.0	$0.9
Commercial Pilots	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Community Based Initiatives - C&I	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Finance Costs	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Commercial Workforce Development	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Commercial & Industrial Performance Incentive	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal - Commercial & Industrial	**($5.6)**	**$0.0**	**$7,977.9**	**$1,176.1**	**$0.0**	**$0.0**	**$9,148.4**
Regulatory							
OER	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
EERMC	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Rhode Island Infrastructure Bank	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal - Regulatory	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**
Grand Total	**$0.0**	**$0.0**	**$7,977.9**	**$1,176.5**	**$0.0**	**$0.0**	**$9,154.4**

Notes:

(1) 2022 Large Commercial Retrofit Commitments ($000):

(2) For more information on Finance Costs, please refer to Attachment 2, Section 9.

(3) OER and EERMC total 3.0% of customers' EE Program Charge collected on Table E-1, minus 3%.

(4) Finance Costs are detailed in Table E-9. Finance Costs include an injection of $2M into the Large C&I Revolving Loan Fund. Without this injection the Large C&I Revolving Loan Fund is projected to be negative by the end of 2022.

(5) Demonstrations and Assessments budgets are included in specific program level budgets listed above. More information on Demonstration and Assessments descriptions, budgets, and which program level budget they are included in can be found in Attachment 8.

(6) Based on the state's System Reliability and Least Cost procurement statute (amended in 2021), funds transferred to the Rhode Island Infrastructure Bank are now classified under Regulatory costs.

Table E-5 - Primary - Reallocated $9,154,400 in the Provisional Plan
National Grid
Calculation of 2022 Program Year Cost-Effectiveness
All Dollar Values in ($000)

	RI Test Benefit/ Cost[1]	Total Benefit	Program Implementation Expenses[2]	Customer Contribution	Performance Incentive	¢/Lifetime kWh
Non-Income Eligible Residential						
Residential New Construction	0.00	$0.0	$0.1	$0.0		
ENERGY STAR® HVAC	0.00	$0.0	$0.5	$0.0		
Energy*Wise*	0.00	$0.0	$2.2	$0.0		
Energy*Wise* Multifamily	0.00	$0.0	$0.4	$0.0		
Home Energy Reports	0.00	$0.0	$0.0	$0.0		
Residential Consumer Products	0.00	$0.0	$0.3	$0.0		
Residential ConnectedSolutions	0.00	$0.0	$0.2	$0.0		
Energy Efficiency Education Programs			$0.0			
Residential Pilots			$0.0			
Community Based Initiatives - Residential			$0.0			
Comprehensive Marketing - Residential			$0.0			
Non-Income Eligible Residential SUBTOTAL	**0.00**	**$0.0**	**$3.7**	**$0.0**	**$0.0**	
Income Eligible Residential						
Single Family - Income Eligible Services	0.00	$0.0	$1.8	$0.0		
Income Eligible Multifamily	0.00	$0.0	$0.5	$0.0		
Income Eligible Residential SUBTOTAL	**0.00**	**$0.0**	**$2.3**	**$0.0**	**$0.0**	
Commercial & Industrial						
Large Commercial New Construction	1.40	$4,873.8	$3,207.7	$279.0	$0.0	
Large Commercial Retrofit	0.86	$6,744.9	$5,176.4	$2,677.5	$0.0	
Small Business Direct Install	0.57	$463.0	$763.4	$51.0	$0.0	
Commercial ConnectedSolutions	0.00	$0.0	$0.9	$0.0	$0.0	
Commercial Pilots			$0.0			
Community Based Initiatives - C&I			$0.0			
Finance Costs			$0.0			
Commercial Workforce Development			$0.0			
C&I SUBTOTAL	**0.99**	**$12,081.7**	**$9,148.4**	**$3,007.5**	**$0.0**	
Regulatory						
OER			0.00			
EERMC			0.00			
Rhode Island Infrastructure Bank			0.00			
Regulatory SUBTOTAL			**$0.0**			
TOTAL	**0.99**	**$12,081.7**	**$9,154.4**	**$3,007.5**	**$0.0**	

Notes:
(1) RI Test B/C Test = Total Benefits from Table E-6A / Program Implementation Expenses from Table E-3
Also includes effects of free-ridership and spillover.
(2) For Implementation Expenses derivation, see Table E-3.

Table E-5 - Secondary - Reallocated $9,154,400 in the Provisional Plan
National Grid
Calculation of 2022 Program Year Cost-Effectiveness with Economic Benefits Included
All Dollar Values in ($000)

	RI Test Benefit/ Cost[1]	Total Benefit	Program Implementation Expenses[2]	Customer Contribution	Performance Incentive	¢/Lifetime kWh
Non-Income Eligible Residential						
Residential New Construction	1.40	$0.2	$0.1	$0.0		
ENERGY STAR® HVAC	1.42	$0.7	$0.5	$0.0		
Energy*Wise*	0.93	$2.0	$2.2	$0.0		
Energy*Wise* Multifamily	1.34	$0.6	$0.4	$0.0		
Home Energy Reports	0.00	$0.0	$0.0	$0.0		
Residential Consumer Products	1.52	$0.4	$0.3	$0.0		
Residential ConnectedSolutions	0.83	$0.2	$0.2	$0.0		
Energy Efficiency Education Programs			$0.0			
Residential Pilots			$0.0			
Community Based Initiatives - Residential			$0.0			
Comprehensive Marketing - Residential			$0.0			
Non-Income Eligible Residential SUBTOTAL	**1.10**	**$4.1**	**$3.7**	**$0.0**	**$0.0**	
Income Eligible Residential						
Single Family - Income Eligible Services	0.86	$1.5	$1.8	$0.0		
Income Eligible Multifamily	1.19	$0.6	$0.5	$0.0		
Income Eligible Residential SUBTOTAL	**0.93**	**$2.1**	**$2.3**	**$0.0**	**$0.0**	
Commercial & Industrial						
Large Commercial New Construction	3.98	$13,863.4	$3,207.7	$279.0		
Large Commercial Retrofit	4.68	$36,767.9	$5,176.4	$2,677.5		
Small Business Direct Install	2.42	$1,967.0	$763.4	$51.0		
Commercial ConnectedSolutions	2.19	$2.0	$0.9	$0.0		
Commercial Pilots			$0.0			
Community Based Initiatives - C&I			$0.0			
Finance Costs			$0.0			
Commercial Workforce Development			$0.0			
C&I SUBTOTAL	**4.33**	**$52,600.2**	**$9,148.4**	**$3,007.5**	**$0.0**	
Regulatory						
OER			0.00			
EERMC			0.00			
Rhode Island Infrastructure Bank			0.00			
Regulatory SUBTOTAL			**$0.0**			
TOTAL	**4.33**	**$52,606.4**	**$9,154.4**	**$3,007.5**	**$0.0**	

Notes:
(1) RI Test B/C Test = Total Benefits from Table E-6A / Program Implementation Expenses from Table E-3
Also includes effects of free-ridership and spillover.
(2) For Implementation Expenses derivation, see Table E-3.

Table E-5A - Reallocated $9,154,400 in the Provisional Plan
National Grid
Calculation of 2022 Program Year Cost-Effectiveness with TRC Test
All Dollar Values in ($000)

	TRC Benefit/ Cost[1]	Total Benefit	Program Implementation Expenses[2]	Customer Contribution	Performance Incentive	¢/Lifetime kWh
Non-Income Eligible Residential						
Residential New Construction	0.00	$0.0	$0.1	$0.0		
ENERGY STAR® HVAC	0.00	$0.0	$0.5	$0.0		
Energy*Wise*	0.00	$0.0	$2.2	$0.0		
Energy*Wise* Multifamily	0.00	$0.0	$0.4	$0.0		
Home Energy Reports	0.00	$0.0	$0.0	$0.0		
Residential Consumer Products	0.00	$0.0	$0.3	$0.0		
Residential ConnectedSolutions	0.00	$0.0	$0.2	$0.0		
Energy Efficiency Education Programs			$0.0			
Residential Pilots			$0.0			
Community Based Initiatives - Residential			$0.0			
Comprehensive Marketing - Residential			$0.0			
Non-Income Eligible Residential SUBTOTAL	**0.00**	**$0.0**	**$3.7**	**$0.0**	**$0.0**	
Income Eligible Residential						
Single Family - Income Eligible Services	0.00	$0.0	$1.8	$0.0		
Income Eligible Multifamily	0.00	$0.0	$0.5	$0.0		
Income Eligible Residential SUBTOTAL	**0.00**	**$0.0**	**$2.3**	**$0.0**	**$0.0**	
Commercial & Industrial						
Large Commercial New Construction	1.07	$3,741.1	$3,207.7	$279.0		
Large Commercial Retrofit	0.67	$5,276.3	$5,176.4	$2,677.5		
Small Business Direct Install	0.41	$335.7	$763.4	$51.0		
Commercial ConnectedSolutions	0.00	$0.0	$0.9	$0.0		
Commercial Pilots			$0.0			
Community Based Initiatives - C&I			$0.0			
Finance Costs			$0.0			
Commercial Workforce Development			$0.0			
C&I SUBTOTAL	**0.77**	**$9,353.0**	**$9,148.4**	**$3,007.5**	**$0.0**	
Regulatory						
OER			$0.0			
EERMC			$0.0			
Rhode Island Infrastructure Bank			$0.0			
Regulatory SUBTOTAL			**$0.0**			
TOTAL	**0.77**	**$9,353.0**	**$9,154.4**	**$3,007.5**	**$0.0**	

(1) TRC B/C Test omits societal benefits that are monetized in the RI Test, including non-embedded emissions (CO2 and Nox), and economic benefits
Also includes effects of free-ridership and spillover.
(2) For Implementation Expenses derivation, see Table E-3.

Table E-6 - Reallocated $9,154,400 in the Provisional Plan
National Grid
Summary of 2022 Benefits by Program (Energy Efficiency Measures)

	Benefits (000's)																		
			Capacity					Energy					Non Electric				Societal		
								Winter		Summer									
	Total	Total (Economic Excluded)	Summer Generation	Capacity DRIPE	Trans	Dist	Reliability	Winter Peak	Winter Off Peak	Summer Peak	Summer Off Peak	Electric Energy DRIPE	Natural Gas	Oil	Other Resource	Non Resource	Carbon	NOx	Economic
Non-Income Eligible Residential																			
Residential New Construction	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
ENERGY STAR® HVAC	$1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1
Energy*Wise*	$2	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2
Energy*Wise* Multifamily	$1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1
Home Energy Reports	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Residential Consumer Products	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Non-Income Eligible Residential SUBTOTAL	**$4**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$4**
Income Eligible Residential																			
Single Family - Income Eligible Services	$2	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2
Income Eligible Multifamily	$1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1
Income Eligible Residential SUBTOTAL	**$2**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$2**
Commercial & Industrial																			
Large Commercial New Construction	$13,863	$4,874	$198	$156	$384	$380	$2	$730	$395	$462	$280	$570	$0	$0	$1	$184	$1,116	$17	$8,990
Large Commercial Retrofit	$36,768	$6,745	$252	$459	$550	$545	$6	$600	$449	$450	$298	$886	-$105	$0	$6	$881	$1,456	$12	$30,023
Small Business Direct Install	$1,967	$463	$14	$19	$28	$28	$0	$40	$32	$43	$36	$69	-$4	$0	$0	$30	$126	$2	$1,504
C&I SUBTOTAL	**$52,598**	**$12,082**	**$463**	**$634**	**$962**	**$953**	**$8**	**$1,370**	**$877**	**$955**	**$614**	**$1,525**	**-$108**	**$0**	**$7**	**$1,094**	**$2,698**	**$31**	**$40,517**
TOTAL	**$52,604**	**$12,082**	**$463**	**$634**	**$962**	**$953**	**$8**	**$1,370**	**$877**	**$955**	**$614**	**$1,525**	**-$108**	**$0**	**$7**	**$1,094**	**$2,698**	**$31**	**$40,523**

Table E-6A - Reallocated $9,154,400 in the Provisional Plan
National Grid
Summary of 2022 Impacts by Program (Energy Efficiency Measures)

	Load Reduction in kW		Electric Energy Savings MWh		Electric Energy Savings MMBtu		Gas Saved MMBtu		Oil Saved MMBtu		Propane Saved MMBtu		Total Net Savings (Electric, Gas, Oil, Propane) MMBtu	
	Summer	Winter	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime
Commercial & Industrial														
Large Commercial New Construction	235	182	1,669	27,330	5,694	93,249	-	-	-	-	-	-	5,694	93,249
Large Commercial Retrofit	701	645	3,547	29,797	12,103	101,668	(2,142)	(12,629)	-	-	-	-	9,961	89,039
Small Business Direct Install	28	8	255	2,539	871	8,662	(72)	(430)	-	-	-	-	800	8,232
C&I SUBTOTAL	**964**	**835**	**5,471**	**59,665**	**18,668**	**203,579**	**(2,213)**	**(13,059)**	-	-	-	-	**16,455**	**190,519**
TOTAL	**964**	**835**	**5,471**	**59,665**	**18,668**	**203,579**	**(2,213)**	**(13,059)**	-	-	-	-	**16,455**	**190,519**

Notes:
1) Lifetime savings are equal to annual savings multiplied by the expected life of measures expected to be installed in each program.

Table E-6B - Reallocated $9,154,400 in the Provisional Plan
National Grid
Summary of 2022 Demand Response Benefits and Savings

	Benefits (000's)															Load Reduction (MW)	MWh Saved	
			Capacity					Energy					Non Electric	Societal				
								Winter		Summer								
	Total	Total (Economic Excluded)	Summer Generation	Capacity DRIPE	Trans	Dist	Reliability	Peak	Off Peak	Peak	Off Peak	Energy DRIPE	Non Resource	Carbon	Economic	Summer	Annual	Lifetime
Non-Income Eligible Residential																		
Residential ConnectedSolutions	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Commercial & Industrial																		
Commercial ConnectedSolutions	$2	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2	$0	$0	$0
TOTAL	**$2**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$2**	**0.0**	**0.0**	**0.0**

Table E-8A - Reallocated $9,154,400 in the Provisional Plan
National Grid
2022 Electric PIM Benefits, Allocations, and Categorization ($000)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
			Capacity					Energy			Utility NEIs	Non Electric					Societal	
	Summer Generation	Capacity DRIPE	Transmission	Distribution	Reliability	Winter Peak Energy	Winter Off Peak Energy	Summer Peak Energy	Summer Off Peak Energy	Electric Energy DRIPE	Utility NEIs	Natural Gas and DRIPE	Oil and Oil DRIPE	Propane and Water	Non Resource	Carbon	NOx	Economic
Non-Income Eligible Residential																		
Residential New Construction	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
ENERGY STAR® HVAC	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1
Energy*Wise*	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2
Energy*Wise* Multifamily	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1
Home Energy Reports	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Residential Consumer Products	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
n-Income Eligible Residential SUBTOTAL	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4
Income Eligible Residential																		
Single Family - Income Eligible Services	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2
Income Eligible Multifamily	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1
Income Eligible Residential SUBTOTAL	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2
Commercial & Industrial																		
Large Commercial New Construction	$198	$156	$384	$380	$2	$730	$395	$462	$280	$570	$0	$0	$0	$1	$184	$1,116	$17	$8,990
Large Commercial Retrofit	$252	$459	$550	$545	$6	$600	$449	$450	$298	$886	$0	-$105	$0	$6	$881	$1,456	$12	$30,023
Small Business Direct Install	$14	$19	$28	$28	$0	$40	$32	$43	$36	$69	$0	-$4	$0	$0	$30	$126	$2	$1,504
C&I SUBTOTAL	$463	$634	$962	$953	$8	$1,370	$877	$955	$614	$1,525	$0	-$108	$0	$7	$1,094	$2,698	$31	$40,517
Included in PIM? (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N
Percent Application in PIM	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	50%	50%	50%	0%	0%	0%	0%
Category	Electric Utility System Benefits	Electric Utility System Benefits	Electric Utility System Benefits	Electric Utility System Benefits	Electric Utility System Benefits	Electric Utility System Benefits	Electric Utility System Benefits	Electric Utility System Benefits	Electric Utility System Benefits	Electric Utility System Benefits	Electric Utility System Benefits	Resource Benefits	Resource Benefits	Resource Benefits	NA	NA	NA	NA

Notes
From 2022 Benefit-Cost Model, reflects benefits in Table E-6

PUC 1-21
Benefit Cost Analysis

Request:

Please provide a summary of the major changes/methodology updates to the 2021 AESC relative to the 2018 AESC, and describe the result of each of the changes/methodology updates on the relevant AESC avoided cost estimates.

Response:

The below response is a summary of the major changes or methodology updates in AESC 2021[1] relative to AESC 2018, and the impact on the relevant AESC avoided cost estimates.

- Generally lower avoided costs of energy, due to sustained low natural gas prices at national hubs, lower estimated costs of complying with the Regional Greenhouse Gas Initiative (RGGI), and increased quantities of zero-marginal-cost renewables. (AESC 2021, ES-Table 4 and 10)
- Generally lower avoided costs of capacity due to a relatively flat supply curve based on observations of recent forward capacity auctions. (AESC 2021, ES-Table 9)
- Generally lower avoided costs of natural gas, based on lower long-term projections of wholesale natural gas prices. Avoided natural gas costs for retail end-users are also lower than in AESC 2018; but because incremental gas pipeline expansion costs are assumed to be higher, the change in avoided costs at the end-user level is not as large as the reduction in gas commodity prices. (AESC 2021, ES-Table 6 and 7)
- Generally higher avoided costs for fuel oil and other fuels, due to updates to recent historical data in the underlying sources in the sources used to calculate these values. (AESC 2021, ES-Table 8)
- Generally higher avoided costs for renewable portfolio standard (RPS) compliance. This is primarily due to recent (or anticipated) increases in RPS target obligations combined with expected increases in load due to electrification. (AESC 2021, ES-Table 12)
- Lower energy DRIPE and capacity DRIPE values, due to changes in utility long-term energy purchases, updated market data, and new commodity forecasts. Natural gas DRIPE and oil DRIPE values are also lower due to similar changes. (AESC 2021, ES-Table 4)

[1] AESC 2021. https://www.synapse-energy.com/sites/default/files/AESC%202021_20-068.pdf

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PUC 1-21, page 2
Benefit Cost Analysis

- Higher non-embedded costs for environmental regulations that are not otherwise included in the above projections (e.g., carbon dioxide, CO2, and nitrogen oxides, NOX). In the 2022 Annual Energy Efficiency Plan the Company has applied an approach based on New England marginal abatement costs, assuming a cost derived from electric sector technologies. In AESC 2021, the value is based on an updated projection of future cost trajectories for offshore wind energy along the eastern seaboard. This increased cost reflects updated information on this technology in the United States, as well as lower energy costs in AESC 2021.
- Lower avoided costs for pooled transmission facility (PTF) costs, as a result of a switch to a forward-looking methodology (AESC 2018 utilized a historical methodology).
- Generally lower avoided costs for reliability, due to a flatter supply capacity market supply curve. This is in spite of a higher estimate for value of lost load (VoLL), determined through newly available data sources.

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PUC 1-22
Benefit Cost Analysis

Request:

Between 2018 and 2021, AESC estimates of avoided Pool Transmission Facility (PTF) costs decreased from $94/kW-yr to $87/kW-yr. Over that same time period, actual PTF rates increased from $119.55/kWy-yr (Schedule PVD-3, 2018 Retail Rate Filing) to $138.37/kW (Bates page 271, 2021 Retail Rate Filing). Please reconcile these two PTF cost trends.

Response:

AESC's estimate of avoided Pool Transmission Facility (PTF) cost is based on an analysis of load-related investments that are incremental to the existing infrastructure.[1] The methodology for avoided Pool Transmission Facility (PTF) cost was updated from AESC 2018 to AESC 2021. AESC 2021 updates the avoided PTF cost using a forward-looking projection of load-related investments, rather than an estimate using historical data. AESC also comments that they have no data on past or projected load growth, and that the avoided PTF is calculated based on historical load growth trends. Because load growth has decreased, the AESC 2018 avoided PTF value was multiplied by 89%[2] in order to arrive at $87/kW-yr. This led to a 7.4% decrease in the avoided PTF.

Comparitively, actual PTF rates are calculated as total revenue requirement divided by total load for the all New England transmission owners using data from FERC Form 1. PTF is a forward looking rate, trued up based on actual load and revenue requirements. From 2018 to 2021, total revenue requirement increased by approximately 10% while load decreased by approximately 5%, leading to a 15.7% increase in the PTF rate.

[1] AESC 2021, p.248. https://www.synapse-energy.com/sites/default/files/AESC%202021_20-068.pdf
[2] AESC 2021, p.249. https://www.synapse-energy.com/sites/default/files/AESC%202021_20-068.pdf

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PUC 1-23
Benefit Cost Analysis

Request:

Does the 2021 AESC's avoided Pool Transmission Facility (PTF) cost estimation methodology account for the way in which PTF costs are allocated among regional network service customers per the ISO-NE Open Access Transmission Tariff?

Response:

The 2021 AESC's avoided Pool Transmission Facility (PTF) cost estimation methodology does not specify how PTF costs are allocated among regional network service (RNS) customers. The 2021 AESC focuses on a New England wide estimation of load-related avoided PTF and doesn't look at state-specific values. It is the Company's understanding that if a state is able to reduce its RNS charge, that reduces that specific state's allocation, but not a reduction in overall RNS costs for New England.[1]

[1] AESC 2021, Section 10.2 Avoided pool transmission facilities transmission. https://www.synapse-energy.com/sites/default/files/AESC%202021_20-068.pdf;

PUC 1-24
Benefit Cost Analysis

Request:

Referencing Bates page 384, the Company writes "T&D benefits could be allocated to summer and winter periods, depending on the relations 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." In response to this, please explain the following:

a) Are there avoided Pool Transmission Facility (PTF) benefits from demand reduction during non-summer times?
b) If the answer to part a is yes, are those benefits captured in the avoided transmission capacity cost estimates that the Company used for its benefit-cost analysis of the proposed 2022 Energy Efficiency Plan?
c) Are there avoided distribution capacity benefits from demand reduction during non-summer times?
d) If the answer to part c is yes, are those benefits captured in the avoided distribution capacity cost estimates that the Company used for its benefit-cost analyses of the proposed 2022 Energy Efficiency plan?

Response:

a) No. The 2021 AESC study states "Regional transmission needs are driven, and have been driven, by summer peak loads. Therefore, the regional PTF value should be applied to evaluation of measures that change the summer peak."[1]

b) N/A

c) No. Similar to the PTF benefits, the avoided distribution capacity benefits are associated with the summer peak, so the benefits would be zero in the non-peak time. "Generation capacity avoided costs are driven by load at the time of the ISO New England peak, which has by convention been associated with an hour ending at 3 p.m. or 5 p.m. on a hot summer day."[2]

d) N/A

[1] AESC 2021, page 246. https://www.synapse-energy.com/sites/default/files/AESC_2021_.pdf
[2] AESC 2021, page 239. https://www.synapse-energy.com/sites/default/files/AESC_2021_.pdf

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PUC 1-25
Benefit Cost Analysis

Request:

For each year that the Company considered avoided distribution capacity costs in its energy efficiency benefit-cost analyses, list the avoided distribution capacity cost estimate ($/kWy-yr) it used.

Response:

Avoided distribution capacity costs are identified in the Company's energy efficiency benefit-cost analyses as the marginal distribution cost (MDC) rate.

The table below shows the MDC rate ($/kW) used in each of the annual Energy Efficiency plans from 2006 – 2022.

Energy Efficiency Plan Year	MDC ($/kW)
2022	96.56
2021	80.24
2020	80.24
2019	80.24
2018	82.22
2017	78.79
2016	78.43
2015	161.86
2014	151.52
2013	86.64
2012	86.64
2011	87.13
2010	60.54
2009	57.58
2008	76.72
2007	44.34
2006	45.52

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PUC 1-26, page 1
Benefit Cost Analysis

Request:

Referencing Bates page 383, please provide the data and calculations to support the avoided distribution capacity cost estimate of $100.02/kW-yr.

Response:

The value of avoided distribution capacity cost estimate used in the 2022 benefit-cost analysis is $96.56/kW-year in 2021 dollars; the Company did not update the text of Attachment 4 to reflect this updated value. This response provides data and calculations regarding the calculation of $96.56/kW-yr, which is the correct value, and the one used in all benefit-cost analyses presented in the Plan as filed..

The avoided distribution capacity cost calculation is provided as Attachment PUC-1-26. This model was developed as part of the Avoided Energy Supply Component Study in 2003, and the algorithms it contains have been used by the Company since that time. The model calculates three primary inputs: the total incremental investments caused by load growth, the annual carrying charge of distribution capital investments, and the incremental growth in peak demand. Each input is calculated on its own sheet (described below).

A summary sheet, **Schedule 1,** at the front of the workbook calculates the avoided distribution capacity cost estimate by dividing the incremental capital investment associated with load growth by the incremental load growth and multiplying the result by the carrying charge to determine an annualized avoided distribution cost value.

Schedule 2: Distribution Investment Schedule

This sheet contains three sets of inputs

a. Analysis Period – This sheet requires the user to define a study period by inputting a base year, a number of historical years, and a number of forecast years. For the 2022 Plan, the base year is 2021, and the number of historical and forecast years are five and six respectively. Therefore, 2016-2026 is the study period.[1]

[1] Only five historic years are used in the analysis because only five years of forecast are available, and the Company prefers to provide relatively equal weight to recent history and forecast in its calculation.

PUC 1-26, page 2
Benefit Cost Analysis

b. Capital Investments – Annual historic distribution capital investment data is from FERC Form 1[2] and forecast capital investment data from the ISR. For the 2022 Plan update, the capital forecast for 2021-2025 is sourced from the 2021 ISR.[3] The 2026 capital forecast is estimated from 2021-2025 trends. All capital forecast values are then converted to 2021 dollars. Historical values were inflated using a rate derived from the Handy Whitman Index.[4] Forecast values were discounted using a rate derived from the Federal Reserve Economic Data Implicit Price Deflator.[5] Using these adjusted annual capital investment values, the model calculates total incremental investments into distribution systems by summing annual capital investments within the study period.

c. Percent of Capital Investments Related to Load Growth – This percentage is sourced from the 2021 ISR based on the ratio of investments in the System Load and Performance Category to the overall capital forecast.

The model calculates the total incremental investments caused by load growth by multiplying the percentage of capital investment assumed to be related to increasing load by the total incremental investments into distribution systems.

Schedule 3: Carrying Charge Schedule

This sheet has five main inputs (described below).

1) After-tax cost of financing
    - Calculated from assumptions and the general inflation rate (sourced from the U.S. Inflation Calculator)[6]

2) Property taxes expense
    - Calculated from 2020 FERC Form 1 inputs

3) Insurance expense
    - Calculated from 2020 FERC Form 1 inputs

[2] Source: https://www.ferc.gov/industries-data/electric/general-information/electric-industry-forms/form-1-electric-utility-annual
[3] Source: http://www.ripuc.ri.gov/eventsactions/docket/4995-NGrid-ElecISR-FY2021-Book%201%20of%202%20(12-20-19).pdf
[4] Source: https://wrallp.com/about-us/handy-whitman-index
[5] Source: https://fred.stlouisfed.org/series/GDPDEF
[6] Source: https://www.usinflationcalculator.com/inflation/historical-inflation-rates/

PUC 1-26, page 3
Benefit Cost Analysis

4) Depreciation expense
    - Calculated from assumptions and the after-tax cost of financing

5) Avoidable operation and maintenance expense
    - Calculated from 2020 FERC Form 1 inputs on Appendix 1 Tab. This Tab takes several types of O&M expenses from the 2020 FERC Form 1 and assigns percentages about how much each of those expense types are deferable by energy efficiency; these percentages were researched and provided by the original tool creators.

6) Income taxes expense
    - Calculated from the after-tax cost of financing

The annual real carrying charge of capital investments is calculated by summing the above inputs.

Schedule 4: Peak Growth Schedule
This sheet uses annual peak demand data consistent with the analysis period input into Sheet 1. Historic and forecast load data for the analysis period is taken from Company data, with load reduction from energy efficiency and demand response added back in to be consistent with the Counterfactual #4 from AESC 2021 that is used to develop other avoided energy and capacity costs. The historical incremental growth in peak demand is calculated by subtracting the minimum annual peak growth value from the maximum annual peak growth value in the historical period. The forecast incremental growth in peak demand is calculated by subtracting the minimum annual peak growth value from the maximum annual peak growth value in the forecast period. The incremental growth in peak demand is calculated by summing the historical and forecast incremental growth in peak demand.

Attachment PUC 1-26

Please see the Excel version of Attachment PUC 1-26

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PUC 1-27
Benefit Cost Analysis

Request:

Referencing Bates page 377, the Company states that its avoided cost estimates are derived from the 2021 AESC, Counterfactual #4. It describes Counterfactual #4 as "the best representative scenario for the DSM portfolios in the near future." The Company then describes the three underlying assumptions of Counterfactual #4: no new energy efficiency resources in 2021 or later; some amount of building electrification; no active demand management resources. For each of the three underlying assumptions of Counterfactual #4, explain why the Company believes them to be "the best representative scenario" for Rhode Island, compared to the other 3 Counterfactual scenarios.

Response:

The table below shows a summary of the four counterfactual scenarios from AESC 2021.[1] This is the first time that AESC has modeled a series of counterfactuals.

Table 24. Modeled counterfactual scenarios in AESC 2021

DSM component included?	Counterfactual #1 *AESC for EE, ADM and building electrification*	Counterfactual #2 *AESC for building electrification only*	Counterfactual #3 *AESC for EE only*	Counterfactual #4 *AESC for EE and ADM only*
Energy Efficiency (EE)	*No*	Yes	*No*	*No*
Active Demand Management (ADM)	*No*	Yes	Yes	*No*
Building electrification	*No*	*No*	Yes	Yes
Transportation electrification	Yes	Yes	Yes	Yes
Distributed generation	Yes	Yes	Yes	Yes

Notes: A "Yes" indicates that the relevant DSM component is included (e.g., modeled) within that counterfactual. A "No" indicates that the DSM component is not incorporated into the modeling in 2021 or any future year. A "No" only removes the programmatic resources associated with each DSM component (e.g., energy efficiency associated with codes and standards is modeled in all scenarios, as is storage or demand response owned or funded by entities other than program administrators).

[1] AESC 2021, page 70. https://www.synapse-energy.com/sites/default/files/AESC%202021_20-068.pdf

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PUC 1-27, page 2
Benefit Cost Analysis

The Company narrowed down its choice of Counterfactuals to #1 and #4 because of the exclusion of energy efficiency resources and active demand management resources. These are removed to model a world where the Rhode Island energy efficiency and demand response programs don't influence prices to isolate the marginal effect of these programs.

The difference between Counterfactuals #1 and #4 is in the inclusion or exclusion of building electrification. Rhode Island energy efficiency programs do not include any significant programmatic building electrification at scale. Therefore, the Counterfactual #4 that models no programmatic energy efficiency or active demand response in the near term, but includes some electrification was selected as the most representative scenario for modeling the Rhode Island DSM programs.

PUC 1-28
Benefit Cost Analysis

Request:

Referencing Bates page 381, the Company describes four different costing periods (winter peak, winter off-peak, summer peak, summer off-peak) to which it allocates annual net energy savings for purposes of calculating avoided electric energy costs. For each relevant measure and/or program, explain how the Company allocates net energy savings among the four costing periods. In your explanations, provide the formulas, assumptions, and a description of the data inputs used.

Response:

The Company allocates net energy savings among the four costing periods based on a measure's load shape. The load shape indicates when a measure's energy savings are expected to occur. Each of the four periods (winter peak, winter off-peak, summer peak, summer off-peak) has a percentage of savings allocated to it; the sum of these four allocated percentages is always 100%.

The primary sources for load shapes are evaluation studies and engineering estimates:

- Evaluation Study 1: The *Massachusetts Residential Baseline Study* was conducted by Guidehouse, Inc. for the Massachusetts Program Administrators and was completed in March 2020. The primary goal of the study was to collect data on saturation, characterization, consumption, peak demand, 8760 electric load shape and key explanatory variables for all major electric and gas appliances, mechanical equipment, and electronics in Massachusetts homes.

- Evaluation Study 2: *Prescriptive C&I Load Shapes of Savings* (P72) was conducted by DNV-GL for the Massachusetts Program Administrators and was completed in March 2018. This study pooled known sources of savings load shapes in an interactive tool to estimate general prescriptive measure load shapes over customizable time periods. 676 individual energy savings load shapes were utilized in the making of this tool.

- Engineering Estimates: When implementing custom measures, an engineering estimate of a project-specific load shape is calculated and used to allocate savings across the four costing periods. For planning purposes, the weighted average load shape is calculated for each measure based on historical project implementation. Weighting is based on net MWh savings.

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Benefit Cost Analysis

For newer measures whose load shapes have not yet been evaluated, estimated load shapes from another program administrator or a similar measure may be used until an evaluation study is completed.

Formulas
Once a measure's load shape has been determined, the following formulas are used to allocate net energy savings among the four costing periods:

Net lifetime MWh * Summer Peak Energy %
Net lifetime MWh * Summer Off-Peak Energy %
Net lifetime MWh * Winter Peak Energy %
Net lifetime MWh * Winter Off-Peak Energy %

PUC 1-29
Benefit Cost Analysis

Request:

Referencing Bates page 381, the Company describes four different costing periods (winter peak, winter off-peak, summer peak, summer off-peak) to which it allocates annual net energy savings for purposes of calculating electric (Demand Reduction Induced Price Effect) DRIPE benefits. For each relevant measure and/or program, explain how the Company allocates net energy savings among the four costing periods. In your explanations, provide the formulas, assumptions, and a description of the data inputs used.

Response:

Please see response to PUC 1-28.

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PUC 1-30
Benefit Cost Analysis

Request:

Referencing Bates pages 382-383, the Company writes "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." Using the AESC study's definitions for cleared and uncleared capacity, how does the weighting of cleared vs. uncleared capacity that the Company forecasts to be delivered by the demand-reducing measures included the proposed 2022 Energy Efficiency Plan compare to the weighting of cleared vs. uncleared capacity on which the 2021 AESC study's estimate of "overall avoided capacity value" is based?

Response:

The definitions of cleared and uncleared capacity from AESC 2021 are as follows:[1]

- Cleared capacity - Any load reduction that clears provides avoided capacity costs in the year that the resource participates in the capacity auction. For example, if a program administrator has bid 1 MW into FCA 15 and expects to deliver that 1 MW starting in the summer of 2024 (the beginning of the FCA 15 commitment period), that benefit will receive the full avoided capacity cost benefit starting in 2024. Likewise, if this measure is re-bid into each subsequent auction for the duration of its life, it will receive an avoided capacity cost equal to the market clearing price for all future years.

- Uncleared capacity - But not all resources are bid into the FCA. Program administrators may choose to claim lower savings from new installations until the program is approved, funding is more certain, or the rate of installation is better known. Thus, a program administrator may bid some (or only a portion) of the anticipated capacity into the FCA. This remaining capacity is known as "uncleared" capacity. Unlike cleared capacity, the benefit associated with this resource is not simply the capacity price multiplied by the resource's capacity. Instead, uncleared capacity utilizes a "phase-in" and "phase-out" schedule that approximates how the impacts of these resources are indirectly captured in the development of inputs to ISO New England's FCM.

[1] AESC 2021, page 124. https://www.synapse-energy.com/sites/default/files/AESC%202021_20-068.pdf

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Benefit Cost Analysis

Per AESC 2021, "In the AESC 2021 User Interface, users may specify a percentage of measures that are cleared in the FCM. This percentage is then used to calculate a weighted average avoided cost for cleared and uncleared capacity, cleared and uncleared capacity DRIPE, and cleared and uncleared reliability. The weighted average is based on a simplified bidding strategy consisting of x percent of demand reductions from measures in each year bid (cleared) into the FCA for that year and the remaining 1-x percent not bid (uncleared) into any FCA. The default value for x is 50 percent."[2] Additionally, AESC identifies that the user of the model will need to estimate the appropriate weighting based on their own energy efficiency portfolio.[3]

The Company applies a weighting of 80%-20% of cleared to uncleared capacity. In the benefit cost analysis, all energy efficiency measures are labeled as cleared while all active demand response measures are labeled uncleared. The Company uses this method because it simplifies modeling and is a more conservative estimate of benefits related to avoided capacity value.

[2] AESC 2021, page 329. https://www.synapse-energy.com/sites/default/files/AESC%202021_20-068.pdf
[3] AESC 2021, page 68. https://www.synapse-energy.com/sites/default/files/AESC%202021_20-068.pdf

PUC 1-31, page 1
Benefit Cost Analysis

Request:

For each of the values of non-energy impacts included in the benefit-cost analysis for the proposed 2022 Energy Efficiency Plan and documented in the 2022 RI TRM, please explain whether and how (if applicable) the value changed between 2021 to 2022.

Response:

Please see Tables 1-5 below for the list of non-energy impacts included in the benefit-cost analysis for the proposed 2022 Energy Efficiency Plan and documented in the 2022 TRM and whether the value changed between 2021 and 2022.

Please see Tables 6-8 below for how the value changed for applicable measures between 2021 to 2022.

Table 1. Per Measure Residential Non-Energy Impacts for Electric and Gas Programs

End Use	TRM Measures	NEI	Change from 2021 (Yes/No)
Lighting	Indoor Fixture	Lighting Quality and Lifetime	No
	Outdoor Fixture		No
	LED Fixture		No
	LED Bulb	Lighting Quality and Lifetime	No
Various	All Measures with oil savings	National Security	No
	All electric measures with kWh savings and all gas measures with MMBTU savings.	Rate Discounts	Yes

1. The NEIs in this table represent impacts that accrue specifically measures in the 2021 Rhode Island portfolio of programs.

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Benefit Cost Analysis

Table 2. Annual per kWh Non-Energy Impacts for Commercial and Industrial Electric Programs

Program		**End Use**	**Change from 2021 (Yes/No)**
New Construction	Prescriptive	Lighting	No
	Custom	Compressed Air	No
Retrofit	Prescriptive	HVAC	No
		Lighting	
	Custom	CHP Systems	No
		Lighting	

Table 3. Annual per Therm Non-Energy Impacts for Commercial and Industrial Gas Programs

Program		**End Use**	**Change from 2021 (Yes/No)**
New Construction	Prescriptive	Boilers	No
		Other Gas Heating	No
	Custom	Commercial Kitchen	No
Retrofit	Prescriptive	HVAC	No
	Custom	HVAC	No

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Benefit Cost Analysis

Table 4. Per Participant Non-Energy Impacts for Residential Electric Measures

Program	NEI	Measure Category	Change from 2021 (Yes/No)
Residential New Construction	Thermal Comfort	Heating System	Yes
	Noise Reduction		Yes
	Asthma Related		Yes
			Yes
Residential Cooling and Heating Equipment	Thermal Comfort	Cool Smart AC System	No
		Cool Smart HP System	No
		Ductless Mini Split HP System	No
		Down size 1/2 ton	No
		QIV and Check up	No
		Thermostats	No
	Noise Reduction	Cool Smart AC System	No
	Home Durability	Cool Smart AC System	No
		Cool Smart HP System	No
		Ductless Mini Split HP System	No
		Down size 1/2 ton	No
		QIV and Check up	No
		Thermostats	No
	Equipment Maintenance	Cool Smart AC System	No
		Cool Smart HP System	No
		Ductless Mini Split HP System	No
		Down size 1/2 ton	No
		QIV and Check up	No

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Benefit Cost Analysis

	Health Benefits	Cool Smart AC System	No
		Cool Smart HP System	No
		Ductless Mini Split HP System	No
		Down size 1/2 ton	No
		QIV and Check up	No
		Thermostats	No
Energy Star Lighting	Lighting Quality and Lifetime	Residential Lighting - Bulbs	No
	Lighting Quality and Lifetime	Residential Lighting - Fixtures	No
Single Family - Income Eligible Services	Arrearages	Basic Educational Measures	No
	Bad Debt Write-offs		No
	Terminations and Reconnections		No
	Customer Calls and Collections		No
	Notices		No
	Improved Safety		No
	Price Hedging	NA	No
	Thermal Comfort	Insulation	No
		Air Sealing	No
		Heating System / Heat Pump	No
		Duct sealing	No
		Pipe wrap	No
		Thermostat	No
	Noise Reduction	Insulation	No
		Air Sealing	No

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Benefit Cost Analysis

Single Family - Income Eligible Services	Home Durability	Insulation	No
		Air Sealing	No
		Heat pumps	No
		Thermostat	No
		Hot Water System	No
		Air Sealing	No
		Duct Sealing	No
		Heating System	No
		HP Water Heater	No
	Equipment Maintenance	Heating System	No
		Heat Pumps	No
	Health Benefits	Insulation	No
		Duct sealing	No
		Pipe wrap	No
		Air Sealing	No
		Heating System/Heat Pumps	No
		Thermostat	No
	Safety-Related Emergency Calls	Heating System/Heat Pumps	No
	Improved Safety	Insulation	No
		Air Sealing	No
		Heating System/ Heat Pumps	No
		Hot Water System	No
		Replacement Freezer/Refrigerator	No
	Thermal Comfort	Window AC	No
	Property Value Increase	Replacement Freezer/Refrigerator	No
		Showerhead	No
EnergyWise Single Family	Thermal Comfort	Insulation	No
		Air Sealing	No
		Thermostat	No

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Benefit Cost Analysis

	Noise Reduction	Insulation	No
		Air Sealing	No
	Home Durability	Insulation	No
		Air Sealing	No
		Thermostat	No
	Health Benefits	Insulation	No
		Air Sealing	No
		Thermostat	No
	Property Value Increase	Showerheads	No
		Refrigerator	No
EnergyWise Multifamily	Thermal Comfort	Insulation	No
		Air Sealing	No
		Thermostat	No
	Noise Reduction	Insulation	No
		Air Sealing	No
	Home Durability	Insulation	No
		Air Sealing	No
		Aerator	No
		Showerheads	No
		Thermostat	No
	Health Benefits	Insulation	No
		Air Sealing	No
		Thermostat	No
	Rental Units Marketability	Showerheads/Aerator	No
		Air Sealing	No
		Refrigerator	No
		Thermostat	No

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Benefit Cost Analysis

	Reduced Tenant Complaints	Showerheads/Aerator	No
		Air Sealing	No
		Refrigerator	No
		Thermostat	No
	Operations & Maintenance	Common Area Lighting	No
			No
	Equipment Maintenance	Thermostat	No
	Lighting Quality and Lifetime	Lighting - Bulbs	No
		Lighting - Fixtures	No
	Rental Property Value Increase	Refrigerator	No
EnergyWise Income Eligible Multifamily Retrofit	Arrearages	N/A	No
	Bad Debt Write-offs		
	Terminations and Reconnections		
	Customer Calls and Collections		
	Price Hedging		
	Notices		
	Thermal Comfort	Insulation	Yes
		Heating System	Yes
		Air Sealing	Yes
	Noise Reduction	Insulation	Yes
		Air Sealing	Yes
	Home Durability	Insulation	Yes
		Air Sealing	Yes
		Heating System	Yes
		Thermostat	No
		Showerheads/Aerator	No

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Benefit Cost Analysis

	Health Benefits	Insulation	Yes
		Heating System	Yes
		Air Sealing	Yes
	Improved Safety	Insulation	Yes
		Air Sealing	Yes
		Heating System	Yes
	Home Productivity	Insulation	Yes
		Air Sealing	Yes
		Heating System	Yes
	Rental Units Marketability	Air Sealing	Yes
		Water Heater	No
		Thermostat	No
		Common Area Lighting/Fixtures	No
		Showerheads/Aerator	No
	Reduced Tenant Complaints	Air Sealing	Yes
		Water Heater	No
		Thermostat	No
		Showerheads/Aerator	No
	Safety-Related Emergency Calls	Heating System	Yes
	Lighting Quality and Lifetime	Common Area Lighting/Fixtures	No
			No
		Common Area Lighting	No
		Common Area Fixtures	No
	Rental Property Value Increase	Common Area Lighting/Fixtures	No
	Equipment Maintenance	Heating System	Yes
		Thermostat	No

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Benefit Cost Analysis

Table 5. Per Participant Non-Energy Impacts for Residential Gas Measures

Program	NEI	Measure Category	Change from 2021 (Yes/No)
Residential New Construction	Thermal Comfort	Heating System	Yes
	Noise Reduction		Yes
	Asthma Related		Yes
			Yes
Residential Heating and Cooling equipment	Thermal Comfort	Combo Condensing boiler/DHW	No
		Furnace w/ECM	No
		Boiler 90%	No
		Boiler 95%	No
		Thermostat	No
	Home Durability	Combo Condensing boiler/DHW	No
		DHW - Condensing	No
		DHW - Tankless	No
		DHW - Stand Alone	No
		Furnace w/ECM	No
		Boiler 90%	No
		Boiler 95%	No
		Thermostat	No
	Equipment Maintenance	Combo Condensing boiler/DHW	No
		Furnace w/ECM	No
		Boiler 90%	No
		Boiler 95%	No
	Health Benefits	Combo Condensing boiler/DHW	No
		Furnace w/ECM	No
		Boiler 90%	No
		Boiler 95%	No
		Thermostat	No

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Benefit Cost Analysis

EnergyWise Single Family	Thermal Comfort	Air Sealing	No
		Thermostat	No
		Insulation	No
	Noise Reduction	Air Sealing	No
		Insulation	No
	Home Durability	Air Sealing	No
		Thermostat	No
		Insulation	No
	Health Benefits	Air Sealing	No
		Thermostat	No
		Insulation	No
EnergyWise Multi Family / C&I Multifamily	Thermal Comfort	Insulation	No
		Duct Sealing	No
		Thermostat	No
		Air Sealing	No
	Noise Reduction	Insulation	No
		Air Sealing	No
	Property Durability	Insulation	No
		Duct Sealing	No
		Thermostat	No
		Showerhead/Aerators	No
		Air Sealing	No
	Health Benefits	Insulation	No
		Duct Sealing	No
		Thermostat	No
		Air Sealing	No
	Equipment Maintenance	Thermostat	No
	Rental Units Marketability	Thermostat	No
		Showerhead/Aerators	No
	Reduced Tenant Complaints	Thermostat	No
		Showerhead/Aerators	No

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Benefit Cost Analysis

Single Family - Income Eligible Services	Safety-Related Emergency Calls	Heating System	No
	Thermal Comfort	Insulation	No
		Air Sealing	No
		Heating System	No
	Noise Reduction	Insulation	No
		Air Sealing	No
	Home Durability	Insulation	No
		Air Sealing	No
		Heating System	No
	Equipment Maintenance	Heating System	No
	Health Benefits	Insulation	No
		Air Sealing	No
		Heating System	No
	Improved Safety	Insulation	No
		Air Sealing	No
		Heating System	No
	Price Hedging	N/A	No
	Arrearages	Participant	No
	Bad Debt Write-offs		No
	Terminations and Reconnections		No
	Customer Calls and Collections		No
	Notices		No

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Benefit Cost Analysis

EnergyWise Income Eligible Multifamily Retrofit	Rental Units Marketability	Air Sealing	Yes
		Water Heater	No
		Showerhead/Aerators	No
		Thermostat	No
	Improved Safety	Insulation	Yes
		Air Sealing	Yes
		Water Heater	No
		Heating System	Yes
	Property Durability	Air Sealing	Yes
		Water Heater	No
		Showerhead/Aerators	No
		Heating System	Yes
	Reduced Tenant Complaints	Air Sealing	Yes
		Water Heater	No
		Showerhead/Aerators	No
		Thermostat	No
	Safety-Related Emergency Calls	Heating System	Yes
	Price Hedging	N/A	No
	Arrearages	Participant	No
	Bad Debt Write-offs		No
	Terminations and Reconnections		No
	Customer Calls and Collections		No
	Notices		No
	Thermal Comfort	Insulation	Yes
		Duct Sealing	No
		Air Sealing	Yes
		Pipe wrap	No
		Thermostat	No
		Heating System	Yes
	Noise Reduction	Insulation	Yes
		Air Sealing	Yes

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Benefit Cost Analysis

	Property Durability	Insulation	Yes
		Duct Sealing	No
		Air Sealing	Yes
		Thermostat	No
		Heating System	Yes
	Equipment Maintenance	Thermostat	No
		Heating System	Yes
	Health Benefits	Insulation	Yes
		Duct Sealing	No
		Air Sealing	Yes
		Pipe wrap	No
		Thermostat	No
		Heating System	Yes

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Benefit Cost Analysis

Table 6. Annual Per Unit NEI Changes between 2021 and 2022

Measure	NEI Category	Annual per Unit		
		2021	2022	% Change
RNC Heating	**Total**	**$117.00**	**$142.33**	**18%**
RNC Heating	Thermal Comfort	$77.00	$91.50	16%
RNC Heating	Noise Reduction	$40.00	$47.53	16%
RNC Heating	Combustion stove NOx, asthma related impacts	$-	$3.28	
RNC Heating	ERV/HRV reduction of formaldehyde, asthma related impact	$-	$0.02	
IE MF Heating System Retrofit	**Total**	**$118.10**	**$799.24**	**85%**
IE MF Heating System Retrofit	Home Productivity	$-	$25.48	
IE MF Heating System Retrofit	Thermal Comfort	$38.92	$741.52	95%
IE MF Heating System Retrofit	Improved Safety	$2.60	$25.48	90%
IE MF Heating System Retrofit	Health Benefits	$31.00	$6.76	-359%
IE MF Heating System Retrofit	Safety Related Emergency Calls	$8.43	$-	
IE MF Heating System Retrofit	Property Durability	$9.72	$-	
IE MF Heating System Retrofit	Equipment Maintenance	$27.43	$-	
IE MF Heating System Retrofit	Rate Discounts	$-	$-	

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Benefit Cost Analysis

IE MF Air Sealing	**Total**	**$77.73**	**$368.88**	**79%**
IE MF Air Sealing	Home Productivity	$-	$11.76	
IE MF Air Sealing	Thermal Comfort	$31.73	$342.24	91%
IE MF Air Sealing	Improved Safety	$0.31	$3.12	90%
IE MF Air Sealing	Health Benefits	$25.28	$11.76	-115%
IE MF Air Sealing	Noise Reduction	$16.39	$-	
IE MF Air Sealing	Property Durability	$2.58	$-	
IE MF Air Sealing	Rental Units Marketability	$0.07	$-	
IE MF Air Sealing	Reduced Tenant Complaints	$1.37	$-	
IE MF Air Sealing	Rate Discounts	$-	$-	
IE MF Insulation	**Total**	**$101.01**	**$368.88**	**73%**
IE MF Insulation	Home Productivity	$-	$11.76	
IE MF Insulation	Thermal Comfort	$42.46	$342.24	88%
IE MF Insulation	Improved Safety	$2.40	$3.12	23%
IE MF Insulation	Health Benefits	$33.83	$11.76	-188%
IE MF Insulation	Noise Reduction	$13.56	$-	
IE MF Insulation	Property Durability	$8.76	$-	
IE MF Insulation	Rate Discounts	$-	$-	

Table 7. Rate Discount NEI Changes between 2021 and 2022 – Electric ($/kWh)

Electric ($/kWh)	**Annual Per kWh**		
	2021	**2022**	**% Change**
NEI Rate Discount	0.00152	0.00176	14%

Table 8. Rate Discount NEI Changes between 2021 and 2022 – Gas ($/Therm)

Gas ($/Therm)	**Annual Per Therm**		
	2021	**2022**	**% Change**
NEI Rate Discount	0.014	0.0152	8%

Prepared by or under the supervision of: Jessica Darling

PUC 1-32
Benefit Cost Analysis

Request:

Please confirm the numerical value for non-embedded greenhouse gas reduction benefits used in the proposed 2022 Energy Efficiency Plan ($/short ton).

Response:

The numerical value for non-embedded greenhouse gas reduction benefits used in the proposed 2022 Energy Efficiency Plan is $125 ($/short ton). Calculation of this value is referenced on Bates page 388 of the 2022 Energy Efficiency Plan as well as in AESC 2021.[1]

[1] AESC 2021, https://www.synapse-energy.com/sites/default/files/AESC_2021_.pdf, page 202.

Prepared by or under the supervision of: Jessica Darling

PUC 1-33
Benefit Cost Analysis

Request:

Referencing Table E-6B (both Original and Provisional Plan), why is the carbon benefits value zero for Commercial ConnectedSolutions but non-zero for Residential ConnectedSolutions?

Response:

Carbon benefits are calculated as the product of energy savings and avoided non-embedded carbon values. The Commercial ConnectedSolutions offerings produce no energy savings and therefore produce no monetized carbon benefit. In contrast, the Residential ConnectedSolutions offerings produce some energy savings and therefore a monetized carbon benefit.

Prepared by or under the supervision of: Jessica Darling

PUC 1-34
Forecast

Request:

Referencing Bates page 118, the Company states "impacts of EH [electric heating] are added to or subtracted from the gross forecast depending on the season to create net forecasts." Please explain how National Grid determines the seasonal load impacts from electric heating. Describe the methodology and supporting assumptions around seasonal heating and cooling demand.

Response:

The impact of electric heat pumps is projected by: (1) forecasting the number of heat pumps to be installed each year; (2) determining the seasonal and monthly load impact per installed heat pump; and (3) taking the product of the number of heat pumps and impact per heat pump to obtain the total system impact.

The number of heat pumps is based on the ISO-NE estimates for Rhode Island.

The seasonal and monthly impacts are estimated separately for the winter and summer seasons. During the winter season, electric heat pumps add electric load for heating. Each heat pump installation is assumed to increase annual load by 4,786 kWh, based off Company data on expected impact. This estimate falls within the range of similar metrics in the ISO-NE's electrification forecast.[1] The annual increase from heat pumps is allocated to the winter months using the percentages in Table 1. This monthly load profile was determined by calculating the space heating demand for natural gas by month across National Grid's US service territories from 2018 to 2020.

Electric heat pumps are efficient cooling systems that displace existing cooling load in the summer. Each heat pump installation is assumed to reduce annual load by 135 kWh, based on analysis done using NYSERDA data.[2] This annual reduction is allocated to summer months based on the percentage in Table 1.

[1] Final 2021 Heating Electrification Forecast, ISO-NE Load Forecast Committee, Slide 11, February 19, 2021 (https://www.iso-ne.com/static-assets/documents/2021/02/lfc2021_final_heating_elec.pdf).
[2] New Efficiency: New York, Analysis of Residential Heat Pumps Potential and Economics, January 2019. (https://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/NYSERDA/18-44-HeatPump.pdf)

Prepared by or under the supervision of: Joseph Gredder and Jingrui Xie

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Forecast

Table 1: Allocation of annual heat pump impact.

	Allocation of Annual Cooling Savings	Allocation of Annual Heating Impact
January	-	21%
February	-	20%
March	-	17%
April	-	13%
May	10%	7%
June	20%	0%
July	30%	0%
August	30%	0%
September	10%	0%
October	-	1%
November	-	6%
December	-	15%

Prepared by or under the supervision of: Joseph Gredder and Jingrui Xie

PUC 1-35
Forecast

Request:

Please provide the month-by-month total kWh consumption for 2021, compared against two prior forecasts: (i) the original forecast proposed by the Company for 2021 which was rejected by the Commission, and the forecast that was approved by the Commission. In the column for actuals, where actuals are not yet available, please use the Company's most current forecast for each of those months.

Response:

The table below presents the 2021 monthly kWh values for:

(i) The original forecasts proposed by the Company in 2020
(ii) The forecast that was approved by the Commission in 2020
(iii) The actual from January 2021 to August 2021 and the Company's most current forecast (vintage Fall 2021) for September 2021 to December 2021

The same table is also provided in Excel format.

		i	ii	iii
Year	**Month**	**Original Forecast (kWh)**	**Approved Forecast (kWh)**	**Actual (kWh)**
2021	Jan	593,178,691	580,666,119	635,867,701
2021	Feb	544,253,804	576,284,115	622,041,643
2021	Mar	529,725,921	562,954,070	597,680,677
2021	Apr	520,730,962	543,505,431	546,869,101
2021	May	449,411,420	486,578,286	496,162,246
2021	Jun	510,346,489	526,973,591	603,489,430
2021	Jul	650,338,728	668,919,465	697,226,251
2021	Aug	672,095,210	705,491,261	737,795,400
2021	Sep	616,035,712	626,367,493	687,730,651
2021	Oct	495,113,634	528,059,014	562,501,789
2021	Nov	478,187,794	499,525,766	530,926,539
2021	Dec	547,127,026	551,602,940	596,804,505
Total		6,606,545,391	6,856,927,553	7,315,095,933

Note: September to December values in the Actual columns are forecasted kWh that the Company released in September 2021

Prepared by or under the supervision of: Jingrui Xie and Joseph Gredder

PUC 1-36
Forecast

Request:

Please provide the month-by-month total therm consumption for 2021, compared against the original forecast for 2021 approved by the Commission. In the column for actuals, where actuals are not yet available, please use the Company's most current forecast for each of those months.

Response:

The Company's actual 2021 data is currently available through September 2021. In the table below, the Company lists:

(i) its forecasted therms for Calendar Year 2021 from its 2020 gas load forecast issued by the Company in June 2020 and filed in the 2020 LRP, GCR, and EE dockets, and,
(ii) its actual therms through September 2021 and its weather-normalized therms for October – December 2021 from its 2021 gas load forecast issued by the Company in June 2021 and filed in the 2021 LRP and GCR dockets.

Please refer to Attachment PUC 1-36 for the Excel version of this table.

		i	ii
		Original Forecast	
Year	**Month**	**(therms)**	**Actual (therms)**
2021	Jan	63,611,115	61,355,156
2021	Feb	70,224,035	63,672,283
2021	Mar	53,684,158	57,142,054
2021	Apr	44,048,963	38,630,219
2021	May	20,286,628	23,715,800
2021	Jun	15,462,053	15,511,509
2021	Jul	12,627,816	12,866,862
2021	Aug	12,326,493	11,840,547
2021	Sep	12,515,037	11,569,688
2021	Oct	15,822,961	18,346,757
2021	Nov	30,373,150	33,825,594
2021	Dec	49,948,020	51,725,219
	Total	400,930,430	400,201,688

Note: October to December values in the Actual columns are forecasted therms that the Company released in June 2021

Prepared by or under the supervision of: Theodore Poe, Jr.

PUC 1-37

EnergyWise Single Family (electric and gas)

Request:

EnergyWise Single Family (electric and gas) Please provide cost data comparing the cost of a typical in-home energy assessment vs. a virtual home energy assessment.

Response:

The Company pays fixed prices for all EnergyWise Single Family assessments. In-home assessments are priced at $170 per assessment. Virtual home energy assessments are priced at $150 per assessment.

Prepared by or under the supervision of: Angela Li

PUC 1-38

EnergyWise Single Family (electric and gas)

Request:

Referencing Bates page 142, the Company writes "approximately two-thirds of customers have selected the in-person assessment over the VHEA [virtual home energy assessment]." Please provide any data or evidence the Company has that can illuminate whether the one-third of customers who selected the VHEA did so as their first choice or whether they did so only after being unable to schedule an in-home assessment.

Response:

The Company does not have any data illustrating a customer first selecting an in-person assessment and then switching to a VHEA due to scheduling. VHEAs were first introduced on 4/6/20 and became the default option until Spring of 2021 to protect both customers and the energy specialists. If customers requested an in-person experience, a hybrid approach was used where the bulk of the discussion about the energy savings opportunities and program options were discussed outdoors with ample distance between the customer and energy specialist. Looking at customer requests from the first half of 2021, the Company noticed that the majority of customers selected an in-person experience and that became the default option for customers beginning in Q3 2021. The VHEA was offered if a customer specifically asked for a virtual assessment or if they expressed concerns with having people in their home.

Prepared by or under the supervision of: Angela Li

PUC 1-39

EnergyWise Single Family (electric and gas)

Request:

Referencing Bates page 142, the Company writes "customer satisfaction scores from post assessment customer surveys show consistent satisfactions scores between in-person and VHEAs, with a slightly higher rating for in-person assessments." Please provide a copy of the post assessment customer survey used and a summary of the results/scores.

Response:

Please see Attachment PUC 1-39-1 for a copy of the post assessment survey. Summarized results are shown in Attachment PUC 1-39-2.

Prepared by or under the supervision of: Angela Li

2021 Home Energy Assessment Survey

1. Would you recommend this program to a friend or family member? *

- Yes
- No
- Not Applicable

2. How satisfied are you with the energy efficiency services you received? *

- Extremely satisfied
- Very satisfied
- Satisfied
- Somewhat satisfied
- Not at all

3. Did your assessment start during the time window specified?

- Yes
- No
- Not Applicable

4. Did the Energy Specialist clearly communicate any delays prior to starting the assessment?

- Yes
- No
- Not Applicable

5. Did the energy specialist present themselves in a professional manner?

- Yes
- No

6. How well did the Home Energy Assessment meet your expectations?

- Extremely Well
- Very Well
- Well
- Somewhat Well
- Not at all
- Not applicable

7. How satisfied were you with the Energy Specialist's explanation of the Home Energy Assessment program offers?

- Extremely Satisfied
- Very Satisfied
- Satisfied
- Somewhat Satisfied
- Not at all
- Not applicable

8. Did the energy specialist provide you the energy assessment report after the assessment?

- Yes
- No
- Not applicable

9. Were you satisfied with the timeframe the energy assessment report was provided?

- Yes
- No
- Not applicable

10. Did the energy specialist clearly define your next steps to take advantage of any recommended offers?

- Yes
- No
- Not Applicable

11. If you were expecting your energy specialist to follow up after your Home Energy Assessment, did they?

- Yes
- No
- Not applicable

12. Did you have an in-person assessment or a virtual assessment?

- In-Person
- Virtual

13. How satisfied were you with how well the energy specialist cleaned up following the Home Energy Assessment?

- Extremely Satisfied
- Very Satisfied
- Satisfied
- Somewhat Satisfied
- Not at all
- Not Applicable

14. Were there any limitations due to the video calling that negatively impacted the experience?

- Yes
- No
- Not Applicable

15. Please explain the limitations.

16. Do you want a representative from Home Energy Services to contact you regarding additional questions you may have?

- Yes
- No
- Not Applicable

17. Do you have any additional comments?

18. On a scale from 1-10 (with 10 being very satisfied), how would you rate your overall satisfaction with your energy assessment?

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

19. May we share your comments about the Energy*Wise* program in National Grid and/or RISE Engineering marketing materials such as flyers, postcards, websites?

Comments will be shared with only your first name and town where the project occurred.

- ○ Yes
- ○ No

This report is filtered
Only show: Invite Variable "division" contains the string "NGRD" and Response Submitted between March 1, 2021 and October 31, 2021 (inclusive)

Report for 2021 Home Energy Assessment Survey

Response Counts

In-Person

Completion Rate:	**100%**	
	Complete	925

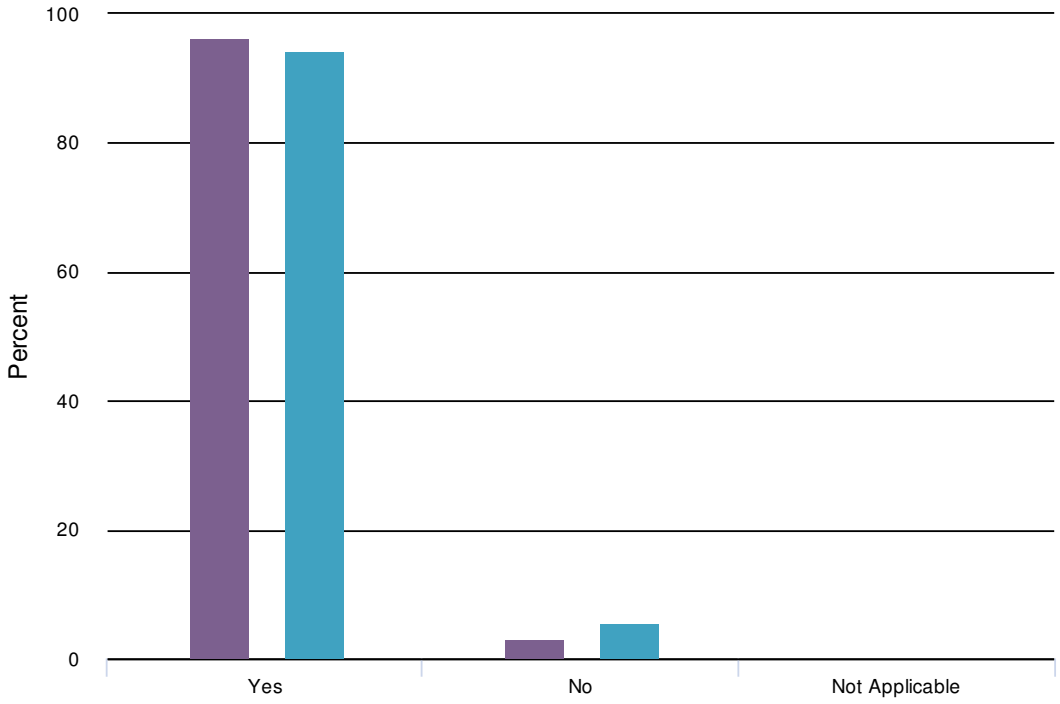
Totals: 925

Virtual

Completion Rate:	**100%**	
	Complete	144

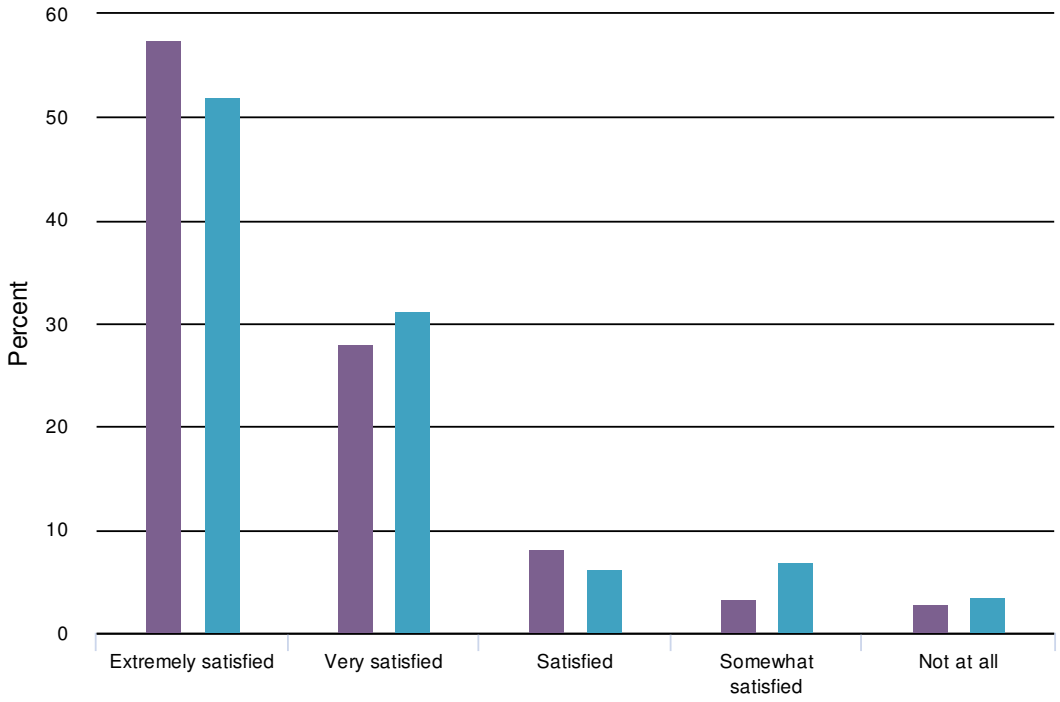
Totals: 144

1. Would you recommend this program to a friend or family member?



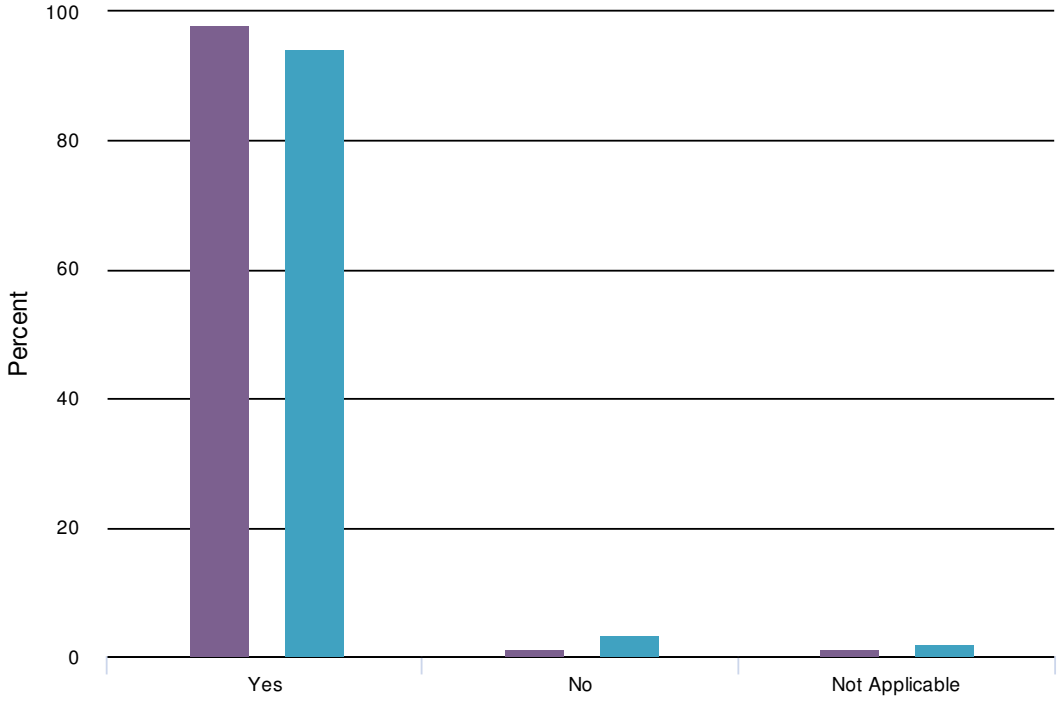
Segment	Value	Percent	% of Total	Responses
In-Person	Yes	96.4%	83.4%	892
	No	3.2%	2.8%	30
	Not Applicable	0.3%	0.3%	3
	Total Responses		86.5%	925
Virtual	Yes	94.4%	12.7%	136
	No	5.6%	0.7%	8
	Not Applicable	0%	0%	0
	Total Responses		13.4%	144

2. How satisfied are you with the energy efficiency services you received?



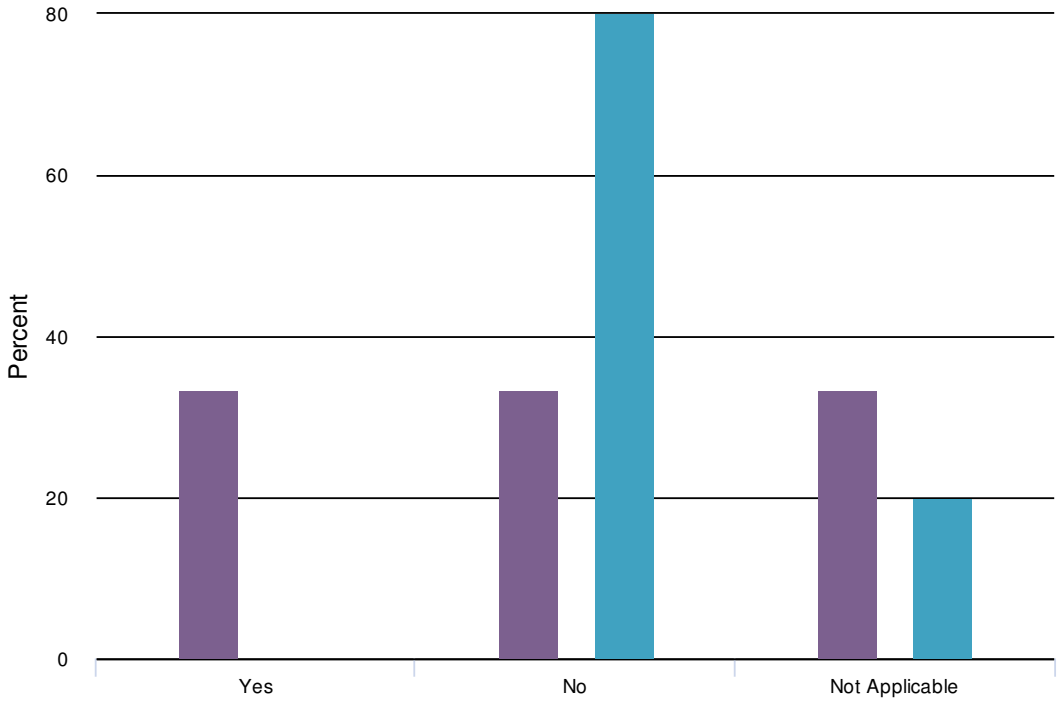
Segment	Value	Percent	% of Total	Responses
In-Person	Extremely satisfied	57.5%	49.8%	532
	Very satisfied	28.1%	24.3%	260
	Satisfied	8.1%	7%	75
	Somewhat satisfied	3.4%	2.9%	31
	Not at all	2.9%	2.5%	27
		Total Responses	86.5%	925
Virtual	Extremely satisfied	52.1%	7%	75
	Very satisfied	31.3%	4.2%	45
	Satisfied	6.3%	0.8%	9
	Somewhat satisfied	6.9%	0.9%	10
	Not at all	3.5%	0.5%	5
		Total Responses	13.4%	144

3. Did your assessment start during the time window specified?



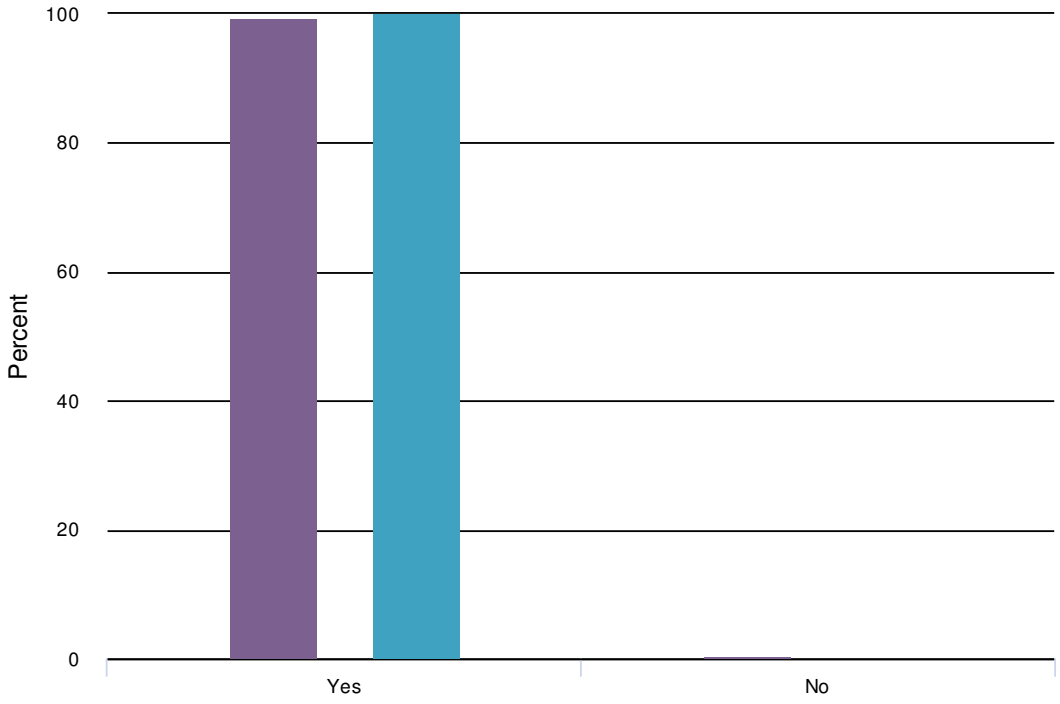
Segment	Value	Percent	% of Total	Responses
In-Person	Yes	97.9%	84.7%	902
	No	1%	0.8%	9
	Not Applicable	1.1%	0.9%	10
	Total Responses		86.4%	921
Virtual	Yes	94.4%	12.8%	136
	No	3.5%	0.5%	5
	Not Applicable	2.1%	0.3%	3
	Total Responses		13.6%	144

4. Did the Energy Specialist clearly communicate any delays prior to starting the assessment?



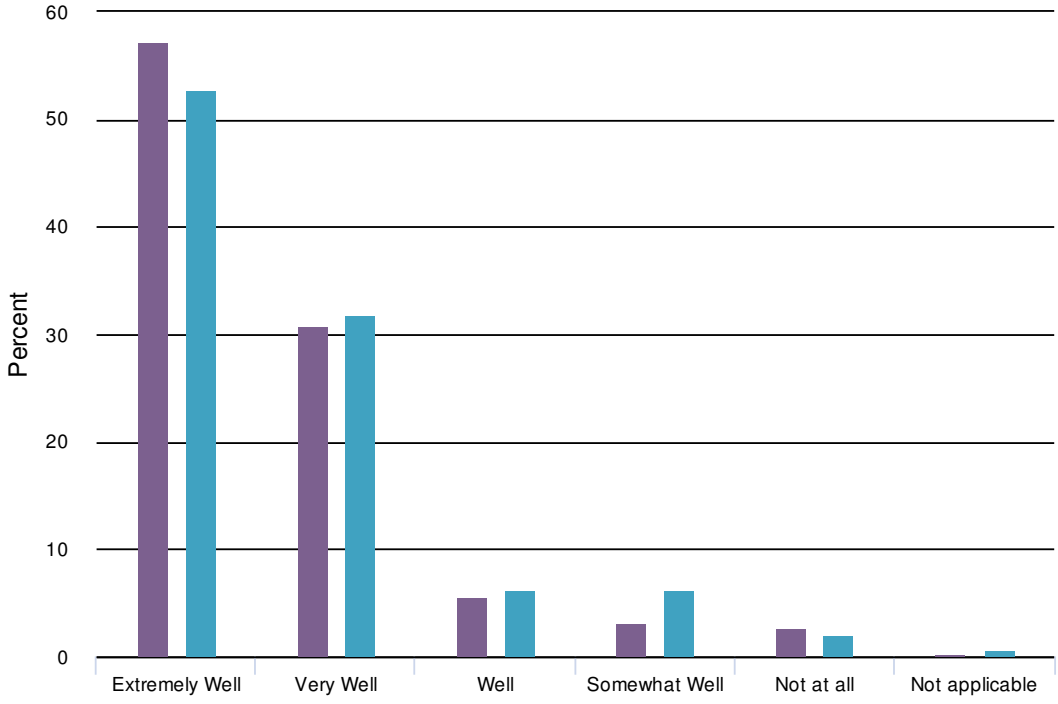
Segment	Value	Percent	% of Total	Responses
In-Person	Yes	33.3%	21.4%	3
	No	33.3%	21.4%	3
	Not Applicable	33.3%	21.4%	3
	Total Responses		64.2%	9
Virtual	Yes	0%	0%	0
	No	80%	28.6%	4
	Not Applicable	20%	7.1%	1
	Total Responses		35.7%	5

5. Did the energy specialist present themselves in a professional manner?



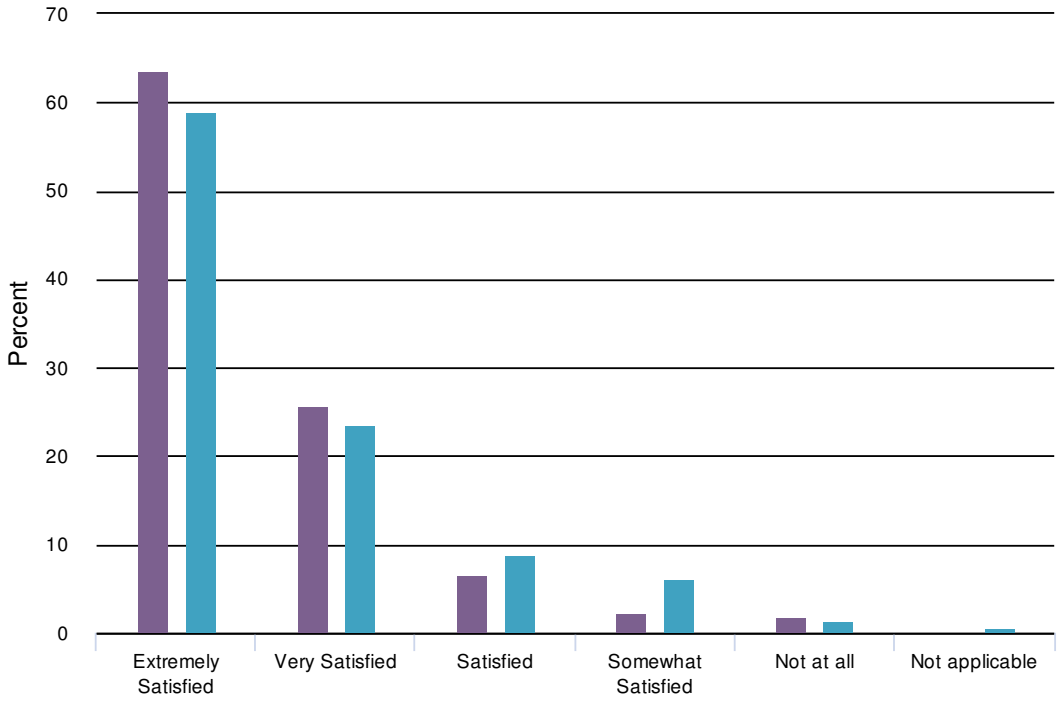
Segment	Value	Percent	% of Total	Responses
In-Person	Yes	99.3%	86.1%	913
	No	0.7%	0.6%	6
	Total Responses		86.7%	919
Virtual	Yes	100%	13.4%	142
	No	0%	0%	0
	Total Responses		13.4%	142

6. How well did the Home Energy Assessment meet your expectations?



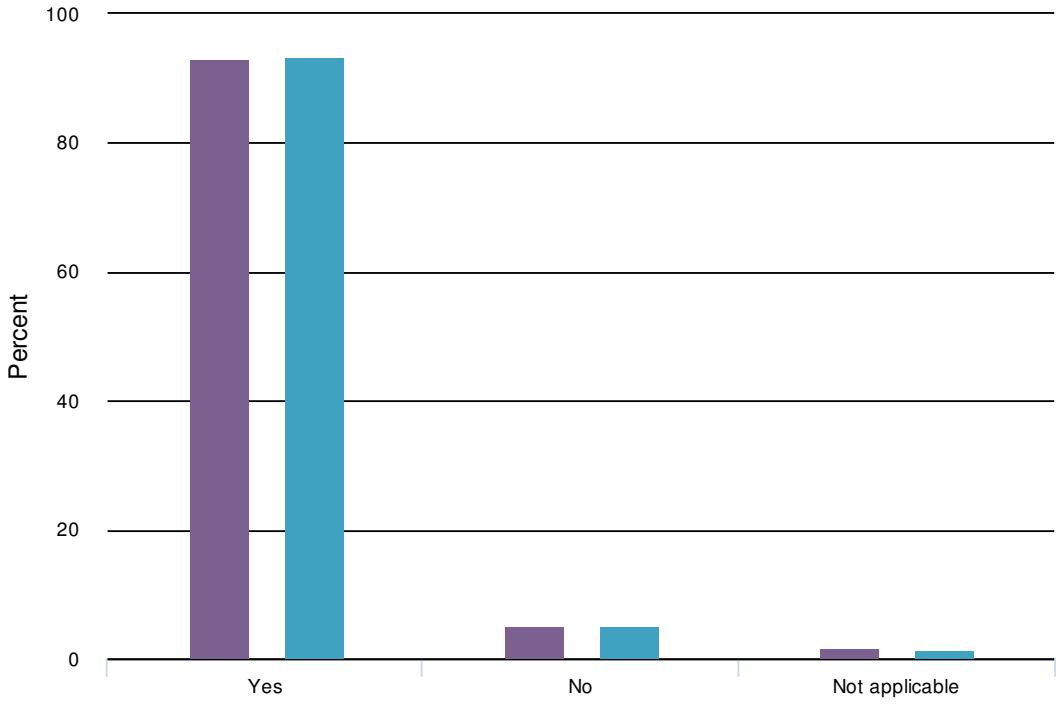
Segment	Value	Percent	% of Total	Responses
In-Person	Extremely Well	57.2%	49.5%	528
	Very Well	30.8%	26.6%	284
	Well	5.6%	4.9%	52
	Somewhat Well	3.3%	2.8%	30
	Not at all	2.8%	2.4%	26
	Not applicable	0.3%	0.3%	3
		Total Responses	86.5%	923
Virtual	Extremely Well	52.8%	7.1%	76
	Very Well	31.9%	4.3%	46
	Well	6.3%	0.8%	9
	Somewhat Well	6.3%	0.8%	9
	Not at all	2.1%	0.3%	3
	Not applicable	0.7%	0.1%	1
		Total Responses	13.4%	144

7. How satisfied were you with the Energy Specialist's explanation of the Home Energy Assessment program offers?



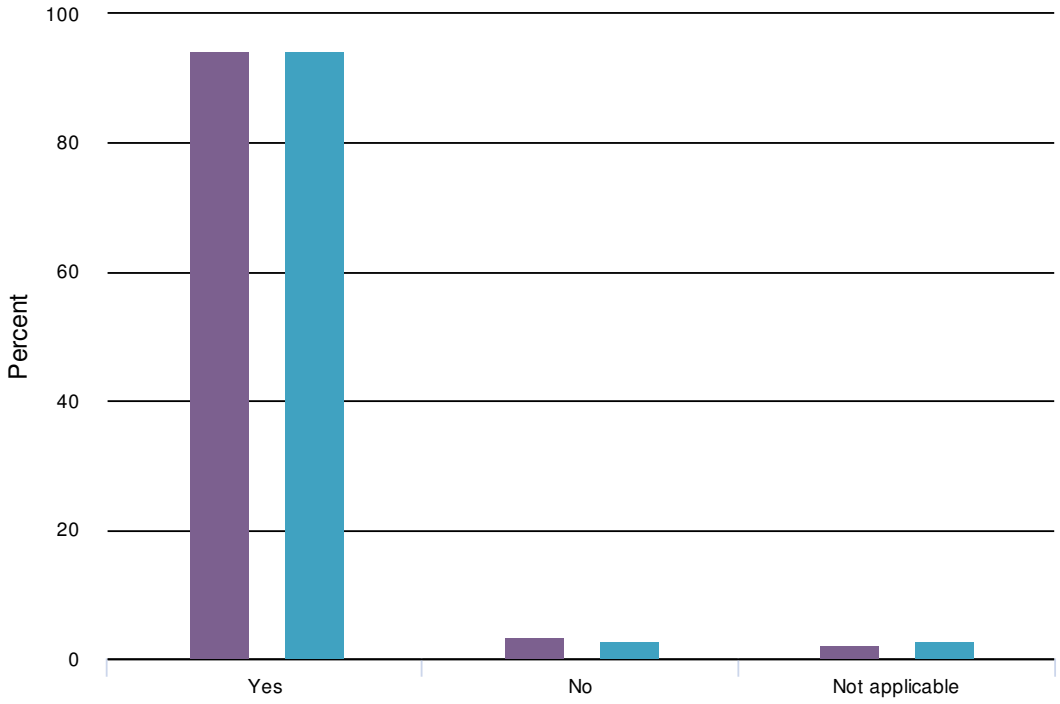
Segment	Value	Percent	% of Total	Responses
In-Person	Extremely Satisfied	63.5%	54.9%	586
	Very Satisfied	25.6%	22.1%	236
	Satisfied	6.7%	5.8%	62
	Somewhat Satisfied	2.2%	1.9%	20
	Not at all	1.8%	1.6%	17
	Not applicable	0.2%	0.2%	2
		Total Responses	86.5%	923
Virtual	Extremely Satisfied	59%	8%	85
	Very Satisfied	23.6%	3.2%	34
	Satisfied	9%	1.2%	13
	Somewhat Satisfied	6.3%	0.8%	9
	Not at all	1.4%	0.2%	2
	Not applicable	0.7%	0.1%	1
		Total Responses	13.5%	144

8. Did the energy specialist provide you the energy assessment report after the assessment?



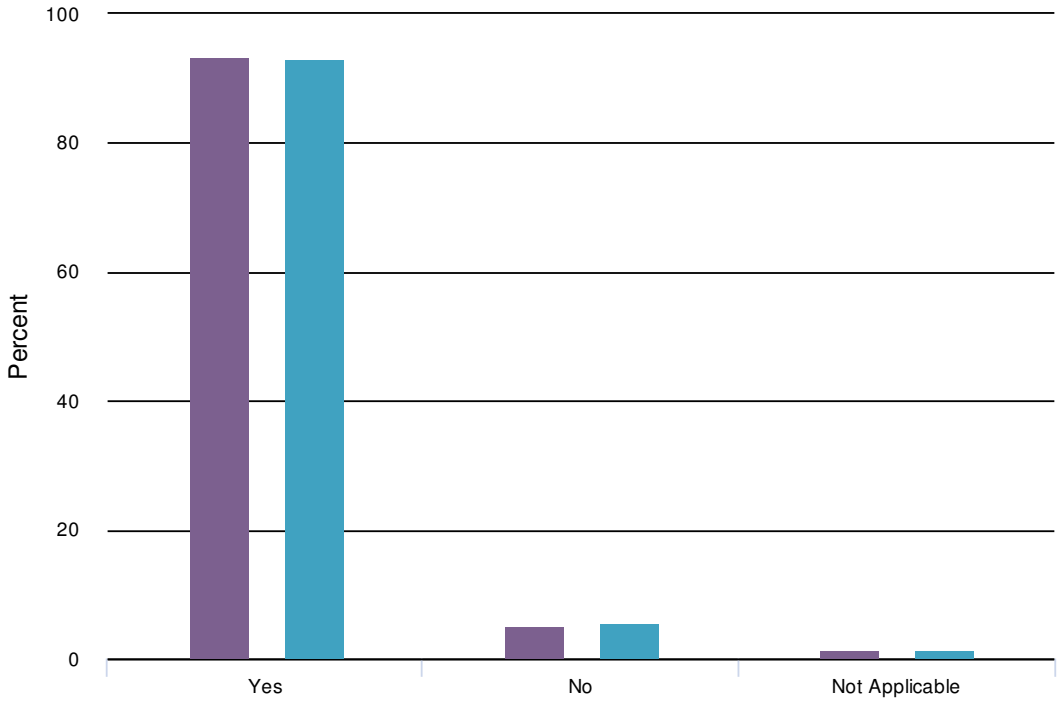
Segment	Value	Percent	% of Total	Responses
In-Person	Yes	93.1%	80.7%	854
	No	5.2%	4.5%	48
	Not applicable	1.6%	1.4%	15
	Total Responses		86.6%	917
Virtual	Yes	93.6%	12.5%	132
	No	5%	0.7%	7
	Not applicable	1.4%	0.2%	2
	Total Responses		13.4%	141

9. Were you satisfied with the timeframe the energy assessment report was provided?



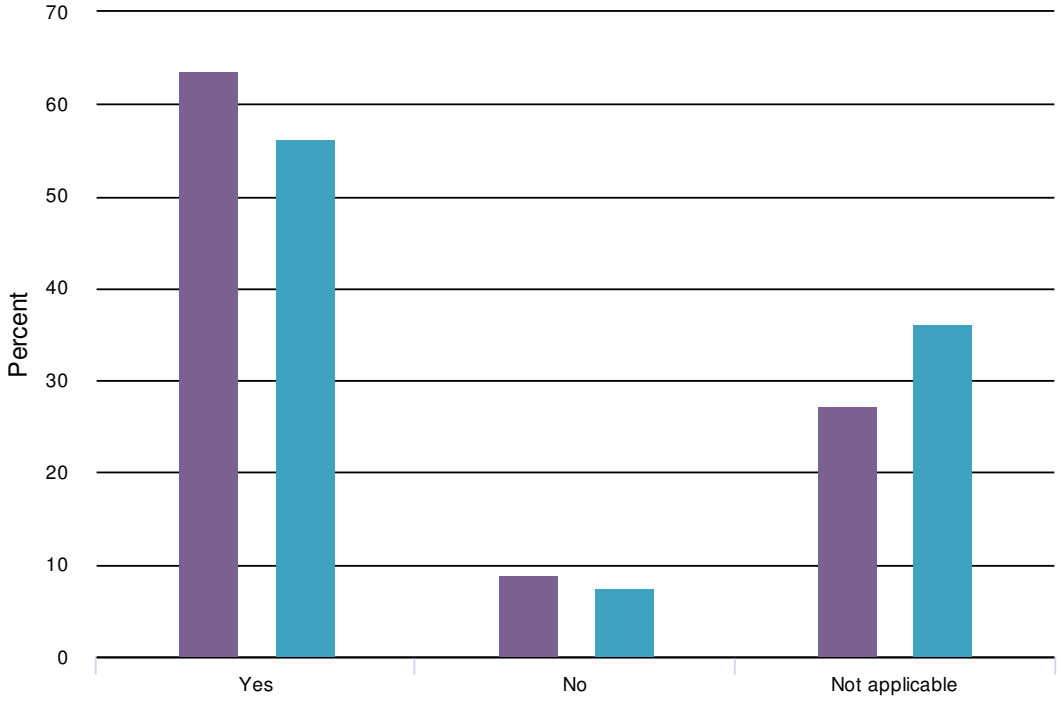
Segment	Value	Percent	% of Total	Responses
In-Person	Yes	94.4%	81.7%	871
	No	3.5%	3%	32
	Not applicable	2.2%	1.9%	20
	Total Responses		86.6%	923
Virtual	Yes	94.4%	12.7%	135
	No	2.8%	0.4%	4
	Not applicable	2.8%	0.4%	4
	Total Responses		13.5%	143

10. Did the energy specialist clearly define your next steps to take advantage of any recommended offers?



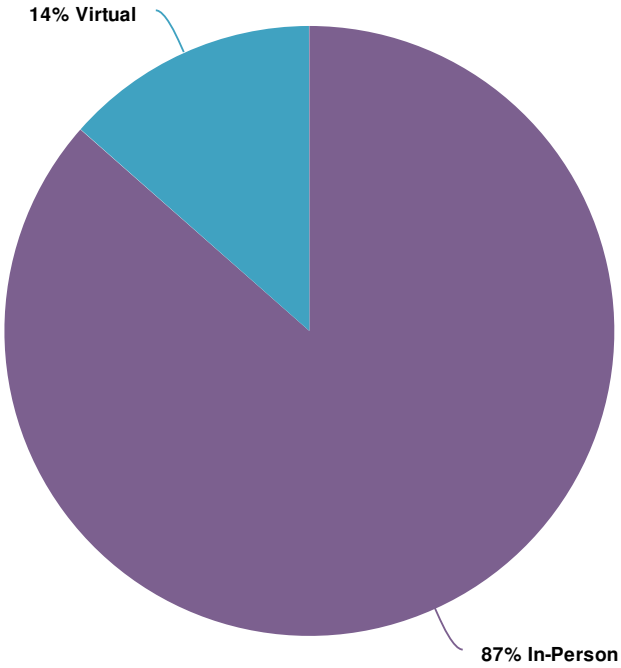
Segment	Value	Percent	% of Total	Responses
In-Person	Yes	93.6%	80.9%	858
	No	5.1%	4.4%	47
	Not Applicable	1.3%	1.1%	12
	Total Responses		86.4%	917
Virtual	Yes	93.1%	12.6%	134
	No	5.6%	0.8%	8
	Not Applicable	1.4%	0.2%	2
	Total Responses		13.6%	144

11. If you were expecting your energy specialist to follow up after your Home Energy Assessment, did they?



Segment	Value	Percent	% of Total	Responses
In-Person	Yes	63.7%	55.1%	583
	No	9%	7.7%	82
	Not applicable	27.3%	23.6%	250
	Total Responses		86.4%	915
Virtual	Yes	56.3%	7.6%	81
	No	7.6%	1%	11
	Not applicable	36.1%	4.9%	52
	Total Responses		13.5%	144

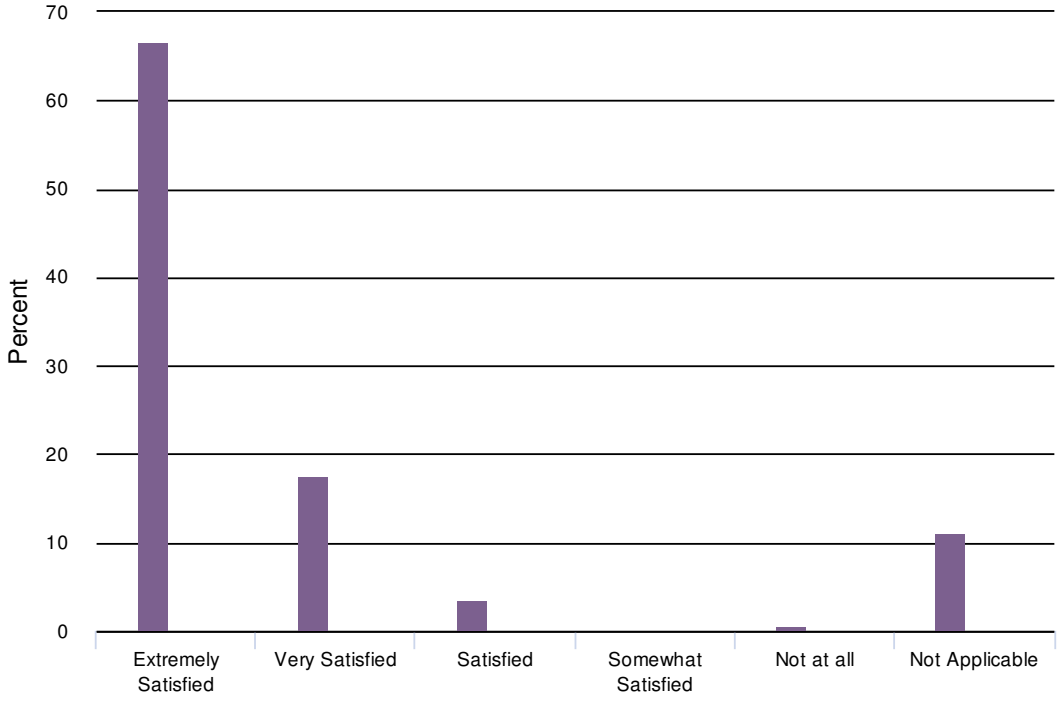
12. Did you have an in-person assessment or a virtual assessment?



Value	Percent	Responses
In-Person	86.5%	925
Virtual	13.5%	144

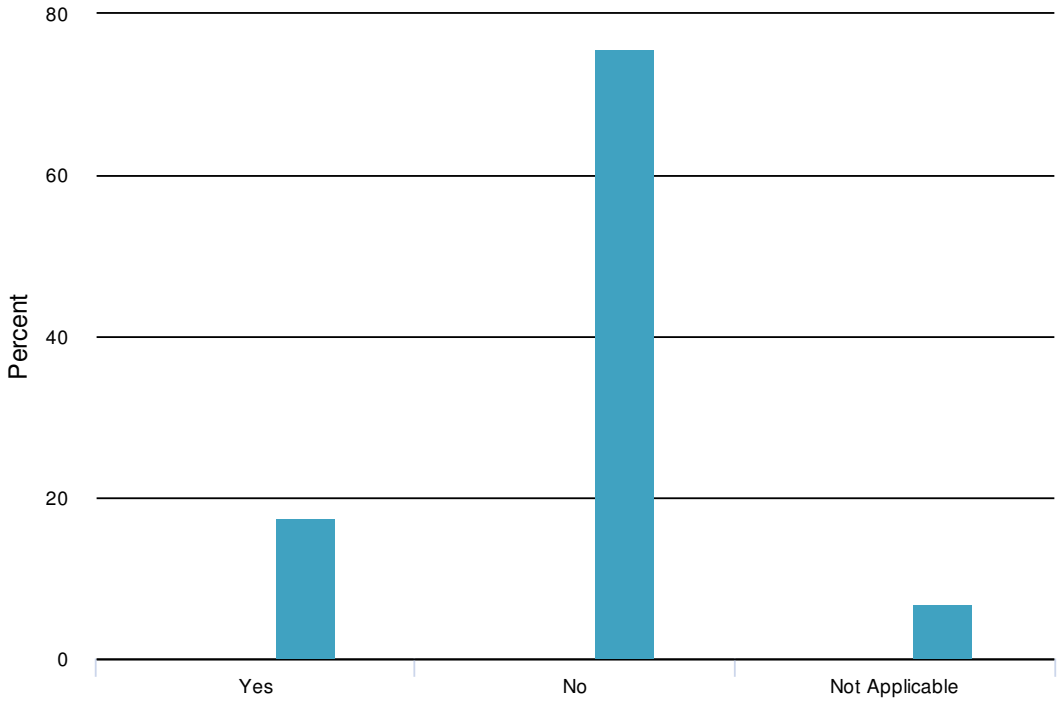
Totals: 1,069

13. How satisfied were you with how well the energy specialist cleaned up following the Home Energy Assessment?



Segment	Value	Percent	% of Total	Responses
In-Person	Extremely Satisfied	66.7%	66.7%	615
	Very Satisfied	17.7%	17.7%	163
	Satisfied	3.6%	3.6%	33
	Somewhat Satisfied	0.3%	0.3%	3
	Not at all	0.7%	0.7%	6
	Not Applicable	11.1%	11.1%	102
		Total Responses	100.1%	922
Virtual	Extremely Satisfied	0%	0%	0
	Very Satisfied	0%	0%	0
	Satisfied	0%	0%	0
	Somewhat Satisfied	0%	0%	0
	Not at all	0%	0%	0
	Not Applicable	0%	0%	0
		Total Responses	0%	0

14. Were there any limitations due to the video calling that negatively impacted the experience?



Segment	Value	Percent	% of Total	Responses
In-Person	Yes	0%	0%	0
	No	0%	0%	0
	Not Applicable	0%	0%	0
	Total Responses		0%	0
Virtual	Yes	17.4%	17.4%	25
	No	75.7%	75.7%	109
	Not Applicable	6.9%	6.9%	10
	Total Responses		100%	144

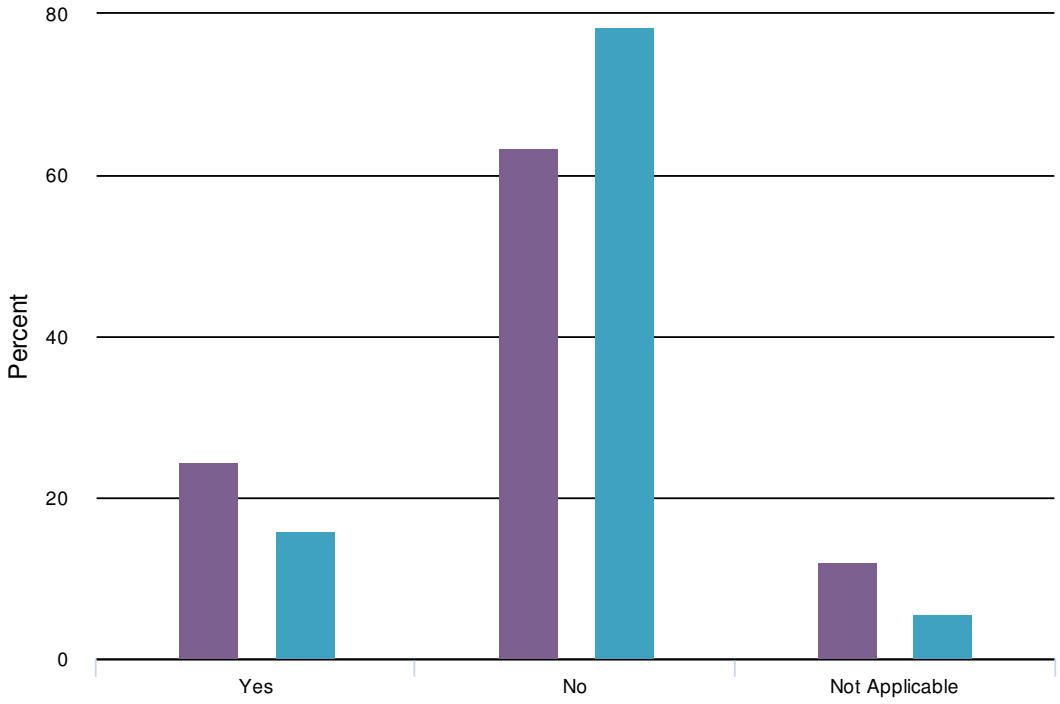
15. Please explain the limitations.

In-Person

No data: No responses found for this question.

Virtual

16. Do you want a representative from Home Energy Services to contact you regarding additional questions you may have?



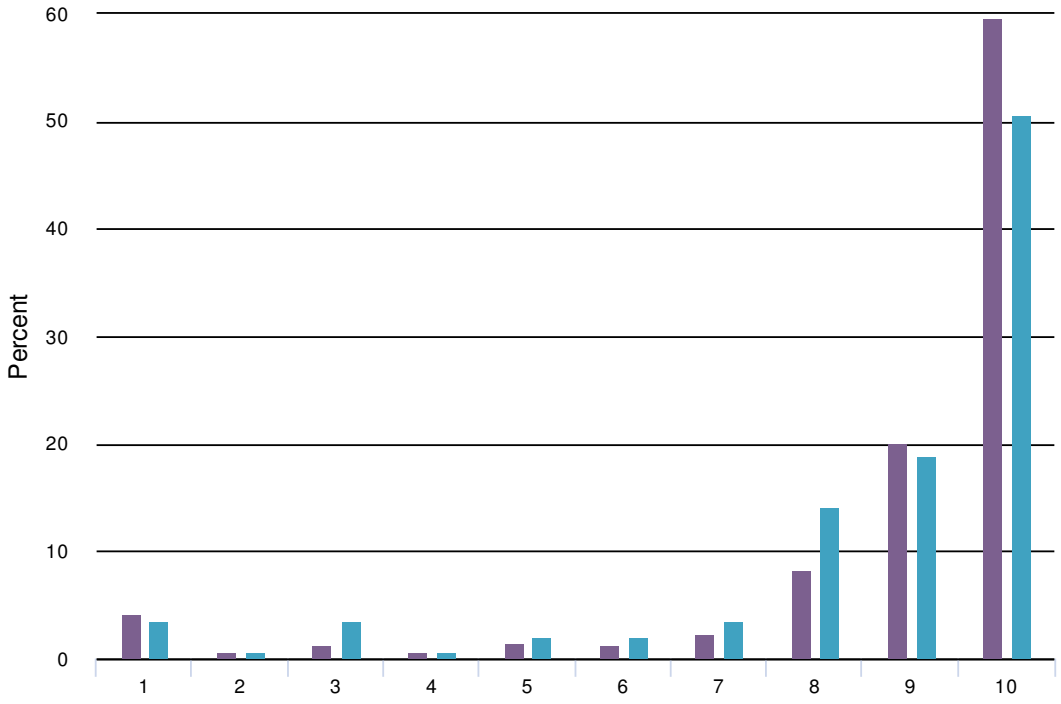
Segment	Value	Percent	% of Total	Responses
In-Person	Yes	24.5%	21.2%	224
	No	63.4%	54.8%	579
	Not Applicable	12%	10.4%	110
	Total Responses		86.4%	913
Virtual	Yes	16%	2.2%	23
	No	78.5%	10.7%	113
	Not Applicable	5.6%	0.8%	8
	Total Responses		13.7%	144

17. Do you have any additional comments?

In-Person

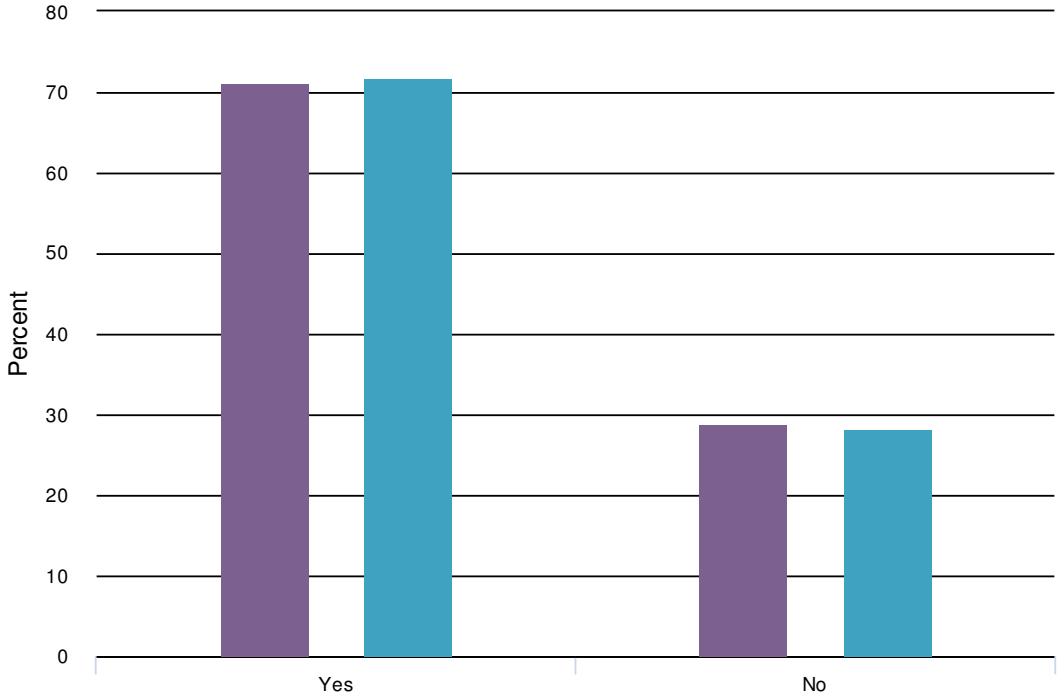
Virtual

18. On a scale from 1-10 (with 10 being very satisfied), how would you rate your overall satisfaction with your energy assessment?



Segment	Value	Percent	% of Total	Responses
In-Person	1	4.2%	3.6%	38
	2	0.6%	0.5%	5
	3	1.3%	1.1%	12
	4	0.7%	0.6%	6
	5	1.5%	1.3%	14
	6	1.3%	1.1%	12
	7	2.4%	2.1%	22
	8	8.3%	7.2%	75
	9	20.1%	17.4%	182
	10	59.6%	51.5%	540
		Total Responses	86.4%	906
Virtual	1	3.5%	0.5%	5
	2	0.7%	0.1%	1
	3	3.5%	0.5%	5
	4	0.7%	0.1%	1
	5	2.1%	0.3%	3
	6	2.1%	0.3%	3
	7	3.5%	0.5%	5
	8	14.1%	1.9%	20
	9	19%	2.6%	27
	10	50.7%	6.9%	72
		Total Responses	13.7%	142

20. May we share your comments about the EnergyWise program in National Grid and/or RISE Engineering marketing materials such as flyers, postcards, websites? Comments will be shared with only your first name and town where the project occurred.



Segment	Value	Percent	% of Total	Responses
In-Person	Yes	71.2%	61.6%	649
	No	28.8%	25%	263
	Total Responses		86.6%	912
Virtual	Yes	71.8%	9.7%	102
	No	28.2%	3.8%	40
	Total Responses		13.5%	142

PUC 1-40

EnergyWise Single Family (electric and gas)

Request:

Regarding online home energy assessments (OHEA), please provide the following data:

a. Number of customers who took an OHEA in 2021
b. Number of customers who took an OHEA in 2021 and later enrolled in an in-home or virtual home energy assessment

Response:

a. 306 RI customers have used the online assessment in 2021.
b. Based on matching addresses, 77 customers who used the on-line home energy assessment tool in 2021 subsequently signed up for in-home or virtual home energy assessments.

Prepared by or under the supervision of: Angela Li

PUC 1-41
EnergyWise Single Family (electric and gas)

Request:

Referencing Bates pages 142-3, National Grid notes that the online home energy assessment (OHEA) tool that will be available to customers in 2022 will be "v2." Assuming this means "version 2," please describe how the version two OHEA tool is different from the version one OHEA tool.

Response:

As part of the version 2 online home energy assessment upgrade, customers can now elect to sign into their National Grid account, thus saving their survey responses to their utility account. With this additional ability, the Company can promote energy-saving programs and highly personalized tips across multiple channels and beyond just the moment of survey completion.

Customers will also be automatically directed to the online assessment tool through promotions within emailed Home Energy Reports (HERs) and via QR codes on print HERs. The data collected through such promotions and online assessment completions will feed back into the platform to provide personalized recommendations and drive customers to take easy next steps towards program enrolments and product purchases.

Prepared by or under the supervision of: Angela Li

PUC 1-42

EnergyWise Single Family (electric and gas)

Request:

When did National Grid start offering the $250 incentive for remediating pre-weatherization barriers through the EnergyWise Single Family program?

Response:

Pre-weatherization barrier incentives were first proposed in the Energy Efficiency Program Plan for 2013. Customers first received the pre-weatherization barrier incentives in 2013.

Prepared by or under the supervision of: Angela Li

PUC 1-43

EnergyWise Single Family (electric and gas)

Request:

How did National Grid determine $250 was the appropriate incentive level to be paid to customers who remediate pre-weatherization barriers through the EnergyWise Single Family program? Please provide supporting documentation, data, and/or calculations.

Response:

Below is a sampling of the pre-weatherization barriers identified in Q3 2021. The list is representative of types and frequency of barriers identified in customer homes. The Company leveraged experience from the Income Eligible program and Massachusetts weatherization program to establish a barrier amount that was " up to $250", allowing the customer to use a licensed contractor of their choice to aid in overcoming the barrier to weatherize. The $250 pre-weatherization barrier amount was selected as an average rate that could overcome some barriers in their entirety (i.e. combustion gas spillage and carbon monoxide – heating system), as well as covering a cost to inspect and quote what would be involved to overcome a larger barrier (e.g. active knob and tube wiring).

The list is following.

Prepared by or under the supervision of: Angela Li

PUC 1-43, page 2

EnergyWise Single Family (electric and gas)

Q3 (based on invoiced audits)

(7/1/2021-9/30/2021)

Item_Buildcomp	WZ

Row Labels	Distinct Count of Custno
INDOOR AIR QUALITY - BEFORE INSULATING	1
INDOOR AIR QUALITY - SMART SWITCH	2
CARBON MONOXIDE- WATER HEATER	2
GAS LEAK	2
CARBON MONOXIDE- OVEN 225ppm	4
ELECTRICAL HAZARD	9
NAILED WALL PANELS	11
PEST INFESTATION IN ATTIC	16
UNVENTED COMBUSTION APPLIANCE	26
VERMICULITE HAZARD MUST MITIGATE	34
CRAWLSPACE HEIGHT NO VAPOR BARRIER	43
CUSTOM BARRIER - MUST FIX	48
INOPERABLE HEATING SYSTEM	76
DEPRESSURIZATION HAZARD	83
COMBUSTION GAS SPILLAGE	88
CARBON MONOXIDE- HEATING SYSTEM	90
MOISTURE BARRIER	100
MOLD AND/OR MILDEW MUST MITIGATE	136
KNOB & TUBE WIRING SIGN-OFF	198
KNOB & TUBE WIRING	527
Grand Total	**1080**

Prepared by or under the supervision of: Angela Li

PUC 1-44

EnergyWise Single Family (electric and gas)

Request:

Regarding the pre-weatherization barriers described on Bates page 143, please provide the following information:

a. Number of customers who were paid the $250 incentive for remediating pre-weatherization barriers in program years 2019 – 2021.
b. Total cost of the incentives for remediating pre-weatherization barriers that were paid out to customers in program years 2019 – 2021.

Response:

a. The number of unique customers who received the pre-weatherization incentive from 2019 – October 25, 2021 totaled 1,743.
b. The total cost of the incentives for remediating pre-weatherization barriers that were paid out to customers in program years 2019 – 2021 (through 10/25/2021) totaled $339,526.

Prepared by or under the supervision of: Angela Li

PUC 1-45

EnergyWise Single Family (electric and gas)

Request:

Does National Grid verify whether customers seeking the $250 incentive for remediating pre-weatherization barriers did so through appropriate channels, using "appropriate licensed professionals?" If so, please describe the procedure.

Response:

The Weatherization barrier incentive form provided to the customer (Attachment PUC 1-45 WZ BARRIER FORM 2021) states, "Hire a qualified, licensed contractor to evaluate and/or remediate the weatherization barrier(s) identified below."

In each of the applicable sections, contractors are asked for their license number and signature as verification that they are a licensed professional. The Lead Vendor reviews this field to verify the license number is populated before issuing reimbursement and permitting the weatherization project to proceed.

Prepared by or under the supervision of: Angela Li

nationalgrid

Rhode Island

Weatherization Barrier Incentive

Based on your Energy Specialist's recommendations, your home can benefit from insulation and/or air sealing improvements. Before moving forward, please follow all the instructions below to remediate your weatherization barriers.

Customer Instructions

1. Hire a qualified, licensed contractor to evaluate and/or remediate the weatherization barrier(s) identified below.

2. **Submit signed and completed copies of this form and a copy of the paid contractor invoice(s)** within 60 days of your Home Energy Assessment to: **Weatherization Barrier Incentive, c/o RISE Engineering**
   1341 Elmwood Ave, Cranston, RI 02910
   or email to **EnergyWiseInfo@RISEengineering.com**

3. The weatherization barrier incentive will be deducted from the customer co-payment amount of the weatherization work. A rebate check will be issued in the event the amount exceeds the customer's co-payment amount.

4. Complete the recommended weatherization improvements.

Customer Information

Customer Name:	Client #:		
Site Address:	City:	State:	Zip:
Phone Number:	Email:		
Customer/Homeowner Signature:	**Date:**		

☐ A. Knob and tube wiring

To determine if there is any active knob and tube wiring, the contractor will evaluate the following areas where eligible weatherization recommendations have been made:

☐ Attic ☐ Slopes ☐ Attic Floor ☐ Knee Wall Floor ☐ Exterior Walls ☐ Basement ☐ Other(s): _____

For Contractor:

☐ I have performed my inspection and determined there is no active knob and tube wiring in the areas selected below.

☐ Attic ☐ Slopes ☐ Attic Floor ☐ Knee Wall Floor ☐ Exterior Walls ☐ Basement ☐ Other(s): _____

☐ I have read and agree to the Terms and Conditions on page 4 of this form.

Contractor Name:

Address:	City:	State:	Zip:
Company Name:	License #:		
Contractor Signature:	**Date:**		

☐ B. Mechanical system barriers (To be filled out by licensed contractor.)

Incentives available for evaluations and system corrections only. Full equipment replacements do not qualify for the Weatherization Barrier Incentive. However, there may be other rebates available for equipment replacements.

High Carbon Monoxide: Contractor is to service and re-evaluate the selected mechanical system(s) and reduce the carbon monoxide level, as measured in the undiluted flue gas, to below 100 parts per million (ppm).
Draft Failure: Contractor is to correct the draft in the selected flue(s). Refer to table on page 4 for acceptable draft ranges.

	High Carbon Monoxide		Draft Failure	
	Existing CO ppm:	Revised CO ppm:	Existing Draft:	Revised Draft:
Heating System				
Water Heater				
Other				

Exhaust Spillage: Contractor is to correct the spillage of flue gases in the selected mechanical system(s). Must not spill after 60 seconds of operation.

☐ Heating System ☐ Water Heater ☐ Other:_____

☐ I have performed my inspection and have corrected the items noted in the areas selected above.

☐ I have read and agree to the Terms and Conditions on page 4 of this form.

Contractor Name:

Address:	City:	State:	Zip:
Company Name:	License #:		

Contractor Signature: **Date:**

☐ C. Ventilation

Mechanical Ventilation: Contractor to install mechanical ventilation capable of providing measured, continuous or intermittent whole building ventilation to meet ASHRAE 62.2. The required rate of flow must be capable of providing _____ CFM (measured at fan).

For Contractor:

☐ I have installed mechanical ventilation to specifications above.
☐ I have installed a Smart Switch to meet the specifications above.
☐ I have installed an ERV/HRV to meet the specifications above.

I have read and agree to the Terms and Conditions on page 4 of this form.

Initials:

Contractor Name:

Address:	City:	State:	Zip:
Company Name:	License #:		

Contractor Signature: **Date:**

☐ D. IC rated recessed light contractor evaluation

During your Home Energy Assessment, recessed light fixtures were noted by your Energy Specialist in the areas where insulation is being recommended. If you decide to have these fixtures covered by insulation, a Rhode Island licensed electrician must certify the fixtures are insulation contact (IC) rated.

An electrician's certification is not required if you choose not to have the recessed lighting covered with insulation. In this case, the recessed lights will be left exposed.

You will receive 100% of the cost (up to $250) to evaluate and replace ten (10) or more* non-IC rated recessed lights with IC rated models. The incentive amount will be deducted from the customer co-payment amount of the weatherization contract. A rebate check will only be issued in the event that the incentive amount exceeds the customer co-payment amount.

*If you have less than 10 recessed lights, while there is no incentive at this time, you can still get them certified or replaced with IC rated lights to allow for a more complete insulating barrier. Proper documentation will be required.

Energy Specialist Evaluation

Name:	Phone Number:	Email:

IC rated recessed light verification is needed in the following areas:

☐ Open attic ☐ Enclosed floor cavity ☐ Enclosed interior slope ☐ All recessed lights

Notes: _____

Electrician's Certification

Company Name:	Electrician's Name:	License #:	
Address:	City:	State:	Zip:
Phone Number:	Email:		

I have performed an inspection of the lighting fixtures and have verified that all recessed lights are IC rated in the following areas:

Open attic	Enclosed floor cavity	Enclosed interior slope	All recessed lights
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

The licensed electrician is responsible for properly identifying the specific locations of all IC rated and non-IC rated lighting in the area(s) being insulated. Failure to do so will make this form invalid.

Electrician Signature:	Date:

Terms and conditions

Eligibility Requirements: These Terms and Conditions may be changed or the offer(s) may be terminated by National Grid at any time without notice. Applicant must (1) be a residential customer of National Grid, (2) must participate in the National Grid Energy*Wise* Home Energy Assessment Program, and (3) must be a resident or owner of a 1-4 family home. The qualifying barrier must be identified at the time of the Home Energy Assessment as a barrier preventing the installation of proposed weatherization improvements. **Customer must complete the recommended weatherization improvements to receive the applicable incentive. Customer must submit the completed Contractor Evaluation Report including a copy of the dated and itemized invoice from the licensed contractor on company letterhead postmarked within 60 days of the Home Energy Assessment. If contractor invoice is not provided within 60 days, the applicable weatherization barrier incentive may be forfeited.** Customer participation does not guarantee the barrier will be cleared.

Application Form: This application must be filled out completely, truthfully and accurately. The customer must date and submit the completed application along with all required documentation for specific rebates. By submitting the rebate application, the customer agrees to abide by these Terms and Conditions.

Contractor Responsibilities and Acknowledgement: In performing any work in connection with the Weatherization Barrier Incentive (as set forth in detail below), the contractor shall: (i) abide by all local, state and federal guidelines, applicable laws (including, but not limited to all applicable environmental laws), building codes, regulations (including, but not limited to EPA Lead Safe and any and all other applicable environmental regulations) and licensing requirements; and (ii) stop work and immediately notify the customer in any case where existing or possible health and/or safety problems exist. The contractor must complete the testing results in the appropriate place on this form and provide their signature. Contractor shall remain solely and fully responsible for their confirmations and notes that they provide on this form and with respect to the Contractor Responsibilities set forth above.

A. Knob & Tube Wiring Evaluation (up to $250 incentive): The knob and tube wiring that has been noted cannot be determined inactive at the time of the Home Energy Assessment performed by the Energy Specialist. Even if the observed wiring appears to be inactive, there might still be active circuits located in inaccessible areas of the home (i.e. walls, etc.). The National Grid Energy*Wise* Program requires that a licensed electrician verify the absence or inactivity of the knob and tube wiring in the areas of your home where we are proposing insulation be installed. We advise you to share this form with your electrician before hiring them to inspect your home to ensure they agree to the terms. The Energy*Wise* Program will rely on the electrician's certification and will not be liable if inaccurate.

B. Mechanical System Evaluation (up to $250 incentive): Combustion safety testing has been conducted on all the heating and water heating equipment (also known as "mechanical systems") in this home. These tests are conducted with all the exhaust equipment running simultaneously, creating a "worst-case" depressurization of the building. If a problem was identified, repairs to correct the problem must be completed by a qualified HVAC contractor. Any and all mechanical system barriers are considered one barrier, which is eligible for an incentive of up to $250. The problems and corrections are as follows:

1. Carbon monoxide levels exceed 100 ppm in the undiluted flue gases. After a clean and tune, or other applicable service, the measurement(s) of undiluted flue gas of carbon monoxide are to be recorded on page 2 of this Contractor Evaluation Report where program rules state the maximum allowable concentration is 100 ppm.
2. During your Home Energy Assessment it was discovered that the identified mechanical system(s) was continuously spilling exhaust gases into the home. This condition is also known as back draft and should end within 60 seconds of system operation in order to be considered acceptable. The contractor must service the system(s) to correct the spillage problem in the selected flue(s), and certify by signature on page 2 of this form that the spillage condition has ceased after 60 seconds of operation.
3. During your Home Energy Assessment it was discovered that the identified mechanical system(s) are not creating sufficient draft. This condition is where exhaust gases are not moving through the chimney at a fast enough rate. The contractor must service the system(s) to correct the draft problem in the selected flue(s). New draft results must be provided on the front of this form and within acceptable draft ranges as described in Table 1.

Table 1 - Acceptable Draft Test Ranges

Outside Temp (ºF)	Minimum Draft Pressure (Pa)
<10	-2.5
10-90	(outside Temp/40) -2.75
>90	-0.5

C. Mechanical Ventilation Installation (up to $250 incentive): Our testing may determine that your home will need an increase in fresh air flow before undertaking any further weatherization work. National Grid provides a weatherization barrier incentive for the installation of mechanical ventilation to provide this additional air flow. Your Energy Specialist will calculate the necessary flow rate and provide recommendations.

D. IC Rated Recessed Lights:

Certification: The electrician's sign-off is not necessary in order to move forward with most program-eligible work. It only needs to be completed if the homeowner would like insulation to be blown over and in contact with existing recessed lighting fixtures in the areas designated by the Energy Specialist.

Insulation Contract: Your Energy Specialist has specified on your insulation contract to add "damming" material around your existing recessed lights to keep any new insulation from coming in contact with the impacted recessed lighting. If your electrician signs this form to certify the recessed lights are IC rated, then your contract will be revised to have this line item removed.

Liability: Due to the liability involved with signing this type of form, we suggest you show or describe this form to your Rhode Island licensed electrician prior to hiring him/her, to be sure he/she is willing to sign it. RISE Engineering and National Grid's Energy*Wise* Home Energy Assessment Program will rely on the licensed electrician's determination and certification and will not be liable if it is inaccurate.

These Terms and Conditions may be changed or the offer(s) may be terminated by National Grid at any time without notice.

PUC 1-46

EnergyWise Single Family (electric and gas)

Request:

Please provide illustrative low, medium, and high estimates of the value of the lifetime energy savings (in dollars) that accrue to a typical EnergyWise Single Family participant who weatherizes their home through the program.

Response:

Based on the September 2020 Impact & Process Evaluation EnergyWise Single Family Program National Grid Rhode Island, there is one deemed savings value for weatherization which is dependent on fuel type. Therefore, low, medium, and high estimates are all aggregated to a single savings number.

2022 per participant lifetime energy savings from weatherization.

Fuel Type	Lifetime Electric	Lifetime Oil	Lifetime Gas	Total Lifetime Energy Savings
Electric	$2,321.90			$2.321.90
Oil	$190.88	$4,209.51		$4,400.39
Gas	$196.97		$1,849.85	$2,046.82

Note: Customers that heat with oil or gas realize both lifetime electric savings and either lifetime oil or lifetime gas savings. Electric savings result from a combination of heating system fans working less frequently with fewer air leaks and aggregate cooling savings from evaluated homes.

Prepared by or under the supervision of: Angela Li

PUC 1-47

EnergyWise Single Family (electric and gas)

Request:

Referencing Bates page 144, National Grid writes "to provide customers a full picture of all their clean energy opportunities, the energy specialist also performs a quick assessment survey to determine whether the home is a good candidate for solar." For the 2021 program year, please estimate how many hours energy specialists spent performing this solar assessment for EnergyWise Single Family participants, and the associated cost of that effort.

Response:

There is no additional cost for providing the solar information. As noted in PUC 1-37, all home energy assessments are performed at a fixed price. Providing the solar assessment typically takes 5 – 10 minutes for an energy specialist and is performed when the specialist is walking around the exterior of a customer's home to look at the age and condition of the roof.

The contents of Home Energy Assessments and time management during these assessments are tailored to the needs and concerns of the individual customer – as a result, solar information is provided only if customers expressed an interest in solar panels, and at no incremental cost to the Company or to the energy efficiency programs.

Prepared by or under the supervision of: Angela Li

PUC 1-48

EnergyWise Single Family (electric and gas)

Request:

Referencing Bates page 145, regarding the proposed plan for unspent RGGI funding dedicated to weatherization incentives for moderate income customers, National Grid writes "If RGGI funds are still unspent in 2022, the RGGI offering will be promoted to the Rhode Island Department of Health's March 30, 2021 Hardest-Hist COVID zip codes and the new moderate income offering will be promoted to [the] remainder of Rhode Island customers" (Bates page 145).

Please confirm whether this means unspent RGGI funds will simply be marketed to those customers located in the Department of Health's Hardest-Hist COVID zip codes or that unspent RGGI funds will be exclusively reserved for those customers

Response:

The Company's intent is to market the RGGI offering to the Department of Health's Hardest-Hit COVID zip codes, though the offering will remain available to all customers.

Prepared by or under the supervision of: Angela Li

PUC 1-49

EnergyWise Single Family (electric and gas)

Request:

Describe the marketing, outreach, and promotional efforts the Company proposes for the 2022 Energy Efficiency Plan to market the 100% landlord weatherization incentive (through the EnergyWise Single Family program) to eligible landlords.

Response:

The Company has not yet developed the marketing, outreach, and promotion plans for the 2022 100% landlord weatherization incentive outreach. In 2021 the Company purchased a landlord mailing list and send out a mailer (attached to this response as Attachment 1-49).

In prior years, English and Spanish language flyers have been distributed at community events and by City of Providence's Office of Sustainability. The Company anticipates that these tactics will continue to be used in 2022.

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Rhode Island landlords can receive an exclusive offer of 100% off approved insulation and air sealing upgrades.
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Get personalized recommendations on how to save money and energy with our Virtual Home Energy Assessment. Collaborate with an energy specialist via phone or video chat and receive 100% off approved insulation.

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Increase your property's value.

Help tenants save each year on energy costs.

Keep tenants comfortable and happy.

Call 1-888-633-7947 to schedule a no-cost Virtual Home Energy Assessment.

***Qualifications:** Tenant must have a National Grid Electric or Gas account. Must obtain a copy of the lease to keep on file. Must be a year round lease, no summer rentals. Must be in a 1-4 unit dwelling. Landlord occupied units may also qualify for 100% when insulation improvements are done in conjuction with all other rental units.

These programs are funded by the energy-efficiency charge on all customers' gas and electric bills, in accordance with Rhode Island law.

EE8125 RI (4/21)

PUC 1-50

EnergyWise Single Family (electric and gas)

Request:

Regarding the proposed concierge service for electric resistance heated homes, please explain whether users of the concierge service who complete the installation of a heat pump electric heating system through the service will be required to do the following:

a. Solicit and receive recommendations for weatherization measures from the concierge?
b. Install any concierge-recommended weatherization measures prior to using the concierge service to install a heat pump?

Response:

a. Yes. Similar to when a customer receives an enhanced incentive for installing electric heat pumps to replace electric resistance heating, the concierge service will have the same weatherization requirements for the home. Specially, that requirement is communicated to customers as: "Home must be fully insulated and weatherized, as recommended or verified through the EnergyWise Program." (Attachment PUC 1-50 – A ri_electric_heating-cooling_form, included as a reference).

b. Yes, see response to part a.

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2021 Rhode Island

Residential electric heating and cooling rebates

nationalgrid

844-615-8315 | ngrid.com/rirebates

Save energy and money, improve comfort, and make your home better with these energy savings offers for residential electric customers.

- **Central Air Conditioners**
- **Central Heat Pumps**
- **Mini-Split Heat Pumps**
- **Smart Thermostats**

These programs are funded by the energy efficiency charge on all customers' utility bills, in accordance with Rhode Island law.

Rhode Island residential electric heating and cooling rebate application

Form must be completed in its entirety.

2021

Please submit online to receive rebate faster: **ngrid.com/rirebates**

STANDARD REBATES

National Grid offers rebates for energy-efficient central air conditioning, central heat pump and mini-split heat pump systems. A licensed contractor must install the equipment in order to qualify for rebates (with the exception of smart thermostats, which may be self-installed by the customer). Only qualifying equipment models are eligible. See qualifying equipment and rebate amounts below.

Equipment Type	Delivery Method	Requirement*	Rebate
Central AC	Ducted	AHRI: SEER ≥ 16, EER ≥ 13	$50 per ton
Central Heat Pump	Ducted	AHRI: SEER ≥ 15, HSPF ≥ 9	$350 per ton
Mini-Split Heat Pump	Ducted or Mixed-Ducted	AHRI: SEER ≥ 15, HSPF ≥ 9	$350 per ton
	Non-Ducted	NEEP**: SEER ≥ 15, HSPF ≥ 10, COP 1.75 at 5°F	$150 per ton
Equipment Type		**Requirement*** **	**Rebate**
ENERGY STAR® Smart Thermostat		ENERGY STAR certified; Wireless connections must be enabled	$75 each

ENHANCED REBATES

National Grid offers an Enhanced Rebate for energy-efficient central and mini-split heat pumps installed in qualifying homes that heat primarily with **electric baseboard resistance heating**. To qualify for Enhanced Rebates, customer must meet the following prerequisites:

1. Valid National Grid customer must participate in a free EnergyWise Home Energy Assessment. To schedule, call 888-633-7947 and reference the Heat Pump Program for expedited scheduling.
2. Home must be fully insulated and weatherized, as recommended or verified through the EnergyWise Program.
3. Equipment must be installed by a program-approved contractor. Visit ngrid.com/ri-hvaccontractors
4. Existing heating system must be electric baseboard resistance heating.

Equipment Type	Delivery Method	Requirement*	Rebate
Central Heat Pump	Ducted	AHRI: SEER ≥ 15, HSPF ≥ 9	$1,250 per ton
Mini-Split Heat Pump	Ducted or Mixed-Ducted	AHRI: SEER ≥ 15, HSPF ≥ 9	
	Non-Ducted	NEEP**: SEER ≥ 15, HSPF ≥ 10, COP 1.75 at 5°F	

*Mini-split heat pumps that only provide cooling are not eligible. SEER–Seasonal Energy Efficiency Ratio. EER–Energy Efficiency Ratio is a measure of instantaneous cooling efficiency. HSPF–Heating Seasonal Performance Factor is a ratio of an air source heat pump's heat output to electricity use over an average heating season. COP– Coefficient of Performance is a ratio of useful heating or cooling provided to work required. Rounding up of SEER/EER ratings is not acceptable.

**For equipment requiring Northeast Energy Efficiency Partnerships (NEEP) listing, refer to NEEP.org.

***Limit two smart thermostats per account. Rebate amount cannot exceed purchase price.

Rhode Island residential electric heating and cooling rebate application

2021

Form must be completed in its entirety.

TO APPLY

Standard Rebates

- Verify that the equipment you will be installing qualifies for a rebate by consulting with a licensed contractor. Qualifying equipment is noted above.
- The equipment must be installed by a licensed installer at a property with an active National Grid residential electric account.

Enhanced Rebates

- This special offer is valid only for National Grid customers whose home heats primarily with **electric baseboard resistance heating**. Replacing old or failed electric heat pump systems **DOES NOT** qualify for the Enhanced Rebate. Homes must also be fully insulated and weatherized, as verified through the EnergyWise program. Valid National Grid customer must participate in a free EnergyWise Home Energy Assessment. To schedule, call 888-633-7947 and reference the Heat Pump Program for expedited scheduling. No-cost energy-saving improvements are available to households that meet certain income guidelines. For more information, call 401-351-1800 or your local Community Action Program (CAP) agency to get started. Or visit ngrid.com/ri-income
- Verify that the equipment you will be installing qualifies for a rebate by consulting with a **program-approved contractor**. Qualifying equipment is noted above.
- Equipment must be installed by a **program-approved contractor**, at a property with an active National Grid residential electric account.
- A list of **program-approved contractors** can be found at ngrid.com/riheatpump

Rebate form and required documentation must be postmarked or submitted online within 60 days of equipment installation date, or by January 31, 2022, whichever comes first.

IMPORTANT: Photocopy your entire submission for your records. You could be required to mail these photocopies. Offer valid on equipment purchased and installed between January 1, 2021 and December 31, 2021 (subject to funding availability). From the time the application is processed and approved, please allow 6–8 weeks for payment. Payment processing will take longer if information or documentation are missing from the application. To review the status of your application, please contact us at 800-292-2032 or visit **ngrid.com/rirebates**

Rhode Island residential electric heating and cooling rebate application

2021

Form must be completed in its entirety.

Rebates are available to eligible residential electric customers only. One electric account number per form. Some restrictions may apply. Rebate offers are subject to change without notice. Please review Terms and Conditions.

Submit online at:
ngrid.com/rirebates
or mail completed form with all required documents to:
National Grid RI Electric Heating & Cooling Rebates
P.O. Box 2528
Manchester, CT 06045

Please make sure your invoice includes:

- Equipment installed
- Quantity installed
- Installer name and address
- Equipment and installation costs
- Model number of indoor and outdoor equipment
- Manufacturer
- "Paid in full" or "zero balance"
- Installation date and location
- AHRI rated cooling capacity in tons
- For Enhanced Rebates, ACCA-approved Manual J load calculation. Contact your contractor to obtain a copy.
- For Enhanced Rebates, provide evidence of weatherization completion and/or energy audit results

CUSTOMER/ACCOUNT HOLDER INFORMATION — FORM MUST BE COMPLETED IN ITS ENTIRETY

EXISTING HEATING FUEL TYPE: ☐ ELECTRIC RESISTANCE ☐ OIL ☐ PROPANE ☐ NATURAL GAS

ELECTRIC ACCOUNT NUMBER AT INSTALLATION ADDRESS

ACCOUNT HOLDER FIRST NAME | ACCOUNT HOLDER LAST NAME

INSTALL ADDRESS | CITY | STATE RI | ZIP

EMAIL ADDRESS | PHONE

PAYEE INFORMATION — ADDITIONAL PROCESSING TIME MAY BE REQUIRED IF ACCOUNT HOLDER IS DIFFERENT THAN PAYEE NAME

PAYEE FIRST NAME/COMPANY NAME (if different than above) | PAYEE LAST NAME

MAILING ADDRESS (if different than above) | CITY | STATE | ZIP

EMAIL ADDRESS | PHONE

HOW DID YOU HEAR ABOUT THIS PROGRAM: (Choose the appropriate ballot box.)

☐ PLUMBER OR CONTRACTOR ☐ ENERGY ASSESSMENT ☐ EQUIPMENT SUPPLIER ☐ TRADE SHOW ☐ SALES REP/ACCOUNT EXECUTIVE

☐ PRINT ADVERTISING ☐ INTERNET ☐ RADIO/TV ☐ DIRECT MAIL/E-MAIL ☐ OTHER _____

☐ HOME ENERGY REPORT ☐ RHODE ISLAND ENERGY CHALLENGE: FIND YOUR FOUR!

CONTRACTOR INFORMATION — THIS INFORMATION MUST ALSO APPEAR ON THE CONTRACTOR INVOICE

CONTRACTOR COMPANY NAME | CONTACT NAME

STREET ADDRESS | CITY | STATE | ZIP

EMAIL ADDRESS | PHONE

CUSTOMER: Please sign the Work Completion and Rebate Validation section. It is required to validate your rebate submission.

Rhode Island residential electric heating and cooling rebate application

2021

Form must be completed in its entirety.

NEW EQUIPMENT INSTALLED (CANNOT APPLY FOR MULTIPLE REBATE OFFERS FOR SAME EQUIPMENT INSTALLATION)

☐ New construction ☐ Replacement system ☐ Adding cooling to existing ductwork ☐ Replacing failed equipment
☐ New or additional ductwork and air conditioning

Pre-existing Fuel Type: ☐ Electric ☐ Oil ☐ Propane ☐ Gas ☐ None ☐ Other _____

Rebate type	Rebate Amount	Date Installed (mm/dd/yyyy)	AHRI* Reference Number	Number of Tons	Customer Rebate Amount *(Rebate Amount x # of Tons)*
Standard Central AC	$50 per ton				
Standard Central Heat Pump	$350 per ton				
Standard Non-Ducted Mini-Split Heat Pump	$150 per ton				
Standard Ducted/Mixed-Ducted Mini-Split Heat Pump	$350 per ton				
Enhanced Heat Pump *(check equipment type that applies)* ☐ Central Heat Pump ☐ Non-Ducted Mini-Split Heat Pump ☐ Ducted/Mixed-Ducted Mini-Split Heat Pump	$1,250 per ton				
Enhanced Heat Pump *(check equipment type that applies)* ☐ Central Heat Pump ☐ Non-Ducted Mini-Split Heat Pump ☐ Ducted/Mixed-Ducted Mini-Split Heat Pump					

*AHRI = Air-Conditioning, Heating, and Refrigeration Institute

Equipment	Rebate Amount	Date Installed (mm/dd/yyyy)	Manufacturer	Model Number	Total Rebate**
ENERGY STAR Smart Thermostat	Up to $75 each				$

Thermostat installation completed by: ☐ Contractor ☐ Customer

Does your home have central air conditioning? ☐ Yes ☐ No

**Limit two smart thermostats per account. Rebate amount cannot exceed purchase price.

WORK COMPLETION AND REBATE VALIDATION

I hereby request a rebate for the listed work. Attached are copies of all receipts. I certify that all information above is correct to the best of my knowledge and that I have read and agree to all Terms and Conditions of this rebate. I certify that a licensed contractor has installed the listed energy-efficient equipment in accordance with Program Guidelines and Terms and Conditions as described on this form. This rebate is for the benefit of Rhode Island residential electric customers of National Grid. This rebate may not be combined with any other utility or energy efficiency service provider offer and may be subject to change without notice. I understand that some restrictions may apply. National Grid reserves the right to conduct field inspections to verify installations.

DATE	NAME (PRINT)	CUSTOMER SIGNATURE
		X

Rhode Island residential electric heating and cooling rebate application **2021**

Form must be completed in its entirety.

TERMS AND CONDITIONS

ENERGY STAR EQUIPMENT REQUIREMENTS

System Requirements—All rebated Heat Pump and Air Conditioning systems must be ENERGY STAR certified; listed with and certified by the Air Conditioning, Heating, and Refrigeration Institute (AHRI) ; and meet the program SEER, EER and HSPF requirements (see table on page 2). The A/C condenser and the evaporative coil must be new and replaced together. The condenser and coil are separate components in a split A/C or central heat pump system, but for rebate purposes, are considered one unit. For rebate purposes, the unit consists of outdoor condensers, indoor unit(s) and air handler(s). All units must have a thermostatic expansion valve (TXV) or electronic expansion valve (EXV) to qualify for rebate.

Sizing—Load calculation requires proper design temperatures for area. Unit installed must be within ½ ton of calculation.

Proof of Purchase—A copy of the customer's invoice itemizing the purchased equipment must accompany the rebate form. The invoice must indicate the equipment type, size, make, model, name of purchaser, installation date and location, date of purchase and total installed cost.

Information Sources to Verify ENERGY STAR Equipment—SEER and HSPF ratings for condenser, evaporator and air handler (if applicable) must be provided. The AHRI directory website at ahridirectory.org lists SEER and HSPF values; if you do not have internet access, please call 1-703-600-0384. AHRI also provides AHRI numbers. For equipment requiring Northeast Energy Efficiency Partnerships (NEEP) listing, refer to NEEP.org.

GENERAL REQUIREMENTS

Time Limit—Qualifying units for equipment rebate must be purchased and installed between January 1, 2021 and December 31, 2021. Rebate form and required documentation must be postmarked or submitted online within 60 days of equipment installation date or by January 31, 2021, whichever comes first. Program is subject to change without prior notice, including rebate levels.

Geographic Requirements—Offers valid only for residential electric customers in Rhode Island.

Application Form—This application must be filled out completely, truthfully, and accurately. The customer must date and submit the completed application along with all required documentation for specific rebates. By submitting the rebate application, the customer agrees to abide by these Terms and Conditions.

Payments—From the time the application is processed and approved, please allow 6–8 weeks for payment. Payment processing will take longer if information or documentation are missing from the application. If payee information is different from account holder information, additional processing time will be needed for payee verification.

Approval and Verification—National Grid reserves the right to verify and to have reasonable access to the residence to inspect the electric heating and cooling system installed prior to issuing rebates.

Tax Liability—National Grid will not be responsible for any tax liability that may be imposed on the customer or contractor as a result of the payment of rebates.

Endorsement—National Grid does not endorse any particular contractor, manufacturer, dealer, materials, product, system design or technology in promoting these offers.

Warranties—NATIONAL GRID DOES NOT GUARANTEE THE PERFORMANCE OF INSTALLED EQUIPMENT EXPRESSLY OR IMPLICITLY. National Grid makes no warranties or representations of any kind, whether statutory, expressed, or implied, including, without limitations, warranties or merchantability or fitness for a particular purpose regarding the electric heating and cooling equipment or services provided by a manufacturer or vendor. Contact your contractor for details regarding equipment performance and warranties.

Limitation of Liability—National Grid and the rebate administrator's liability is limited to paying the rebate specified. National Grid and the rebate administrator are not liable for: (1) the quality, safety, and/or installation of the equipment, including its fitness for any purpose; (2) the estimated energy savings of the equipment; (3) the workmanship of the installation contractor; and (4) any consequential or incidental damages or for any damages in tort connected with or resulting from participation in these offers.

Contractor Certification—Contractor certifies that installation and services performed have been in accordance with all applicable municipal, state and federal codes, standards and regulations, as well as program requirements.

Smart Thermostats—Smart thermostats need to be connected to a Wi-Fi network. Limit two per household. Must provide receipt as proof of purchase.

Payments Assignable to a Third Party— (a) The Customer may request that the rebate be paid directly to a third party by so indicating on the rebate application. Notification of third-party payment will be sent to the Customer upon submission of the rebate application for the purpose of Customer confirmation. (b) If no payment choice is made, the Company will send the rebate payment directly to the Customer at the address indicated in the rebate application.

ISO-NE Capacity Payments or Environmental Credits—Customer agrees that the Energy Efficiency Program Provider (EEPP) has the unilateral right to apply for any ISO-NE capacity payments or environmental credits resulting from this energy efficiency project, and agrees not to file for such payments or credits either directly or indirectly. Contractors agree to provide the EEPP with such further documentation as the EEPP may request to confirm the EEPP's ownership of such benefits.

ENHANCED REBATE REQUIREMENTS

Existing Heating System—The Enhanced Rebate is only eligible for homes heated primarily by electric baseboard resistance heating. Replacing old or failed electric heat pump systems does not qualify for the Enhanced Rebate.

Program-Approved Contractors—Systems applying for the Enhanced Rebate must be installed by a RI HVAC program-approved contractor. A list of program-approved contractors can be found at ngrid.com/riheatpump

Equipment Sizing—Systems applying for the Enhanced Rebate must be properly sized according an ACCA-approved Manual J load calculation completed by a RI HVAC program-approved contractor.

Approval and Verification—Prior to receiving the Enhanced Rebate, every project must receive a Quality Control (QC) inspection from National Grid or their agents. Applicant must provide reasonable access for these QC inspections. No Enhanced Rebates will be paid until a passing QC inspection has been completed.

PUC 1-51

EnergyWise Single Family (electric and gas)

Request:

Does the proposed enhanced incentive for customers who seek weatherization measures and gas system upgrades require customers to complete weatherization measures prior to upgrading their gas systems, similar to the Company's enhanced Air Source Heat Pump incentive model? If no, explain the Company's rationale for not requiring the weatherization measures to be completed prior to gas system upgrades.

Response:

This enhanced weatherization incentive builds on the best practice learned from the electric heating heat pump upgrades. Requirements will be the same and will involve customers providing either a signed completion of weatherization work, signed contract for weatherization work, or an action plan stating there were no substantial weatherization recommendations.

Prepared by or under the supervision of: Angela Li

PUC 1-52

EnergyWise Single Family (electric and gas)

Request:

Multifamily Please describe in detail the Company's tiered incentive model referenced on Bates page 155.

Response:

The tiered incentive model for the Multifamily Program is split into two offers: one for high rise apartments and another for condos. Both provide customers a comprehensive offer which may include upgrades to a property's common area (e.g. LED lighting, weatherization, and mechanical equipment and controls). High rise apartments may be eligible to receive an additional 10% incentive on lighting, weatherization, and approved mechanical improvements when taking advantage of recommended upgrades. Condos may be eligible to receive up to 100% common area incentives when individual units have energy efficiency measures completed through the program.

Prepared by or under the supervision of: Angela Li

PUC 1-53
Income Eligible Services (Electric and Gas)

Request:

How does the cost of a typical in-person AMP assessment compare to that of a virtual AMP assessment in the Income Eligible Services program?

Response:

CAP Agencies are paid a fixed $160 fee for both virtual as well as in-person assessments.

Prepared by or under the supervision of: Laura Rodormer

PUC 1-54
Income Eligible Services (Electric and Gas)

Request:

Since offering the virtual home energy assessments, how many customers who qualify for Income Eligible Services have done the following:

a. Request an in-person AMP assessment?
b. Complete an in-person AMP assessment?
c. Request a virtual AMP assessment?
d. Complete a virtual AMP assessment?

Response:

The virtual AMP home energy assessments began in June 2020.

IES AMP Requests and Completions: June 2020 – September 2021

		2020	**2021**	**Total**
a.	Request an in-person AMP assessment?	748	1,386	2,134
b.	Complete an in-person AMP assessment?	748	1,386	2,134
c.	Request a virtual AMP assessment?	1,213	812	2,025
d.	Complete a virtual AMP assessment?	1,213	812	2,025

Prepared by or under the supervision of: Laura Rodormer

PUC 1-55
Income Eligible Services (Electric and Gas)

Request:

Referencing Bates page 169, the Company writes "After the CAP Agency verifies income eligibility, the CAP will schedule a no-cost or virtual AMP and/or Weatherization/Heating System assessment. In some cases, the AMP and Weatherization/Heating System assessments are separate due to… the CAP Agency's availability of two-person assessment teams." How does the presence of a two-person CAP assessment team who simultaneously provides AMP and Weatherization/Heating System assessments impact an IES participant's likelihood of installing weatherization measures? Please provide supporting data/analysis.

Response:

The presence of a two-person assessment team that completes both the IES AMP and Weatherization/Heating System assessments at the same time is done per the request of the customer, and if a CAP Agency has both an AMP and Weatherization assessor available at the same time.

To date the IES Program has not tracked the jobs that have had two-person AMP and weatherization assessment teams and the subsequent installation of weatherization measures. As a result, that specific data is not available. The likelihood of installing weatherization measures is not dependent on the number of auditors - it is instead a function of the conditions of the home, whether a customer wants to move forward with weatherization, if the home is deemed safe to install weatherization measures and (since COVID) if the customer is willing to follow mandated health and safety protocols.

Secondarily, the use of a two-person team is for training AMP assessors on the weatherization process so that the AMP assessor can pre-screen participating residences for viable weatherization opportunities. The IES program does approximately 3 times as many AMP audits as weatherization audits, so this training helps to streamline the time in a customer's home and provide initial information to the weatherization assessment team.

Prepared by or under the supervision of: Laura Rodormer

PUC 1-56
Income Eligible Services (Electric and Gas)

Request:

Regarding CAP Agencies' AMP and Weatherization/Heating Services assessor workforce, please explain the following:

a. How many qualified AMP and/or Weatherization and Heating Services assessors were in the CAP workforce prior to the start of the Covid pandemic?
b. How many qualified AMP and/or Weatherization and Heating Services assessors are currently in the CAP workforce?
c. How much money does the Company dedicate in the 2022 EE budget to "train, hire, and retain assessors" (Bates page 171) for the CAP Agencies' workforce?
d. How many incremental assessors (relative to the current baseline of CAP assessors, detailed in part b) does the Company believe the proposed spending (detailed in part c) will result in?

Response:

The CAP Agencies' AMP and Weatherization/Heating Services assessor workforce is the responsibility of the Agencies. The IES Program Lead Vendor works with the Agencies to determine the ideal number of staff to complete the IES services outlined in the Annual Energy Efficiency Plan and offers training programs for AMP and Weatherization/Heating Services assessor workforce.

The following numbers are as of October 31, 2021:

a. How many qualified AMP and/or Weatherization and Heating Services assessors were in the CAP workforce prior to the start of the Covid pandemic?
   - 26
b. How many qualified AMP and/or Weatherization and Heating Services assessors are currently in the CAP workforce?
   - 31
c. How much money does the Company dedicate in the 2022 EE budget to "train, hire, and retain assessors" (Bates page 171) for the CAP Agencies' workforce?
   - The IES Program does not include funds to hire and/or retain CAP Agencies' workforce.
   - Rather, the 2022 IES Program budgeted $50K to provide IES Program specific training for assessors. The training budget is for ongoing training on IES Program elements including best practices, new measures (I.e., Wi-Fi thermostats), and use of software.

Prepared by or under the supervision of: Laura Rodormer

PUC 1-56, page 2

Income Eligible Services (Electric and Gas)

d. How many incremental assessors (relative to the current baseline of CAP assessors, detailed in part b) does the Company believe the proposed spending (detailed in part c) will result in?

- The training budget will not increase the number of assessors as the IES Program does not hire assessors. The training budget is for ongoing training on IES Program elements including best practices, new measures (I.e., Wi-Fi thermostats), and use of software.

Prepared by or under the supervision of: Laura Rodormer

PUC 1-57
Income Eligible Services (Electric and Gas)

Request:

Referencing Bates page 172, the Company writes "The IES Program is working with Rhode Island Builders Association to develop a comprehensive training program [for CAP assessors] . . . This program will be launched in 2021 and be fully instituted in 2022." Please provide a status update on that program, including how many individuals have completed the training program in 2021 and how many the Company expects to complete the program in 2022, and the amount spent in 2021 and budgeted amount for 2022.

Response:

The IES Program is working with Rhode Island Builders Association to develop and offer a comprehensive Construction Weatherization Training Program. Currently participants are being screened for the first cohort of 24 people who will begin the Construction Weatherization Training Program in November 2021 at the RIBA training facility in Coventry, RI.

The RI Department of Labor and Training has approved a second cohort of 24 people to go through the Construction Weatherization Training Program in 2022.

The IES Program does not have a budgeted line-item for the Construction Weatherization Training Program. Rather, the Program's Lead Vendor is instrumental in development of the curricula, providing training scenarios and best practices and will provide information sessions on how the training can lead the cohort participants to transition into the IES Program. The Lead Vendor is compensated for delivery of these services through their IES program administration fee.

Prepared by or under the supervision of: Laura Rodormer

PUC 1-58
Income Eligible Services (Electric and Gas)

Request:

Regarding the Company's proposed targeted landlord marketing and communication strategy for the IES program, please provide the following information:

a. For the 2020 and 2021 program years, how many landlords did the Company market the IES program to?
b. For the 2020 and 2021 program years, how many customers who completed assessment or installation measures through the IES Program rented their housing from landlords who received IES program marketing from the Company?
c. Describe the Company's landlord marketing efforts (through the IES program) to-date.
d. How is the Company's proposed targeted landlord marketing and communication strategy for the 2022 program year different from what is described in part c?

Response:

a. In 2020 and 2021, the IES Program did not run a targeted communication strategy to landlords for the IES Program; therefore, there is no direct correlation between landlord awareness and customer participation.

b. In 2021 the IES Program compiled a list of RI landlords of properties with income eligible tenants.

c. The Company is currently developing the strategy for a targeted communication to landlords for the IES Program, with anticipated launch in December 2021. The Company's originally planned efforts on this front eariler in 2021 were delayed due the COVID-19 pandemic, and sensitivity around encouraging landlords to pursue potentially disruptive upgrades during a time when the income eligible community was hard-hit with COVID-19 impacts and stresses.

d. The 2022 IES marketing and communication strategy to landlords will occur on a regular basis, with a specific cadence still to be determined. Feedback from landlords will be solicited via survey tools embedded in communications. These surveys will aim to identify IES marketing needs for landlords and/or tenants and will be used to further develop and refine campaigns once they are deployed.

Prepared by or under the supervision of: Laura Rodormer

PUC 1-59
Income Eligible Services (Electric and Gas)

Request:

Referencing Bates page 173, the Company writes "the PUC recommended that the Company look into possible solutions to stop the installation of new oil/propane heating systems for emergency heating system replacements as they perpetuate the burning of carbon-intensive fuels. A working group, convened to address this topic, provided recommendation to reduce the number of oil/propane heating system replacements and to identify funding sources for paying for the fuel switching." Please provide a copy of the working group's recommendations.

Response:

The working group presented recommendations at the April 29th Technical Working Group Meeting. The full presentation is attached and the "Potential Solutions for Emergency Oil/Propane Heating System Replacements" are outlined on slides 14 and 15 and copied below.

Potential Solutions for Emergency Oil/Propane Heating System Replacements

- Conduct a study/research to identify all barriers and opportunities for IE customers.
    - Gain information from RI installs on the amount of time that it would take to transition a home from oil/propane to ASHP in emergency situation.
    - RFI/RFP to identify a company to replace a % of systems during the summer months. (Per PUC suggestion)
- Compile all costs for oil/propane to ASHP to identify areas to reduce cost.
    - IES programmatic costs
    - Design/installation/equipment/controls costs
    - Customer costs
- Partner with CAPs/DHS/other stakeholders to develop solutions. Create Working Group.
    - Continue DHS collaboration for leveraged funds to support the process
- Coordinate with MA EE and Efficiency Maine.
- Target Oil/propane heating systems for replacement in summer to avoid "no heat" during winter.
- Offer X-year ASHP maintenance programs, paid out of IES budget.
- Offer temporary housing for customers while home/heating system is upgraded.
- Defer replacement of Oil/Propane systems that are "only" highly inefficient to summer months.
- Offer solar hot water systems if heat pump hot water systems aren't feasible.

Prepared by or under the supervision of: Laura Rodormer

Income Eligible Services Energy Efficiency Program

Emergency Oil/Propane Heating System Replacement

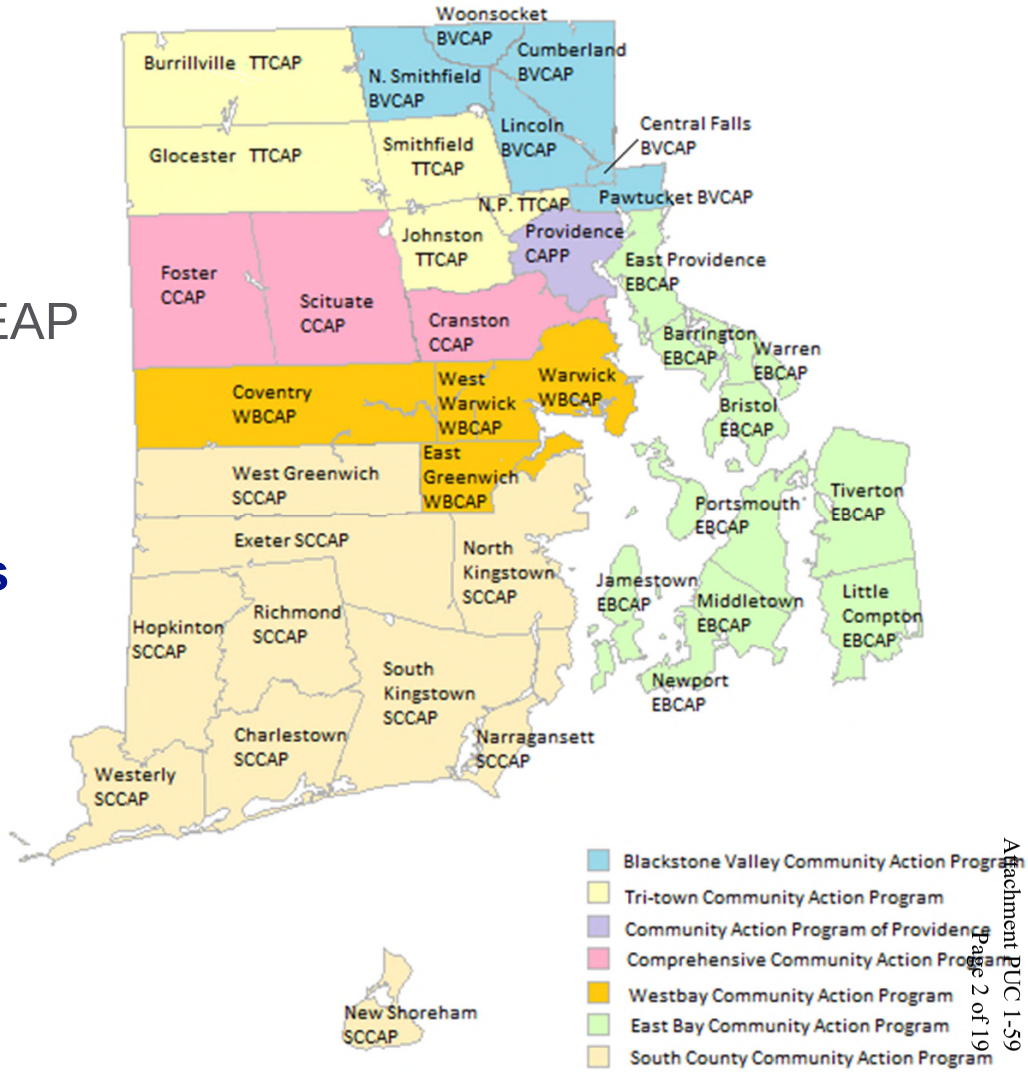
April 29, 2021

Laura Rodormer, National Grid
Mike Rossacci, National Grid
David MacLellan, CLEAResult

nationalgrid

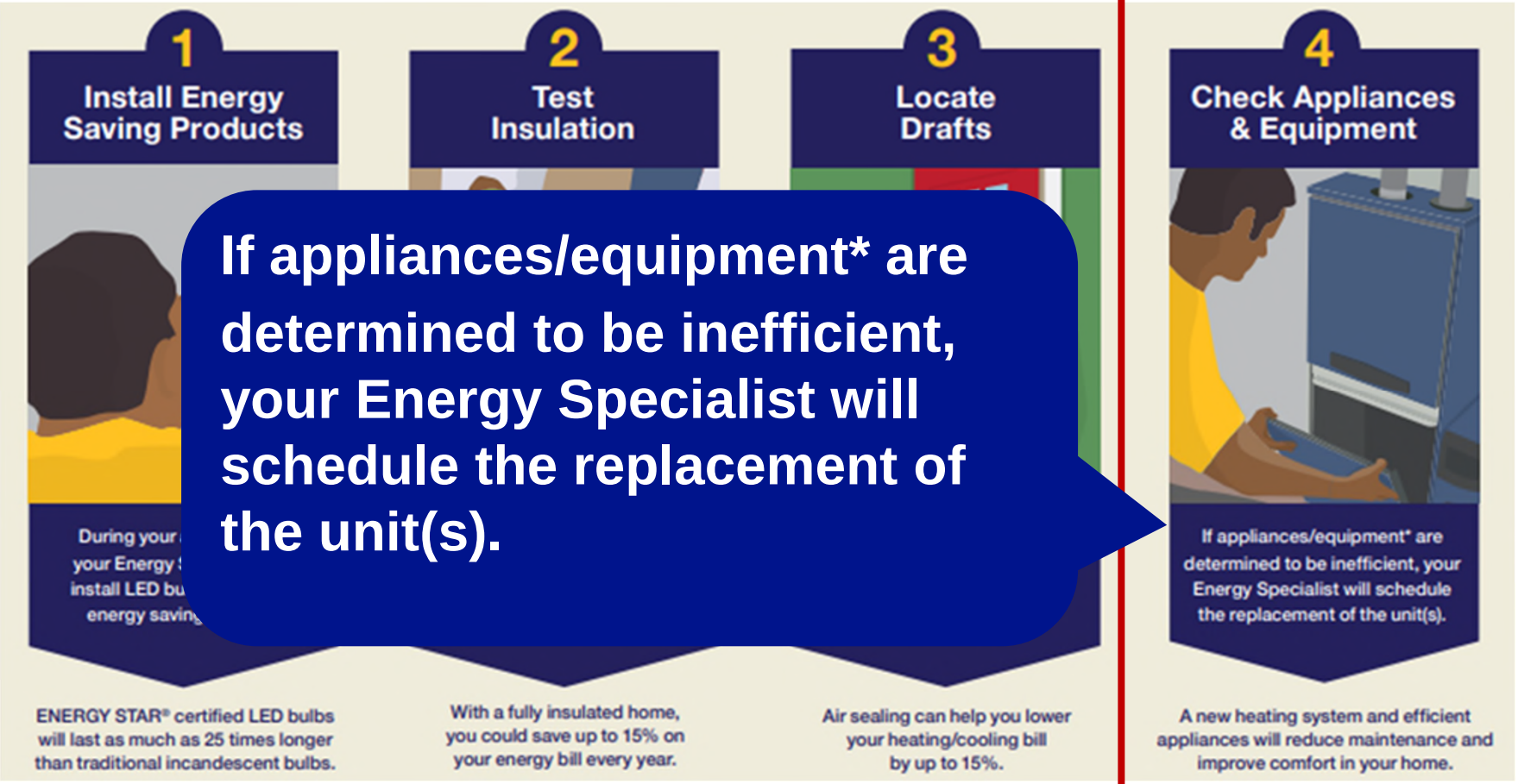
Rhode Island Income Eligible Services (IES) Program

- **Eligibility**
  - Customers on National Grid discount rate code
  - Customer on receiving LIHEAP benefits
  - 1 – 4 units
- **Served by six regional CAPs**
- **100% incentives**
- **Leveraged funds**
  - LIHEAP
  - WAP



Rhode Island Income Eligible Services Program

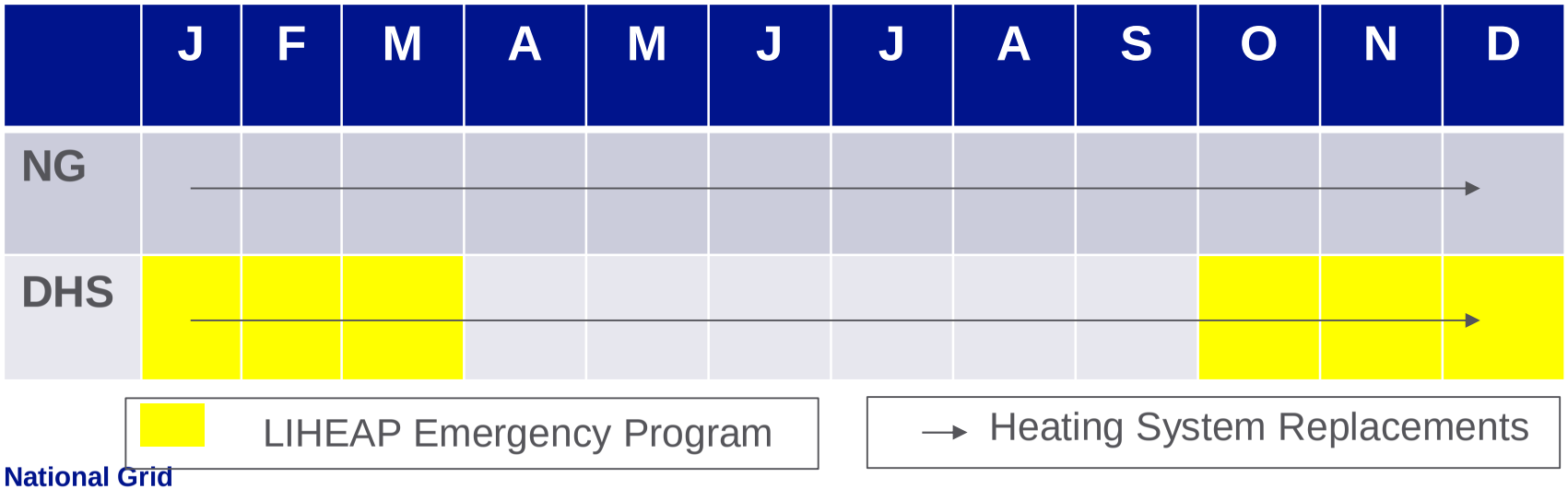
Rhode Island Income Eligible Services Program



If appliances/equipment* are determined to be inefficient, your Energy Specialist will schedule the replacement of the unit(s).

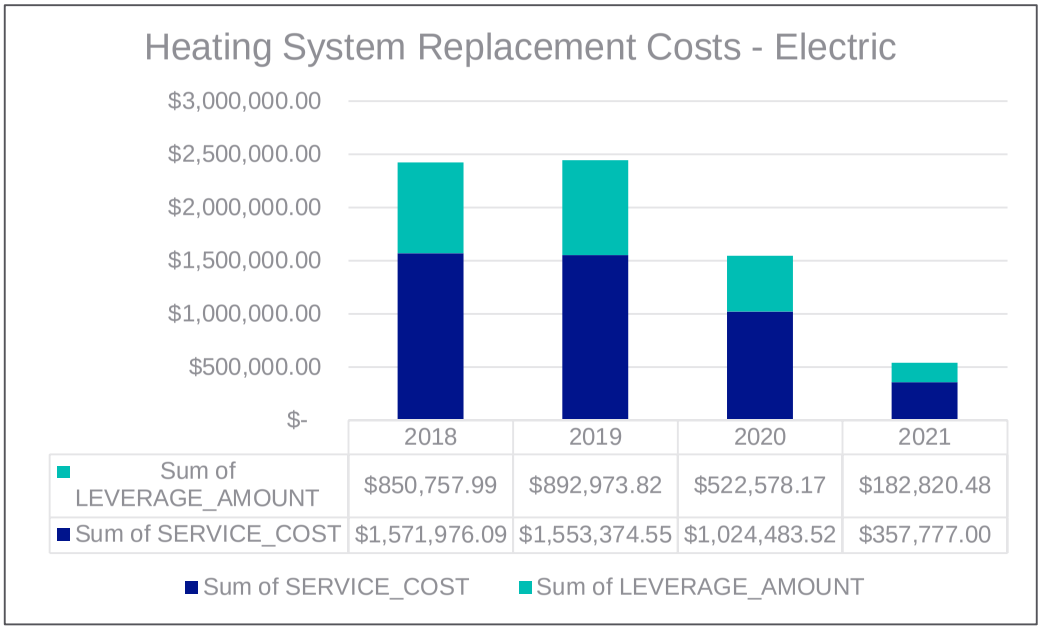
Rhode Island Income Eligible Services Program – Collaboration with DHS

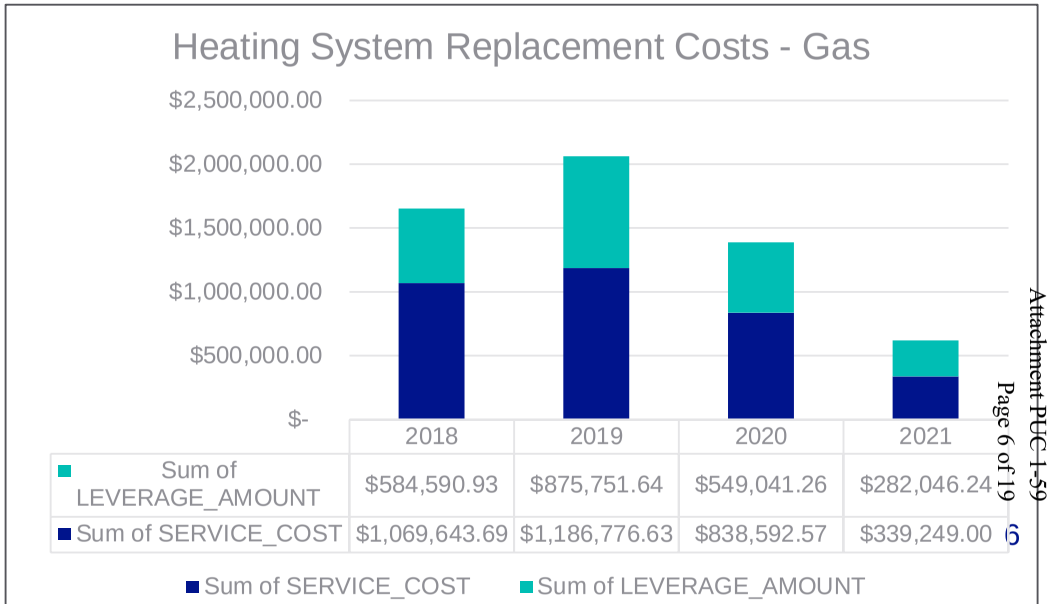
- Emergency Season for LIHEAP Emergency Program
  - Procurement process is adapted to quickly serve customers
- Benefit of collaboration with DHS
  - Energy efficiency standards are higher for equipment
  - Standards for equipment and installation are more rigorous
  - Leveraged funds reduces average costs for the IES Program



Rhode Island Income Eligible Services Program – Collaboration with DHS

- DHS invests $2 - $3M a year in like-for-like heating systems





Emergency Heating System Replacements

- **Emergency heating system replacements based on:**
  - Health and safety
  - Failure
  - Energy inefficiency – if only EE, then deferred to non-emergency heating season.
- **Current acceptable length of time for emergency heating system replacement is ~48 hours.**
- **Emergency heating system replacements scenarios**

Original System	Emergency Heating System Replacement
Electric Resistance/ASHP	Electric Resistance/ASHP
Gas	Gas
Oil/Propane	Oil/Propane

Emergency Oil/Propane Heating System Replacement

Original System	Most Likely Replacement
Electric Resistance/ASHP	Electric Resistance/ASHP
Gas	Gas
Oil/Propane	Oil/Propane

- During the 2021 – 2023 PUC Hearing, the issue of Emergency Oil/Propane Heating System Replacements was raised.
  - Heating systems are replaced every 15 – 20 years.
    - **Issue**: Oil/Propane to Oil/Propane (like-for-like) replacements perpetuate the carbon emissions for another 15 – 20 years.
  - There is a need to come up with solutions to remove barriers for emergency replacement of oil/propane heating systems with ASHPs.

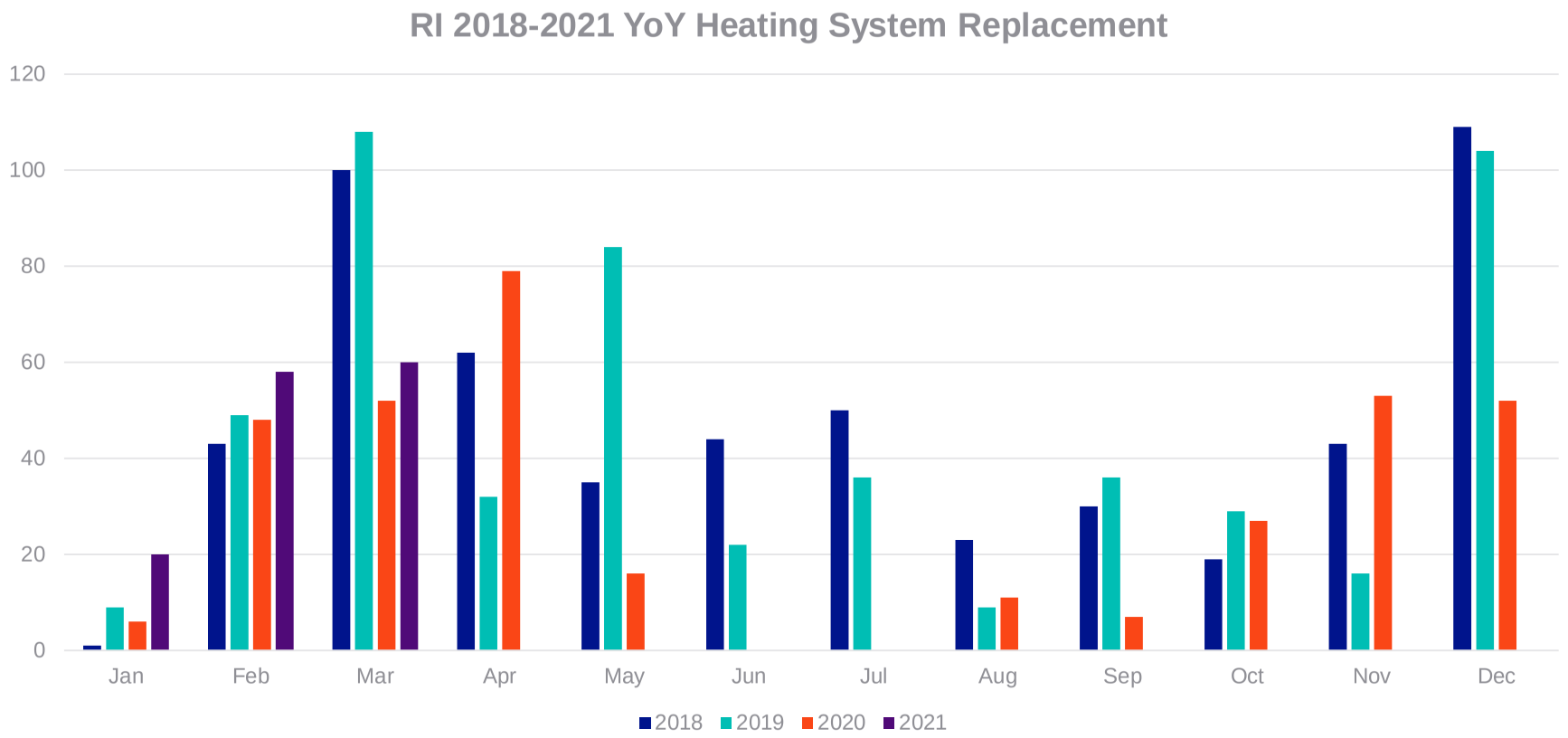
Barriers for Emergency Oil/Propane Heating System Replacement to ASHP

- Customers need heat right away in an emergency situation, and to fuel switch it 3 – 4 weeks.
    - Majority of emergency heating system replacements occur between October and March.
- Electricity costs for customers: electricity for ASHP heating vs. oil for heating, and possibly new cost (load) in summer for AC.
    - No electric heat rate in RI
    - Cost of annual system maintenance.
    - Monthly filter replacement during peak use to achieve efficiency.
- 100% incentive can get very expensive for the IES Program.
    - Electrical panel upgrade may be required.
    - Potential for new ductwork, controls and new electric hot water system.

Barriers for Emergency Oil/Propane Heating System Replacement to ASHP - continued

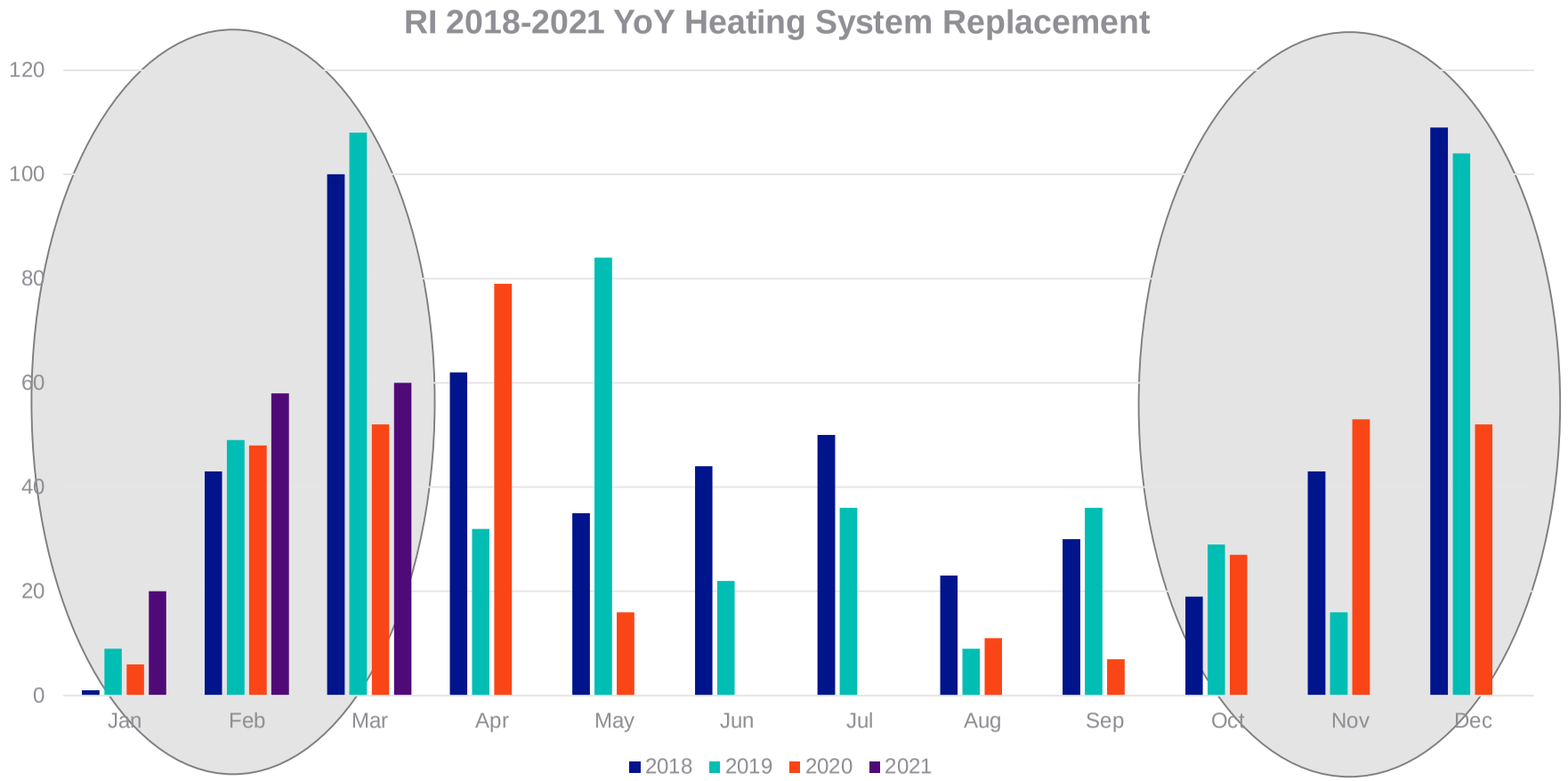
- Every ASHP project is a custom project that could take several weeks to design and install.
  - Model the home based on the design/heat load of home
  - Bid the contractor
  - Schedule the contractor
  - Do the work / test install
- Time necessary to replace system would leave customer without heat for too long and could cause damage to home due to freezing pipes.
- ASHP requirement for WX would have to be waived for emergency replacement due to additional time.
  - Not weatherizing could mean the equipment wouldn't be properly sized (customer dissatisfaction, evaluation impact)
  - Waiting for weatherization could add a week or more, adding to time without heat.

RI 2018-2021 YoY Heating System Replacement



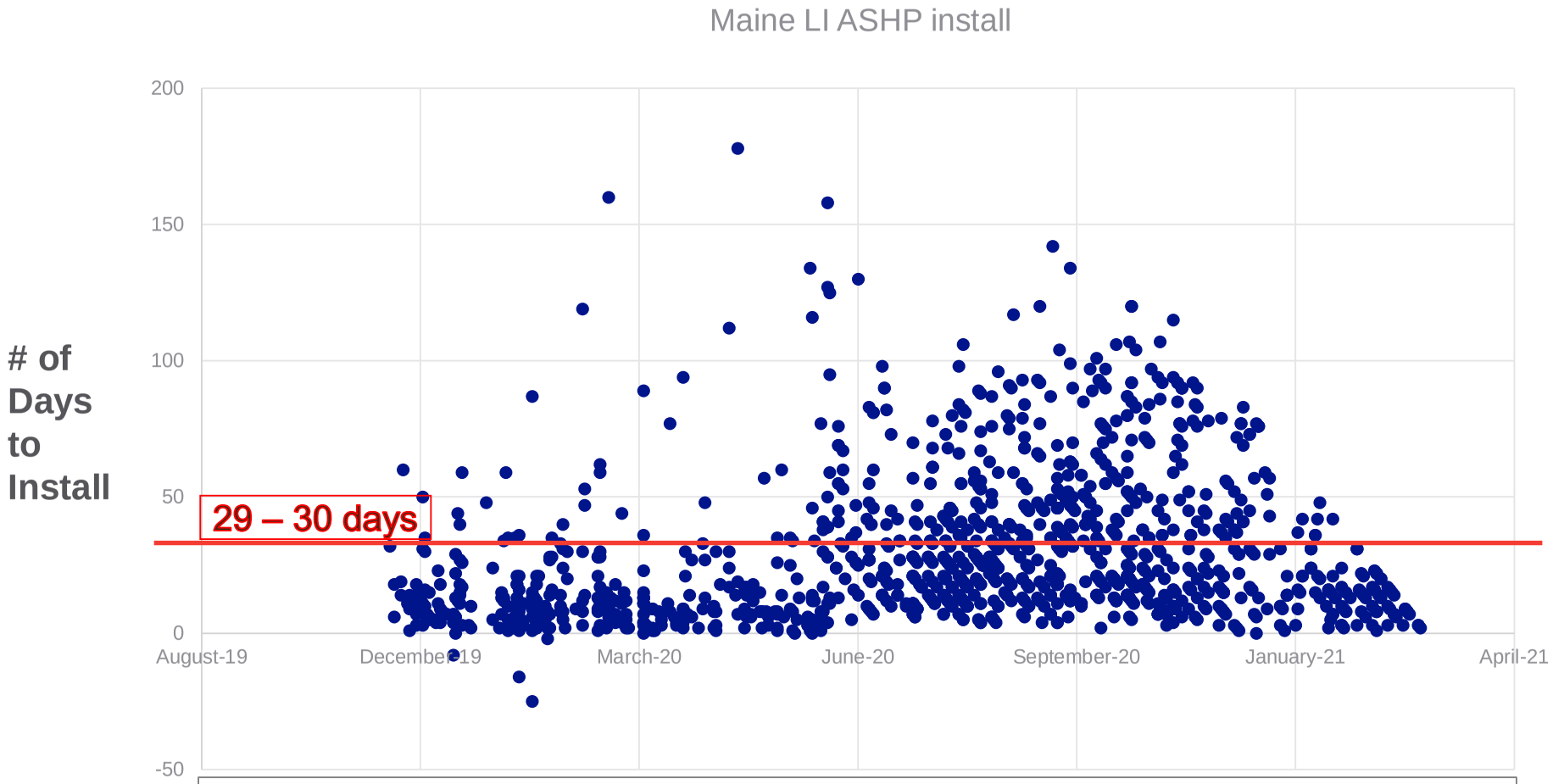
- **Based on invoice paid dates, not installs.**
- **Mid March of 2020, invoicing slowed to mid-may (8 weeks) and is zero by June (10 weeks) demonstrating the lag of paid invoice.**
- **Typical push in December, then Jan #s are low, and increases seen again in Feb/Mar showing 8 – 10 week lag.**

RI 2018-2021 YoY Heating System Replacement



- **Typical lag is 8 – 10 weeks from install to invoice.**
- **Data indicates October – March highest months for replacements.**

Maine CC ASHP Installations - # of Days to Install



- 1,264 units installed and completed.
- All are simple one head, one exterior unit systems.
- Average time from rebate application/approval to install/complete is 29.71 days.

Potential Solutions for Emergency Oil/Propane Heating System Replacements

- Conduct a study/research to identify all barriers and opportunities for IE customers.
  - Gain information from RI installs on the amount of time that it would take to transition a home from oil/propane to ASHP in emergency situation.
  - RFI/RFP to identify a company to replace a % of systems during the summer months. (Per PUC suggestion)
- Compile all costs for oil/propane to ASHP to identify areas to reduce cost.
  - IES programmatic costs
  - Design/installation/equipment/controls costs
  - Customer costs
- Partner with CAPs/DHS/other stakeholders to develop solutions. Create Working Group.
  - Continue DHS collaboration for leveraged funds to support the process
- Coordinate with MA EE and Efficiency Maine.

Potential Solutions for Emergency Oil/Propane Heating System Replacements

- Target Oil/propane heating systems for replacement in summer to avoid “no heat” during winter.
- Offer X-year ASHP maintenance programs, paid out of IES budget.
- Offer temporary housing for customers while home/heating system is upgraded.
- Defer replacement of Oil/Propane systems that are “only” highly inefficient to summer months.
- Offer solar hot water systems if heat pump hot water systems aren’t feasible.

DISCUSSION

- Emergency Oil/Propane Heating System Replacement
  - Opportunities?
  - Barriers?
- Time necessary to effectively provide fuel switching.
  - How to ensure customers safety/comfort/financial impact
- Costs to IES Program
  - System design, site visits, old system removal, new equipment, controls, possible hot water
- Costs to customer
  - Maintenance
  - Electricity cost for heating and possibly new AC
- Opportunity to reduce GHG emissions

Thank you for your time today!

We welcome your suggestions and willingness to help find solutions for our customers and our environment.

nationalgrid

2020 YTD December - Performance

Measure	2021	2020	2019	Change	% Change
Heating System Replacement	436	174	289	(115)	-40%
Minisplit – Electric Replacement	50	6	12	(6)	-50%
Gas Heating System Replacement	294	160	245	(85)	-35%

Extra slide for reference

PUC 1-60

Income Eligible Services (Electric and Gas)

Request:

In 2021, how many oil/propane heating systems that experienced system failure (or were deemed unsafe) did the Company replace with more efficient oil/propane heating systems through the IES program?

Response:

As of September 30, the IES Program has replaced 166 oil/propane heating systems in 2021.

Prepared by or under the supervision of: Laura Rodormer

PUC 1-61
Income Eligible Services (Electric and Gas)

Request:

Does the IES program offering in which the Company replaces a failing or unsafe oil/propane heating system with a new oil/propane heating system extend to non-income eligible programs? Does the Company propose to extend this to Moderate income customers?

Response:

Incentives for a new oil/propane heating system replacement are not currently available outside of the Company's income-eligible programs. The Company has no current plans to expand offers for new oil/propane systems to the anticipated enhanced moderate-income customer program offerings.

Prepared by or under the supervision of: Laura Rodormer

PUC 1-62
Income Eligible Services (Electric and Gas)

Request:

Referencing Figure 9 on Bates page 175, the customer participant estimates summed across the four categories of Single Family Income Eligible Energy Efficiency Services total 5,688 (3,300+1,234+678+476). Earlier, on Bates page 173, the "Income Eligible Services – Single Family – Electric Program Goals, Metrics, Budgets, Participation for 2022" table estimates participation at 3,583; and the "Income Eligible Services – Single Family – Gas Program Goals, Metrics, Budgets, Participation for 2022" table on Bates page 174 estimates participation at 1,098. Please reconcile these customer participation estimates.

Response:

Figure 9 on Bates page 175 reflects budgets and goals for 2021. The numbers for participation across the measures sum to 5,688 because customers can participate in more than one segment of the program and have an AMP and/or Weatherization and/or a Heating System replacement – this would lead to a single customer's participation being counted in three columns.

In contrast, in the tables "Income Eligible Services – Single Family – Electric Program Goals, Metrics, Budgets, Participation for 2022 and Income Eligible Services – Single Family – Gas Program Goals, Metrics, Budgets, Participation for 2022" (totaling 4,681), the participant numbers net out customers participating in multiple program segments and only count any such customer as a single participant.

Prepared by or under the supervision of: Laura Rodormer

PUC 1-63
Income Eligible Services (Electric and Gas)

Request:

Referencing Bates page 173, the Company estimates the 2022 budget for IES Single Family (electric) to be $13,265,000. On Bates page 201, the costs listed under the "total incentives" and "shared cost" columns for the Income Eligible Single Family (electric) program sum to $13,054,501. Please reconcile these amounts.

Response:

The total referenced on Bates page 173 is the correct budget total.[1] The total costs listed under the "total incentives" and "shared cost" columns for the Income Eligible Single Family (electric) program on Bates Page 201 were not updated to include $210,903 in incentive costs for "major repairs". The remaining $404 discrepancy is due to rounding on Bates page 173.

[1] Note that this amount is rounded to the nearest hundred dollars.

Prepared by or under the supervision of: John Richards and Laura Rodormer

PUC 1-64, page 1

Home Energy Reports

Request:

Referencing Bates page 181, the Company writes "in 2021 HER launched a targeted 1-click promotion module within digital HERs in Rhode Island which allowed the Company to quickly gather updated information on customer's home and provide personalized program recommendations… The new 1-click promotion modules will continue in 2022. Areas of interest include collecting information on customers who cool their homes with a central air conditioning unit to promote purchase of Smart thermostats and Connected Solutions." Regarding these 1-click promotion modules in the Home Energy Reports program, please explain the following:

a. If the Company uses the modules in 2022 to collect information on customers with central air conditioning and to promote Connected Solutions to them, how will the Company measure and evaluate success at the end of 2022? In other words, how will the Company know if the use of the 1-click promotion modules was successful at driving residential customers with central air conditioning to Connected Solutions?
b. Did the Company consider using the 1-click modules in 2022 to collect information on customers with electric resistance heat and to promote Air Source Heat Pumps to them?

Response:

a. To evaluate success of a promotional module, the Company will monitor the registration of new customers into the Connected Solutions program in the timeframe after the 1-click promotion in order to determine whether there was an increase in participation. Please see the response to part b as an example of data captured by marketing in response to promotional activities.

b. The Company has not developed the plan for application of the 1-click promotion in 2022. Generally, the intent of this initiative will be to deploy the 1-click promotion with the goal of gathering information about customers in situations where there may currently be less information available.

   In contrast, electric resistance heating customers can often be identified based on usage data. As an example of how the Company currently markets to customers likely to be using electric resistance heat, below please find an excerpt from the Company's 2021 Q2 report that describes application of a video tool used to educate electric heat customers about Air Source Heat Pumps (https://f.io/0pkLP9xC).

Prepared by or under the supervision of: Angela Li

PUC 1-64, page 2

Home Energy Reports

In early June, National Grid's marketing team sent an interactive video email to 31,784 electric heating customers promoting high efficiency heat pumps and heat pump water heaters. 604 calls came into the customer contact center during Q2 (193 in April, 176 in May and 235 in June), as well as 30 emails to the program inbox. The data indicates an increase in the number of calls in June after the video email was sent.

Please see below.

Prepared by or under the supervision of: Angela Li

PUC 1-64, page 3
Home Energy Reports

Prepared by or under the supervision of: Angela Li

PUC 1-65
Residential Consumer Products

Request:

Residential Consumer Products Referencing Bates page 184, the Company estimates the 2022 budget for Residential Consumer Products (electric) to be $2,837,000. On Bates page 200, the costs listed under the "total incentives" and "shared cost" columns for the Residential Consumer Products (electric) program sum to $2,740,344. Reconcile these two cost estimates.

Response:

The total referenced on Bates page 184 is the correct budget total.[1] The total costs listed under the "total incentives" and "shared cost" columns for the Residential Consumer Products (electric) program on Bates Page 200 were not updated to include two measures:

Measure	Units	Incentive / Unit	Total Incentives
Energy Star ProductsClothes Washer Most Efficient	6,100	$10	$61,000
Energy Star ProductsRefrigerator Most Efficient	1,790	$ 20	$35,800

The remaining $144 discrepancy is due to rounding on Bates page 184.

[1] Note that this amount is rounded to the nearest hundred dollars.

PUC 1-66

Residential ENERGY STAR HVAC (Electric and Gas)

Request:

Please provide a table with the following information from program years 2019, 2020, and 2021 (to date):

a. Total Commission-approved HEAT Loan budget
b. Actual HEAT Loan spend in the EnergyWise program
c. Actual Heat Loan spend in the Residential ENERGY STAR HVAC program (electric and gas).

Response:

a. In 2019, HEAT Loan budgets were included in the incentive budgets for HEAT Loan Supported Programs: EnergyWise Single Family, EnergyWise Multifamily, ENERGY STAR HVAC Electric. For 2019, the total incentive budgets for these programs, inclusive of both HEAT Loan as well as customer rebate incentive budgets is provided for these programs below.

   In 2020 and 2021, the HEAT Loan budgets were listed in Attachment 1, Table 3 "Electric Programs" and the aggregated HEAT Loan-only budgets for these programs are listed below for 2020 and 2021.

b. The HEAT Loan spend in the EnergyWise single family and Multifamily Programs are shown below.

c. The Heat Loan spend in the Residential ENERGY STAR electric HVAC program is shown below.

Prepared by or under the supervision of: Laura Rodormer

PUC 1-66, page 2

Residential ENERGY STAR HVAC (Electric and Gas)

		2019	2020	2021
a	Total Budgeted Incentive Spend for HEAT Loan Supported Programs	$13,690,030*	$1,630,000	$1,630,000
b	Actual HEAT Loan spend in the EnergyWise program	$953,219	$770,436	$614,743
c	Actual HEAT Loan spend in the EnergyWise Multifamily program	$16,135	$16,172	$9,446
d	Actual Heat Loan spend in the Residential ENERGY STAR HVAC program (electric).	$232,027	$127,032	$128,384

*The 2019 number represents total annual incentive budget for EnergyWise Single and Multifamily as well as Residential ENERGY STAR HVAC programs. This number includes not only anticipated HEAT Loan costs, but also anticipated direct incentive spend associated with customer rebates in these programs.

Prepared by or under the supervision of: Laura Rodormer

PUC 1-67

Residential ENERGY STAR HVAC (Electric and Gas)

Request:

What is the total HEAT Loan budget that the Company is proposing for the 2022 Plan, and how does the Company propose to allocate it between the EnergyWise and Residential ENERGY STAR HVAC programs?

Response:

The total heat loan budget that the Company is proposing for the 2022 Plan is $900,000. The heat loan budget will be allocated with $250,000 to EnergyWise Single Family, $50,000 EnergyWise Multi-Family and $600,00 to Residential ENERGY STAR HVAC programs.

	Heat Loan Budget Allocations
EnergyWise Electric	$250,000
EnergyWise Multifamily Electric	$50,000
HVAC Electric	$410,000
HVAC Gas	$190,000
Total	**$900,000**

Prepared by or under the supervision of: Laura Rodormer

PUC 1-68

Residential ENERGY STAR HVAC (Electric and Gas)

Request:

Referencing Bates page 189, the Company estimates the 2022 budget for Residential ENERGY STAR HVAC (electric) to be $4,487,000. On Bates page 199, the costs listed under the "total incentives" and "shared cost" columns for the Residential ENERGY STAR HVAC (electric) program sum to $4,896,853. Reconcile these two cost estimates.

Response:

The total costs listed on Bates Page 189 did not include $410,000 in Heat Loan Financing for the Residential ENERGY STAR HVAC (electric) program. The remaining $165 discrepancy is due to rounding on Bates page 189.

Please see the Company's filing letter dated November 5, 2021 for additional details on the $410,000 discrepancy and how it is addressed in revised Attachment 5, Table E-2.

Prepared by or under the supervision of: John Richards

PUC 1-69

Residential ENERGY STAR HVAC (Electric and Gas)

Request:

Referencing Bates page 190, the Company estimates the 2022 budget for Residential ENERGY STAR HVAC (gas) to be $3,732,000. On Bates page 203, the costs listed under the "total incentives" and "shared cost" columns for the Residential ENERGY STAR HVAC (gas) program sum to $3,462,464. Reconcile these two cost estimates.

Response:

The total referenced on Bates page 190 is the correct budget total[1]. The total costs listed under the "total incentives" and "shared cost" columns for the Residential ENERGY STAR HVAC (gas) program on Bates Page 203 were not updated to include one row:

Measure	Units	Incentive / Unit	Total Incentives
HVAC Financing			$190,000

In addition, the costs listed under the "total incentives" and "shared cost" columns for the Residential ENERGY STAR HVAC (gas) do not include $80,000 in incentive costs for the ENERGY STAR HVAC (gas) program's Gas Heat Pump Demonstration.

These two areas account for the discrepancy between these two amounts. The remaining $464 discrepancy is due to rounding on Bates page 190.

[1] Note that this amount is rounded to the nearest hundred dollars.

Prepared by or under the supervision of: John Richards

PUC 1-70

Residential ENERGY STAR HVAC (Electric and Gas)

Request:

Referencing the Residential ENERGY STAR HVAC program on Bates page 199, what does the budget line item for "HVAC Financing" cover? Specifically, are the cost of anticipated HEAT Loans included in that line item?

Response:

The budget line item for "HVAC Financing" covers the HEAT Loan cost for the electric HVAC measures. The HEAT loan costs incurred by and budgeted for within each program represent the pre-paid interest buy-down amounts that the Company anticipates making to participating lenders, as well as associated vendor administrative processing costs, in order to allow for each loan to be a 0% interest loan from the perspective of participating customers.

Prepared by or under the supervision of: Laura Rodormer

PUC 1-71, page 1
Residential Connected Solutions

Request:

Regarding the proposed pool pump demand response program, please explain the following:

a. Will customers who already participate in another ConnectedSolutions program be eligible to participate in the pool pump program?
b. What is the single eligible pool pump manufacturer for the 2022 program?
c. Why does the Company's DERMs support only one manufacturer for the 2022 program?
d. Why does the Company believe that its DERMs will be able to support more manufacturers by 2023?
e. Explain how the Company developed its goal of 25 participants for the 2022 program year.
f. Why aren't pool pumps that participate in the proposed demand response program eligible for the HEAT Loan?
g. Explain the Company's rationale for offering an annual incentive for staying in the program, as opposed to an incentive based on average performance during called events. In your response, address the Company's decision to call demand response events for participating pool pumps "on the same dates and times as the battery-based demand response program" (Bates page 191) but to offer a different incentive structure than the battery-based demand response program.

Response:

a. Yes. Customers in Connected Solutions can participate with multiple devices. Currently, the ConnectedSolutions program already supports customers who participate with both thermostats and battery storage systems.

b. Pentair

c. As far as the Company has been able to determine, there is only one DR-ready pool pump system on the market. Pool pumps can also be controlled with a load control switch. However, the cost of adding a load control switch just for demand response is not cost-effective, as shown in the Guidehouse appliance studies, due to the need to support the full equipment and install cost of a load control switch who's only value is the ability to participate in Connected Solutions.

Prepared by or under the supervision of: Paul Wassink

PUC 1-71, page 2
Residential Connected Solutions

d. In each device category so far, such as thermostats, battery storage systems, and electric vehicles in the Company's Massachusetts service area, the Company has started with either a single or a few supported manufacturers. However, the Company has been able to grow the list of supported manufactures over time both as new models become available and existing models become supportable by the Company's DERMs provider and are added to the eligible list.

e. The Company spoke with the Company's DERMS provider and Pentair to determine the current penetration of DR-ready pool pumps and projected uptake with an upfront incentive. Forecasting customer interest and uptake for a new measure comes with more uncertainty than forecasting enrollment rates for devices that have been in the program for years.

f. The Company will consider adding DR-ready pool pumps to the list of eligible purchases to receive a HEAT Loan. However, the Company did not budget for this item in 2022. Compared to other purchases that are eligible for HEAT Loan, such as high efficiency heating systems and battery storage, pool pumps are a relatively low-cost item. Customers may not be willing to go through the HEAT Loan process to finance a relatively small amount.

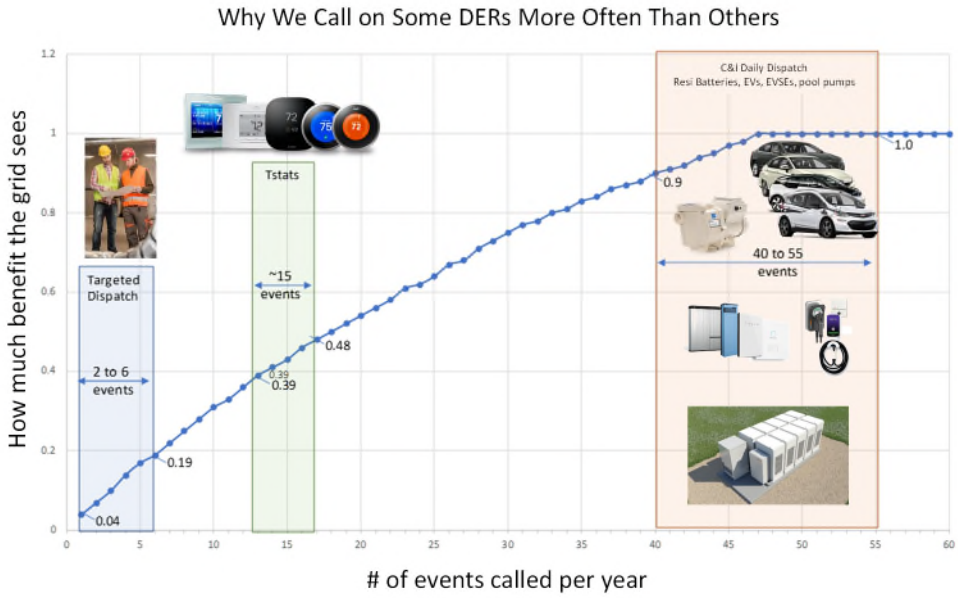
g. The Company expects few customers to opt-out of pool pump DR events because pausing a pool pump does not decrease customers' comfort or deplete a customer's battery storage reserve. So, the added complexity of a participation incentive or a kW-curtailed pay-for-performance incentive is not needed. The Company learned in the first year of offering the thermostat DR program that a participation-based incentive led to significant customer angst and confusion while not decreasing opt-out rates. The thermostat DR measure also does not have a participation-based or kW curtailed pay-for-performance incentive. A kW-discharged pay-for-performance incentive is warranted for the residential battery DR measure due to the variety of battery system sizes, settings, and configurations that influence how much a battery can discharge during DR events.

   Battery storage systems, pool pumps, and EVs (which are in the Company's DR programs in its Massachusetts service area) are examples of DERs that can be called on often without impacting customer comfort. Calling on DERs to curtail load more often to shave more annual peak loads increases the effect curtailment has in reducing the installed capacity requirement producing more system benefits[1]. Thermostats are called

[1] The Effect of Uncleared Capacity Load Reduction on Peak Forecasts, by Synapse Energy Economics, 2019, Please see Attachment PUC 1-71.

PUC 1-71, page 3
Residential Connected Solutions

on less often because they do impact customer comfort, and increased event frequency would be expcted to negatively impact customer willingness to enroll in and continue to paricipate in the ConnectedSolutions program.



The Effect of Uncleared Capacity Load Reductions on Peak Forecasts

Supplement to 2018 AESC

Prepared for National Grid

April 22, 2019

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CONTENTS

1. INTRODUCTION

This report provides the results of Resource Insight's analysis of the effects of load reductions on a varying number of days per year over a varying number of years. This work arose from discussion among the sponsors of the 2018 Avoided Energy Supply Cost (AESC) study who identified a need for greater clarity on the effect of changes in load on the ISO New England load forecasts and hence on future capacity requirements.[1] This analysis included the construction of a regression model to mimic the ISO New England forecast model and the variation of the historical data to determine the effect of targeted load reductions for the Forward Capacity Auctions (FCAs). We interpret these effects as having an impact on the future value of capacity demand reduction induced price effect (DRIPE).

Our modeled results indicate that a load reduction program that occurs on even a single peak day each summer can affect the load forecast used in the FCA. In most situations, the load forecast will fall more if the historical load is reduced for more days per year or for more years. Regardless of the number of days that a program reduces load annually, the reduction in the load forecast rises steadily for at least eight years. If the program reduces load on less than 55 days, the forecast reduction continues to increase until the program has been running for 12 days. For programs that reduce load on less than 13 days annually, running the program for more years continues to depress the load forecast further, up to the 15 years' worth of historical data that ISO New England uses to develop each load forecast.

1.1. Background

This issue is specific to uncleared load reduction programs or those resources that do not participate in FCAs. These would include load reductions from some behavioral programs and rate-design initiatives that are not eligible capacity resources. Although these uncleared resources do not receive capacity payments, they reduce the aggregate amount of capacity that is required, and hence the price of that capacity, by reducing the ISO New England peak load forecast used in the FCA for that year.

The quantity and price of the capacity obligations acquired in the FCA of a particular year (year t) depend on the forecast prepared in the previous year ($t - 1$). That forecast is built upon a regression analysis constructed from daily historical data from each of the 62 days in July and August for the previous 15 years ($t - 16$ to $t - 2$), which consists of 930 data points. The regression formulation for the forecast (which is used for the Capacity Energy Load and Transmission (CELT) report and the Regional System Plan (RSP) for years t to $t + 9$, as well as the FCA for the year starting in $t + 4$) may vary from year to year, but appears to consistently include multiple independent variables computed from a weighted

[1] See the 2018 AESC Report, Chapter 5. Avoided Capacity Costs (available at http://www.synapse-energy.com/sites/default/files/AESC-2018-17-080-Oct-ReRelease.pdf) for more information. Specifically, see page 105 of the 2018 AESC Report for some discussion of this issue.

temperature-humidity index (WTHI), including an annual time trend times WTHI and the gross energy forecast (before energy-efficiency and behind-the-meter photovoltaic solar).

Our analysis reconstructs a proxy ISO New England load forecast in order to quantify the impact different load reductions over different time periods and under different conditions.

2. THE REFERENCE REGRESSION MODEL

We constructed our proxy for the ISO New England forecast model based on the data used in the 2017 CELT forecast, which was used in FCA 12 to procure capacity for the summer of 2021.[2] All of the effects described below for the reference regression model are for load reductions of various numbers of years that would have been used in producing the 2017 CELT forecast for summer 2021, which was the basis for the demand curve used in FCA 12. A one-year load reduction would affect only the 2016 summer peak day(s), a two-year reduction would affect 2015 and 2016, a three-year reduction would affect 2014–2016, and a 15-year reduction would reduce peaks in 2002–2016.

2.1. Input data

Although we consulted with ISO New England on its forecast data, ISO New England did not provide us with its proprietary demand model data or any details on the functional form of its regression model, beyond those in the Forecast Data summaries provided on the ISO New England web site.[3]

Since we did not have ISO New England's exact data, we needed to develop a proxy dataset. As a result, our analysis should be interpreted as an estimate of load reduction effects, based upon data and using a model similar to that currently used by ISO New England. We do not claim that our model is a precise prediction of future ISO New England forecasts. Since ISO New England's data and its model structure change (at least a little) every year, we cannot anticipate the exact form of the ISO New England load forecast model for any specific future year.

Development of proxy data

We made a number of assumptions to generate our proxy historical dataset, which may not necessarily match ISO New England's past and future sources and methodology.

[2] FCA 12 was conducted in February 2018 and was the most recent FCA conducted at the time of this analysis. This is also consistent with the CELT forecast used in 2018 AESC.

[3] This data includes ISO New England's computation of daily WTHI and reconstitution of load for peak-hour energy-efficiency reductions, demand response and OP #4 measures, and behind-the-meter solar output.

The dependent variable in the regression analysis is the daily gross peak demand, which is the actual daily peak demand[4] plus the effects of behind-the-meter solar PV and energy-efficiency programs (referred to as "passive demand response" or "PDR" by ISO New England) for both peak demand and energy, as well as the effects of Operation Procedure #4 (OP #4) events and load management on peak (which is available only for the summer and winter peaks).[5] Our understanding is that ISO New England uses a proprietary data service to estimate the output of installed solar capacity in each historical hour, while assuming that every hour's PDR reduction is equal to the PDR resource cleared in that capacity delivery year.

We estimated historical daily gross peak load as the sum of (a) the maximum hourly demand for the day in ISO New England's hourly load data files[6] and (b) the summer peak PV and PDR reported in the ISO New England's 2017 Forecast Data spreadsheet for the year.[7] We computed the gross monthly net energy for load (NEL) by multiplying the historical monthly sum of actual load by the ratio of gross annual energy to net annual energy from the ISO New England 2017 Forecast Data.[8]

We computed the ISO New England temperature-humidity index (THI) for each day (0.5 × dry-bulb temperature + 0.3 × wet-bulb temperature + 15) as the weighted average of the THI's from eight weather stations around the region.[9] We then computed the WTHI for each day using ISO New England's formula (weights of 10 for today's THI, 5 for yesterday's THI, and 2 for the previous day).[10]

2.2. Model specification

We estimated the historical relationship of gross load to WTHI, time, NEL and other variables with an ARIMAX (Auto-Regressive Integrated Moving-Average model with eXogenous variables) regression model.[11] This model incorporates both exogenous variables (e.g., net energy for load, weather) and the

[4] Actual daily peak demand is available from the ISO New England website.

[5] For more information on OP#4 events, see https://www.iso-ne.com/static-assets/documents/rules_proceds/operating/isone/op4/op4_rto_final.pdf

[6] See https://www.iso-ne.com/isoexpress/web/reports/load-and-demand/-/tree/sys-load-eei-fmt for more information.

[7] CELT 2017 Forecast Data File, Tab 5, WN. CELT 2017 was analyzed, as it was the projection used as the basis of the 2018 AESC Study.

[8] CELT 2017 Forecast Data File, Tab 1, History, Gross ISO-NE Coincident Summer Peak.

[9] Weather data were downloaded from https://mesonet.agron.iastate.edu/. The Notes sheet of the annual *SMD Hourly.xlsx* file provide the following weights for the weather stations: Windsor Locks CT (27.7%); Bridgeport CT (7%); Boston MA (20.1%); Burlington VT (4.6%); Concord NH (5.8%); Worcester MA (21.4%); Providence RI (4.9%); Portland ME (8.5%). We used the same weights for all years; we have not been able to confirm whether ISO New England has changed the weights over time, as load (especially summer peak) has increased in northern New England compared to the southern portion of the region.

[10] Forecast Modeling Procedure for the 2018 CELT, May 1, 2018, page 9. https://www.iso-ne.com/static-assets/documents/2018/04/modeling_procedure_2018fcst.pdf. Note that this document contains all citations for coefficients and weights used in this analysis.

[11] See www.statsmodels.org/devel/generated/statsmodels.tsa.statespace.sarimax.SARIMAX.html for more information.

autoregressive error terms that ISO New England uses in its regression model. These are summarized in Table 1.

Table 1. Variables used in summer peak model

Variable	Definition
Intercept	Constant Term
PEAK	Daily Peak Load, MW
MA_NEL	12-month Moving Sum Annual Net Energy for Load, GWh
WTHI_SQ	The square of [the 3-day Weighted Temperature-Humidity Index at Peak– 55°]
TIME_WTHI	Year indicator; (2002=11, …, 2016=25) × WTHI
Weekend_WTHI	WTHI for a weekend day, else 0
July_04WTHI	WTHI for July_4, else 0
HOLWTHI	WTHI for a Holiday, else 0
Yr2005	1 if Year=2005; 0 otherwise
Yr2012	1 if Year=2012; 0 otherwise
AR(1)	Correction for autocorrelated error from the previous year
AR(2)	Correction for autocorrelated error from the two years previously

The independent variables included the following for each July and August day in 2002 through 2016:

- Net Energy for Load, grossed up for PV and EE, over the twelve months ending in the current month (July or August, depending on the data point), as described in the previous section.
- The 3-day weighted temperature-humidity index (WTHI) for the eight cities used in ISO New England's own modeling of weather (see footnote 5). In our analysis, following the treatment in the ISO New England model, the WTHI variable is used as the square ($[WTHI–55]^2$), and as various cross terms, such as WTHI × weekend dummies.
- Year × (WTHI–55), where the year index is the calendar year minus 1991.
- Boolean flags (i.e., dummies) for holidays, July 4th, weekends, the years 2005 and 2012, and WTHI times the dummy variables for weekends, holidays and July 4th.[12]

Table 1 reproduces the description of the summer peak model in the Peak Definitions in ISO New England's 2017 Regional and State Energy & Peak Model Details, corrected to reflect conversations with

[12] It is unclear why ISO New England included variables for both holidays and July 4th, since the only holiday in the two summer months is July 4th. We used the two redundant variables; collectively, the two dummies should capture the effect of July 4th. It is also not unclear why the years 2005 and 2012 featured Boolean flags.

the ISO forecasters and the specific model described in the Summer Peak Models tab of the Model Details.[13]

2.3. Forecast data

Once we developed the regression equation, we required forecast input values for the equation. ISO New England provides the forecast gross energy for load in its forecast.[14] Projection of the time trend and binary variables is straightforward: 2017 is year 26, 2018 is year 27, etc.; the weekend binary equals WTHI on future Saturdays and Sundays, the July 4 and holiday binaries equal WTHI on July 4 each year.

ISO New England's forecasting method does not use a single WTHI value, but instead identifies the highest load for a variety of input conditions:

> Weekly peak load forecast distributions are developed by combining output from the daily peak load models with energy forecasts and weekly distributions of weather variables over 40 years.
>
> The expected weather associated with the seasonal peak is considered to be the 50th percentile of the top 10% of the pertinent week's historical weather distribution. The monthly peak load is expected to occur at the weather associated with the 20th percentile of the top 10% of the pertinent week's weather distribution. The "pertinent week" is the week of the month or season with the most extreme weather distribution. For resource adequacy purposes, peak load distributions are developed for each week of the forecast horizon.[15]

We do not have access to the distributions that ISO New England used in this method, nor do we have a clear operational description of the method. Therefore, we performed a calculation to estimate a value of WTHI that best reproduced the 2017 CELT peak forecast, which turned out be 81.4°.

2.4. Base forecast benchmarking

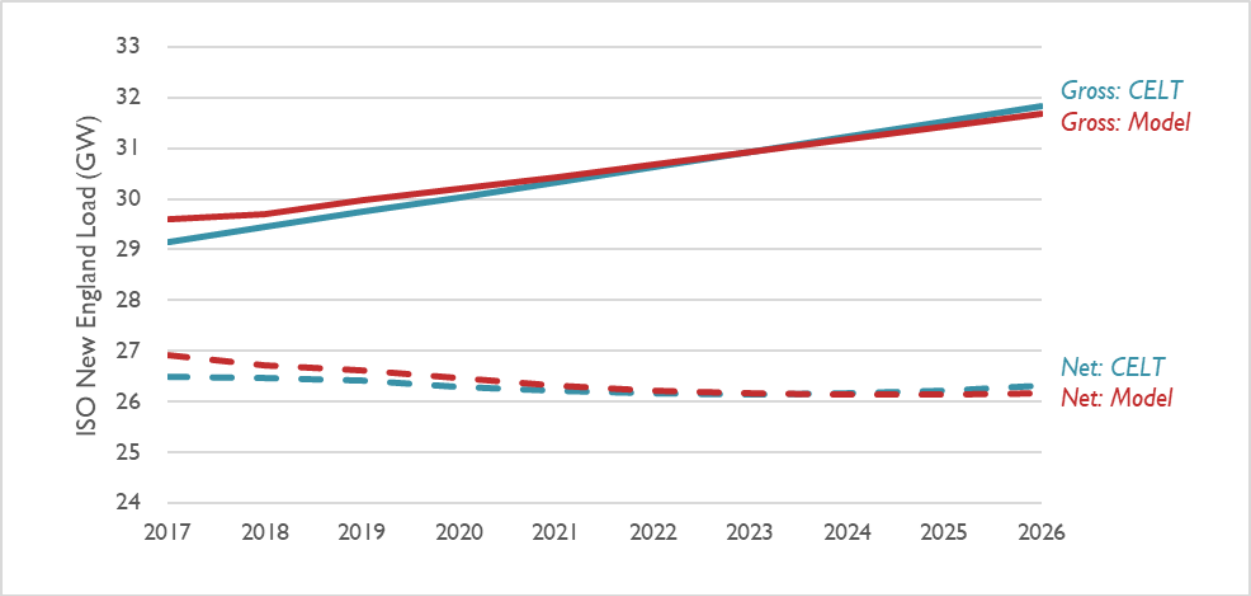
Figure 1 summarizes our modeled Gross and NET 2017 forecast against the 2017 reported Gross and NET CELT forecast. Our modeled forecasted peak demands closely match the ISO's 2017 CELT forecast. Our forecasts for gross peak are within 0.2 percent of the 2017 CELT forecast for 2021, the year for which the 2017 forecast determined the installed capacity requirement.

[13] The ISO New England forecast documentation sometimes refers to gross loads as net of PV and PDR, and the Forecast Modeling Procedure for 2017 CELT describes the composite time variable as using WTHI–55º, while the 2017 Regional and State Energy & Peak Model Details file suggests that WTHI is not reduced by 55º.

[14] 2017 Forecast Data File, Tab 6, Monthly NEL.

[15] Forecast Modeling Procedure for the 2018 CELT, May 1, 2018, p. 6.

Figure 1. Comparison of forecasts of gross and net Summer Peak, 2017 CELT and Resource Insight modeled proxy



3. THE EFFECT OF LOAD REDUCTIONS ON THE FORECAST

3.1. Structure of reductions

Using our constructed base forecast, we estimated how various load reductions in 2002 through 2016 would have affected the ISO New England load forecast for 2021. Each sensitivity run for the analysis consisted of four steps:

1. Reduce historical gross peak demands on a specified number of summer event days (*d*) for a specified number of years (*y*) by a constant number of megawatts (MW) (Δ*L*).
2. Estimate new regression model coefficients using the same functional form and the modified historical data.
3. Develop peak demand forecasts for the years 2017–2026 (and most importantly, 2021) using the new coefficients.
4. Compute the ratio (*R)* of the change between forecast peak (Δ*F*) to the load reduction (Δ*L*).

The ratio *R* can be thought of as a measure of the efficiency of load reduction in reducing the forecast.

For *ΔL*, we tested load reductions of 250 MW, 500 MW, and 1,000 MW. We used the same reduction in all the days and all the years adjusted in any particular run.

For *d*, we reduced load on the highest days, from one event day to all 62 summer days per affected year. We tested reductions on the highest-load days and the highest-WTHI days and looked at the effect of imperfect forecasting of peak days.

For *y*, we reduced load on the most recent years, from just one year (2016) to all 15 years 2002–2016.

3.2. The effect of lower input values on regression forecasts

When we undertook this analysis, we expected that reductions on more days, and reductions in more years, would consistently push down the forecast further. As we discuss in the next section, that is not what we found. Before presenting our results, we will explain how they can arise.

The next four figures show a regression through 15 years of base data, which in this case we have set to 1.5 percent annual growth as a hypothetical.[16] In each figure, we show the base historical data, the linear trend line with the base data (which produces a forecast of 32,320 MW in 2021), the historical data that would have been observed with 1,000 MW reductions in some years, and the regression trend line with the modified data. Figure 2 shows the effect of load reductions in the last two years of data,

[16] A comparable analysis using weather-normalized loads before PDR and PV for 2002 through 2016 produced very similar results, but is a little harder to read, due to the drop in load associated with the Great Recession in 2009 and 2010.

representing a demand response program operating in 2015 and 2016. The trend line tilts so that the trend is higher than the actual load in the first few years and in the last two years (the ones with demand response reductions), but lower than the input data for 2008–2014. The projection for 2021 is about 700 MW lower than in the base case.

Figure 2. Effect of two years of demand response on the forecast

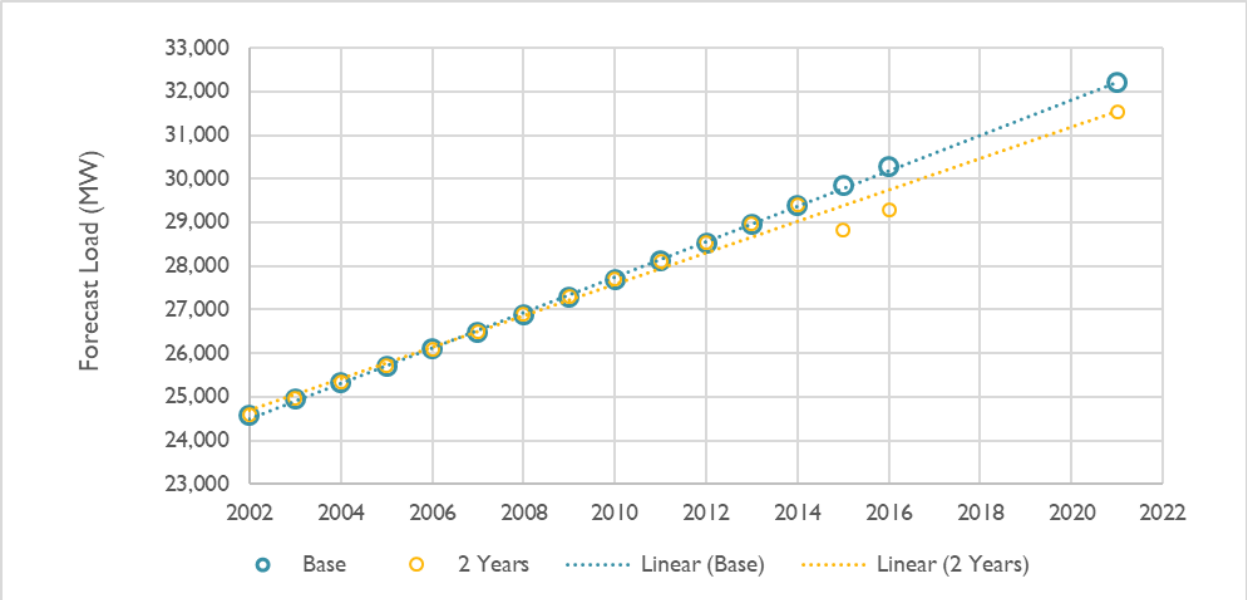


Figure 3 shows the effect of five years of demand response reductions. The trend line with the demand response has tilted further, so that it is almost 1,000 MW below the base-case trend by 2016, and 1,400 MW below the base-case forecast for 2021. The trend line mostly rotates clockwise, rather than moving down, so the change from the base case increases over time and the reduction in the 2021 forecast is substantially larger than the reduction in loads in the five years affected by demand response.

Figure 3. Effect of five years of demand response on the forecast

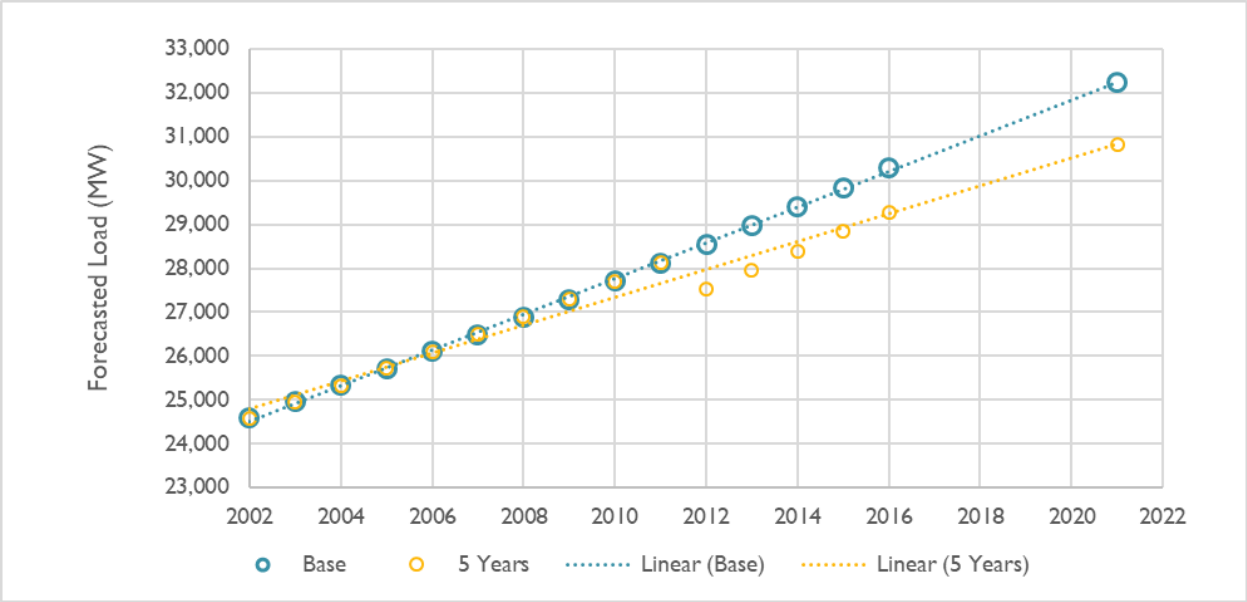
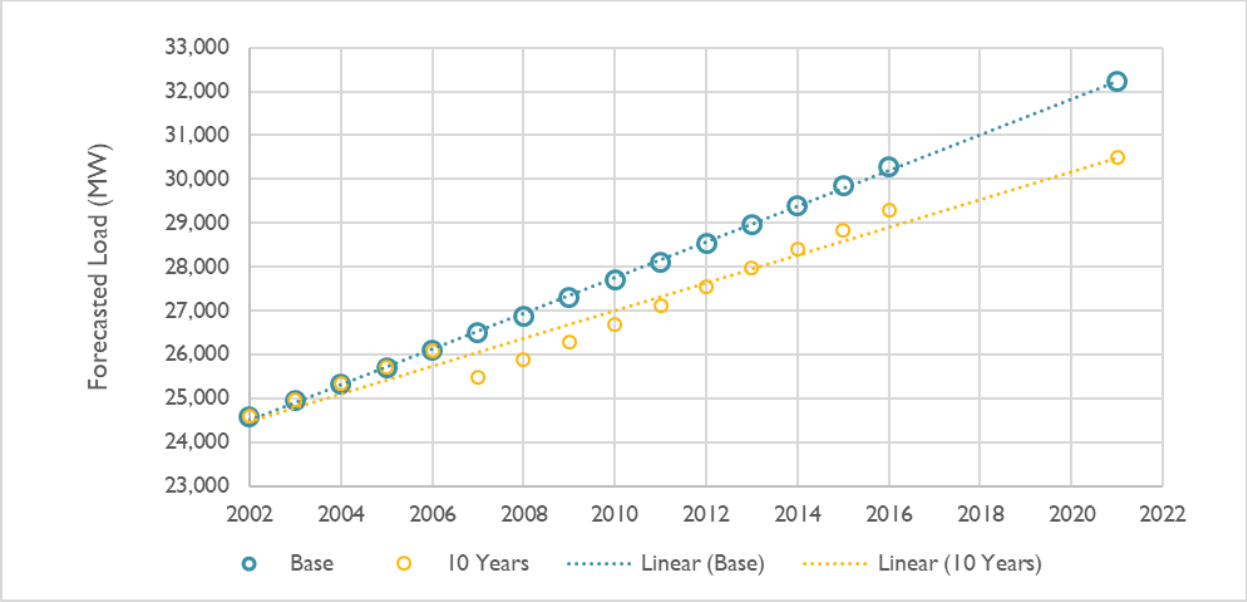


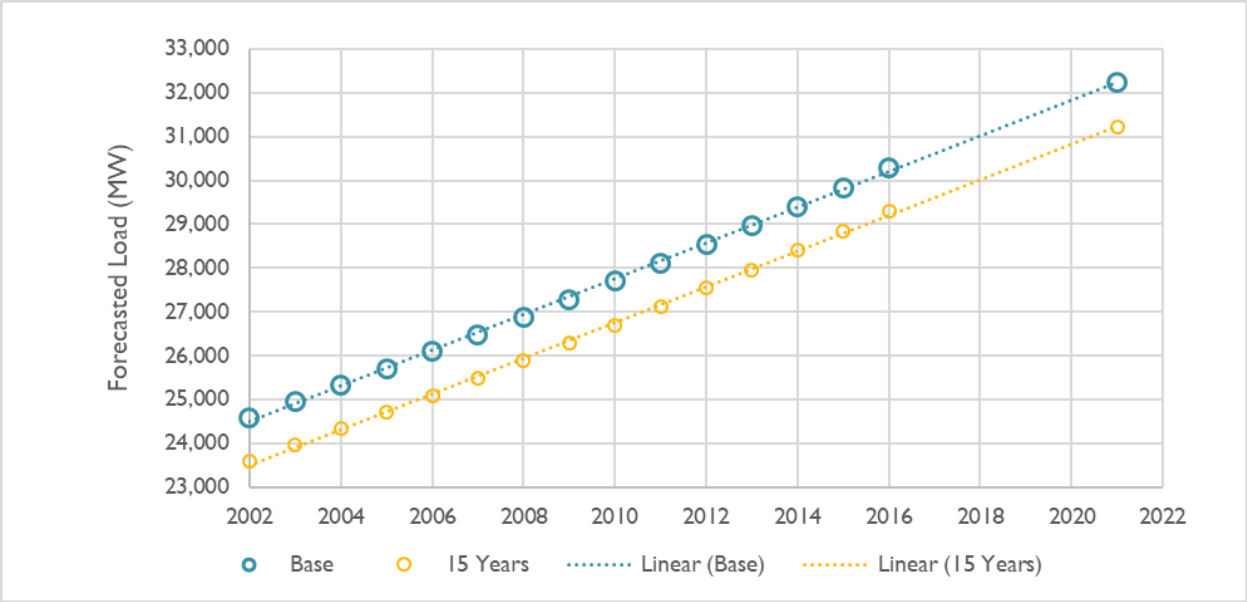
Figure 4 shows the effects of nine years of demand response, which continues the pattern in Figure 3; the forecast for 2021 would be almost 1,800 MW below the base case.

Figure 4. Effect of nine years of demand response on the forecast



Finally, Figure 5 shows that 15 years of 1,000-MW load reductions lowers the trend line by 1,000 MW, while leaving the slope the same as in the base case. The forecast for 2021 is thus 1,000 MW lower than in the base case.

Figure 5. Effect of 15 years of demand response on the forecast



Thus, demand response in some number of the latest years will tend to produce forecast reductions that exceed the annual reductions in the historical data. Beyond some point, additional years of demand response will result in smaller forecast reductions, and once the demand response effect has been in effect for the entire study period, the forecast reduction will equal the reduction in the annual input data.

The same pattern would be expected as the reductions are extended to more of the highest-load days in each year.

3.3. Results for reductions on highest-load days

Not surprisingly, we found that the decreases in the forecast peaks based on load reductions varied with (a) the number of days on which load was reduced each year and (b) the number of years of load reductions in the historical load data. Interestingly, we found that the size of the load reduction had essentially no effect on the ratio *R*. If load is reduced 100 MW on the five highest-load days in each of the last five summers in the modeling dataset (2012–2016), the forecast for 2021 would be reduced by 24 MW; if the reductions in the historical load were 1,000 MW, the forecast would be reduced by 240 MW.

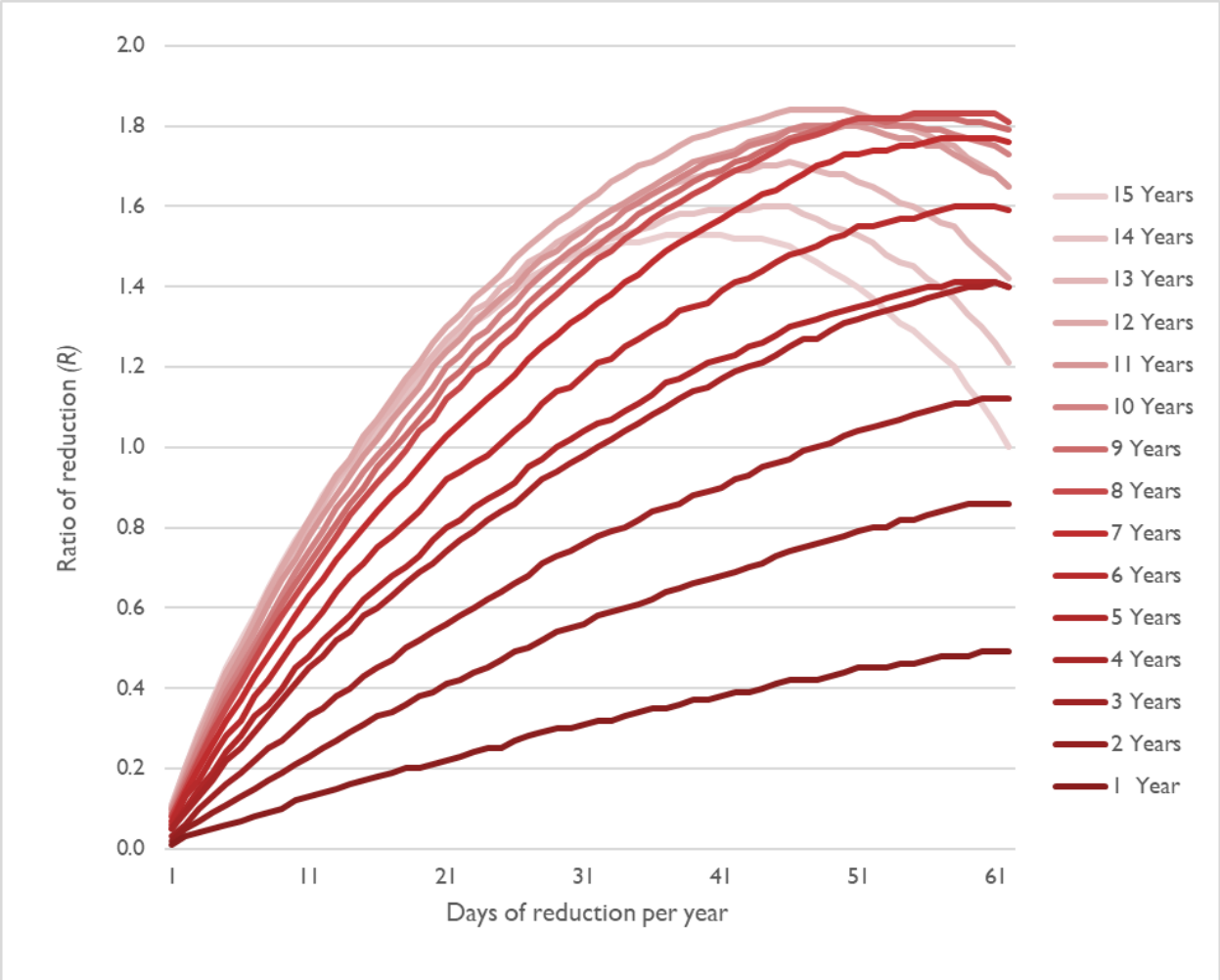
For any duration of a load reduction program, the value of *R* rises with the number of days in which load is reduced, up to at least 35 days. For load reduction programs lasting more than eight years, the value of *R* begins to fall if the number of days reduced exceeds some threshold; at about 55 days for a 9-year program and at about 40 days for a 15-year program.

However, the value of *R* did not vary monotonically with respect to either the number of days or the number of years, and *R* could be more than 1.0, as shown in Figure 6.

For a load reduction program lasting more than two years, reducing load on a large number of days results in $R > 1$, such that the reduction in the load forecast is larger than the reported reduction in the historical load. For a three-year program, *R* peaks at about 1.1 with reductions in 60 days; programs lasting 8 to 12 years have peak *R* above 1.8 for about 50 days of reductions; and a program that reduces load in all 15 years used in the forecast would have a value of *R* over 1.5 for 31 to 46 days of reduction, with *R* falling rapidly for any additional days.

A program that reduces load for all 62 summer days each year for 15 years has an *R* value of exactly 1.0. In effect, such a program would look, for peak-forecasting purposes, like a cleared energy efficiency measure.

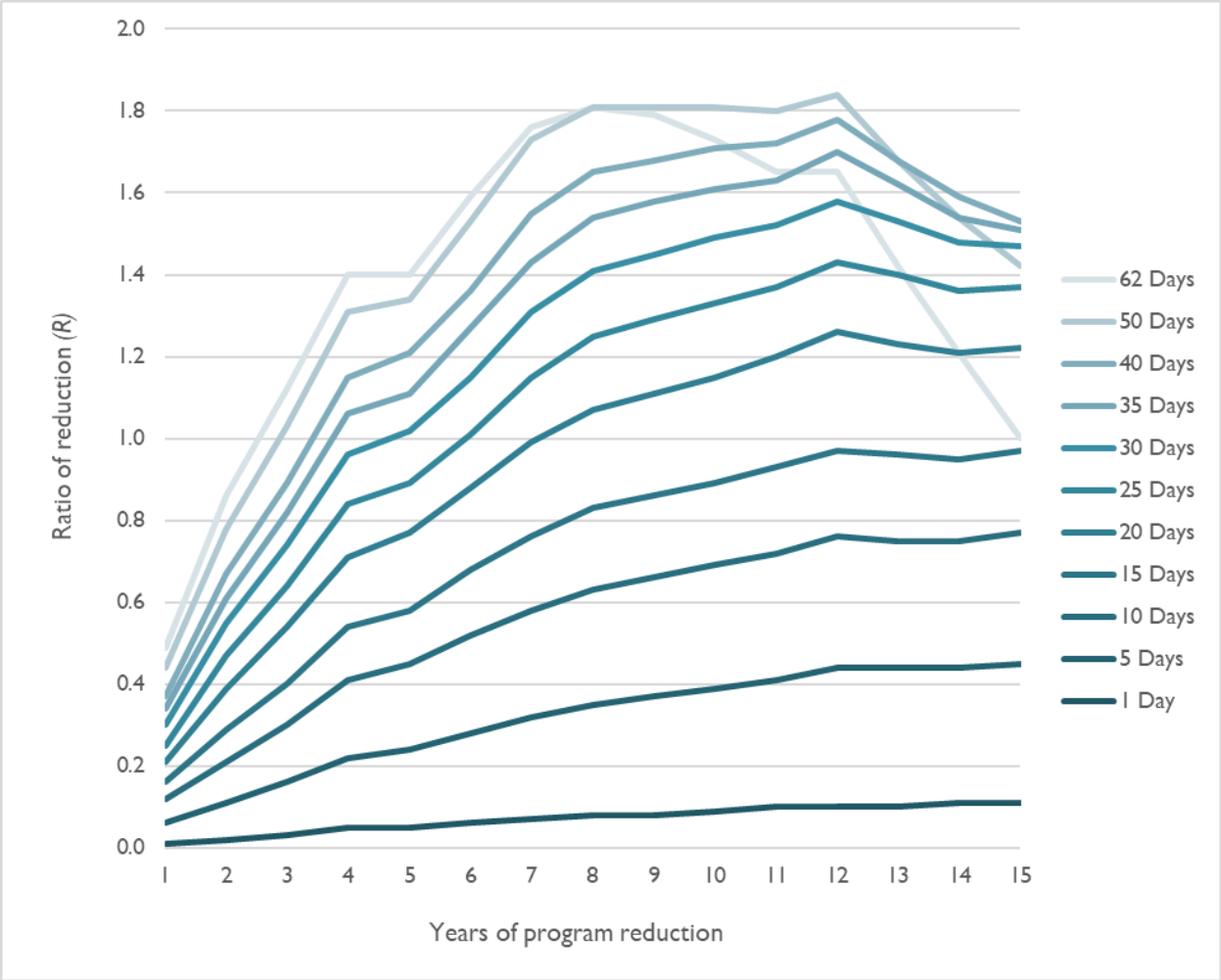
Figure 6. Ratio of forecasted load reduction to historical load reduction, various durations



Note: Ratios are shown for 2021 forecasted year.

Figure 7 provides the same data, but with the duration of the reduction in years on the *x* axis and each line representing a number of days of load reduction in each year (essentially swapping the *x* axis and legend in Figure 6). For purposes of readability, we present only a subset of days, rather than the full 62.

Figure 7. Ratio of forecast reduction to load reduction, various numbers of peak days per year



The horizontal axis in Figure 7 is the number of years that a load reduction has been in place, as of the last year of historical data for the forecast (year $t - 2$). See Appendix A for the *R* values from Figure 6 and Figure 7 numerically.

3.4. Applying the results to demand response screening and valuation

The results in Figure 6 and Figure 7, as well as Appendix A, can be used in at least two ways. First, they can be used to screen potential demand response programs by modifying the value used for capacity DRIPE. For example, a new program that would first reduce load in 2020, for the top ten summer days, would be a one-year reduction in the data for the 2021 forecast, which would be used in the 2022 FCA 16 for the summer of 2025. Since Appendix A shows that a 10-day program has an R value of 0.12, a 200 MW load reduction in 2021 would reduce the forecast peak by 24 MW and produce the DRIPE benefits of that size load reduction.

Once the program has run for three years (2020–2022), it would be a three-year reduction for the 2023 forecast used in 2024 for FCA 18 for the summer of 2027. The program would have an R value of 0.30, so

the FCA forecast for 2027 would be reduced by 60 MW. Similarly, if the program continues to run for 15 years, the reduction in the forecast used for FCA 30 would be 154 MW.

Second, the results can be used retrospectively, to evaluate the effect of a program that has been operating. In 2019, a Program Administrator might file results for a 100 MW program that it ran in 2014–2018, reducing load on the top 15 days of each summer. From Appendix A, we would use the 15-day row of Appendix A and estimate that the program reduced the load used in the FCA forecasts by 17 MW in 2018 (for which 2014 was the last year of data used in the forecast), 31 MW in 2019, 43 MW in 2020, and 58 MW in 2021. The sum of the avoided capacity and DRIPE from those years would be benefits of the program.

3.5. Demand response dispatch scenarios

This section describes the results of our analysis under a variety of dispatch and implementation sensitivities, including situations in which demand response is dispatched according to weather or in line with day-ahead forecasts. We also examine situations in which the dispatch of demand response misses some peak days, is performed according to some forecast of load distribution, and in which demand response is dispatched for only a single day each year.

Dispatching according to weather, rather than load

The results above assume that a demand response program identifies the highest-load days and achieves load reduction on those days. The results are essentially identical for a program that concentrates on reducing load on the days with the worst weather (the highest WTHI values), even though those are slightly different from the highest load days.

Dispatching demand response with day-ahead forecasts

The results are also very similar (although the curves are less smooth) if targeting of the demand response is imperfect, such that the program is activated on some days that are not in the *d* highest days. For example, the program administrator may call an event on a day that looks like it will be one of the top *d* days for the summer, but it may turn out to have an actual load lower than expected. Or, it may turn out that there are more higher-load days that occur later in that summer, after the program administrator has called as many days as is allowed by the tariff or contracts.[17]

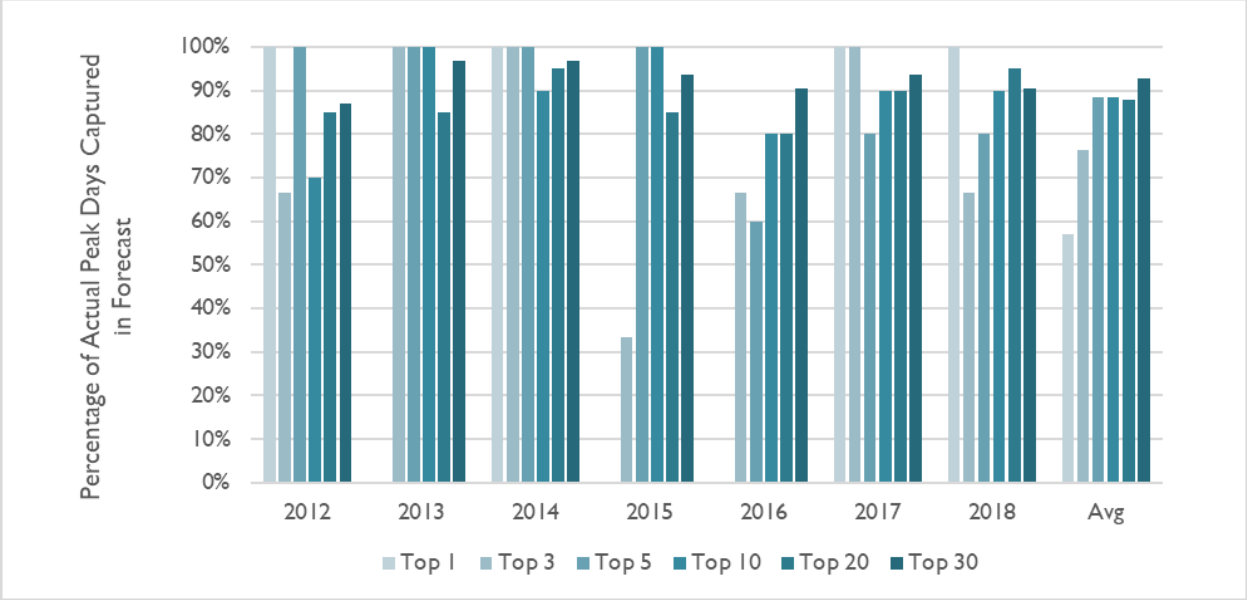
Figure 8 shows the accuracy of demand response program dispatch that is called when the day-ahead peak load is expected to be one of the highest *d* days. These results factor in the optimistic assumption that the program administrator has perfect information about the highest loads for the current summer

[17] The ISO New England day-ahead forecasts are actually quite accurate, correctly flagging the highest *d* days of the summer, if the load of the lowest of those days is known.

but not when those highest load days will occur. With this assumption, programs allowing for 5 to 20 days of load reductions would catch 90 percent of the intended control days.

Where the day-ahead load would result in activation of a day outside the targeted group, it is almost always close to the intended group. For example, a program targeted at the top 10 days might miss day six, but that unused activation would likely be present on day 11 or 12.

Figure 8. Percentage of highest days flagged by day-ahead load forecast, by year



Dispatching demand response, missing some days

Figure 8 shows the targeting errors if the program administrator somehow knew what the load would be on day d, the lowest load day for which the administrator should activate the program. A more realistic simulation would recognize that the program administrator does not know in early July whether the rest of the summer will be hot or mild, and thus will not know whether a particular day-ahead load forecast is likely to be one the *d* highest days.

Table 2 shows how close the load reductions would be to the perfect-information case with typical substitution of peak days with days just outside the targeted period. For example, Sensitivity Case 4 tests the effect on load reductions of calling an event on the 14th highest day rather than the 9th day of a 10-day per year program, while Sensitivity Case 5 models the effect of calling an event on the 14th highest day rather than the 6th day. Other than Sensitivity Case 1 (an unlikely single-day program calling an event on the second-highest day, rather than the highest-load day), the effect of the imperfect dispatch is within 6 percent of the effect of perfect dispatch, and sometimes the dispatch error actually increases the reduction in forecast load.

Table 2. Ratios of forecast reduction with minor dispatch errors, as a percentage of forecast reduction from perfect dispatch

Sensitivity Case	Event Days	Changes from Optimal Dispatch		Years of Operation			
		Top Days Missed	*Non-Top Days added*	*1*	*5*	*10*	*15*
1	1	#1	#2	67%	92%	92%	81%
2	3	#3	#4	99%	105%	99%	98%
3	5	#5	#7	101%	101%	98%	98%
4	10	#9	#14	99%	97%	98%	98%
5	10	#6	#14	99%	96%	98%	97%
6	20	#14, #17	#25, #30	100%	99%	98%	96%
7	20	#11, #12	#22, #23	98%	97%	97%	96%
8	20	#16, #20	#27, #32	103%	100%	98%	97%
9	31	#18, #24, #27, #30	#34, #37, #40, #43	96%	96%	96%	94%
10	31	#18, #27, #31	#34, #37, #40	98%	97%	97%	95%

Table 3 shows the results for poorly targeted dispatch of a load reduction program in the top 30 days of the summer, either 10 events per year on every third day (starting with day 1 or day 2) or 15 events per year on every second day (either the even-numbered days or the odd-numbered). These dispatch choices represent nearly the worst cases for 10 or 15 annual events, yet they still produce 62 percent to 92 percent of the forecast reduction due to load reductions perfectly targeted to the 10 or 15 days with highest loads.

Table 3. Ratios of forecast reduction with even more imperfect dispatch, as a percentage of forecasted reduction from perfect dispatch

Event Days	Dispatch Days, Ranked by Load	Years of Operation			
		1	*5*	*10*	*15*
10	Every 3rd day: 1, 4, 7, 10, 13, 16, 19, 22, 25, 28	85%	78%	75%	68%
10	Every 3rd day: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29	73%	72%	71%	62%
15	Odd days: 1,3, 5, 7, 9, 11,13,15,17,19,21, 23,25, 27, 29	92%	84%	82%	76%
15	Even days: 2, 4, 6, 8, 10,12,14, 16, 18, 20, 22, 24, 26, 28, 30	84%	78%	76%	68%

Dispatching demand response with forecast load distribution

To examine dispatch errors more systematically, we tested a case in which the program was activated and load was curtailed when the day-ahead forecast was within *k*% of ISO New England's forecast of the summer peak, where *k* is the percentage of peak that, on average over the historical data, was exceeded for *d* days per year.

This is a simplified example of a typical demand response program (such as dynamic peak pricing), in which the program administrator tries to foresee peak days and curtail load on those days. In some low-load years, the program will miss some days that later turn out to have been in the top *d* days, while in other years, the program will operate on days that turn out not to be in the top *d* days.

Demand response program administrators are likely to be more sophisticated than the simple algorithm that we used. For example, the program administrator will know how much of the summer remains, how many event days are left for the year, whether the remainder of the summer is forecast to be warmer or cooler than usual, and what a more detailed forecast for the next week or more shows.

Assuming that the program administrator has no information about the loads for the particular year, dispatching with this simple algorithm results in forecast load savings of 80 percent to 100 percent of the perfect-information dispatch, from about four to fifty event days annually. The detailed pattern of differences between the values shown in Appendix A and the values shown in Appendix B may well be due to the different performance of the algorithm in the specific historical years. Overall, a reasonably thoughtful program administrator should be able to achieve about 95 percent of the benefits shown in Appendix A.

Daily dispatch values

Finally, we estimated the effects of load reductions in just a single day each year, from the highest-load day to the lowest-load day of the summer, and for one to fifteen years of program operation. The specific effect of reductions in any particular day is probably very sensitive to the specific historical pattern of daily loads and weather, so the detailed differences in the daily values (for example, between the 18th and 19th days, or between seven years and eight years) may not be significant. See Appendix C for our estimate of the R value (reduction in the 2021 forecast as a fraction of the annual historical load reductions), for various number of years and various numbers of days per year.

These daily values, if summed up for the top *d* days, produce load reductions lower than those we found for reductions in the top *d* days. This is illustrated in Figure 9, Figure 10, and Figure 11, for programs lasting 1, 5, and 15 years, respectively. In each figure, we plot the sum of the daily contributions to reducing the load forecast (the sum of days) as compared to the reduction from the top days as a group (the optimal dispatch results). The latter is always larger.

Figure 9. Reduction ratio (R) for 1-year program, various numbers of days

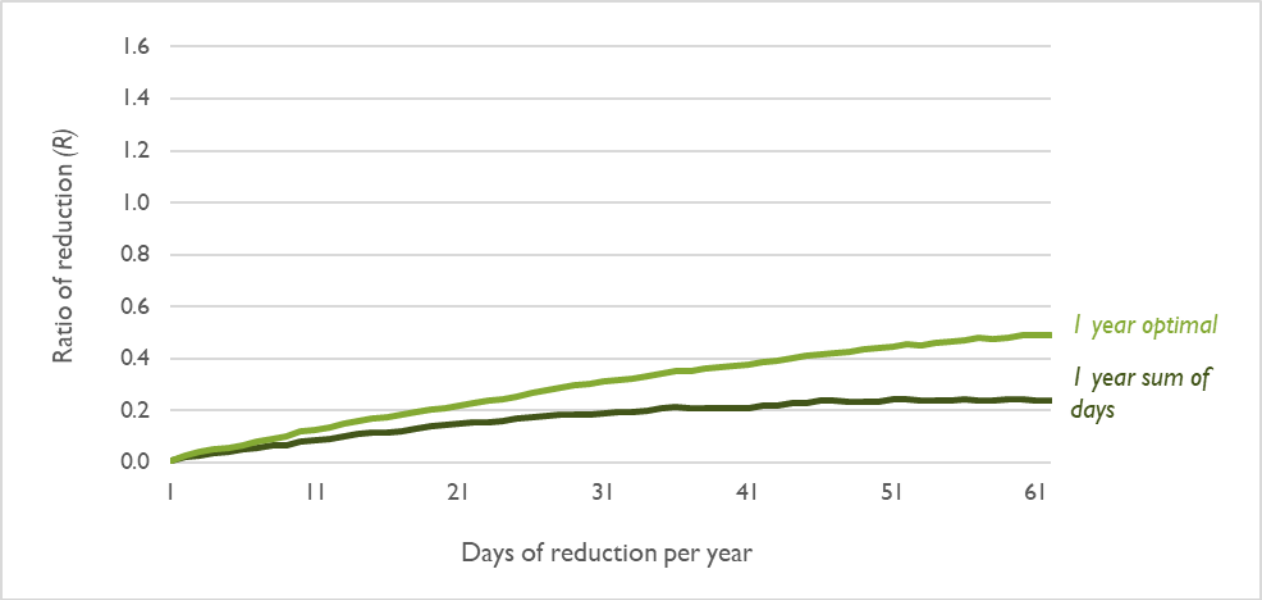


Figure 10. Reduction ratio (R) for 5-year program, various numbers of days

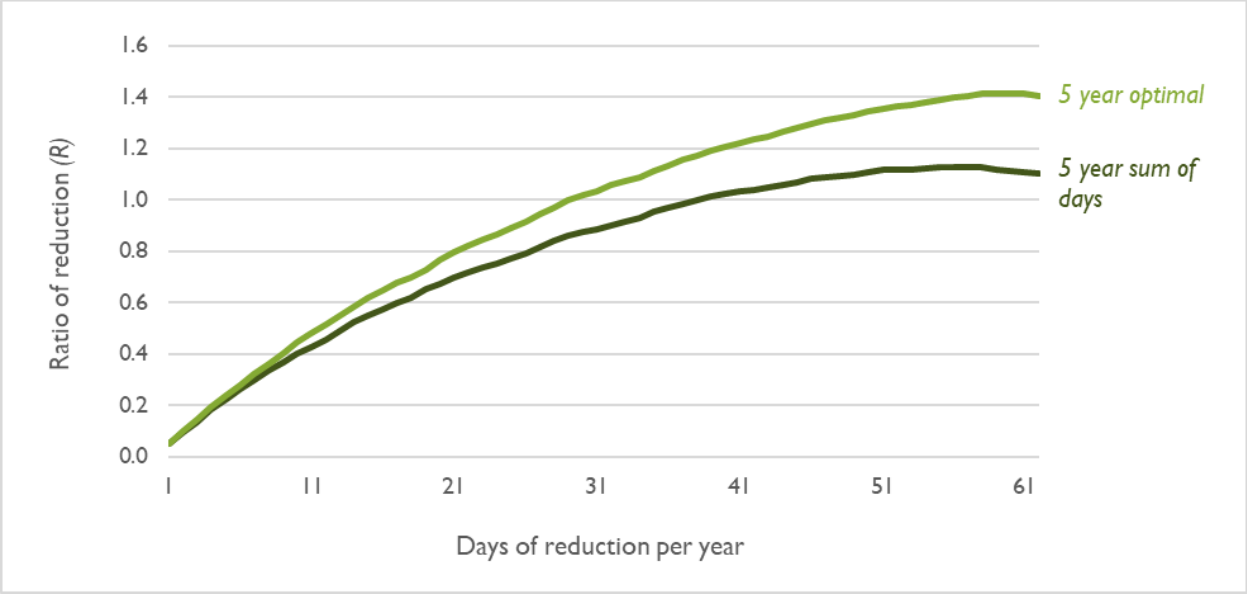
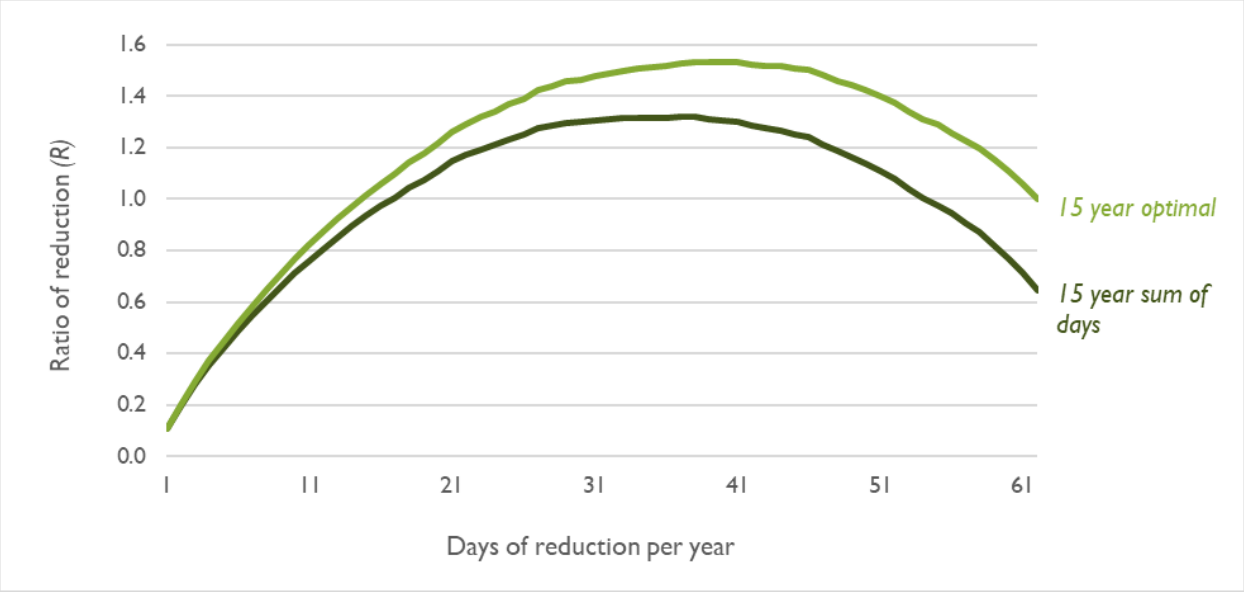


Figure 11. Reduction ratio (R) for 15-year program, various numbers of days



The question then arises, without computing the effects of reductions on all the possible combinations of days (on the order of 10^{18} possibilities), how can the effect of some set of load reductions on capacity DRIPE be estimated?

We propose that the load effect (R) for reductions on a set of days *S*, for which the lowest-load day in *S* is the D^{th} highest load day of the summer, be estimated as the average of

The sum of the R values for the days in S (from Table 6, Appendix C), and

The R value for D days (from Table 4, Appendix A), minus the sum of the R values for the days less than D that are not in S (from Table 6, Appendix C).

For days 1, 4, and 5 of a one-year program (or a program that has only been running for a year), the value would be the average of

The sum of 0.009, 0.013 and 0.005, or 0.027, and

0.06 minus (0.010 + 0.006), or 0.044.

(0.027 + 0.044) ÷ 2 = 0.036.

If greater precision is necessary, or for more complex situations, for example to estimate the effect of different amounts of load reduction on different days over multiple years, we recommend repeating the regressions we describe above for the specific situation.

APPENDIX A. RATIO OF FORECAST REDUCTION TO LOAD REDUCTION

Table 4 displays the values behind Figure 6 and Figure 7, located in section 3.2. These values can be applied to capacity DRIPE values from AESC 2018 to determine new capacity DRIPE values that are specific to a demand response program.

Table 4. Ratio of forecast reduction to load reduction, by years and days/year

	Years of Reductions														
Days	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
1	0.01	0.02	0.03	0.05	0.05	0.06	0.07	0.08	0.08	0.09	0.10	0.10	0.10	0.11	0.11
2	0.03	0.05	0.06	0.09	0.10	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.20	0.20
3	0.04	0.07	0.10	0.13	0.15	0.17	0.20	0.22	0.23	0.25	0.26	0.28	0.28	0.29	0.29
4	0.05	0.09	0.13	0.17	0.19	0.23	0.26	0.29	0.30	0.32	0.34	0.36	0.36	0.37	0.37
5	0.06	0.11	0.16	0.22	0.24	0.28	0.32	0.35	0.37	0.39	0.41	0.44	0.44	0.44	0.45
6	0.07	0.13	0.19	0.25	0.28	0.32	0.37	0.41	0.43	0.45	0.48	0.50	0.50	0.50	0.52
7	0.08	0.15	0.22	0.29	0.33	0.38	0.43	0.47	0.49	0.51	0.54	0.57	0.57	0.57	0.58
8	0.09	0.17	0.25	0.33	0.36	0.42	0.48	0.53	0.55	0.57	0.61	0.64	0.64	0.63	0.65
9	0.10	0.19	0.27	0.37	0.40	0.47	0.53	0.58	0.61	0.63	0.67	0.70	0.70	0.69	0.71
10	0.12	0.21	0.30	0.41	0.45	0.52	0.58	0.63	0.66	0.69	0.72	0.76	0.75	0.75	0.77
11	0.13	0.23	0.33	0.45	0.48	0.55	0.63	0.68	0.71	0.74	0.78	0.82	0.81	0.80	0.82
12	0.14	0.25	0.35	0.48	0.52	0.59	0.67	0.73	0.76	0.79	0.83	0.87	0.86	0.86	0.88
13	0.15	0.27	0.38	0.52	0.55	0.64	0.72	0.78	0.81	0.85	0.88	0.93	0.92	0.91	0.93
14	0.16	0.29	0.40	0.54	0.58	0.68	0.76	0.83	0.86	0.89	0.93	0.97	0.96	0.95	0.97
15	0.17	0.31	0.43	0.58	0.62	0.71	0.80	0.87	0.90	0.94	0.98	1.03	1.01	1.00	1.02
16	0.18	0.33	0.45	0.60	0.65	0.75	0.84	0.91	0.95	0.98	1.02	1.07	1.06	1.04	1.06
17	0.19	0.34	0.47	0.63	0.68	0.78	0.88	0.95	0.99	1.02	1.07	1.12	1.10	1.08	1.10
18	0.20	0.36	0.50	0.66	0.70	0.81	0.91	0.99	1.03	1.07	1.11	1.17	1.15	1.13	1.14
19	0.20	0.38	0.52	0.69	0.73	0.84	0.95	1.04	1.07	1.11	1.15	1.21	1.19	1.17	1.18
20	0.21	0.39	0.54	0.71	0.77	0.88	0.99	1.07	1.11	1.15	1.20	1.26	1.23	1.21	1.22
21	0.22	0.41	0.56	0.74	0.80	0.92	1.03	1.12	1.16	1.20	1.24	1.30	1.27	1.25	1.26
22	0.23	0.42	0.58	0.77	0.82	0.94	1.06	1.15	1.19	1.23	1.27	1.33	1.30	1.28	1.29
23	0.24	0.44	0.60	0.79	0.85	0.96	1.09	1.19	1.23	1.27	1.31	1.37	1.34	1.31	1.32
24	0.25	0.45	0.62	0.82	0.87	0.98	1.12	1.21	1.26	1.29	1.34	1.40	1.36	1.33	1.34
25	0.25	0.47	0.64	0.84	0.89	1.01	1.15	1.25	1.29	1.33	1.37	1.43	1.40	1.36	1.37
26	0.27	0.49	0.66	0.86	0.91	1.04	1.18	1.28	1.32	1.36	1.40	1.47	1.42	1.39	1.39
27	0.28	0.50	0.68	0.89	0.95	1.07	1.22	1.32	1.36	1.40	1.44	1.50	1.46	1.42	1.42

	Years of Reductions														
Days	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
28	0.29	0.52	0.71	0.92	0.97	1.11	1.25	1.35	1.39	1.43	1.47	1.53	1.48	1.44	1.44
29	0.30	0.54	0.73	0.94	1.00	1.14	1.28	1.38	1.42	1.46	1.49	1.56	1.51	1.46	1.46
30	0.30	0.55	0.74	0.96	1.02	1.15	1.31	1.41	1.45	1.49	1.52	1.58	1.53	1.48	1.47
31	0.31	0.56	0.76	0.98	1.04	1.18	1.33	1.44	1.48	1.51	1.54	1.61	1.55	1.49	1.48
32	0.32	0.58	0.78	1.00	1.06	1.21	1.36	1.47	1.50	1.54	1.57	1.63	1.57	1.51	1.49
33	0.32	0.59	0.79	1.02	1.07	1.22	1.38	1.49	1.53	1.56	1.59	1.66	1.59	1.52	1.50
34	0.33	0.60	0.80	1.04	1.09	1.25	1.41	1.52	1.55	1.59	1.61	1.68	1.60	1.53	1.51
35	0.34	0.61	0.82	1.06	1.11	1.27	1.43	1.54	1.58	1.61	1.63	1.70	1.62	1.54	1.51
36	0.35	0.62	0.84	1.08	1.13	1.29	1.46	1.57	1.60	1.63	1.65	1.71	1.63	1.55	1.52
37	0.35	0.64	0.85	1.10	1.16	1.31	1.49	1.59	1.62	1.65	1.67	1.73	1.65	1.57	1.53
38	0.36	0.65	0.86	1.12	1.17	1.34	1.51	1.61	1.64	1.67	1.69	1.75	1.66	1.58	1.53
39	0.37	0.66	0.88	1.14	1.19	1.35	1.53	1.63	1.66	1.69	1.71	1.77	1.67	1.58	1.53
40	0.37	0.67	0.89	1.15	1.21	1.36	1.55	1.65	1.68	1.71	1.72	1.78	1.68	1.59	1.53
41	0.38	0.68	0.90	1.17	1.22	1.39	1.57	1.67	1.69	1.72	1.73	1.79	1.68	1.59	1.53
42	0.39	0.69	0.92	1.19	1.23	1.41	1.59	1.69	1.71	1.73	1.74	1.80	1.69	1.59	1.52
43	0.39	0.70	0.93	1.20	1.25	1.42	1.61	1.70	1.72	1.75	1.76	1.81	1.69	1.59	1.52
44	0.40	0.71	0.95	1.21	1.26	1.44	1.63	1.72	1.74	1.76	1.77	1.82	1.70	1.60	1.52
45	0.41	0.73	0.96	1.23	1.28	1.46	1.64	1.74	1.75	1.77	1.78	1.83	1.70	1.60	1.51
46	0.42	0.74	0.97	1.25	1.30	1.48	1.66	1.76	1.77	1.79	1.79	1.84	1.71	1.60	1.50
47	0.42	0.75	0.99	1.27	1.31	1.49	1.68	1.77	1.78	1.80	1.79	1.84	1.70	1.58	1.48
48	0.42	0.76	1.00	1.27	1.32	1.50	1.70	1.78	1.79	1.80	1.79	1.84	1.69	1.57	1.46
49	0.43	0.77	1.01	1.29	1.33	1.52	1.71	1.79	1.80	1.80	1.79	1.84	1.68	1.55	1.44
50	0.44	0.78	1.03	1.31	1.34	1.53	1.73	1.81	1.81	1.81	1.80	1.84	1.68	1.54	1.42
51	0.45	0.79	1.04	1.32	1.35	1.55	1.73	1.82	1.82	1.81	1.80	1.83	1.66	1.53	1.40
52	0.45	0.80	1.05	1.33	1.36	1.55	1.74	1.82	1.82	1.81	1.79	1.82	1.65	1.51	1.37
53	0.45	0.80	1.06	1.34	1.37	1.56	1.74	1.82	1.81	1.80	1.78	1.81	1.63	1.48	1.34
54	0.46	0.82	1.07	1.35	1.38	1.57	1.75	1.82	1.82	1.80	1.77	1.80	1.61	1.46	1.31
55	0.46	0.82	1.08	1.36	1.39	1.57	1.75	1.83	1.82	1.80	1.77	1.79	1.60	1.45	1.29
56	0.47	0.83	1.09	1.37	1.40	1.58	1.76	1.83	1.82	1.79	1.75	1.78	1.58	1.42	1.26
57	0.48	0.84	1.10	1.38	1.40	1.59	1.77	1.83	1.82	1.79	1.75	1.76	1.56	1.40	1.23
58	0.48	0.85	1.11	1.39	1.41	1.60	1.77	1.83	1.82	1.78	1.73	1.75	1.55	1.37	1.20
59	0.48	0.86	1.11	1.40	1.41	1.60	1.77	1.83	1.81	1.77	1.71	1.72	1.51	1.33	1.15
60	0.49	0.86	1.12	1.40	1.41	1.60	1.77	1.83	1.81	1.76	1.69	1.70	1.48	1.30	1.11
61	0.49	0.86	1.12	1.41	1.41	1.60	1.77	1.83	1.80	1.75	1.68	1.68	1.45	1.26	1.06
62	0.49	0.86	1.12	1.40	1.40	1.59	1.76	1.81	1.79	1.73	1.65	1.65	1.42	1.21	1.00

APPENDIX B. RATIO OF FORECAST REDUCTION TO LOAD REDUCTION, WITH FORECAST LOAD DISTRIBUTION

Table 5 displays a modified version of the values in Appendix A, assuming imperfect dispatch. See section 3.3, subsection "Dispatching demand response with forecast load distribution" for more information.

Table 5. Ratio of forecast reduction to load reduction, imperfect dispatch

	Years of Reductions														
Days	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
1	0.01	0.01	0.01	0.02	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05
2	0.02	0.02	0.02	0.05	0.06	0.07	0.09	0.09	0.09	0.10	0.10	0.11	0.11	0.11	0.12
3	0.03	0.06	0.08	0.11	0.13	0.15	0.17	0.17	0.17	0.19	0.20	0.21	0.21	0.21	0.21
4	0.04	0.09	0.13	0.17	0.19	0.21	0.25	0.26	0.26	0.27	0.28	0.30	0.30	0.30	0.30
5	0.05	0.11	0.15	0.20	0.22	0.25	0.29	0.30	0.31	0.33	0.34	0.36	0.36	0.36	0.36
6	0.06	0.13	0.17	0.23	0.25	0.29	0.34	0.36	0.37	0.39	0.40	0.42	0.42	0.42	0.42
7	0.07	0.14	0.20	0.27	0.29	0.33	0.38	0.40	0.41	0.44	0.45	0.47	0.47	0.46	0.46
8	0.08	0.16	0.23	0.30	0.32	0.37	0.42	0.45	0.46	0.48	0.50	0.52	0.52	0.51	0.51
9	0.09	0.18	0.25	0.32	0.35	0.40	0.46	0.49	0.50	0.52	0.54	0.57	0.56	0.55	0.55
10	0.10	0.20	0.27	0.35	0.39	0.44	0.51	0.54	0.55	0.58	0.60	0.62	0.62	0.61	0.60
11	0.12	0.22	0.29	0.38	0.42	0.49	0.56	0.59	0.60	0.63	0.65	0.68	0.68	0.66	0.66
12	0.12	0.23	0.31	0.41	0.45	0.53	0.60	0.64	0.65	0.68	0.70	0.73	0.73	0.71	0.71
13	0.13	0.24	0.32	0.44	0.47	0.55	0.64	0.67	0.69	0.71	0.74	0.77	0.77	0.75	0.75
14	0.14	0.25	0.34	0.47	0.51	0.60	0.68	0.71	0.73	0.76	0.79	0.82	0.82	0.80	0.80
15	0.15	0.29	0.38	0.52	0.57	0.66	0.75	0.79	0.82	0.85	0.88	0.91	0.91	0.88	0.88
16	0.15	0.30	0.40	0.55	0.59	0.69	0.78	0.83	0.85	0.88	0.92	0.96	0.94	0.92	0.91
17	0.17	0.32	0.43	0.58	0.62	0.73	0.82	0.88	0.90	0.94	0.98	1.02	1.00	0.98	0.97
18	0.17	0.34	0.45	0.60	0.64	0.75	0.85	0.92	0.94	0.98	1.02	1.06	1.04	1.00	0.99
19	0.18	0.35	0.46	0.62	0.67	0.78	0.88	0.95	0.98	1.01	1.05	1.09	1.07	1.03	1.02
20	0.19	0.37	0.48	0.64	0.69	0.80	0.91	0.98	1.01	1.05	1.09	1.14	1.11	1.06	1.06
21	0.19	0.38	0.49	0.66	0.71	0.82	0.93	1.00	1.03	1.07	1.10	1.15	1.13	1.08	1.07

	Years of Reductions														
Days	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
22	0.20	0.39	0.50	0.68	0.73	0.84	0.96	1.03	1.06	1.10	1.13	1.19	1.16	1.10	1.09
23	0.21	0.41	0.54	0.71	0.76	0.88	1.00	1.07	1.11	1.14	1.18	1.24	1.20	1.14	1.13
24	0.22	0.43	0.56	0.74	0.78	0.90	1.02	1.10	1.13	1.17	1.21	1.26	1.23	1.16	1.15
25	0.23	0.44	0.58	0.76	0.81	0.93	1.06	1.14	1.18	1.21	1.25	1.31	1.27	1.21	1.19
26	0.23	0.45	0.58	0.78	0.82	0.95	1.08	1.16	1.20	1.23	1.27	1.33	1.30	1.23	1.22
27	0.24	0.47	0.60	0.80	0.84	0.97	1.10	1.18	1.22	1.26	1.30	1.36	1.33	1.26	1.25
28	0.25	0.48	0.61	0.81	0.86	0.99	1.13	1.21	1.25	1.29	1.32	1.38	1.34	1.27	1.26
29	0.26	0.50	0.63	0.84	0.88	1.02	1.16	1.25	1.29	1.32	1.36	1.42	1.38	1.31	1.29
30	0.26	0.50	0.63	0.85	0.89	1.03	1.17	1.26	1.30	1.34	1.37	1.43	1.39	1.31	1.29
31	0.27	0.52	0.66	0.87	0.92	1.06	1.21	1.29	1.34	1.37	1.40	1.46	1.42	1.33	1.32
32	0.28	0.53	0.68	0.90	0.94	1.08	1.24	1.32	1.36	1.40	1.43	1.49	1.44	1.35	1.33
33	0.29	0.55	0.71	0.93	0.98	1.12	1.28	1.37	1.41	1.44	1.47	1.53	1.48	1.39	1.35
34	0.30	0.56	0.72	0.95	1.00	1.15	1.31	1.39	1.44	1.47	1.49	1.56	1.50	1.41	1.37
35	0.31	0.58	0.74	0.98	1.03	1.18	1.34	1.43	1.47	1.50	1.53	1.58	1.53	1.44	1.40
36	0.33	0.60	0.78	1.01	1.06	1.21	1.37	1.47	1.51	1.54	1.56	1.62	1.56	1.46	1.43
37	0.34	0.62	0.80	1.04	1.09	1.24	1.41	1.50	1.54	1.57	1.59	1.65	1.58	1.48	1.44
38	0.35	0.63	0.82	1.06	1.11	1.27	1.44	1.53	1.57	1.60	1.62	1.68	1.59	1.50	1.44
39	0.35	0.64	0.83	1.09	1.13	1.29	1.46	1.55	1.60	1.63	1.64	1.69	1.60	1.50	1.45
40	0.36	0.66	0.85	1.10	1.15	1.31	1.48	1.58	1.62	1.65	1.66	1.71	1.62	1.52	1.46
41	0.37	0.67	0.87	1.12	1.17	1.33	1.51	1.61	1.64	1.67	1.68	1.73	1.61	1.50	1.43
42	0.37	0.67	0.88	1.13	1.17	1.34	1.52	1.61	1.65	1.67	1.69	1.73	1.60	1.48	1.41
43	0.38	0.68	0.89	1.15	1.19	1.35	1.53	1.63	1.67	1.69	1.70	1.75	1.61	1.50	1.42
44	0.39	0.69	0.90	1.15	1.20	1.37	1.55	1.64	1.68	1.70	1.71	1.75	1.62	1.50	1.41
45	0.39	0.70	0.92	1.18	1.21	1.39	1.57	1.67	1.70	1.73	1.73	1.77	1.64	1.52	1.42
46	0.40	0.71	0.93	1.19	1.23	1.40	1.59	1.70	1.73	1.75	1.75	1.79	1.66	1.54	1.44
47	0.40	0.72	0.94	1.20	1.24	1.41	1.60	1.71	1.74	1.76	1.76	1.79	1.65	1.53	1.43
48	0.41	0.73	0.95	1.21	1.24	1.41	1.60	1.71	1.73	1.76	1.75	1.78	1.63	1.50	1.40
49	0.41	0.74	0.96	1.22	1.26	1.43	1.62	1.73	1.75	1.78	1.77	1.80	1.65	1.51	1.40
50	0.42	0.75	0.97	1.23	1.27	1.44	1.64	1.74	1.76	1.79	1.78	1.80	1.64	1.50	1.38
51	0.42	0.76	0.98	1.25	1.28	1.46	1.65	1.76	1.78	1.81	1.79	1.82	1.65	1.51	1.38
52	0.43	0.78	1.01	1.28	1.31	1.49	1.68	1.79	1.81	1.82	1.80	1.82	1.66	1.51	1.38
53	0.45	0.79	1.02	1.30	1.33	1.51	1.70	1.81	1.83	1.85	1.82	1.84	1.67	1.52	1.38

	Years of Reductions														
Days	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
54	0.45	0.80	1.03	1.31	1.34	1.52	1.71	1.82	1.84	1.85	1.83	1.84	1.68	1.52	1.37
55	0.46	0.81	1.05	1.32	1.34	1.52	1.71	1.82	1.83	1.84	1.80	1.82	1.64	1.47	1.32
56	0.46	0.82	1.06	1.33	1.35	1.53	1.73	1.83	1.84	1.84	1.80	1.81	1.63	1.46	1.30
57	0.47	0.83	1.07	1.34	1.36	1.54	1.73	1.83	1.84	1.84	1.79	1.80	1.62	1.44	1.27
58	0.47	0.84	1.08	1.35	1.37	1.56	1.75	1.84	1.85	1.85	1.80	1.81	1.62	1.44	1.26
59	0.47	0.83	1.08	1.35	1.36	1.54	1.73	1.81	1.80	1.76	1.72	1.72	1.53	1.34	1.16
60	0.48	0.85	1.09	1.37	1.37	1.56	1.73	1.81	1.80	1.77	1.72	1.72	1.52	1.34	1.14
61	0.48	0.85	1.10	1.38	1.39	1.57	1.73	1.81	1.79	1.76	1.71	1.71	1.48	1.28	1.08
62	0.49	0.86	1.12	1.39	1.39	1.58	1.75	1.82	1.80	1.76	1.69	1.69	1.45	1.26	1.04

APPENDIX C. IMPACT OF INDIVIDUAL DAY LOAD REDUCTIONS

Table 6 shows our estimate of the R value (reduction in the 2021 forecast as a fraction of the annual historical load reductions), for various number of years and various numbers of days per year. See section 3.3, subsection "Daily dispatch values" for more information.

Table 6. Effect of individual day load reductions on reduction ratios

	Years of Reductions														
Days	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
1	0.009	0.021	0.032	0.046	0.051	0.063	0.072	0.079	0.082	0.089	0.096	0.102	0.104	0.106	0.108
2	0.010	0.021	0.031	0.040	0.046	0.056	0.064	0.073	0.078	0.081	0.081	0.086	0.086	0.086	0.087
3	0.006	0.016	0.025	0.036	0.040	0.047	0.056	0.062	0.065	0.069	0.074	0.080	0.080	0.080	0.083
4	0.013	0.024	0.035	0.046	0.050	0.056	0.063	0.069	0.070	0.067	0.081	0.083	0.075	0.075	0.077
5	0.005	0.016	0.026	0.036	0.038	0.044	0.050	0.055	0.058	0.060	0.064	0.067	0.066	0.066	0.068
6	0.011	0.014	0.020	0.038	0.041	0.046	0.052	0.050	0.052	0.053	0.057	0.061	0.059	0.058	0.060
7	0.005	0.013	0.022	0.033	0.034	0.040	0.047	0.052	0.054	0.054	0.056	0.060	0.059	0.058	0.059
8	0.007	0.022	0.024	0.035	0.036	0.045	0.052	0.055	0.056	0.059	0.060	0.062	0.062	0.061	0.063
9	0.004	0.013	0.021	0.031	0.034	0.039	0.044	0.049	0.053	0.054	0.055	0.057	0.055	0.054	0.053
10	0.012	0.014	0.021	0.032	0.030	0.038	0.043	0.047	0.048	0.050	0.050	0.052	0.051	0.051	0.053
11	0.006	0.014	0.020	0.027	0.027	0.032	0.038	0.042	0.043	0.046	0.048	0.050	0.048	0.047	0.047
12	0.004	0.013	0.020	0.027	0.029	0.035	0.040	0.045	0.047	0.049	0.050	0.051	0.050	0.048	0.049
13	0.013	0.022	0.027	0.033	0.036	0.041	0.045	0.049	0.049	0.052	0.045	0.048	0.047	0.046	0.045
14	0.009	0.010	0.017	0.023	0.031	0.028	0.033	0.037	0.038	0.038	0.039	0.042	0.039	0.037	0.043
15	0.004	0.013	0.018	0.024	0.027	0.032	0.036	0.039	0.040	0.041	0.044	0.046	0.044	0.042	0.041
16	0.002	0.010	0.016	0.022	0.023	0.029	0.033	0.036	0.037	0.039	0.039	0.041	0.039	0.036	0.036
17	0.004	0.011	0.016	0.021	0.023	0.027	0.031	0.033	0.035	0.036	0.038	0.041	0.038	0.034	0.033
18	0.009	0.012	0.023	0.024	0.023	0.027	0.031	0.036	0.036	0.037	0.037	0.039	0.040	0.038	0.037
19	0.010	0.017	0.023	0.023	0.031	0.026	0.032	0.036	0.037	0.037	0.036	0.038	0.033	0.031	0.030
20	0.006	0.012	0.012	0.018	0.020	0.023	0.029	0.031	0.034	0.036	0.037	0.039	0.037	0.034	0.035
21	0.004	0.011	0.017	0.023	0.025	0.029	0.033	0.036	0.038	0.037	0.037	0.039	0.039	0.035	0.037
22	0.004	0.010	0.014	0.021	0.019	0.022	0.025	0.028	0.027	0.028	0.026	0.027	0.024	0.024	0.026

	Years of Reductions														
Days	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
23	0.001	0.009	0.015	0.020	0.021	0.024	0.027	0.030	0.030	0.029	0.028	0.032	0.028	0.024	0.022
24	0.007	0.012	0.010	0.015	0.014	0.016	0.019	0.022	0.022	0.022	0.028	0.023	0.019	0.016	0.019
25	0.008	0.015	0.018	0.021	0.023	0.024	0.028	0.030	0.027	0.028	0.026	0.027	0.024	0.023	0.021
26	0.006	0.013	0.018	0.016	0.018	0.021	0.026	0.028	0.027	0.026	0.026	0.027	0.023	0.019	0.018
27	0.005	0.012	0.017	0.024	0.025	0.027	0.030	0.032	0.031	0.031	0.031	0.031	0.028	0.027	0.025
28	0.003	0.009	0.021	0.021	0.025	0.024	0.026	0.032	0.025	0.024	0.021	0.021	0.017	0.013	0.009
29	0.001	0.008	0.013	0.017	0.017	0.023	0.026	0.026	0.025	0.025	0.023	0.023	0.022	0.016	0.012
30	0.002	0.009	0.012	0.015	0.015	0.017	0.021	0.021	0.020	0.020	0.018	0.017	0.013	0.008	0.003
31	0.002	0.013	0.016	0.014	0.013	0.016	0.019	0.021	0.020	0.020	0.019	0.019	0.014	0.009	0.005
32	0.008	0.007	0.010	0.015	0.015	0.016	0.020	0.021	0.021	0.020	0.017	0.018	0.014	0.010	0.005
33	0.000	0.005	0.007	0.011	0.012	0.015	0.018	0.020	0.020	0.019	0.018	0.018	0.012	0.009	0.005
34	0.006	0.005	0.013	0.018	0.018	0.021	0.024	0.025	0.024	0.023	0.013	0.013	0.008	0.005	-0.001
35	0.009	0.015	0.018	0.022	0.021	0.017	0.019	0.018	0.016	0.016	0.013	0.013	0.008	0.005	0.000
36	0.002	0.006	0.010	0.015	0.015	0.016	0.019	0.018	0.016	0.015	0.013	0.012	0.008	0.004	0.002
37	-0.001	0.006	0.009	0.014	0.015	0.018	0.020	0.018	0.016	0.015	0.014	0.014	0.009	0.007	0.002
38	-0.001	0.005	0.007	0.018	0.018	0.015	0.016	0.016	0.016	0.015	0.013	0.012	0.009	0.005	-0.001
39	0.000	0.005	0.008	0.011	0.010	0.012	0.014	0.012	0.012	0.011	0.010	0.008	0.002	0.000	-0.006
40	-0.001	0.005	0.009	0.012	0.010	0.010	0.013	0.013	0.012	0.010	0.008	0.008	0.002	-0.002	-0.008
41	0.001	0.006	0.009	0.011	0.011	0.014	0.015	0.014	0.012	0.012	0.010	0.008	0.002	-0.002	-0.006
42	0.008	0.005	0.008	0.010	0.008	0.010	0.012	0.010	0.008	0.005	0.003	0.002	-0.004	-0.008	-0.015
43	0.001	0.005	0.006	0.007	0.008	0.012	0.013	0.013	0.010	0.008	0.006	0.004	0.000	-0.003	-0.010
44	0.008	0.013	0.007	0.016	0.011	0.013	0.015	0.012	0.011	0.010	0.007	0.006	0.003	-0.001	-0.008
45	0.001	0.005	0.007	0.009	0.009	0.011	0.012	0.009	0.006	0.003	0.003	-0.001	-0.007	-0.009	-0.016
46	0.007	0.005	0.008	0.011	0.012	0.012	0.015	0.014	0.011	0.009	0.008	0.005	-0.001	-0.006	-0.011
47	0.001	0.005	0.009	0.010	0.009	0.011	0.011	0.008	0.005	0.001	-0.004	-0.007	-0.013	-0.019	-0.026
48	-0.001	0.003	0.004	0.005	0.002	0.004	0.009	0.007	0.005	0.001	-0.002	-0.004	-0.011	-0.018	-0.026
49	-0.002	0.003	0.008	0.011	0.008	0.009	0.008	0.006	0.003	-0.001	-0.005	-0.007	-0.013	-0.018	-0.023
50	0.001	0.004	0.007	0.008	0.007	0.009	0.007	0.005	0.004	-0.001	-0.004	-0.008	-0.012	-0.018	-0.026
51	0.007	0.011	0.014	0.013	0.010	0.012	0.009	0.006	0.004	-0.005	-0.008	-0.011	-0.018	-0.023	-0.031
52	-0.001	0.002	0.003	0.003	0.000	0.001	-0.001	-0.001	-0.004	-0.009	-0.011	-0.013	-0.019	-0.024	-0.029
53	-0.002	0.001	0.002	0.003	0.001	0.001	-0.001	-0.005	-0.008	-0.013	-0.018	-0.021	-0.026	-0.033	-0.041

	Years of Reductions														
Days	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
54	0.000	0.004	0.004	0.005	0.003	0.002	0.000	-0.003	-0.007	-0.010	-0.015	-0.019	-0.024	-0.027	-0.034
55	-0.002	0.002	0.003	0.006	0.003	0.005	0.003	0.003	0.001	-0.005	-0.008	-0.010	-0.016	-0.021	-0.027
56	0.004	0.001	0.003	0.004	0.001	0.000	-0.001	-0.005	-0.007	-0.013	-0.019	-0.023	-0.021	-0.027	-0.034
57	-0.001	0.001	0.003	0.003	0.000	0.000	0.000	-0.003	-0.005	-0.010	-0.013	-0.018	-0.024	-0.030	-0.038
58	-0.002	0.001	0.002	0.003	0.000	-0.001	-0.003	-0.008	-0.010	-0.013	-0.018	-0.021	-0.025	-0.029	-0.036
59	0.004	-0.001	-0.001	-0.001	-0.006	-0.007	-0.009	-0.011	-0.014	-0.021	-0.028	-0.032	-0.039	-0.045	-0.051
60	0.002	0.004	-0.002	-0.001	-0.004	-0.003	-0.004	-0.008	-0.011	-0.017	-0.024	-0.028	-0.035	-0.042	-0.050
61	-0.005	-0.003	0.006	-0.001	-0.005	0.002	-0.007	-0.009	-0.004	-0.018	-0.025	-0.029	-0.038	-0.047	-0.055
62	0.000	-0.001	-0.002	-0.003	-0.009	-0.013	-0.014	-0.018	-0.022	-0.029	-0.037	-0.040	-0.048	-0.058	-0.068

PUC 1-72
Residential Connected Solutions

Request:

For program years 2016 – 2021, provide a table with the following information on the Smart thermostat-based demand response program:

a. Company's forecast of enrolled participants
b. Actual enrolled participants
c. Company's forecast of demand reduction (kW)
d. Actual demand reduction (kW)
e. Company's forecast of program budget
f. Actual program spend.

Response:

	2016	**2017**	**2018**	**2019**	**2020**	**2021**
Company's forecast of enrolled participants by the end of the calendar year	200	960	1,720	3,936[1]	4,526	6,409
Actual enrolled participants by the end of the calendar year	96	813	1,674	2,479	3,969	TBD
Company's forecast of demand reduction (kW) for the summer peaks	100 kW	480 kW	860 kW	1,985 kW	2,263 kW	5,445 kW
Actual demand reduction (kW) for the summer peaks	48 kW	321 kW	569 kW	1,795 kW	3,870 kW	TBD
Company's forecast of program budget by the end of the calendar year*	$488,104	$248,600	$300,096	$283,110	$241,627	$1,128,535
Actual program spends by the end of the calendar year*	$236,100	$434,536	$171,639	$121,776	$373,492	TBD

*Historically, the Company has not tracked thermostat and battery measure costs separately. The budget numbers in this table are the Company's best estimate of the separate thermostat and battery measure costs.

[1] In the 2019 Annual Energy Efficiency Plan (2019 Plan), the Company forecasted there would be 3,936 enrolled participants and there were 2,479 actually enrolled by the end of the calendar year as noted in this response. However, both forecasted and actual enrollments for the 2019 Plan were mislabeled in the 2019 plan.

Prepared by or under the supervision of: Paul Wassink

PUC 1-73
Residential Connected Solutions

Request:

For program years 2019 - 2021 provide a table with the following information on the battery-enabled demand response program:

a. Company's forecast of enrolled participants
b. Actual enrolled participants
c. Company's forecast of demand reduction (kW)
d. Actual demand reduction (kW)
e. Company's forecast of program budget
f. Actual program spend.

Response:

	2019	2020	2021
Company's forecast of enrolled participants by the end of the calendar year	50	100	300
Actual enrolled participants by the end of the calendar year	15	52	199
Company's forecast of demand reduction (kW) for the summer peaks	250 kW	500 kW	1,800 kW
Actual demand reduction (kW) for the summer peaks	85 kW	230 kW	TBD
Company's forecast of program budget for the summer peaks*	$0	$220,000	$792,000
Actual program spends for the summer peaks*	$49,000	$197,085	TBD

*Historically, the Company has not tracked thermostat and battery measure costs separately. The budget numbers in this table are the Company's best estimate of the separate thermostat and battery measure costs.

Prepared by or under the supervision of: Paul Wassink

PUC 1-74, page 1
Residential Connected Solutions

Request:

Regarding the battery-enabled demand response program, please explain the following:

a. Are battery systems that receive funding from the Energy Storage Adder Pilot Program (administered by the Renewable Energy Fund) required to participate in the Company's demand response program?
b. Are battery systems that receive funding from the Energy Storage Adder Pilot Program (administered by the Renewable Energy Fund) also eligible for a HEAT Loan?
c. To date, how many participating battery systems received funding from the Energy Storage Adder Pilot Program (administered by the Renewable Energy Fund)?
d. To date, how many participating battery systems were financed through a HEAT Loan? If the Company anticipates extending HEAT Loan eligibility to participating battery systems, why isn't there a budget line item for HEAT Loans under the Residential Connected Solutions electric program on Bates page 202?
e. Does the Company require participating battery systems to be paired with co-located distributed generation facilities? Please explain all relevant requirements.
f. How many participating battery systems are paired with a net-metered generation facility?
g. How many participating battery systems are paired with a generation facility enrolled in the Renewable Energy Growth program?
h. To what does the Company attribute the 50% increase in forecast enrollment during the 2022 program year?

Response:

a. No. Customers who receive the Energy Storage Adder from the Renewable Energy Fund are not required to enroll in Connected Solutions. Customers who receive the adder are required to enroll in Connected Solutions or obtain a signature from the owner opting out of the Connected Solutions program unless the owner is not a National Grid electric distribution customer.[1]

[1] Energy Storage Adder Pilot Program, OER, 2020, page 6,bullet 5, (https://commerceri.com/wp-content/uploads/2020/09/REF-Storage-Adder-RFP-FINAL-.pdf) "The applicant must enroll the energy storage component in National Grid's Connected Solutions program or obtain a signature from the owner opting out of the program, unless the owner is not a National Grid electric distribution customer. Please note that National Grid reserves the right to limit participation on a first-come, first-served basis based on total program budget."

Prepared by or under the supervision of: Paul Wassink

PUC 1-74, page 2
Residential Connected Solutions

b. Yes, customers are eligible for the Heat Loan regardless of their participation in the Energy Storage Adder of the Renewable Energy Fund.

c. The Renewable Energy Fund is administered by the Office of Energy Resources. The Company does not know which customers have applied for or received the Energy Storage Adder of the Renewable Energy Fund.

d. To date (10/25/2021), 59 participating battery systems have been financed through the HEAT Loan. Residential customers purchasing a new battery storage system are eligible to receive a Heat Loan for the cost of the battery system. The Company budgeted $25,000 for Heat Loans in the Residential Connected Solutions budget in the 2022 plan. On Bates 202, this $25,000 is embedded within the Sales, Technical Assistance, and Training line.

e. To participate in the Connected Solutions program there are no requirements that battery storage systems be paired with solar or any other generation facility. However, the federal Investment Tax Credit and the Energy Storage Adder of the Renewable Energy Fund do have requirement for on-site solar. Additionally, the distributed generation interconnection process may sometimes have requirements for on-site generation.

f. Out of the 179 customers who are enrolled in the Connected Solutions battery measure and have finished the interconnection process as of 10/26/2021, 173 of them are incentivized through the Net Metering program.

g. Out of the 179 customers who are enrolled in the Connected Solutions battery measure and have finished the interconnection process as of 10/26/2021, 6 of them are incentivized through the Re-Growth program.

h. The Company expected a higher increase in enrollments in 2021 due to the addition of an Energy Storage Adder in the Renewable Energy Fund. The Company planned for 300 residential battery systems to participate in summer DR events in 2021. However, preliminary data shows approximately 132 RI customers participated. Some of this decrease in program growth may be related to the economic impacts of the COVID-19 pandemic, which are expected to continue to mitigate through 2022. As a result, the Company is planning for 66 new residential battery systems to participate in 2022.

Prepared by or under the supervision of: Paul Wassink

PUC 1-74, page 3

Residential Connected Solutions

	2019	**2020**	**2021**	**2022**
RI Residential Batteries Accounts Participating	50	100	132 tentative *300 proposed*	450 proposed
RI Residential Batteries Increase Year-Over-Year	50	50	32	318
RI Residential Batteries % Year-Over-Year Growth	N/A	100%	32%	241%

Prepared by or under the supervision of: Paul Wassink

PUC 1-75
Residential Connected Solutions

Request:

Regarding the Smart thermostat-based demand response program, please explain the following:

a. On Bates page 191, the Company writes "after purchase, thermostat manufacturers send emails and in-app notification to customers inviting them to enroll in the ConnectedSolutions program." Please clarify whether or not this means every Rhode Island customer of the supported thermostat manufacturers has received at least one notification of the ConnectedSolutions program from the manufacturer.

b. To what does the Company attribute the 42% increase in forecast enrollment during the 2022 program year?

Response:

a. There are 7 supported thermostat manufacturers. Each manufacturer has unique marketing strategies and capabilities. Some manufactures send out messaging after a fixed time after device activation, while others wait for specific dates. Depending on what device the customers has purchased, when the customer activated that device, whether the customer chooses not to receive any marketing during setup, and whether the customer gave their email address during device activation, some customers may have not received even one notification about the ConnectedSolutions program from their manufacturer.

b. In 2020 the Company achieved a 60% year-over-year growth, and the Company anticipated achieving a 61% year-over-year growth rate in 2021. The 42% growth rate for 2022 is in line with the trend of a decreasing growth rate since the launch of this measure. However, the Company is also working on adding new devices and manufacturers to the program which will hopefully increase the year-over-year growth rate.

State	2016	2017	2018	2019	2020	2021	2022
RI Thermostats Enrolled by the End of the Calendar Year	96	813	1,674	2,479	3,969	6,409 tentative	9,101 proposed
RI Thermostats Enrolled Increase Year-Over-Year	200	717	861	805	1,490	2,440	2,692
RI Thermostats Enrolled % Year-Over-Year Growth	N/A	747%	106%	48%	60%	61%	42%

Prepared by or under the supervision of: John Richards

PUC 1-76
Residential Connected Solutions

Request:

Referencing Bates page 194, the Company estimates the 2022 budget for Residential Connected Solutions to be $1,802,200. On Bates page 202, the costs listed under the "total incentives" and "shared cost" columns for the Residential Connected Solutions program sum to $707,428. Reconcile these two cost estimates.

Response:

The "total incentives" budget listed on Bates page 202 is incorrect. Please see an updated total for incentive costs below. Other "shared costs" do not change.

Measure	**Units**	**Incentive / Unit**	**Total Incentives**
Thermostats New	2,692	$45	$121,140
Thermostats Existing	6,409	$20	$128,180
Battery Daily (number of unit)	300	$3,600	$1,080,000
Pool Pumps	25	$100	$2,500

In addition, the costs listed under the "total incentives" and "shared cost" columns in the Residential Connected Solutions program do not include $24,300 in incentive costs for the Residential Connected Solutions program Solar Inverter Demonstration.

Finally, a $9,000 discrepancy remains due to the final budget on Bates 194 not being correctly updated as of the time of the Plan filling.

The additional $228 discrepancy is due to rounding on Bates page 194.

Please see the Company's filing letter dated November 5, 2021 for additional details on the $9,000 discrepancy and how it is addressed in revised Attachment 5, Table E-2.

Prepared by or under the supervision of: John Richards

PUC 1-77
Residential Connected Solutions

Request:

For each of the program years 2016 through 2021, did the Company call an event through the Smart thermostat-based demand response program that coincided with the exact day and hour of that year's ISO-NE system peak?

Response:

The Company has called thermostats events which coincided with the exact day and hour of the ISO-NE system peak in every year since 2016.

	2016	**2017**	**2018**	**2019**	**2020**	**2021**
Date and Hour of ISO Annual Peak[1]	8/12/16 2:00 PM	6/13/17 4:00 PM	8/29/18 4:00 PM	7/30/19 5:00 PM	7/27/20 5:00 PM	6/29/21 5:00 PM
Time Frame of Thermostat Event Which Hit the Peak	8/12/2016 2:00 PM to 5:00 PM	6/13/17 2:00 PM to 5:00 PM	8/29/18 2:00 PM to 5:00 PM	7/30/19 3:00 PM to 6:00 PM	7/27/20 4:00 PM to 7:00 PM	6/29/21 4:00 PM to 7:00 PM

[1] FCM Annual System Peak Day, Hour, and Load, ISO-NE, October 2021, (https://www.iso-ne.com/isoexpress/web/reports/load-and-demand/-/tree/ann-sys-peak-day-hr-load).

Prepared by or under the supervision of: Paul Wassink

PUC 1-78
Residential Connected Solutions

Request:

For each of the program years 2016 through 2021, did the Company call an event through the battery-enabled demand response program that coincided with the exact day and hour of that year's ISO-NE system peak?

Response:

The residential battery measure did not start until 2019. Since the start of the residential battery measure, the Company has called events that coincided with the exact day and hour of the year's ISO-NE system peak.

Batteries

	2016	2017	2018	2019	2020	2021
Date and Hour of ISO Annual Peak	8/12/16 2:00 PM	6/13/17 4:00 PM	8/29/18 4:00 PM	7/30/19 5:00 PM	7/27/20 5:00 PM	6/29/21 5:00 PM
Time Frame of Thermostat Event Which Hit the Peak	N/A	N/A	N/A	7/30/2019 4:00 PM to 6:00 PM	7/27/2020 4:00 PM to 6:00 PM	6/29/2021 4:00 PM to 6:00 PM

Prepared by or under the supervision of: Paul Wassink

PUC 1-79
Residential Connected Solutions

Request:

For its active demand response offerings in both the Residential Connected Solutions programs, has the Company considered calling events during non-summer seasons? Please explain.

Response:

The Rhode Island electric grid uses more power (kW) in the summertime than any other time of the year. Many parts of the grid, including the size and number of power plants, transmission lines, substation transformers, distribution lines, and distribution transformers, must be sized to this peak load. The system benefits claimed by the Connected Solutions program, including DRIPE (Demand Response Induced Price Effects), transmission deferral, distribution deferral, capacity deferral, and reliability, are related to reducing electric loads at these peak times.

The Company has investigated possible system benefits of calling demand response events in the wintertime and co-commissioned a study to quantify system benefits of winter electric curtailment. That study found no quantifiable system benefits to winter electric load curtailment.[1]

In the shoulder seasons (fall and spring), electric loads are often low and distributed generation production is often high. For areas with high amounts of distributed generation, this could lead to localized areas of over generation and back feeding, which if the local distribution system is not upgraded to support, could cause unexpected and uncontrolled back feeding. Therefore, if a system benefit for shoulder season electric curtailment or beneficial electric load increase is quantified, the implementation of a demand response program would have to be careful to avoid local distribution issues.

There could be benefits to calling demand response events outside of the summer peak system. For example, if a substation transformer is undergoing maintenance so that the load of two feeders must be supported by only one feeder, or to beneficially increase loads (such as by charging batteries) during days/hours when local feeders have more distributed generation production than loads. The Company is working on improving its advanced distribution management system (ADMS) to be able to conduct the real-time power flow calculations on every feeder to dynamically respond to these very local and often unpredictable events. Once that ADMS is in place, the ADMS will be able to call on the distributed energy resource management system (DERMS) to dynamically help balance supply and demand.

[1] AESC Supplemental Study, Synapse Energy Economics, Inc. (2020), https://ma-eeac.org/wp-content/uploads/AESC-Supplemental-Study-Part-I-Winter-Peak.pdf.

Prepared by or under the supervision of: Paul Wassink

PUC 1-79, page 2

Residential Connected Solutions

The Company has investigated the possibility of calling on DERs to help reduce GHG emissions. Annual peak GHG emission rates (in lb. of CO^2-equivalent/kWh generated) happen during winter cold spells when dual-fuel power plants switch to diesel or coal power plants are dispatched. The operation of these diesel or coal-consuming plants lasts for days to weeks. Therefore, any curtailment event would have to last for a similar time to shift electric use from high GHG emission rate times to lower GHG emission rate times. The Company does not yet have any technology in the ConnectedSolutions program that could curtail or discharge energy for days or weeks.

The Company has investigated the possibility of calling on DERs to reduce electric use at times of high wholesale market prices. Wholesale market price spikes often correspond to an unexpected, forced outage of a major power plant, which reduces supply in the market while maintaining demand. These events are unpredictable by nature, and ISO-NE already has a procedure to call on active DR resources participating in the wholesale markets during these emergency events.

PUC 1-80

Large C&I New Construction Program

Request:

When describing the Whole Building Energy Use Intensity Reduction pathway (Bates page 218), the Company writes "To be eligible for incentives in this pathway, projects need to achieve a minimum 10% EUI reduction from the RI baseline. The RI Baseline for 2022 will be based on the current RI building code." Please clarify the specific date of the RI building code that the 2022 RI Baseline will be based on.

Response:

The 2022 RI Baseline will be based on the current RI building code. If a new code is adopted in 2022 or in the final three months of 2021, the RI Baseline will be based on the new code once the concurrency period ends. When a new code is adopted, builders are allowed a concurrency period (typically about three months) during which buildings can be designed to meet either the new or existing code. After this time, all buildings must comply with the current RI building code. The date of the project building permit determines which code date is applicable.

Prepared by or under the supervision of: Joshua Kessler

PUC 1-81
Large C&I New Construction Program

Request:

When developing the energy savings estimates for the proposed 2022 Large C&I New Construction program, what assumptions did the Company make regarding the Rhode Island state energy code, including whether or not a new energy code gets adopted in 2022 (and when), and the quantitative impact of a new state energy code on RI baseline(s).

Response:

The Company included no significant adjustments to savings calculations based on state energy code updates. Based on anecdotal discussions with RI building code officials, the Company does not believe that there are likely to be significant updates impacting the Large C&I New Construction program in 2022.

Prepared by or under the supervision of: Joshua Kessler

PUC 1-82
Large C&I New Construction Program

Request:

Referencing Bates page 221, the Company writes "no significant program changes are proposed since the program's new four path structure was just introduced in 2021. More time is needed for projects to be completed within this new program structure before its effectiveness can be assessed." Based on what the Company knows today about the Large C&I New Construction project pipeline, does the Company expect to be able to assess the effectiveness of the new four path program structure at some point within the 2022 program year?

Response:

Yes, by the end of 2022, the Company will have sufficient experience with the new four-path Large C&I New Construction structure to preliminarily assess whether these pathways have been effective at recruiting a robust project pipeline and encouraging project developers to achieve deeper energy savings by influencing the building design. However, as these projects typically take multiple years to complete, there will not be a sufficient volume of completed projects to conduct a formal EM&V study to fully assess the accuracy of savings calculations.

Prepared by or under the supervision of: Joshua Kessler

PUC 1-83

Large C&I New Construction Program

Request:

How did the Company develop and justify its eligibility requirement for the Performance Lighting Plus initiative that requires participants have an average minimum of 2,000 lighting operating hours per year (before controls)? Please provide supporting assumptions, data or evidence.

Response:

The Company has found through the process of screening many applications that projects that contain fewer than a specified number of operating hours are far less likely to have a Benefit Cost Ratio (BCR) that is greater than 1.0.

A minimum of 1,500-2,000 hours of use is a common requirement for many types of Commercial and Industrial (C&I) applications. Currently, both the prescriptive lighting forms for New Construction and Retrofit have 2,000 operating hour minimums.

Performance Lighting projects are inherently complex and are reviewed by technical representatives with substantial lighting experience. Each performance lighting project is evaluated holistically, on the basis of anticipated costs as well as planned savings and benefits.

Prepared by or under the supervision of: Benajamin Rivers

PUC 1-84
Large C&I New Construction Program

Request:

Explain the specific changes to the Performance Lighting Plus initiative that are being proposed for the 2022 Plan. How, specifically, do the proposed changes to the Performance Lighting Plus initiative respond to the three "rationale[s] for changes" that the Company identifies on Bates page 226?

Response:

The Company lists changes made to the Performance Lighting initiative below with an explanation for each change. The three rationale(s) for changes have been listed at the bottom of this response. The Company also lists the rationale(s) for change parenthetically by number at the end of each change for ease of review.

Change 1

The Company has proposed reducing the number of Performance Lighting tiers from three to two. The former Tier 1 (2021 EE Plan) is no longer aggressive enough to move projects beyond standard practice for the market. In the proposed plan, customers must present and install projects that are 40% lower than code for building or space type. The previous requirement was 10% lower than code. (2)

Change 2

The Company has proposed changing the incentive from $/watt saved to $/kWh saved. This will allow customers and their vendor partners to more easily assess the positive impact that the potential incentive will have on their project economics. (1)

Change 3

The Company has proposed allowing "room-based controls" to be substituted for Design Lights Consortium (DLC) Luminaire Level Lighting Controls (LLLC) on a case by case basis in Tier 1. These control systems, which allow control groups of fixtures to be controlled by one of more external sensors, have grown in popularity and sophistication alongside LLLC luminaires. Excluding them in certain situations would be a strategic mistake resulting in the loss of one or more control capabilities. (1,2)

Prepared by or under the supervision of: Benjamin Rivers

PUC 1-84, page 2

Large C&I New Construction Program

Change 4

The Company has proposed to eliminate the requirement that Tier 2 systems "demonstrate demand response capability." This change might seem counterintuitive, but the Company believes relaxing this requirement may lead to the adoption of more Tier 2 systems and possibly more demand response in the future. The distinction lies in the fact that all Tier 2 systems accepted by National Grid, per DLC's requirements, must be capable of energy monitoring and demand response, but proving that the demand response is operational is burdensome to customers and their installation partners. This is one major reason that few customers have chosen fully compliant Tier 2 systems in the past. Customers may always participate in a demand response program in the future if they feel that it is the best choice for them. The necessary technology will already be present. (2,3)

The three rationales for changes identified on Bates page 226 and referenced above are:

1. Increase transparency for customers and their advisors to increase program participation.

2. Move the market forward for luminaires and systems with additional savings and capabilities.

3. Increase the deployment of demand responsive lighting

PUC 1-85
Large C&I New Construction Program

Request:

On Bates page 222, the Company estimates the 2022 budget for Large C&I New Construction (electric) to be $18,387,000. On Bates page 295, the costs listed under the "total incentives" and "shared cost" columns for the Large Commercial and Industrial New Construction (electric) program sum to $9,232,431. Reconcile these two cost estimates.

Response:

The totals referenced on Bates pages 222 and Bates page 295 are incorrect. The total referenced on Bates page 414 is the correct amount[1]. The totals on Bates page 222 and 295 excluded $14,000 in additional STAT costs that are captured on Bates page 414. In addition, the total costs listed under the "total incentives" and "shared cost" columns for the Large C&I New Construction (electric) program on Bates Page 295 were not updated to include one subprogram:

Subprogram	Net Annual kWh Tracker by Subprogram	Incentive / Net Annual kwh	Total Incentives
CHP - RI Grows	15,578,122	$0.59	$9,154,400

The remaining $169 discrepancy is due to rounding on Bates page 295.

[1] Note that this amount is rounded to the nearest hundred dollars.

Prepared by or under the supervision of: John Richards

PUC 1-86, page 1

Large Commercial Retrofit Program

Request:

Provide an (anonymized) list of all customers who participated in the EnergySmart Grocer initiative during program years 2019, 2020, and 2021. For each customer, list the following information:

a. Date(s) of participation
b. Specific measures installed by the customer through the initiative (ex: refrigeration, HVAC equipment, kitchen equipment, etc.)
c. Cost of the program incentive paid out to that customer

Response:

Please see below for the requested data. If a number repeats within a year and a fuel, it means that the installation happened at the same location.

2019 Electric

Cust. #	End Use	End Use Detail	Final Payment	Incentive
1	Lighting		12/23/2019	$19,721
2	Refrigeration		12/16/2019	$630
3	Lighting		03/19/2019	$17,937
4	Lighting		06/21/2019	$66,352
5	Mult Custom	Refrigeration	09/05/2019	$26,119
5	Lighting		09/03/2019	$5,710
6	Lighting		12/23/2019	$28,260
7	Other		06/17/2019	$650
7	Lighting		07/01/2019	$7,722
8	Lighting		07/01/2019	$17,660
8	Drives & Motors		05/21/2019	$5,200
8	Lighting		05/21/2019	$3,053
8	Refrigeration		05/21/2019	$5,400
9	Lighting		12/10/2019	$26,867
10	HVAC		01/11/2019	$3,902

Prepared by or under the supervision of: Benjamin Rivers

PUC 1-86, page 2

Large Commercial Retrofit Program

Cust. #	End Use	End Use Detail	Final Payment	Incentive
10	**HVAC**		04/17/2019	$1,463
11	**Lighting**		12/16/2019	$16,227
12	**Refrigeration**		02/11/2019	$20,700
13	**Lighting**		10/16/2019	$43,447
14	**Lighting**		08/02/2019	$15,904
15	**Refrigeration**		06/18/2019	$10,500
16	**Lighting**		12/10/2019	$6,396
17	**Refrigeration**		08/13/2019	$1,800
17	**Mult Custom**		04/05/2019	$7,520
17	**Refrigeration**		10/21/2019	$4,375
17	**Refrigeration**		04/05/2019	$27,808
17	**Refrigeration**		04/01/2019	$9,900
18	**Refrigeration**		12/31/2019	$721
19	**Lighting**		05/06/2019	$13,350
20	**Refrigeration**		05/21/2019	$2,225
20	**Other**	**Kitchen Equipment**	09/24/2019	$4,000
21	**Lighting**		04/03/2019	$4,200
22	**Mult Custom**	**Hd control/N. Cover**	04/23/2019	$1,362
23	**Refrigeration**		11/07/2019	$1,650
24	**Lighting**		07/01/2019	$6,951
25	**Lighting**		12/16/2019	$16,992
26	**Lighting**		11/08/2019	$3,475
27	**Lighting**		05/06/2019	$2,000
28	**Lighting**		12/23/2019	$2,811
28	**Lighting**		08/13/2019	$27,152
29	**Refrigeration**		12/20/2019	$3,840
30	**Lighting**		09/03/2019	$2,550
31	**Other**	**Kitchen Equipment**	09/03/2019	$4,000
32	**Lighting**		04/05/2019	$96,457
33	**Lighting**		12/09/2019	$8,063
33	**Lighting**		12/02/2019	$940
34	**Lighting**		12/09/2019	$68,500

PUC 1-86, page 3

Large Commercial Retrofit Program

Cust. #	End Use	End Use Detail	Final Payment	Incentive
35	**Lighting**		12/13/2019	$33,145
35	**Lighting**		12/13/2019	$2,600
36	**Lighting**		12/18/2019	$66,021
36	**Lighting**		12/09/2019	$3,910
36	**Refrigeration**		11/04/2019	$11,875
37	**Refrigeration**		02/19/2019	$16,100
38	**Mult Custom**	**Refrig. /HVAC drives**	12/31/2019	$15,165
				$821,278

2020 Electric

Cust. #	End Use	End Use Detail	Final Payment	Incentive
1	**Refrigeration**		07/17/2020	$518
2	**Lighting**		11/17/2020	$8,801
3	**Lighting**		06/16/2020	$89,797
4	**Lighting**		08/03/2020	$70,089
5	**Lighting**		12/18/2020	$19,779
6	**Lighting**		06/16/2020	$85,984
7	**Lighting**		12/18/2020	$3,963
8	**Lighting**		02/11/2020	$7,820
9	**Lighting**		11/04/2020	$24,672
10	**Lighting**		11/17/2020	$105,807
11	**Lighting**		07/01/2020	$71,780
12	**Lighting**		12/18/2020	$4,115
13	**Lighting**		09/18/2020	$15,271
14	**Lighting**		08/24/2020	$58,796
15	**Refrigeration**		04/01/2020	$4,900
16	**Lighting**		08/03/2020	$76,504
17	**Lighting**		06/05/2020	$36,019
18	**Lighting**		06/01/2020	$76,384
19	**Refrigeration**		08/05/2020	$6,440

Prepared by or under the supervision of: Benjamin Rivers

PUC 1-86, page 4

Large Commercial Retrofit Program

Cust. #	End Use	End Use Detail	Final Payment	Incentive
20	**Lighting**		06/11/2020	$61,910
21	**Lighting**		07/17/2020	$24,959
21	**Mult Custom**	**Refrig. Controls**	12/07/2020	$1,003
22	**Lighting**		06/01/2020	$46,340
21	**Mult Custom**	**Refrig. Controls**	04/01/2020	$54,141
23	**Lighting**		12/18/2020	$4,096
24	**Lighting**		06/01/2020	$83,029
25	**Lighting**		05/15/2020	$88,721
26	**Lighting**		06/11/2020	$84,880
27	**Refrigeration**		12/09/2020	$6,900
28	**Lighting**		05/14/2020	$68,306
29	**Lighting**		05/14/2020	$78,064
30	**Lighting**		11/17/2020	$53,385
30	**Lighting**		11/06/2020	$16,425
31	**Refrigeration**		12/31/2020	$5,431
31	**Mult Custom**	**Refrig. Controls**	12/31/2020	$10,780
32	**Lighting**		09/23/2020	$16,120
33	**Lighting**		08/24/2020	$77,293
34	**Lighting**		11/03/2020	$4,141
34	**Other**		08/05/2020	$4,000
35	**Refrigeration**		10/07/2020	$14,044
36	**Lighting**		06/01/2020	$79,099
37	**Refrigeration**		10/14/2020	$20,918
38	**Lighting**		07/01/2020	$102,622
39	**Mult Custom**	**Refrig. Controls**	04/01/2020	$29,115
40	**Lighting**		04/06/2020	$1,760
41	**Refrigeration**		12/31/2020	$120,993
41	**Lighting**		11/09/2020	$57,970
41	**Lighting**		12/01/2020	$7,360
				$1,991,242

Prepared by or under the supervision of: Benjamin Rivers

PUC 1-86, page 5

Large Commercial Retrofit Program

2021 Electric

Cust. #	End Use	End Use Detail	Final Payment	Incentive
1	Refrigeration		02/01/2021	$783
1	Refrigeration		06/01/2021	$392
2	Refrigeration		09/10/2021	$391
2	Refrigeration		09/24/2021	$26,680
3	Refrigeration		04/01/2021	$450
4	Mult Custom	Cold Cases	04/16/2021	$360
5	Refrigeration		04/01/2021	$675
6	Refrigeration		09/17/2021	$391
7	Food Service		09/24/2021	$1,000
7	Food Service		09/24/2021	$1,800
8	Food Service		07/02/2021	$1,800
8	Food Service		07/02/2021	$1,000
8	Lighting		08/24/2021	$53,885
8	Mult Custom	Refrigeration	08/05/2021	$18,277
9	Food Service		03/08/2021	$900
9	Refrigeration		04/01/2021	$363
9	Mult Custom	Refrigeration	07/12/2021	$11,947
9	Lighting		03/05/2021	$2,760
10	Refrigeration		09/17/2021	$580
11	Refrigeration		03/08/2021	$4,890
12	Refrigeration		04/01/2021	$450
13	Refrigeration		03/24/2021	$450
14	Refrigeration		09/10/2021	$1,145
15	Refrigeration		09/17/2021	$391
16	Mult Custom	Cold Cases	04/16/2021	$360
17	Food Service		07/01/2021	$200
18	Lighting		02/03/2021	$750
19	Refrigeration		04/01/2021	$675
20	Refrigeration		08/12/2021	$1,013

Prepared by or under the supervision of: Benjamin Rivers

PUC 1-86, page 6

Large Commercial Retrofit Program

Cust. #	End Use	End Use Detail	Final Payment	Incentive
21	**Mult Custom**	**Cold Cases**	04/16/2021	$360
22	**Lighting**		10/01/2021	$400
23	**Refrigeration**		09/17/2021	$580
24	**Refrigeration**		09/17/2021	$869
25	**Refrigeration**		02/01/2021	$2,799
26	**Refrigeration**		02/08/2021	$203
27	**Mult Custom**	**Cold Cases**	04/16/2021	$360
28	**HVAC**		10/08/2021	$601
28	**Lighting**		09/01/2021	$5,352
29	**Lighting**		02/03/2021	$4,039
30	**Refrigeration**		09/10/2021	$391
31	**Refrigeration**		04/01/2021	$450
32	**Lighting**		02/01/2021	$3,810
33	**Refrigeration**		09/10/2021	$391
34	**Mult Custom**	**Cold Cases**	04/16/2021	$360
35	**Lighting**		10/04/2021	$400
36	**Refrigeration**		10/15/2021	$178
37	**Food Service**		03/01/2021	$200
38	**Refrigeration**		09/17/2021	$580
38	**Lighting**		01/25/2021	$1,800
39	**Lighting**		03/01/2021	$89,460
39	**Refrigeration**		02/01/2021	$783
39	**Refrigeration**		06/01/2021	$783
40	**Refrigeration**		02/09/2021	$7,325
40	**Refrigeration**		06/01/2021	$392
40	**Refrigeration**		02/01/2021	$392
41	**Mult Custom**	**Cold Cases**	04/16/2021	$360
42	**Food Service**		07/01/2021	$200
43	**Lighting**		02/02/2021	$4,058
44	**Mult Custom**	**Cold Cases**	04/16/2021	$360
45	**Lighting**		02/17/2021	$800
46	**Refrigeration**		02/01/2021	$225

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Large Commercial Retrofit Program

Cust. #	End Use	End Use Detail	Final Payment	Incentive
47	**Refrigeration**		04/01/2021	$450
48	**Lighting**		08/06/2021	$44,520
49	**Mult Custom**	**Cold Cases**	05/03/2021	$360
50	**Refrigeration**		09/01/2021	$391
50	**Mult Custom**		03/19/2021	$15,329
51	**Mult Custom**		04/16/2021	$360
51	**Lighting**		08/24/2021	$38,224
52	**Refrigeration**		03/24/2021	$450
53	**Lighting**		01/25/2021	$900
53	**Refrigeration**		09/17/2021	$580
54	**Refrigeration**		02/01/2021	$1,400
55	**Mult Custom**	**Cold Cases**	05/03/2021	$360
56	**Refrigeration**		09/01/2021	$225
57	**Mult Custom**	**Cold Cases**	04/16/2021	$360
58	**Mult Custom**	**Cold Cases**	04/16/2021	$360
59	**HVAC**		03/16/2021	$920
				$369,202

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Large Commercial Retrofit Program

2019
Gas

Cust. #	End Use	Incentive	Close Date
1	Refrigeration	$ 4,158	3/31/2019
1	Refrigeration	$ 11,732	3/31/2019
2	Refrigeration / HVAC	$ 3,966	1/31/2019
3	Refrigeration	$ 1,760	3/31/2019
4	Refrigeration	$ 4,983	8/31/2019
5	Refrigeration	$ 9,450	2/28/2019
5	Refrigeration	$ 12,150	1/31/2019
6	HVAC	$ 4,370	2/28/2019
7	Refrigeration / HVAC	$ 766	4/30/2019
8	HVAC	$ 6,506	12/31/2019
		$ 55,683.00	

2020
Gas

Cust. #	End Use	Incentive	Close Date
1	HVAC	$ 6,506	12/31/2019
2	Refrigeration / HVAC	$ 34,480	3/31/2020
		$ 40,986	

2021
Gas

Cust. #	End Use	Incentive	Close Date
1	Refrigeration	$ 1,946	6/30/2021
2	Refrigeration	$ 15,660	9/30/2021
3	Kitchen Equipment	$ 2,000	7/31/2021
4	Kitchen Equipment	$ 2,000	10/31/2021
5	Refrigeration	$ 15,597	8/31/2021
4	Refrigeration	$ 24,038	10/31/2021
		$ 61,241	

Prepared by or under the supervision of: Benjamin Rivers

PUC 1-87
Large Commercial Retrofit Program

Request:

How, specifically, is the Company proposing to change the performance-based compensation structure under the EnergySmart Grocer initiative for the 2022 program year?

Response:

The Company is currently negotiating with the vendor on the exact levels of compensation received per gross kWh delivered. Finalized Pay for Performance charts will not be available until later in 2021.

However, directionally, the Company has proposed creating two Pay for Performance (P4P) compensation schedules for the vendor. The previous three tier (Up to 75%, 76%-100%, and 100%+ of goal) single P4P compensation schedule did not distinguish between a kWh delivered from lighting and a kWh from another end use such as HVAC, which has a longer measure life. As the measure life for lighting has fallen dramatically and a larger portion of the vendor's savings were generated by lighting than seen in the beginning years of the initiative, the Company felt it was appropriate to send the vendor an economic signal to place less emphasis on lighting measures and more emphasis on other measures such as refrigeration and HVAC. As with the previous compensation schedule, performance that exceeds goal in both lighting and non-lighting will be more richly rewarded than performance which falls in the 75-100% of goal range.

Prepared by or under the supervision of: Benjamin Rivers

PUC 1-88
Large Commercial Retrofit Program

Request:

Referencing Bates page 234, the Company proposes the following changes to the Industrial Initiative for 2022: "the initiative will expand outreach to customers in 200 to 400 kW range to encourage greater participation by small and medium sized industrial customers." Please explain the following regarding the proposed changes:

a. For program years 2019, 2020, and 2021, how many manufacturing and industrial customers did the Company have?
b. For program years 2019, 2020, and 2021, how many manufacturing and industrial customers with demand of 200-400 kW did the Company have?
c. Of the manufacturing and industrial customers with demand of 200-400 kW, how many customers participated in the Industrial Initiative in program years 2019, 2020, and 2021?

Response:

a. For program years 2019, 2020, and 2021, the Company had 334 manufacturing and industrial customers.
b. For program years 2019, 2020, and 2021, the Company had 178 manufacturing and industrial customers with demand of 200-400 kW.
c. Of the manufacturing and industrial customers with demand of 200-400 kW, nine participated in 2019, nine participated in 2020, and seven have participated year-to-date in 2021 through October.

The Company maintains a list of potential industrial customers, including all customers that have participated in the Industrial Initiative. For purposes of this analysis, any customers on this list were categorized as "manufacturing and industrial."

Note that through the process described above, the Company was unable to reproduce estimates of exactly how many manufacturing and industrial customers it had in the specific years requested. The Company believes, however, that it is unlikely that the number varied significantly during the years 2019 to 2021.

Prepared by or under the supervision of: Joshua Kessler

PUC 1-89
Large Commercial Retrofit Program

Request:

Referencing Bates page 234, the Company notes that the "Industrial Initiative has helped diversify the Electric portfolio, with 66% of savings deriving from non-lighting measures, especially compressed air (17%), process (15%), HVAC (14%), and motors and drives (9%)." How will the proposed expansion of Initiative outreach to small- and medium-sized industrial customers impact savings diversity? Specifically, under the proposed outreach expansion, does the Company expect more, less, or about the same percentage of savings to derive from non-lighting measures?

Response:

Overall, the Company anticipates a similar savings mix from the Industrial Initiative under the proposed expansion. This expansion represents a small portion of the Industrial Initiative budget (7 percent of the contract budget), thus this outreach effort is unlikely to substantially alter the measure mix.

The Company anticipates a similar mix of energy-consuming equipment will be found in facilities belonging to small- and mid-sized customers. However, because the majority of small- and mid-sized facilities have historically been targeted less for energy efficiency improvements than larger C&I customers, many of these customers are more likely to have remaining efficient lighting retrofit opportunities than larger C&I customers. Accordingly, on a go-forward basis the Company believes that this effort is likely to yield more opportunities to implement lighting retrofits and other more established energy efficiency measures than the overall Industrial Initiatives efforts, which more commonly targets larger customers where these opportunities have already been realized. Thus, lighting may represent a moderately greater percentage of savings within these small- and mid-sized facilities compared to the overall Industrial Initiative measure mix.

Prepared by or under the supervision of: Joshua Kessler

PUC 1-90
Large Commercial Retrofit Program

Request:

Regarding the Lodging Initiative, the Company proposes offering a new incentive to support the replacement of packaged terminal air conditioners with packaged terminal heat pumps. However, when describing the overall Lodging Initiative on Bates page 274, the Company notes "the [lodging] sector was hit hard by COVID-19 and may experience continued headwinds if business travel declines permanently as remote conferencing has replaced in-person meetings." Given that the Company believes the sector may continue to experience financial hardship, why is 2022 the right time to introduce the new incentive for packaged terminal heat pumps?

Response:

Introducing a new prescriptive incentive for packaged terminal heat pumps (PTHP's) would be a relatively minor, one-time expense. Although many lodging customers have been reluctant to invest in their properties, some continue to do so, especially with targeted energy efficiency investments like PTHP's that help reduce their long-term operating costs, even if the industry experiences a prolonged downturn.

PTHP's can offer short simple payback periods (often 1 to 3 years), which makes this an attractive measure even for customers that are hesitant to invest in their properties. Financial incentives can further reduce this payback period and make the measure even more attractive.

Furthermore, this measure can be installed in non-lodging facilities, such as assisted living, dormitories, and multifamily. This broader applicability increases the value of establishing a prescriptive incentive for PTHP's.

It should also be noted that the full context of the comment quoted above on Bates Page 274 was that the Company considered but does not currently plan to launch a full-scale vendor-driven Lodging Initiative. Implementing this type of initiative would likely require significant ongoing budget expenditures to cover vendor costs and National Grid staff time, whereas introducing a new prescriptive incentive would require a small fraction of the budget needed to support a vendor-driven Lodging Initiative.

Prepared by or under the supervision of: Joshua Kessler

PUC 1-91
Large Commercial Retrofit Program

Request:

On Bates page 222, the Company estimates the 2022 budget for Large C&I New Construction (electric) to be $18,387,000. On Bates page 295, the costs listed under the "total incentives" and "shared cost" columns for the Large Commercial and Industrial New Construction (electric) program sum to $9,232,431. Reconcile these two cost estimates.

Response:

See the Company's response to PUC 1-85.

Prepared by or under the supervision of: John Richards

PUC 1-92
OER Weatherization Funding

Request:

Regarding the $1.1 million in weatherization funding from OER, please explain the following:

a. How much funding will remain available for the 2022 program year?
b. Of the funding that remains available in the 2022 program year, which programs will it be allocated to? Describe the total amounts to be allocated between programs.

Response:

a. The final balance is an estimate as offers are still being made to customers, but the Company's vendor believes that approximately $950,000 will remain available for customers of all fuel (per RI Office of Energy's request) types in 2022.

b. Based on current outreach and original estimates the Company anticipates that –
    a. ~20% or $190,000 will be allocated to Small Business electric customers
    b. ~25% or $237,500 will be allocated to Small Business delivered fuel customers
    c. ~55% or $522,500 will be allocated to Small Business gas customers

Prepared by or under the supervision of: Benjamin Rivers

PUC 1-93

OER Weatherization Funding

Request:

Referencing Bates page 278, how does the Company propose to "prioritize marketing of these weatherization installations in areas hit hardest by the COVID pandemic," specifically the zip codes included in the Department of Health's March 30, 2021 Hardest-Hit COVID zip codes list?

Response:

The Company's vendor will build marketing lists for each of the priority zip codes. Direct mail supplemented by neighborhood canvassing will be the primary vehicle for generating interest in this energy saving opportunity. Once a few successful projects are completed, the primary approach will be supplemented by social media messaging that targets influencers within these communities featuring cases studies of program participants.

Prepared by or under the supervision of: Benjamin Rivers

PUC 1-94
C&I Connected Solutions

Request:

Referencing Bates page 281, the Company writes "the number of enrolled MW in Targeted Dispatch has decreased since 2019. This is in large part due to customers choosing to move their enrollment from Targeted Dispatch to Daily Dispatch. This is a good trend, because Daily Dispatch generates more system benefits per MW than Targeted Dispatch." If Daily Dispatch generates more system benefits and is more popular among customers, why does the Company propose to continue the Targeted Dispatch offering?

Response:

Most customers are not capable or willing to curtail loads for the 30 to 60 events per summer for the Daily Dispatch offering. Customers participating in the Daily Dispatch typically curtail in a way that does not affect their comfort or operations, such as with standby generators or batteries. Whereas customers participating in Targeted Dispatch typically curtail through means that do impact their comfort or operations, such as changing manufacturing schedules, HVAC setbacks, or dimming lighting.

Targeted Dispatch customers tend to be more willing to participate if the number of events is limited to the 1-8 events per summer. In the event the Company stopped offering the Targeted Dispatch, the Company would expect few or no customers would migrate from Targeted Dispatch to Daily Dispatch. The customers who prefer Daily Dispatch have already enrolled in Daily Dispatch. Customers participate in Connected Solutions in a variety of ways, and the Company aims to provide a portfolio of demand response programs that maximizes the number of customers who can participate.

Prepared by or under the supervision of: Paul Wassink

PUC 1-95
C&I Connected Solutions

Request:

Please update "Table 6 – Targeted Dispatch Participation" (Bates page 281) to include a row for number of participating customers.

Response:

Please see the updated table below.

Table 6. Targeted Dispatch Participation

	Historic Numbers				Estimated Number	Proposed Number
	2017	**2018**	**2019**	**2020**	**2021**	**2022**
Average MW of Curtailment over all events	11	27	32	21	23 (vs. 37 planned)	28 (20% increase)
Number of Participating Accounts	32	49	115	152	151	180

Prepared by or under the supervision of: Paul Wassink

PUC 1-96
C&I Connected Solutions

Request:

Please update "Table 7 – Daily Dispatch Participation" (Bates page 282) to include a row for number of participating customers.

Response:

Please see the updated table below.

Table 7. Daily Dispatch Participation

	Historic Numbers		Estimated Number	Proposed Number
	2019	2020	2021	2022
Average MW of Curtailment over all events	0	4	8 (vs. 4 planned)	10 (25% increase)
Number of Participating Accounts	0	13	29	36

Prepared by or under the supervision of: Paul Wassink

PUC 1-97
C&I Connected Solutions

Request:

Referencing Tables 6 and 7 (Bates pages 281-2), what does the Company mean by "average MW of Curtailment over all events"? In your response, explain how the information included in the Tables is different than (or the same as) the sum of curtailed MW over all events.

Response:

The average MW of Curtailment over all events refers to the average curtailment by all customers, across all events, averaged together without any weighting. This average value does not take into account the increased significance of curtailing load during the single peak hour of the year. This is the same as the sum of curtailed MW over all events.

This average curtailment is inputted into the benefit cost model. That model contains another line, labeled "DR Scaling Factor", which does account for exactly which peaks were curtailed in any given summer. This DR Scaling Factor is calculated using a separate spreadsheet tool developed by Synapse as a result of the Effect of Uncleared Capacity Load Reductions on Peak Forecasts study conducted by Synapse Energy Economics. Please see Attachment PUC 1-71, for the Effect of Uncleared Capacity Load Reductions on Peak Forecasts study.

Prepared by or under the supervision of: Paul Wassink

PUC 1-98
C&I Connected Solutions

Request:

For each of the years included in "Table 7 – Daily Dispatch Participation," (Bates page 282) explain whether the curtailed MW came from customers who had been previously enrolled in Targeted Dispatch but switched over to Daily Dispatch for that year, or whether the MW came from customers who had only participated in Daily Dispatch.

Response:

Please see the updated table below.

Table 7. Daily Dispatch Participation

	Historic Numbers		Estimated Number
	2019	2020	2021
Average MW of Curtailment over all events for customers who were not previously enrolled in Targeted Dispatch	0	0.4	0.9
Average MW of Curtailment over all events for customers who were previously enrolled in Targeted Dispatch	0	3.6	7.1
Total	0	4	8

Prepared by or under the supervision of: Paul Wassink

PUC 1-99
C&I Connected Solutions

Request:

For each of the program years 2017 through 2021, did the Company call an event through the Targeted Dispatch initiative that coincided with the exact day and hour of that year's ISO-NE system peak?

Response:

Yes, the Company has called Targeted Dispatch events which coincided with the exact day and hour of each ISO-NE system peak each year since 2017.

Targeted Dispatch

	2016	**2017**	**2018**	**2019**	**2020**	**2021**
Date and Hour of ISO Annual Peak	8/12/16 2:00 PM	6/13/17 4:00 PM	8/29/18 4:00 PM	7/30/19 5:00 PM	7/27/20 5:00 PM	6/29/21 5:00 PM
Time Frame of Targeted Dispatch Event Which Hit the Peak	N/A	6/13/17 2:00 PM to 5:00 PM	8/29/18 2:00 PM to 5:00 PM	7/30/19 3:00 PM to 6:00 PM	7/27/20 4:00 PM to 7:00 PM	6/29/21 4:00 PM to 7:00 PM

Prepared by or under the supervision of: Paul Wassink

PUC 1-100
C&I Connected Solutions

Request:

For each of the program years 2017 through 2021, did the Company call an event through the Daily Dispatch initiative that coincided with the exact day and hour of that year's ISO-NE system peak?

Response:

Yes, the Company has called RI Daily Dispatch events which coincided with the exact day and hour of the ISO-NE system peak each year since 2020.

Daily Dispatch

	2016	2017	2018	2019	2020	2021
Date and Hour of ISO Annual Peak	8/12/16 2:00 PM	6/13/17 4:00 PM	8/29/18 4:00 PM	7/30/19 5:00 PM	7/27/20 5:00 PM	6/29/21 5:00 PM
Time Frame of Targeted Dispatch Event Which Hit the Peak	N/A	N/A	N/A	7/30/19 3:00 PM to 6:00 PM*	7/27/20 4:00 PM to 7:00 PM	6/29/21 4:00 PM to 7:00 PM

** In 2019 no customers enrolled in the RI Daily Dispatch measure. However, the Company did have enrollments in their Massachusetts service area and did call a Daily Dispatch event which coincided with the exact day and hour of the annual peak.*

Prepared by or under the supervision of: Paul Wassink

PUC 1-101
C&I Connected Solutions

Request:

In Tables 6 and 7 (Bates pages 281-2), the Company proposes 28 MW of average curtailment in 2022 for the Targeted Dispatch initiative and 10 MW of average curtailment in 2022 for the Daily Dispatch initiative. Then, on Bates page 283, the Company proposes 32.4 MW of Annual Active Demand Reduction across both ConnectedSolutions initiatives. Please reconcile the demand reduction estimate from Tables 6 and 7 (38 MW) with the demand reduction estimate on Bates page 283 (32.4 MW).

Response:

The values in Tables 6 and 7 (Bates pages 281-2) are the gross annual MW for the Commercial Connected Solutions programs. The value on Bates page 283 is the net annual MW for the Commercial Connected Solutions programs.

Prepared by or under the supervision of: Paul Wassink

PUC 1-102
C&I Connected Solutions

Request:

For its active demand response offerings in both the Commercial Connected Solutions programs, has the Company considered calling events during non-summer seasons? Please explain why or why not.

Response:

Please see the response to PUC 1-79.

Prepared by or under the supervision of: Paul Wassink

PUC 1-103
C&I Connected Solutions

Request:

Based on the numbers included in the "Commercial ConnectedSolutions – Electric Program Goals, Metrics, Budgets, Participation for 2022" table on Bates page 283, the cost of a unit (kW) of demand reduction through the proposed 2022 Commercial ConnectedSolutions program appears to be $135.4/kW. Based on the numbers included in the "Residential ConnectedSolutions – Electric Program Goals, Metrics, Budgets, Participation for 2022" table on Bates page 194, the cost of a unit (kW) of demand reduction through the proposed 2022 Residential ConnectedSolutions program appears to be $244.7/kW. Explain why the cost-per-kW of demand reduction in Residential ConnectedSolutions is nearly twice as expensive as the cost-per-kW of demand reduction in Commercial ConnectedSolutions for the proposed 2022 Plan.

Response:

For each measure included in Connected Solutions, the largest proportion of the cost is the customer incentive. These incentives are designed to be large enough to adequately encourage customers to participate while being small enough to maintain cost effectiveness. Incentive structures are also designed to be simple so that customers can quickly understand them when deciding to enroll.

Comparing Connected Solutions measures on a $/kW rate is potentially confusing, because some measures are called on more often than others, leading to a higher system benefit value per kW.

The customer incentive, how often measures are called, and the BCR for each measure is summarized in the table below.

Measure	Customer Incentive	Number of Events per Year	BCR
C&I Targeted Dispatch	$35/kW-summer	1 to 8	5.2
C&I Daily Dispatch	$300/kW-summer	30 to 60	1.6
Thermostats	$25 upfront $20 annual	13 to 17	New 4.7 Existing 10.6
Batteries	$400/kW-summer Heat Loan	30 to 60	1.2
Pool Pumps	$100 upfront $20 annual	30 to 60	2.5

Prepared by or under the supervision of: Paul Wassink

PUC 1-104
C&I Connected Solutions

Request:

Referencing Bates pages 281-2, Tables 6 and 7 suggest the Company is proposing to achieve more MW of curtailment from the Targeted Dispatch and Daily Dispatch initiatives in the 2022 Plan than in the 2021 plan. Specifically, the Company proposes a 20% increase for Targeted Dispatch and a 10% increase for Daily Dispatch. However, Table E-7 on Bates page 423 suggests that the target for Active Demand Response achieved through the Commercial ConnectedSolutions program will decrease by 1,200 kW between the approved 2021 and proposed 2022 plans. Please reconcile these two estimates of year-over-year changes in demand reduction from the Commercial ConnectedSolutions program.

Response:

The values in Tables 6 and 7 (Bates pages 281-2) are the gross annual MW for the Commercial Connected Solutions programs. The value on Bates page 423 is the net annual MW for the Commercial Connected Solutions programs. The Targeted Dispatch measure has a 80% relization rate. 28 MW (from Table 6) times 80% plus 10 MW (from Table 7) times a 100% relization rate equals 32,400 kW (from Table E-7).

Prepared by or under the supervision of: Paul Wassink

PUC 1-105
C & I Connected Solutions

Request:

Referencing Bates page 76, please provide a summary of the results of the Company's review of summer 2021 performance related to Targeted Dispatch and Daily Dispatch.

Response:

The Company is still collecting meter data and calculating performance for the summer of 2021.

The Company is still missing meter data for about 10% of Targeted Dispatch customers. The performance calculated so far with this missing data shows and average curtailment over all events of 31 MW. However, these calculations have not been through the full review process.

The Company is still missing meter data for about 50% of Daily Dispatch customers. Much of this meter data will come from the asset-level metering provided by the curtailment service providers. Due to the large amount of missing data, work has not yet started on calculating the performance for Daily Dispatch.

Prepared by or under the supervision of: Paul Wassink

PUC 1-106
C&I Connected Solutions

Request:

On Bates page 222, the Company estimates the 2022 budget for Large C&I New Construction (electric) to be $18,387,000. On Bates page 295, the costs listed under the "total incentives" and "shared cost" columns for the Large Commercial and Industrial New Construction (electric) program sum to $9,232,431. Reconcile these two cost estimates.

Response:

Please see the Company's response to PUC 1-85.

Prepared by or under the supervision of: John Richards

Redacted

PUC 1-107

Evaluation, Measurement, and Verification

Request:

Please update Table 2 (Bates page 304) to include a column for forecast evaluation cost.

Response:

Table 2. Planned Evaluation Studies in 2022

Sector	Study Code	Type	Affected Programs	Study Name	State Lead	Projected cost
C&I	RI-21-CG-CustGasPY20	Impact	C&I Gas	Impact Evaluation of PY2020 Custom Gas Installations (continued from 2021)	RI	
C&I	RI-21-CE-CustElecPY20	Impact	C&I Elec	Impact Evaluation of PY2020 Custom Electric Installations (continued from 2021)	RI	
C&I	RI-22-CG-CustGasPY21	Impact	C&I Gas	Impact Evaluation of PY2021 Custom Gas Installations	RI	
C&I	RI-22-CE-CustElecPY21	Impact	C&I Elec	Impact Evaluation of PY2021 Custom Electric Installations	RI	
C&I	RI-22-CX-FRSO	NTG	C&I	C&I Free-Ridership and Spillover Study	RI	
C&I	RI-22-CX-Proc	Process	C&I	Small Business Process Evaluation	RI	
C&I	RI-22-CX-Codes	Codes	C&I	C&I New Construction Baseline Study	RI	
C&I	RI-22-CE-LightMar	Market	C&I Electric	C&I Lighting Market Characterization Study	RI	
C&I	RI-22-CX-Presc	Impact	C&I	C&I Prescriptive Non-Lighting Impact Evaluation	MA	
C&I	RI-22-CX-RTUOpt	Impact	C&I	Automated RTU Optimization Demonstration Evaluation	RI	
Residential	RI-21-RX-NPStudy	Market	Multiple	EE Non-Participant Study (continued from 2021)	RI	

Prepared by or under the supervision of: Romilee Emerick and John Richards

Redacted

PUC 1-107, page 2

Evaluation, Measurement, and Verification

Residential	RI-21-RE-SolarDRDemo	Impact	DR	Solar Inverter Power Factor Correction Demonstration Evaluation (continued from 2021)	RI	[redacted]
Residential	RI-21-RG-GasHPDemo	Impact	HVAC Demo	Gas Heat Pump Demonstration Evaluation	RI	
Residential	RI-21-RX-CSNC	Impact	RNC/Codes	Residential New Construction and Code Compliance Study (continued from 2021)	RI	
Residential	RI-22-RX-SecondaryHeat	Impact	EWSF	Follow-up Research on Secondary Heating in EnergyWise Single Family Program	RI	
Residential	RI-22-RE-HPMeter	Impact	Energy Star HVAC - Electric	Mini-Split/Central Heat Pump Metering Study	MA	
Residential	RI-22-RX-ModerateNEI	NEI	EWSF	Moderate Income NEI study	MA	
Cross-cutting	RI-22-XX-Workforce	Policy	Multiple	Workforce Associated with Rhode Island Energy Efficiency Programs Analysis Study	RI	
Cross-cutting	RI-22-XX-WorkDev	Policy	Multiple	Rhode Island Energy Efficiency Workforce Development Needs Assessment	RI	

PUC 1-108
Evaluation, Measurement, and Verification

Request:

For program years 2011-2021, provide a table that includes the following information:

a. Proposed annual budget for evaluation study expenditures
b. Proposed annual budget for evaluation study expenditures as a percentage of total proposed annual budget
c. Actual annual spending on evaluation study expenditures

Response:

a.

Table 1. Proposed annual budget for evaluation study expenditures

	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Annual evaluation budget (in $million)	$1.7	$1.4	$1.3	$1.4	$1.3	$1.4	$2.4	$2.3	$2.6	$3.5	$3.1

b.

Table 2. Proposed annual budget for evaluation study expenditures as a percentage of total proposed annual budget

	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Annual evaluation budget as percentage of total proposed annual budget	2.7%	1.9%	1.3%	1.3%	1.2%	1.3%	2.0%	1.9%	1.8%	2.4%	2.0%

Prepared by or under the supervision of: Romilee Emerick and John Richards

PUC 1-108, page 2

Evaluation, Measurement, and Verification

c.

Table 3. Actual annual spending on evaluation study expenditures

	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Actual annual spending on evaluation (in $million)	$0.6	$1.0	$0.5	$1.0	$1.0	$1.4	$3.0	$1.4	$1.8	$2.4	NA

PUC 1-109
Evaluation, Measurement, and Verification

Request:

Regarding the Impact Analysis of Residential WiFi Thermostats (Draft) on Bates page 352, please explain the following:

a. What is the significance of the Company adopting the draft results of this study, compared to the other studies/evaluations in which the Company adopted final results?
b. For each of the relevant programs listed on Bates page 352, how much did claimable electric savings from WiFi and programmable thermostats decrease? Please explain the impacts in terms of gross savings as well as percentage change.
c. For each of the relevant programs listed on Bates page 352, how much did claimable gas savings from WiFi and programmable thermostats decrease? Please explain the impacts in terms of gross savings as well as percentage change.

Response:

a During the planning process, the final results from the study were available but the report itself had not been finalized. After consultation with EERMC consultants, National Grid determined it was appropriate to provide these updated savings now versus waiting another year to apply these results. Since the plan was filed, this study has now been finalized and there were no updates to the savings provided in the benefit cost model and/or technical reference manual. The final report can be found here: MARES24- Final Report - 2021 09 29.pdf
b The "Residential Wi-Fi Thermostats" study mentioned in part a) could not produce reliable electric savings estimates. This can be verified in section 3.1 titled electric savings. Due to this, there were no updates to the electric savings and the 2021 planning numbers are the same as the 2022 planning numbers.
c Please see table below for a comparison between the 2021 plan and the 2022 plan for the gas Wi-Fi program offerings. There is a 21.3% increase in savings for the multifamily Wi-Fi thermostats, 10% reduction in savings for the single-family Wi-Fi thermostat measure and a 35% reduction in savings for the single-family programmable thermostat measure. There was an error in all iterations of the multifamily programmable thermostat savings. The updated savings of 2.07 was mistakenly omitted from the BCR model. If entered correctly, this update would result in a 38% increase in energy savings ((2.07-1.5)/1.5=0.38) The impact of this correction would show marginally higher BCR values that the current measure level and program level BCRs.

Prepared by or under the supervision of: Antonio Larson

Program	Measure	2022 Plan Gas Savings (MBTU)	2021 Plan Gas Savings (MBTU)	Savings Reduction Gas Savings (MBTU)	Percentage Reduction
Energy Star Heating System	WiFi Enabled Thermostat	2.79	3.11	-0.32	-10.3%
Energy Star Heating System	WiFi Enabled Thermostat with Cooling	2.79	3.11	-0.32	-10.3%
Energy Star Heating System	Programmable Thermostat	2.07	3.20	-1.13	-35.3%
Energy Wise Single Family	WiFi thermostat	2.79	3.20	-0.41	-12.8%
Energy Wise Single Family	Programmable thermostat	2.07	3.20	-1.13	-35.3%
EnergyWise Multifamily	Wi-Fi programmable thermostat (controls gas heat only)	2.79	2.30	0.49	21.3%
EnergyWise Multifamily	Programmable thermostat	1.5	1.50	0.00	0.0%
Low Income Multifamily	Wi-Fi Thermostat (controls gas heat only)	2.79	2.30	0.49	21.3%
Low Income Multifamily	Programmable thermostat	1.5	1.50	0.00	0.0%
C&I Multifamily	Wi-Fi programmable thermostat (controls gas heat only)	2.79	2.30	0.49	21.3%
C&I Multifamily	Programmable thermostat	1.5	1.50	0.00	0.0%

PUC 1-110
Performance Incentive Mechanism

Request:

Referring to Table E-8B (both Original and Provisional), please show the underlying calculation of the $31,171,270 eligible spending budget for the non-income eligible residential subtotal. Note all data inputs into the calculation and specify where each input is included elsewhere in Attachment 5, if relevant.

Response:

The eligible spending budget for each sector is defined in the fifth column of table E-3 in both the Original and Provisional versions of Attachment 5.

The eligible spending budget starts with the total sector budget in the last column of E-2 and removes the following categories: regulatory costs, pilot costs, assessment costs, Residential ConnectedSolutions costs, and performance incentive costs. Each of these categories is shown on a line in table E-3 except Assessment costs. Assessments are embedded within programs, rather than reported separately as pilots are. Therefore, the cost of assessments is not called out with a separate line item in Table E-3.

The tables below summarize the derivation of the eligible spending budget. Reference is made to the cells in the Excel format version of Attachment 5 that was filed with the Provisional Plan. The eligible spending budgets for the non-income eligible residential sector differs slightly between the Original ($31,171,270) and the Provisional ($31,174,743) Plans because of the mechanism of allocation of cross sector costs to programs.

Prepared by or under the supervision of: John Tortorella

PUC 1-110, page 2

Performance Incentive Mechanism

Table 1.
Derivation of Eligible Spending Budget for the
Non-Income Eligible Residential Sector for Original Plan

Ref.	Category	Value	Cell Reference in Table E3	Notes
(1)	Proposed Sector Budget from E-2	$32,998,332	B21	
(2)	Commitments	$0	C21	
(3)	Regulatory Costs (sector level)	$0	D21	Regulatory Costs in Table E-3 are allocated at the portfolio level. They are allocated to sectors for the performance incentive in Table E8B
(4)	Performance Incentive	$0	E21	
(5)	Residential ConnectedSolutions	$1,802,218	B14	
(6)	Residential Pilots	$0	B16	
(7)	Residential Assessments	$24,844	N/A	Embedded within programs, so not shown on a separate line in table E3. Subtracted from cell F21.
(8)	Eligible Spending Budget	$31,171,270	F21	Eligible Spending Budget = Row 1 - Sum of Rows 2 through 7

Source: Attachment 5 – Filed 10-1-21, Table E-3

Prepared by or under the supervision of: John Tortorella

PUC 1-110, page 3

Performance Incentive Mechanism

Table 2.
Derivation of Eligible Spending Budget for the
Non-Income Eligible Residential Sector for Provisional Plan

Ref.	Category	Value	Cell Reference in Table E3	Notes
(1)	Proposed Sector Budget from E-2	$33,002,027	B21	
(2)	Commitments	$0	C21	
(3)	Regulatory Costs (sector level)	$0	D21	Regulatory Costs in Table E-3 are allocated at the portfolio level. They are allocated to sectors for the performance incentive in Table E8B.
(4)	Performance Incentive	$0	E21	
(5)	Residential ConnectedSolutions	$1,802,441	B14	
(6)	Residential Pilots	$0	B16	
(7)	Residential Assessments	$24,844	N/A	Embedded within programs, so not shown on a separate line in table E3. Subtracted from cell F21.
(8)	Eligible Spending Budget	$31,174,743	F21	Eligible Spending Budget = Row 1 - Sum of Rows 2 through 7.

Source: Attachment 5 – Filed 10-8-21 (Provisional Plan), Table E-3

Prepared by or under the supervision of: John Tortorella

PUC 1-111
Performance Incentive Mechanism

Request:

Referring to Table E-8B (both Original and Provisional, please show the underlying calculation of the $54,713,968 eligible spending budget for C&I (subtotal). Note all data inputs into the calculation and specify where each input is included elsewhere in Attachment 5, if relevant.

Response:

The eligible spending budget for each sector is defined in the fifth column of table E-3 in both the Original and Provisional versions of Attachment 5.

The eligible spending budget starts with the total sector budget in the last column of E-2 and removes the following categories: regulatory costs, pilot costs, assessment costs, Commercial ConnectedSolutions costs, and performance incentive costs. Each of these categories is shown on a line in table E-3 except Assessment costs. Assessments are embedded within programs, rather than reported separately as Pilots are. Therefore, the cost of assessments is not called out with a separate line item in Table E-3.

The tables below summarize the derivation of the eligible spending budget. Reference is made to the cells in the Excel format version of Attachment 5 that was filed with the Provisional Plan. The eligible spending budgets for the Commercial & Industrial sector differs slightly between the Original ($54,713,968) and the Provisional ($54,707,098) Plans because of the mechanism of allocation of cross sector costs to programs.

Prepared by or under the supervision of: John Tortorella

PUC 1-111, page 2
Performance Incentive Mechanism

Table 1.
Derivation of Eligible Spending Budget for the
Commercial & Industrial Sector for Original Plan

Ref.	Category	Value	Cell Reference in Table E3	Notes
(1)	Proposed Sector Budget from E-2	$64,630,985	B21	
(2)	Commitments	$0	C21	
(3)	Regulatory Costs (sector level)	$0	D21	Regulatory Costs in Table E-3 are allocated at the portfolio level. They are allocated to sectors for the performance incentive in Table E8B
(4)	Performance Incentive	$5,500,000	E21	
(5)	Commercial ConnectedSolutions	$4,385,962	B14	
(6)	Commercial Pilots	$0	B16	
(7)	Commercial Assessments	$31,055	N/A	Embedded within programs, so not shown on a separate line in table E3
(8)	Eligible Spending Budget	$54,713,968	F21	Eligible Spending Budget = Row 1 - Sum of Rows 2 through 7

Source: Attachment 5 – Filed 10-1-21, Table E-3

Prepared by or under the supervision of: John Tortorella

PUC 1-111, page 3
Performance Incentive Mechanism

Table 2.
Derivation of Eligible Spending Budget for the
Commercial & Industrial Sector for Provisional Plan

Ref.	Category	Value	Cell Reference in Table E3	Notes
(1)	Proposed Sector Budget from E-2	$64,625,015	B21	
(2)	Commitments	$0	C21	
(3)	Regulatory Costs (sector level)	$0	D21	Regulatory Costs in Table E-3 are allocated at the portfolio level. They are allocated to sectors for the performance incentive in Table E8B
(4)	Performance Incentive	$5,500,000	E21	
(5)	Commercial ConnectedSolutions	$4,386,861	B14	
(6)	Commercial Pilots	$0	B16	
(7)	Commercial Assessments	$31,055	N/A	Embedded within programs, so not shown on a separate line in table E3
(8)	Eligible Spending Budget	$54,707,098	F21	Eligible Spending Budget = Row 1 - Sum of Rows 2 through 7

Source: Attachment 5 – Filed 10-8-21 (Provisional Plan), Table E-3

Prepared by or under the supervision of: John Tortorella

PUC 1-112
Performance Incentive Mechanism

Request:

Please explain the Company's rationale for the changes to the proposed Gas Energy Efficiency Performance Incentive.

Response:

The Company interpreted the guidance from Order 24225 such that in the case of negative PIM-eligible net benefits the structure as explained below would result. The Company does not view this as a change to the Performance Incentive Mechanism, per se, but rather an implementation of prior guidance from the Commission for addressing a specific circumstance resulting from planned values in the 2022 Annual Energy Efficiency Plan.

In the 2021 Annual Energy Efficiency Plan, the calculation of PIM-eligible net benefits resulted in a slightly positive net benefit value for the non-income eligible residential sector. As a result, of the requested $1.7 Million total Gas Energy Efficiency earning opportunity, $100,000 was assigned to the non-income eligible residential sector and the remaining $1.6 Million was assigned to the Commercial & Industrial sector. The Income Eligible Residential Sector, at design level, produced negative PIM-eligible net benefits. This sector was therefore assigned a positive design level achievement for PIM earning of $2.0 Million PIM-eligible net benefits, at which level the Company would be eligible to earn an incentive of $500,000.[1]

In the proposed 2022 Annual Energy Efficiency Plan, as with 2021, the income eligible residential sector produced negative PIM-eligible net benefits and the C&I sector produced positive PIM-eligible net benefits. The calculation of the PIM-eligible net benefits for the non-income eligible residential sector resulted in a negative net benefit value for the sector, differing from 2021. As a result, the Company allocated the requested $1.7 Million gas portfolio earning opportunity to the C&I sector. The Company also applied positive design level achievement goals of $2.0 Million PIM-eligible net benefits to the Income Eligible and Non-Income Eligible residential sectors, at which level a $500,000 incentive could be earned. As mentioned above, this result is consistent with how the Company interpreted the guidance from Order 24225.[2]

[1] Refer to Appendix A (PDF page 56 of 62) of PUC Order 24225 for a table summarizing these values: http://www.ripuc.ri.gov/eventsactions/docket/5076-NGrid-Ord24225%20(9-21-2021).pdf
[2] Refer to 2022 Annual Energy Efficiency Plan Filing, Table G8C, Bates page 441 http://www.ripuc.ri.gov/eventsactions/docket/5189-NGrid-Energy%20Efficiency%20Plan%202022%20(PUC%2010-1-21).pdf

Prepared by or under the supervision of: John Tortorella

PUC 1-113
Performance Incentive Mechanism

Request:

Referencing Bates page 122, please explain why the Company proposes to recalculate the sector spending budgets but not the goals or incentive targets after transfers between sector budgets.

Response:

The Company has interpreted the Performance Incentive Mechanism guidance issued as Appendix A of Order 24225[1] as not permitting changes to the goals or incentive targets set in each annual plan. The sector spending budgets could be adjusted, subject to the stipulations and notifications in Sections 10.4 and 10.5[2], to account for changes in opportunities to deliver savings during the course of the program year but the Company would do so at its risk with respect to the PIM.

[1] RI PUC Docket 5076, Order 24225 issued September 21, 2021.
http://www.ripuc.ri.gov/eventsactions/docket/5076-NGrid-Ord24225%20(9-21-2021).pdf

[2] Filed 2022 Annual Energy Efficiency Plan, Bates pages 121-122:
http://www.ripuc.ri.gov/eventsactions/docket/5189-NGrid-Energy%20Efficiency%20Plan%202022%20(PUC%2010-1-21).pdf

Prepared by or under the supervision of: John Tortorella

PUC 1-114

Budget, SBC Charge, and Bill and Rate Impacts

Request:

Referring to the chart on Bates page 19, please provide a similar analysis and chart using the total dollars from which the given SBC rates were derived in each column, rather than the electric SBC charge in rates.

Response:

Please see the table below.

1		(a)	(b)	(c)	(d)	(e)	(f)
2		2021 Charge	Updated Load Forecast	5% Budget Increase	Fund Balance Update	FCM Revenue Change (Electric Only)	2021-2022 Growth
3	Electric Customer Funding Required $(000)	$75,423	$0	$5,830	$20,395	$1,683	$27,908
4	Percent Change		0.0%	7.7%	27.0%	2.2%	37.0%
5	(1) Cell 4b does not change because updating the load forecast only impacts the EE charge. The total customer funding required from ratepayers does not change.						

Prepared by or under the supervision of: John Richards

PUC 1-115

Budget, SBC Charge, and Bill and Rate Impacts

Request:

Referring to the chart on Bates page 20, please provide a similar analysis and chart using total dollars from which the given SBC rates were derived in each column, rather than the gas SBC charge in rates.

Response:

Please see the table below.

1		(a)	(b)	(c)	(d)	(e)	(f)
2	Rate Category	2021 Charge	Updated Load Forecast	5% Budget Increase	Fund Balance Update	C&I Charge Funding Allocation Update (Gas Only)	2021-2022 Growth
3	Gas Residential Customer Funding Required $(000)	$22,701	$-	$82	$9,967	$-	$10,050
4	Percent Change		0.0%	0.4%	43.9%	0.0%	44.3%
5	Gas C&I Customer Funding Required $(000)	$5,380	$-	$1,666	$2,003	$-	$3,669
6	Percent Change		0.0%	31.0%	37.2%	0.0%	68.2%
7	Total Customer Funding Required $(000)	$28,081	$-	$1,748	$11,970	$-	$13,718
8	(1) column (e) - 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. In 2021, $5.06 million in C&I collections went to fund the residential and income eligible sectors. In 2022, this has been increased to $7.46M. This increases the proposed C&I EE charge and decreases the proposed Residential EE charge.						
9	(2) column (e) - Cells 3e, 5e, and 7e do not change because updating the funding allocation only impacts the EE charge(s). The total customer funding required from each sector (line 4 in the G-1 table) does not change.						
10	(3) Cells 3b,5b, and 7b do not change because updating the load forecast only impacts the EE charge. The total customer funding required from ratepayers does not change.						

Prepared by or under the supervision of: John Richards

PUC 1-116
Budget, SBC Charge, and Bill and Rate Impacts

Request:

Referring to the response to PUC 1-22 in docket 5076, please provide an analysis for each of the programs in the proposed 2022 program year that is the same type of analysis shown on Attachment PUC 1-22-29, pages 1 through 5 (comparing the total and individual program cost solely against the electric energy costs and the electric generation costs). Please provide this analysis for the "provisional plan" referenced on Bates page 29 of the plan.

Response:

Table 1 below summarizes the requested cost of supply analysis comparing the total and individual program cost solely against the electric energy costs and the electric generation costs. Attachment PUC 1-116 provides program-level detail. This analysis is completed for the "Provisional Plan" only.
As with the response in PUC 1-22 in Docket 5076, the Company took several additional steps to assess cost of supply at program-level rather than portfolio-level. These additional data processing steps are described below.

Distributing sector-level implementation costs to programs: Some categories of implementation costs are included in the plans at the sector-level. To analyze cost of supply at the program level, sector-level costs were distributed to programs by multiplying those sector-level costs by the ratio of the program's direct programmatic costs to all direct programmatic costs within the sector. This is an approximation for the purposes of this cost of supply calculation and is not necessarily reflective of the distribution of these costs in actual implementation.

Distributing sector-level shareholder incentive costs to programs: The shareholder incentive amounts are planned at the sector-level. To analyze cost of supply at the program level, sector-level shareholder incentive costs were distributed to programs by multiplying those incentive costs by the ratio of the program's direct programmatic costs to all direct programmatic costs within the sector. This is an approximation for the purposes of this cost of supply calculation and is not necessarily reflective of the actual distribution of shareholder incentive. This approach does not apply to the ConnectedSolutions demand response programs, which are not eligible for the energy efficiency shareholder incentive.

Prepared by or under the supervision of: Jessica Darling

PUC 1-116, page 2
Budget, SBC Charge, and Bill and Rate Impacts

Distributing portfolio-level costs to programs: Some costs are defined at the portfolio level (EERMC and OER costs). They are allocated to programs for the purpose of this analysis by multiplying those portfolio level costs by the ratio of the program's direct programmatic costs to all direct programmatic costs across all sectors. This is an approximation for the purposes of this cost of supply calculation.

Table 1

Calculation of limited cost of supply compared to cost of energy efficiency for Electric Energy Efficiency and Demand Response portfolio

		2022
	a	b
1	Electric Energy Costs	$57,445,780
2	Electric Generation Costs	$7,017,268
3	**Cost of supply = Sum of Rows 1 through 5**	**$64,463,048**
4	Program Implementation Expenses	$117,116,459
5	Customer Contribution	$18,802,494
6	Shareholder Incentive	$5,500,000
7	**Cost of energy efficiency = Sum of Rows 7 through 9**	**$141,418,953**
8	**Difference = Row 6 - Row 10**	**-$76,955,905**

Notes:
(1) Table E-6, sum of Energy columns "Winter Peak, "Winter Off-Peak", "Summer Peak" and "Summer Off-Peak.", and Table E-6B Energy columns "Summer Peak" and "Summer Off-Peak"
(2) Table E-6 and E-6B, Capacity column "Summer Generation."
(4) 2022 Provisional Annual Plan Table E-2
(5) 2022 Provisional Annual Plan Table E-2
(6) 2022 Provisional Annual Plan Table E-2

Prepared by or under the supervision of: Jessica Darling

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 5189
Attachment PUC 1-116-1
Summary of Cost of Supply Calculations for Electric Portfolio and Programs

Sector	Portfolio or Program Category	Analysis Version	Cost Component	2022
Portfolio	Electric Portfolio	Electric Energy and Generation Only	Cost of Supply	$64,463,048
			Cost of Energy Efficiency	$141,418,953
			Difference	-$76,955,905
Residential	Residential New Construction	Electric Energy and Generation Only	Cost of Supply	$1,156,603
			Cost of Energy Efficiency	$2,238,985
			Difference	-$1,082,382
Residential	Energy Star® HVAC	Electric Energy and Generation Only	Cost of Supply	$5,972,364
			Cost of Energy Efficiency	$6,772,799
			Difference	-$800,435
Residential	EnergyWise	Electric Energy and Generation Only	Cost of Supply	$1,022,339
			Cost of Energy Efficiency	$17,833,928
			Difference	-$16,811,589
Residential	EnergyWise Multifamily	Electric Energy and Generation Only	Cost of Supply	$1,625,763
			Cost of Energy Efficiency	$4,121,664
			Difference	-$2,495,901
Residential	Home Energy Reports	Electric Energy and Generation Only	Cost of Supply	$1,817,801
			Cost of Energy Efficiency	$2,898,524
			Difference	-$1,080,723
Residential	Residential Consumer Products	Electric Energy and Generation Only	Cost of Supply	$3,191,145
			Cost of Energy Efficiency	$4,720,391
			Difference	-$1,529,246
Commercial & Industrial	Large Commercial New Construction	Electric Energy and Generation Only	Cost of Supply	$16,380,710
			Cost of Energy Efficiency	$16,232,881
			Difference	$147,829
Commercial & Industrial	Large Commercial Retrofit	Electric Energy and Generation Only	Cost of Supply	$23,434,139
			Cost of Energy Efficiency	$47,760,866
			Difference	-$24,326,727
Commercial & Industrial	Small Business Direct Install	Electric Energy and Generation Only	Cost of Supply	$4,152,150
			Cost of Energy Efficiency	$13,861,738
			Difference	-$9,709,587
Income Eligible	Single Family - Income Eligible Services	Electric Energy and Generation Only	Cost of Supply	$2,948,342

			Cost of Energy Efficiency	$14,291,406
			Difference	-$11,343,064
Income Eligible	Income Eligible Multifamily	Electric Energy and Generation Only	Cost of Supply	$1,875,166
			Cost of Energy Efficiency	$3,809,327
			Difference	-$1,934,161
Residential	Residential ConnectedSolutions	Electric Energy and Generation Only	Cost of Supply	$240,811
			Cost of Energy Efficiency (Demand Response)	$1,977,974
			Difference	-$1,737,164
Commercial & Industrial	Commercial ConnectedSolutions	Electric Energy and Generation Only	Cost of Supply	$645,716
			Cost of Energy Efficiency (Demand Response)	$4,898,469
			Difference	-$4,252,753

Notes:
Cost of supply sources:

Table E-6, sum of Energy columns "Winter Peak, "Winter Off-Peak", "Summer Peak" and "Summer Off-Peak.", and Table E-6B Energy columns "Summer Peak" and "Summer Off-Peak"
Table E-6 and E-6B, Capacity column "Summer Generation."

Cost of Energy Efficiency sources:

2022 Provisional Annual Plan Table E-2

PUC 1-117

Budget, SBC Charge, and Bill and Rate Impacts

Request:

Referring to the response to PUC 8-1 in docket 5076, please provide a similar chart and analysis for the 2022 proposed program as illustrated in Attachment PUC 8-1-1. Please provide this analysis for the "provisional plan" referenced on Bates page 29 of the plan.

Response:

Please see Table 1 below which shows the components of the cost of supply calculation for the electric portfolio overall with the addition of two rows: the lifetime MWh savings from the portfolio and the calculated cost of supply in dollars per lifetime kWh.

Table 1: Provisional Plan Electric Portfolio - Cost of Supply Components and Calculation of $/Lifetime kWh

		2022
Ref	**a**	**b**
1	Electric Energy Costs	$57,445,780
2	Electric Generation Costs	$ 7,017,268
3	Electric Transmission Capacity Costs	$16,878,757
4	Electric Distribution Capacity Cost	$16,723,139
5	Natural Gas Costs	$ (2,435,344)
6	Fuel Costs	$19,636,011
7	Income Eligible Rate Discount	$107,155
8	Arrearages	$147,884
9	Price Effects	$37,541,278
10	Non-embedded Greenhouse Gas Reduction Costs	$47,127,173
11	Non-embedded Nitrous Oxide (NOx Costs)	$ 1,271,510
12	Reliability Costs	$ 1,277,883
13	**Cost of supply = Sum of Rows 1 through 12**	**$202,738,493**
14	Electric Energy Savings (Lifetime MWh)	893,474
15	**Cost of supply ($/kWh) = Row 13 / (Row 14 * 1000)**	**$0.2269**

Notes:
(1) Table E-6, sum of Energy columns "Winter Peak, "Winter Off-Peak", "Summer Peak" and "Summer Off-Peak.", and Table E-6B Energy columns "Summer Peak" and "Summer Off-Peak"

(2) Table E-6 and E-6B, Capacity column "Summer Generation."

Prepared by or under the supervision of: Jessica Darling

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Budget, SBC Charge, and Bill and Rate Impacts

(3) Table E-6 and E-6B, Capacity column "Trans."
(4) Table E-6 and E-6B, Capacity column "Dist."
(5) Table E-6, Non-electric column "Natural Gas." less Gas DRIPE included in that column
(6) Table E-6, sum of Non-electric columns "Natural Gas," "Oil", "Other Resource."
(7) Calculations from Electric Benefit-Cost Model, 2022 Plan
(8) Calculations from Electric Benefit-Cost Model, 2022 Plan
(9) Table E-6 and E-6B, sum of Capacity column "Capacity DRIPE" and Energy column "Energy DRIPE." and calculation from Electric Benefit-Cost Model, 2021-2023 Plan for "Gas DRIPE"
(10) Table E-6 and E-6B, Societal column "Carbon."
(11) Table E-6, Societal column "NOx."
(12) Table E-6 and E-6B, Capacity column "Reliability."
(14) Table E-6A

Prepared by or under the supervision of: Jessica Darling

PUC 1-118, page 1
Budget, SBC Charge, and Bill and Rate Impacts

Request:

Referring to the response to PUC 9-2 in docket 5076, please provide the same type of summary tables for the 2022 program year. Please provide this analysis for the "provisional plan" referenced on Bates page 29 of the plan.

Response:

The Company has performed this analysis for the 2022 energy efficiency programs contained in the electric and natural gas portfolios.

The electric and gas BCA Excel models output only the present value of the lifetime benefits attributable to measures (and consequently programs and portfolios when those measures are aggregated), rather than summarizing annual levels of benefit streams at the program level. While the savings generated by a measure on an annual basis are assumed to remain constant over the duration of a measure's life, the avoided costs against which those streams of savings are monetized into benefits vary over time.

Therefore, annual savings will remain constant over the lifetime of measure, while annual benefit values can vary. For purposes of this analysis, the present value of program level lifetime benefits has been converted to annual values that are equal over the duration of the lifetime of the savings and benefits in a program.

The calculations of payback used for this request can be generalized as follows:

$$Payback\ Period = \frac{(Program\ Implementation\ Expenses + Customer\ Contribution)}{Annual\ Benefits}$$

For each of the three parts of the response, the numerator in the calculation is equivalent to the sum of the "Program Implementation Expenses" and "Customer Contributions" columns as shown in Table E-5 (Attachment 5 of the Provisional Plan) and G-5 (Attachment 6).

The average measure life by program is determined by dividing the lifetime energy savings by the annual energy savings, as seen in E-6A (Attachment 5 of the Provisional Plan) and G-6A (Attachment 6).

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PUC 1-118, page 2
Budget, SBC Charge, and Bill and Rate Impacts

For **Part One** of the analysis (cost of supply), two versions are shown:

- Version 1 only includes the benefit category "Electric Energy Costs" or "Natural Gas Costs" for the electric and gas portfolios, respectively.
- Version 2 includes the categories of benefits that are included as costs of energy supply in the cost of supply analysis as indicated in PUC 1-116.

For **Part Two** of the analysis, the Company has used all of the benefits as included in the calculation of the Total Resource Cost (TRC) Test BCA as shown in the refiled Table E-5A (Attachment 5 of the Provisional Plan) and G-5A (Attachment 6) of the filing.

For **Part Three** of the analysis (RI Test), two versions are shown:

- Version 1 where the Company used all of the benefits, with the exception of Economic Benefits, in the calculation of the RI Test BCA for programs as shown in Table E-5-Primary and Table G-5-Primary in Attachment 5 of the Provisional Plan and Attachment 6, respectively.
- Version 2 where the Company used all of the benefits, including Economic Benefits, in the calculation of the RI Test BCA for programs as shown in Table E-5-Secondary and Table G-5-Secondary in Attachment 5 of the Provisional Plan and Attachment 6, respectively.

Refer to the summary tables below for the payback period (in years) under each part of the requested analysis. In scenarios where the calculated payback period is greater than the average measure life for the program, the payback period for the program in that part is listed as "N/A." For Commercial ConnectedSolutions in the Electric Portfolio, there are no associated kWh energy savings and therefore no Electric Energy Costs to quantify for Version 1 of Part 1. For this reason, the payback period for the program for Version 1 of Part 1 is listed as "N/A." Further, an average measure life of 1 year is used for calculating the payback period of Commercial ConnectedSolutions in Parts 1 (Version 2), 2, and 3.

Prepared by or under the supervision of: Jessica Darling

PUC 1-118, page 3

Budget, SBC Charge, and Bill and Rate Impacts

Electric Portfolio – Programmatic Payback Periods (Years)

		Part 1		Part 2	Part 3	
Sector	**Program**	**Version 1: Cost of Supply ("Electric Energy Costs")**	**Version 2: Cost of Supply (PUC 1-116)**	**TRC Test BCA (Table E5A – Attachment 5 Provisional)**	**RI Test BCA Primary (Table E5 – Primary – Attachment 5 Provisional)**	**RI Test BCA Secondary (Table E5 – Secondary- Attachment 5 Provisional)**
Residential	Residential New Construction	N/A	8.5	9.8	7.8	5.2
Residential	Energy Star® HVAC	N/A	7.3	9.1	6.7	4.6
Residential	EnergyWise	N/A	N/A	N/A	4.6	2.4
Residential	EnergyWise Multifamily	N/A	13.1	10.0	8.3	4.9
Residential	Home Energy Reports	N/A	0.5	0.7	0.5	0.3
Residential	Residential Consumer Products	N/A	3.2	4.2	3.0	2.1
Commercial & Industrial	Large Commercial New Construction	14.3	5.7	6.4	4.9	2.1
Commercial & Industrial	Large Commercial Retrofit	N/A	4.8	4.8	3.8	1.2
Commercial & Industrial	Small Business Direct Install	N/A	N/A	N/A	5.6	2.3
Income Eligible	Single Family - Income Eligible Services	N/A	10.6	6.6	5.6	3.9
Income Eligible	Income Eligible Multifamily	N/A	12.2	7.2	6.2	4.1
Residential	Residential ConnectedSolutions	N/A	0.7	0.6	0.6	0.4
Commercial & Industrial	Commercial ConnectedSolutions	N/A	0.5	0.4	0.4	0.2

PUC 1-118, page 4

Budget, SBC Charge, and Bill and Rate Impacts

Natural Gas Portfolio – Programmatic Payback Periods (Years)

Sector	Program	Part 1		Part 2	Part 3	
		Version 1: Cost of Supply ("Natural Gas Costs")	Version 2: Cost of Supply (PUC 1-116)	TRC Test BCA (Table G5A – Attachment 6)	RI Test BCA Primary (Table G5 – Attachment 6	RI Test BCA Secondary (Table G5 – Attachment 6)
Residential	Energy Star® HVAC	N/A	N/A	N/A	15.1	10.7
Residential	EnergyWise	N/A	N/A	N/A	18.1	9.9
Residential	EnergyWise Multifamily	N/A	13.3	5.6	4.7	3.4
Residential	Home Energy Reports	0.6	0.3	0.6	0.3	0.2
Residential	Residential New Construction	N/A	16.3	13.9	10.1	9.5
Commercial & Industrial	Large Commercial New Construction	8.8	4.3	3.6	2.5	2.0
Commercial & Industrial	Large Commercial Retrofit	6.6	3.2	2.4	1.7	1.3
Commercial & Industrial	Small Business Direct Install	8.8	4.5	5.9	3.5	2.6
Commercial & Industrial	Commercial & Industrial Multifamily	14.3	7.3	2.8	2.4	1.8
Income Eligible	Single Family - Income Eligible Services	N/A	N/A	10.0	8.9	6.0
Income Eligible	Income Eligible Multifamily	N/A	12.1	3.1	2.8	2.2

PUC 1-119

Budget, SBC Charge, and Bill and Rate Impacts

Request:

Referring to the response to Record Request No. 8 in docket 5076, please provide the same information provided in the referenced response for both the proposed electric and gas programs for the 2022 program year. Please provide this analysis for the "provisional plan" referenced on Bates page 29 of the plan.

Response:

Please see Attachments PUC 1-119-1 and PUC 1-119-2. The tables below list the unique participants included in the models.

2022 Provisional Plan Electric Rate and Bill Impacts Model	**Unique Participants**
Residential (Model 1: HERs only)	298,076
Residential (Model 2: All Programs Except HER)	117,270
Residential (Model 3: All Programs)	415,346

2022 Gas Rate and Bill Impacts Model	**Unique Participants**
Residential (Model 1: HERs only)	152,324
Residential (Model 2: All Programs Except HER)	9,269
Residential (Model 3: All Programs)	161,593

Prepared by or under the supervision of: John Richards

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 5189
Attachment PUC 1-119-1
2022 Provisional Plan Electric Rate and Bill Impacts - Expanded

Sector	Long Term Rate Impacts	Change in Bills			
			Non-Participants	Average Customer	Average Participant
Residential (Model 1: HERs only)	0.01%	**Long Term Average**	**0.01%**	**-0.04%**	**-0.06%**
		2022	0.11%	-0.82%	-1.19%
		2023	0.00%	0.00%	0.00%
		2024	0.00%	0.00%	0.00%
		2025	0.00%	0.00%	0.00%
		2026	0.00%	0.00%	0.00%
		2027	0.00%	0.00%	0.00%
		2028	0.00%	0.00%	0.00%
		2029	0.00%	0.00%	0.00%
		2030	0.00%	0.00%	0.00%
		2031	0.00%	0.00%	0.00%
		2032	0.00%	0.00%	0.00%
		2033	0.00%	0.00%	0.00%
		2034	0.00%	0.00%	0.00%
		2035	0.00%	0.00%	0.00%
		2036	0.00%	0.00%	0.00%
		2037	0.00%	0.00%	0.00%
		2038	0.00%	0.00%	0.00%
		2039	0.00%	0.00%	0.00%
		2040	0.00%	0.00%	0.00%
		2041	0.00%	0.00%	0.00%
Residential (Model 2: All Programs Except HERs)	0.17%	**Long Term Average**	**0.17%**	**-0.12%**	**-7.05%**
		2022	6.03%	5.40%	1.35%
		2023	-0.47%	-1.05%	-4.86%
		2024	-0.47%	-1.05%	-4.87%
		2025	-0.39%	-0.97%	-4.79%
		2026	-0.31%	-0.88%	-4.71%
		2027	-0.29%	-0.76%	-4.91%
		2028	-0.22%	-0.69%	-4.84%
		2029	-0.26%	-0.48%	-10.91%
		2030	-0.22%	-0.44%	-10.87%
		2031	-0.08%	-0.30%	-10.75%
		2032	-0.08%	-0.29%	-10.74%
		2033	0.05%	-0.17%	-10.63%
		2034	0.05%	-0.17%	-10.63%
		2035	0.04%	-0.17%	-10.64%
		2036	0.04%	-0.17%	-10.64%
		2037	0.03%	-0.13%	-13.75%
		2038	0.03%	-0.13%	-13.75%
		2039	0.00%	0.00%	0.00%
		2040	0.00%	0.00%	0.00%
		2041	0.00%	0.00%	0.00%

Residential (Model 3: All Programs)	0.26%	**Long Term Average**	**0.26%**	**-0.08%**	**-6.82%**
		2022	7.06%	5.44%	5.15%
		2023	-0.52%	-1.11%	-4.91%
		2024	-0.53%	-1.11%	-4.92%
		2025	-0.44%	-1.02%	-4.84%
		2026	-0.36%	-0.93%	-4.76%
		2027	-0.15%	-0.62%	-4.78%
		2028	-0.08%	-0.55%	-4.71%
		2029	-0.13%	-0.35%	-10.79%
		2030	0.05%	-0.17%	-10.63%
		2031	0.05%	-0.17%	-10.63%
		2032	0.05%	-0.17%	-10.63%
		2033	0.05%	-0.17%	-10.63%
		2034	0.05%	-0.17%	-10.63%
		2035	0.04%	-0.17%	-10.64%
		2036	0.04%	-0.17%	-10.64%
		2037	0.03%	-0.13%	-13.75%
		2038	0.03%	-0.13%	-13.75%
		2039	0.00%	0.00%	0.00%
		2040	0.00%	0.00%	0.00%
		2041	0.00%	0.00%	0.00%

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 5189
Attachment PUC 1-119-2
2022 Plan Gas Rate and Bill Impacts - Expanded

Sector	Long Term Rate Impacts	Change in Bills			
			Non-Participants	Average Customer	Average Participant
Residential (Model 1: HERs only)	0.02%	**Long Term Average**	**0.02%**	**0.00%**	**-0.01%**
		2022	0.45%	0.003%	-0.17%
		2023	0.00%	0.00%	0.00%
		2024	0.00%	0.00%	0.00%
		2025	0.00%	0.00%	0.00%
		2026	0.00%	0.00%	0.00%
		2027	0.00%	0.00%	0.00%
		2028	0.00%	0.00%	0.00%
		2029	0.00%	0.00%	0.00%
		2030	0.00%	0.00%	0.00%
		2031	0.00%	0.00%	0.00%
		2032	0.00%	0.00%	0.00%
		2033	0.00%	0.00%	0.00%
		2034	0.00%	0.00%	0.00%
		2035	0.00%	0.00%	0.00%
		2036	0.00%	0.00%	0.00%
		2037	0.00%	0.00%	0.00%
		2038	0.00%	0.00%	0.00%
		2039	0.00%	0.00%	0.00%
		2040	0.00%	0.00%	0.00%
		2041	0.00%	0.00%	0.00%
		2042	0.00%	0.00%	0.00%
		2043	0.00%	0.00%	0.00%
		2044	0.00%	0.00%	0.00%
		2045	0.00%	0.00%	0.00%
Residential (Model 2: All Programs Except HERs)	0.47%	**Long Term Average**	**0.46%**	**0.26%**	**-4.72%**
		2022	8.93%	8.62%	1.76%
		2023	0.11%	-0.17%	-6.39%
		2024	0.11%	-0.17%	-6.39%
		2025	0.11%	-0.17%	-6.39%
		2026	0.10%	-0.17%	-6.39%
		2027	0.10%	-0.16%	-6.39%
		2028	0.10%	-0.16%	-6.39%
		2029	0.10%	-0.16%	-6.40%
		2030	0.10%	-0.16%	-6.40%
		2031	0.10%	-0.16%	-6.40%
		2032	0.09%	-0.16%	-6.40%
		2033	0.09%	-0.16%	-6.40%
		2034	0.09%	-0.16%	-6.40%
		2035	0.09%	-0.16%	-6.41%
		2036	0.09%	-0.16%	-6.41%
		2037	0.08%	-0.16%	-6.41%
		2038	0.04%	-0.09%	-3.53%
		2039	0.04%	-0.09%	-3.53%
		2040	0.03%	-0.05%	-2.25%
		2041	0.03%	-0.05%	-2.25%
		2042	0.03%	-0.05%	-2.25%
		2043	0.03%	-0.05%	-2.25%
		2044	0.02%	-0.05%	-2.25%
		2045	0.00%	0.00%	0.00%

		Long Term Average	0.48%	0.25%	0.15%
Residential (Model 3: All Programs)	0.49%	2022	9.38%	8.57%	8.32%
		2023	0.11%	-0.17%	-0.26%
		2024	0.11%	-0.17%	-0.26%
		2025	0.11%	-0.17%	-0.27%
		2026	0.10%	-0.17%	-0.27%
		2027	0.10%	-0.16%	-0.27%
		2028	0.10%	-0.16%	-0.27%
		2029	0.10%	-0.16%	-0.27%
		2030	0.10%	-0.16%	-0.27%
		2031	0.10%	-0.16%	-0.28%
		2032	0.09%	-0.16%	-0.28%
		2033	0.09%	-0.16%	-0.28%
		2034	0.09%	-0.16%	-0.28%
		2035	0.09%	-0.16%	-0.28%
		2036	0.09%	-0.16%	-0.29%
		2037	0.08%	-0.16%	-0.29%
		2038	0.04%	-0.09%	-0.16%
		2039	0.04%	-0.09%	-0.16%
		2040	0.03%	-0.05%	-0.10%
		2041	0.03%	-0.05%	-0.10%
		2042	0.03%	-0.05%	-0.10%
		2043	0.03%	-0.05%	-0.11%
		2044	0.02%	-0.05%	-0.11%
		2045	0.00%	0.00%	0.00%

PUC 1-120

Budget, SBC Charge, and Bill and Rate Impacts

Request:

Referring to the response to PUC 3-5 in docket 5076, please provide similar charts showing actual expenditures by month for each 2021 program through the end of September. For October through December please use the Company's current forecast. Please update this response for actuals as they become available during the course of this proceeding for October and November.

Response:

Please see Attachment PUC 1-120-1 (electric) and Attachment PUC 1-120-2 (gas).

Prepared by or under the supervision of: John Richards and Brian Pelletier

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 5189
Attachment PUC 1-120-1
Approved 2021 Budget Compared to YTD and Projected Expenditures ($000) - Electric

		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
		Approved Implementation Budget 2021 ($000)	Actual Year-To-Date Expenditures (through September 2021)									Projected 2021 Expenditures	Difference (Annual Filed Budget - Projected Spend)	% Projected Spend/Annual Filed Budget
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT-DEC (Projection)		
1	Residential New Construction (Electric)	$1,611.3	$7.5	$7.2	$182.6	$10.2	$8.3	$226.1	$140.7	$6.6	$114.8	$900.80	$6.5	100%
2	ENERGY STAR HVAC (Electric)	$3,487.8	-$100.4	$205.3	$518.2	$87.3	$400.8	$544.6	$382.2	$219.3	$51.8	$1,178.5	$0.0	100%
3	EnergyWise (Electric)	$15,692.2	$30.6	$41.8	$4,644.0	$2,280.2	$1,824.9	$1,914.0	$1,460.3	$1,151.1	$161.1	$7,641.3	-$5,457.3	135%
4	EnergyWise Multi Family (Electric)	$2,804.3	$7.8	$144.7	$160.6	$135.4	$97.9	$137.9	$70.6	$36.7	$25.9	$1,846.6	$140.2	95%
5	Home Energy Reports (Electric)	$2,641.7	-$1,331.3	$1,698.0	$186.8	$355.3	$182.0	$186.7	$182.7	$182.0	$183.5	$486.6	$329.4	88%
6	ENERGY STAR Lighting (Electric)	$5,274.8	$13.8	$63.5	$94.6	$838.4	$193.6	$685.4	$108.4	$397.1	$297.7	$2,582.3	$0.0	100%
7	Residential Consumer Products (Electric)	$2,681.2	$9.0	$410.6	$323.0	$91.1	$79.1	$182.0	$380.6	$115.1	$148.9	$941.9	$0.0	100%
8	Residential ConnectedSolutions (Electric)	$1,920.5	$3.4	$44.7	$43.0	$5.7	$77.0	$21.3	$33.1	$24.9	$74.8	$1,479.3	$113.3	94%
9	Energy Efficiency Education Programs (Electric)	$40.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$9.0	$0.0	$0.0	$31.0	$0.0	100%
10	Residential Pilots (Electric)	$0.0	$0.3	$0.5	$0.6	$0.8	$1.8	$6.1	$1.0	$16.4	$19.5	-$47.0	$0.0	0%
11	Community Based Initiatives - Residential (Electric)	$226.2	$0.1	$13.8	$1.6	$0.0	$3.1	$0.0	$14.9	$9.4	$48.2	$135.0	$0.0	100%
12	Comprehensive Marketing Residential (Electric)	$332.7	$0.1	$0.2	$0.4	$18.4	$6.7	$0.3	$41.3	$3.7	$0.8	$260.8	$0.0	100%
13	OTHER RESIDENTIAL PROGRAMS (Electric)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	0%
14	**Subtotal Non-Income Eligible Residential**	**$36,713**	**-$1,358.8**	**$2,630.3**	**$6,155.3**	**$3,822.7**	**$2,875.2**	**$3,904.4**	**$2,824.8**	**$2,162.3**	**$1,127.1**	**$17,437.1**	**-$4,867.8**	**113%**
15	Single Family - Income Eligible Services (Electric)	$12,846.1	-$13.1	$773.3	$689.5	$587.2	$775.5	$532.9	$785.0	$599.5	$524.8	$5,664.5	$1,926.9	85%
16	Income Eligible Multifamily (Electric)	$3,549.0	$7.1	$15.0	$10.1	$354.7	$11.3	$18.0	$45.8	$42.3	$133.8	$2,910.9	$0.0	100%
17	**Subtotal Income Eligible Residential**	**$16,395**	**-$6.0**	**$788.4**	**$699.6**	**$941.9**	**$786.7**	**$551.0**	**$830.8**	**$641.8**	**$658.6**	**$8,575.5**	**$1,926.9**	**88%**
18	Large Commercial New Construction (Electric)	$8,188.2	$128.1	$264.9	$328.8	$535.8	$2,166.1	$447.9	$189.1	$521.4	$1,031.7	$3,696.7	-$1,122.3	114%
19	Large Commercial Retrofit (Electric)	$31,565.2	$1,016.0	-$878.9	$1,762.7	$1,922.4	$514.1	$981.8	$2,595.9	$1,838.2	$1,797.5	$18,665.4	$1,350.1	96%
20	Small Business Direct Install (Electric)	$8,883.6	$546.4	$239.0	$536.9	$7.8	$756.0	$573.2	-$120.4	$1,073.8	$244.1	$5,026.9	$0.0	100%
21	Commercial ConnectedSolutions (Electric)	$2,990.1	$10.5	$12.3	$14.5	$14.8	$15.2	$12.1	$12.4	$10.1	$12.1	$2,876.1	$0.0	100%
22	Commercial Pilots (Electric)	$0.0	$0.3	$0.1	$0.4	$0.1	$0.0	$0.1	$3.3	$0.0	-$0.4	-$3.9	$0.0	0%
23	Community Based Initiatives - C&I (Electric)	$74.5	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$74.5	$0.0	100%
24	Finance Costs (Electric)	$5,000.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$5,000.0	$0.0	100%
25	OTHER C&I PROGRAMS (Electric)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	0%
26	**Subtotal Commercial & Industrial**	**$56,702**	**$1,701.4**	**-$362.7**	**$2,643.3**	**$2,480.8**	**$3,451.4**	**$2,014.9**	**$2,680.3**	**$3,443.5**	**$3,085.1**	**$35,335.8**	**$227.8**	**100%**
27	**TOTAL All Sectors**	**$109,809**	**$336.6**	**$3,055.9**	**$9,498.3**	**$7,245.5**	**$7,113.3**	**$6,470.3**	**$6,335.9**	**$6,247.5**	**$4,870.7**	**$61,348.4**	**-$2,713.1**	**102%**
28	**REGULATORY (Electric)**	**$1,477.0**	**$0.0**	**$0.0**	**$260.4**	**$101.7**	**$12.1**	**$184.6**	**$155.4**	**$164.5**	**$62.9**	**$535.3**	**$0.0**	**100%**
29	OER (Electric)	$738.5	$0.0	$0.0	$184.6	$61.5	-$61.5	$184.6	$61.5	$61.5	$61.5	$184.6	$0.0	100%
30	EERMC (Electric)	$738.5	$0.0	$0.0	$75.8	$40.1	$73.7	$0.0	$93.8	$103.0	$1.4	$350.7	$0.0	100%
31	**OTHER COSTS NOT LISTED ABOVE (Electric)**	**$0.0**	**$2.2**	**$1.2**	**$6.4**	**$0.0**	**-$2.6**	**$72.0**	**$0.0**	**$0.0**	**$0.6**	**-$79.8**	**$0.0**	**0%**

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 5189
Attachment PUC 1-120-2
Approved 2021 Budget Compared to YTD and Projected Expenditures ($000) - Gas

		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
		Approved Implementation Budget 2021 ($000)	Actual Year-To-Date Expenditures (through September 2021)									Projected 2021 Expenditures	Difference (Annual Filed Budget - Projected Spend)	% Projected Spend/Annual Filed Budget
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT-DEC (Projection)		
1	Residential New Construction (Gas)	$674.8	$2.4	$4.6	$61.2	$4.3	$2.8	$72.1	$96.9	$4.4	$33.9	$243.34	$149.05	78%
2	ENERGY STAR HVAC (Gas)	$3,673.0	$8.8	$264.0	$288.0	$196.7	$408.6	$162.8	$199.7	$42.4	$19.7	$1,321.5	$760.7	79%
3	EnergyWise (Gas)	$8,117.6	$18.1	$28.4	$2,699.7	$1,801.0	$1,676.4	$1,553.6	$1,219.7	$777.3	$37.3	$6,268.2	-$7,962.1	198%
4	EnergyWise Multi Family (Gas)	$1,491.6	$8.5	$29.0	$41.2	$330.3	$42.3	$176.0	$8.0	$21.1	$37.4	$1,021.5	-$223.8	115%
5	Home Energy Reports (Gas)	$450.9	-$211.1	$271.9	$177.9	$34.4	$29.9	$30.7	$30.0	$29.7	$30.0	-$47.8	$75.3	83%
6	Residential Pilots (Gas)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	0%
7	Community Based Initiatives - Residential (Gas)	$75.8	$0.0	$4.5	$0.5	$0.0	$1.0	$0.0	$5.0	$16.4	$11.2	$37.1	$0.0	100%
8	Comprehensive Marketing Residential (Gas)	$64.8	$0.0	$0.0	$0.2	$3.6	$2.4	$0.2	$16.1	$1.5	$4.3	$36.5	$0.0	100%
9	OTHER RESIDENTIAL PROGRAMS (Gas)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	0%
10	**Subtotal Non-Income Eligible Residential**	**$14,548.5**	**-$173.2**	**$602.4**	**$3,268.7**	**$2,370.3**	**$2,163.4**	**$1,995.3**	**$1,575.3**	**$892.8**	**$173.8**	**$8,880.4**	**-$7,200.8**	**149%**
11	Single Family - Income Eligible Services (Gas)	$5,952.3	$84.5	$233.5	$235.8	$367.1	$297.7	$298.6	$290.1	$382.4	$236.7	$2,930.7	$595.2	90%
12	Income Eligible Multifamily (Gas)	$3,009.4	$4.3	$7.4	$8.3	$11.9	$5.0	$14.1	$18.7	$6.3	$208.0	$2,424.3	$301.0	90%
13	**Subtotal Income Eligible Residential**	**$8,961.8**	**$88.8**	**$241.0**	**$244.1**	**$379.0**	**$302.8**	**$312.8**	**$308.8**	**$388.7**	**$444.7**	**$5,355.0**	**$896.2**	**90%**
14	Large Commercial New Construction (Gas)	$2,634.2	$27.5	$189.5	$164.3	$213.5	$192.0	$247.5	$227.2	$183.2	$278.2	$472.7	$438.6	83%
15	Large Commercial Retrofit (Gas)	$5,054.1	$59.4	$120.7	$420.6	$350.9	$279.9	$214.6	$137.2	$160.2	$234.5	$1,697.1	$1,379.2	73%
16	Small Business Direct Install (Gas)	$332.7	$9.4	$6.3	$2.0	$7.7	$6.6	$3.4	$2.1	$3.5	$4.2	$287.5	$0.0	100%
17	Commercial Pilots (Gas)	$215.8	$0.2	$28.9	$0.5	$46.9	$0.7	$0.5	$0.7	$24.9	$0.5	$0.0	$112.0	48%
18	Community Based Initiatives - C&I (Gas)	$24.8	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$24.8	$0.0	100%
19	Commercial & Industrial Multifamily (Gas)	$953.2	$3.6	$22.6	$36.6	$31.7	$24.7	$13.5	$14.4	$5.7	$8.6	$791.7	$0.0	100%
20	Finance Costs (Gas)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	0%
21	OTHER C&I PROGRAMS (Gas)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	0%
22	**Subtotal Commercial & Industrial**	**$9,214.8**	**$100.1**	**$367.9**	**$624.0**	**$650.8**	**$503.9**	**$479.5**	**$381.5**	**$377.4**	**$525.9**	**$3,273.8**	**$1,929.9**	**79%**
23	**TOTAL All Sectors**	**$32,725**	**$15.7**	**$1,211.3**	**$4,136.8**	**$3,400.0**	**$2,970.1**	**$2,787.7**	**$2,265.6**	**$1,658.9**	**$1,144.4**	**$17,509.3**	**-$4,374.7**	**113%**
24	**REGULATORY (Gas)**	**$550.1**	**$0.0**	**$0.0**	**$97.0**	**$37.9**	**$4.5**	**$68.8**	**$57.9**	**$61.3**	**$23.4**	**$199.4**	**$0.0**	**100%**
25	EERMC (Gas)	$275.1	$0.0	$0.0	$28.2	$14.9	$27.4	$0.0	$35.0	$38.4	$0.5	$130.6	$0.0	100%
26	OER (Gas)	$275.1	$0.0	$0.0	$68.8	$22.9	-$22.9	$68.8	$22.9	$22.9	$22.9	$68.8	$0.0	100%
27	**OTHER COSTS NOT LISTED ABOVE (Gas)**	**$0.0**	**$0.0**	**$1.1**	**-$1.1**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**0%**

PUC 1-121
Budget, SBC Charge, and Bill and Rate Impacts

Request:

Referencing Bates page 446, the Company writes "in the 2021 plan, annual net energy savings and annual net participants were assumed constant until the lifetime net energy savings were reached. In the 2022 plan, annual savings and participants reflect the phasing-out of individual programs." For each of the nine electric bill impact models developed for the 2022 plan, describe the net effect of this change on the modeled energy and bill savings.

Response:

Key:

- Model 1: Residential – HERs Only
- Model 2: Residential – All Programs Without HERs
- Model 3: Residential – All Programs
- Model 4: Income Eligible – HERs Only
- Model 5: Income Eligible – All Programs Without HERs
- Model 6: Income Eligible – All Programs
- Model 7: Small C&I
- Model 8: Medium C&I
- Model 9: Large C&I

Notes:

- In the response below, "significant" net effects are defined as changes in modeled energy or bill savings greater than 1%.
- A more negative percentage for modeled energy or bill savings indicates a greater magnitude of savings for the customer. For example, a customer group with -10% bill savings is seeing a greater reduction in bills than a customer group with -5% bill savings.

Models 1, 4, 7, 8, and 9:

These models only reflect energy savings for one program. Therefore, the update described on Bates page 446 does not have any net effect on modeled energy and bill savings.

Model 2:

The update described on Bates page 446 does not have a significant net effect on modeled energy savings. The same is true for modeled bill savings except for average participants. This customer group sees modeled bill savings increase (bills are reduced) from -2.25% to -7.05% with the update (see Attachment PUC 1-121-1).

Prepared by or under the supervision of: John Richards

PUC 1-121, page 2

Budget, SBC Charge, and Bill and Rate Impacts

Model 3:

The update described on Bates page 446 does not have a significant net effect on modeled energy or bill savings for non-participants or average customers. For average participants, modeled energy savings increase from -1.04% to -4.10%, and modeled bill savings increase (bills are reduced) from -0.10% to -6.82% with the update (see Attachment PUC 1-121-1).

Model 5:

The update described on Bates page 446 does not have a significant net effect on modeled energy savings. The same is true for modeled bill savings except for average participants. This customer group sees modeled bill savings increase (bills are reduced) from -5.93% to -7.24% with the update (see Attachment PUC 1-121-1).

Model 6:

The update described on Bates page 446 does not have a significant net effect on modeled energy or bill savings for non-participants or average customers. For average participants, modeled energy savings increase from -3.35% to -9.64%, and modeled bill savings increase (bills are reduced) from -1.02% to -6.82% with the update (see Attachment PUC 1-121-1).

Explanation of Results:

In models 2, 3, 5, and 6, modeled bill savings consistently increase (bills are reduced) with the update. This is because the phasing-out of programs decreases the number of annual participants attributed to certain level of overall bill savings.

In models 3 and 6, the increase in modeled energy savings for average participants can be attributed to the phasing-out of HERs. Because HERs has comparatively small modeled energy savings per participant, the phasing-out of HERs will reveal participants in measures with comparatively large modeled per-capita energy savings.

Prepared by or under the supervision of: John Richards

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 5189
Attachment PUC 1-121-1

	2022 EE Plan vs. No EE			
		Income-Eligible	Typical Energy Savings	Typical Bill Savings
Without Update Described on Bates Page 446	Model 2: Residential - Standard Income - All Programs Without HERs	Average Participant	-4.41%	-2.25%
		Non-Participant	0.00%	0.18%
		Average Customer	-0.58%	-0.14%
With Update Described on Bates Page 446	Model 2: Residential - Standard Income - All Programs Without HERs	Average Participant	-4.48%	-7.05%
		Non-Participant	0.00%	0.17%
		Average Customer	-0.55%	-0.12%
Without Update Described on Bates Page 446	Model 3: Residential - Standard Income - All Programs	Average Participant	-1.02%	-0.10%
		Non-Participant	0.00%	0.26%
		Average Customer	-0.86%	-0.05%
With Update Described on Bates Page 446	Model 3: Residential - Standard Income - All Programs	Average Participant	-4.10%	-6.82%
		Non-Participant	0.00%	0.26%
		Average Customer	-0.69%	-0.08%
Without Update Described on Bates Page 446	Model 5: Residential - Income Eligible - All Programs Without HERs	Average Participant	-10.53%	-5.93%
		Non-Participant	0.00%	0.44%
		Average Customer	-2.28%	-0.93%
With Update Described on Bates Page 446	Model 5: Residential - Income Eligible - All Programs Without HERs	Average Participant	-10.53%	-7.24%
		Non-Participant	0.00%	0.46%
		Average Customer	-2.28%	-1.04%
Without Update Described on Bates Page 446	Model 6: Residential - Income Eligible - All Programs	Average Participant	-3.35%	-1.02%
		Non-Participant	0.00%	0.50%
		Average Customer	-3.26%	-0.98%
With Update Described on Bates Page 446	Model 6: Residential - Income Eligible - All Programs	Average Participant	-9.64%	-6.82%
		Non-Participant	0.00%	0.50%
		Average Customer	-2.41%	-1.06%

PUC 1-122
Budget, SBC Charge, and Bill and Rate Impacts

Request:

Referencing Bates page 445, the Company writes "in the electric and gas bill impact analysis, rate changes are modeled by mapping energy efficiency programs to groupings of customers approximating rate classes and estimating changes in both delivery service rates and supply costs. In both models, other effects of energy efficiency beyond direct energy savings such as… avoided infrastructure investments (electric) are also included." Please explain how the electric bill impact model allocates the value of avoided infrastructure investments among the different "groupings of customers approximating rate classes"? Consider the following hypothetical scenario to help focus your response: when executing the A16 rate class model, the Company assumes that the residential non-income eligible programs proposed in 2022 EE Plan generate $1,000,000 in avoided Pool Transmission Facility (PTF) infrastructure costs. How does the model allocate that $1,000,000 in avoided PTF costs between the A16 rate class and all other electric rate classes in order to model typical energy savings and typical bill savings for the A16 rate class?

Response:

In all nine electric rate and bill impacts models, the statewide (for distribution) and regionwide (for transmission) values of avoided infrastructure investments are entered into each model as $/kW inputs. These values are constant for every grouping of customers approximating rate classes. In other words, the avoided distribution value is $98.06/kW-yrk[1] and the avoided PTF transmission value is $98.98/kW-yr[1] across every customer group / rate class. There is no allocation of the dollar value of avoided infrastructure investments. In all nine models, these avoided infrastructure values are multiplied by sector-specific annual net demand savings and divided by sector-specific net energy sales to produce a sector-specific avoided distribution / PTF transmission value component of the rate impact in cents/kWh.

In the hypothetical scenario described in the request, the $1,000,000 in avoided PTF infrastructure costs would not be allocated by the non-income eligible rate and bill impacts model because the $1,000,000 is not a direct input. Furthermore, all rate and bill impact models are independent. Therefore, there is no allocation of any values between models.

[1] Escalated to 2022 dollars

Prepared by or under the supervision of: John Richards

PUC 1-123
Budget, SBC Charge, and Bill and Rate Impacts

Request:

Referencing Bates page 469, the Company writes "the portion of the natural gas avoided cost that impacts rates is limited to the avoided retail margin costs and price suppression benefits (Demand Reduction Induced Price Effects). In contrast, in the electric model there are embedded RGGI costs in rates and the electric model also accounts for T&D avoided costs. The gas model has the capability to incorporate a T&D avoided cost in the future should one be developed in the future, but it is not currently accounted for in the calculation of long-term rates in the present analysis." Please clarify whether or not the natural gas bill impact analysis model, in its current form, is technically capable of accounting for the same range of benefits that the electric model accounts for.

Response:

The natural gas bill impact analysis model, in its current form, is not fully capable of accounting for the same range of benefits as the electric model. Modifications and expansions of the model calculations and inputs would be required to incorporate an input for avoided gas T&D.

Prepared by or under the supervision of: John Richards

PUC 1-124

Budget, SBC Charge, and Bill and Rate Impacts

Request:

On Bates page 222, the Company estimates the 2022 budget for Large C&I New Construction (electric) to be $18,387,000. On Bates page 295, the costs listed under the "total incentives" and "shared cost" columns for the Large Commercial and Industrial New Construction (electric) program sum to $9,232,431. Reconcile these two cost estimates.

Response:

Please see the Company's response to PUC 1-85.

Prepared by or under the supervision of: John Richards

PUC 1-125

Budget, SBC Charge, and Bill and Rate Impacts

Request:

On Bates page 222, the Company estimates the 2022 budget for Large C&I New Construction (electric) to be $18,387,000. On Bates page 295, the costs listed under the "total incentives" and "shared cost" columns for the Large Commercial and Industrial New Construction (electric) program sum to $9,232,431. Reconcile these two cost estimates.

Response:

Please see the Company's response to PUC 1-85.

Prepared by or under the supervision of: John Richards

PUC 1-126

Budget, SBC Charge, and Bill and Rate Impacts

Request:

On Bates page 222, the Company estimates the 2022 budget for Large C&I New Construction (electric) to be $18,387,000. On Bates page 295, the costs listed under the "total incentives" and "shared cost" columns for the Large Commercial and Industrial New Construction (electric) program sum to $9,232,431. Reconcile these two cost estimates.

Response:

Please see the Company's response to PUC 1-85.

Prepared by or under the supervision of: John Richards

PUC 1-127
Pilots, Demonstrations, Assessments

Request:

Referring to Tables 2, 3, 4, and 5 on Bates pages 614-616 of the 2021 Annual Energy Efficiency Plan, please update the tables with a column showing actual spend.

Response:

Please see the updated tables in Attachment PUC 1-127.

Prepared by or under the supervision of: Ezra McCarthy

Attachment PUC 1-127
Pilots, Demonstrations, Assessments

Table 2. Electric Commercial and Industrial Demonstrations and Assessments

Classification	Fuel	Name	C&I Programs	Duration	Budget	Savings Estimation	Evaluation	2021 Spend*
Demonstrations								
Industrial	Dual	Continuous Energy Improvement (CEI)	C&I Retrofit	2018-2021	$ 380,800	900 MWh (projected for 2021)	Vendor	$ 299,699
Lighting	Dual	Network Lighting Controls Plus HVAC (NLC+)	C&I Retrofit	2020-2021	$ 130,252	1.44 kWh/SF	Vendor	$ 25,431
HVAC	Dual	Kitchen Exhaust	C&I Retrofit	2020-2021	$ 66,292	27 MWh (potential)	Vendor	$ 3,495
	Dual	Smart Valves	C&I Retrofit	2021	$ 177,750	300 MWh (projected for 2021)	Vendor	$ 34,043
	Elec.	Enzyme-based HVAC Coil Cleaning	C&I Retrofit	2021	$ 85,538	6-10% of HVAC consumption	Vendor	$ 5,230
Innovation Pipeline	Elec.	Innovative Electric	Allocated	2020	$ 32,401	To be estimated	To be determined	$ -
Assessments								
Laundry	Dual	Shared Laundry Facility Clothes Washers and Dryers	C&I New Construct-ion	2021	$ 6,480	Unknown	Internal Review	$ 5,224
General	Dual	Use of Submetering to Support EE Opportunities	C&I Retrofit	2021	$ 25,921	Unknown	Internal Review	$ 5,224
Refrigeration	Elec.	Refrigerant Leak Survey and Repair	C&I Retrofit	2021	$ 25,921	Unknown	Internal Review	$ 5,868
HVAC	Elec.	HVAC Automation for Demand Response	C&I New Construct-ion	2021	$ 25,921	Unknown	Internal Review	$ 6,558
Total Electric C&I Demonstration					**$ 873,033**			**$ 367,898**
Total Electric C&I Assessments					**$ 84,242**			**$ 22,874**

* Actual spend through September 2021

Prepared by or under the supervision of: Ezra McCarthy

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 5189
Attachment PUC 1-127
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Table 3. Gas Commercial and Industrial Pilots, Demonstrations and Assessments

Classification	Fuel	Name	C&I Programs	Duration	Budget	Savings Estimation	Evaluation	2021 Spend*
Pilot								
Active Demand Response	Gas	Gas Demand Response Pilot	N/A	2021	$ 215,780	27,280 Therms (projected for 2021)	Vendor	$ 103,791
Demonstrations								
Industrial	Dual	Continuous Energy Improvement (CEI)	C&I Retrofit	2018-2021	$ 179,200	75,000 Therms (projected for 2021)	Vendor	$ 80,406
HVAC	Dual	Network Lighting Controls Plus HVAC (NLC+)	C&I Retrofit	2020-2021	$ 64,154	0.012 Therms/sqft	Vendor	$ 15,703
	Dual	Smart Valves	C&I Retrofit	2021	$ 59,250	23,000 Therms (projected for 2021)	Vendor	$ 11,068
	Dual	Kitchen Exhaust	C&I Retrofit	2020-2021	$ 134,593	67,000 Therms (potential)	Vendor	$ 8,638
	Gas	Gas Heat Pumps	C&I New Construct-ion	2022-2022	$ 233,287	15,000-20,000 Therms (for a 400-600 mbh unit)	Vendor	$ 4,926
Innovation Pipeline	Gas	Innovative Gas	Allocated	2021	$ 32,401	To be estimated	To be determined	$ -
Assessments								
Laundry	Dual	Shared Laundry Facility Clothes Washers and Dryers	C&I New Construct-ion	2021	$ 19,441	Unknown	Internal Review	$ 4,288
General	Dual	Use of Submetering to Support EE Opportunities	C&I Retrofit	2021	$ 25,921	Unknown	Internal Review	$ 4,926
Total Gas C&I Pilots					**$ 215,780**			**$ 103,791**
Total Gas C&I Demonstrations					**$ 702,885**			**$ 120,741**
Total Gas C&I Assessments					**$ 45,361**			**$ 9,214**

* Actual spend through September 2021

Prepared by or under the supervision of: Ezra McCarthy

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 5189
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Table 4. Electric Residential Demonstrations and Assessments

Classification	Fuel	Name	Residential Program	Duration	Budget	Savings Estimation	Evaluation	2021 Spend*
Demonstration								
HVAC	Dual	New Air Sealing and Insulation Products	EnergyWise	2021-2022	$ 25,921	0.05 kWh/sqft	Vendor	$ 23,380
Demand Response	Elec.	Solar Inverter Direct Load Control	Residential Demand Response	2021-2023	$ 254,570	102.5 kWh/ inverter	Independent	$ 41,588
Innovation Pipeline	Elec.	Innovation Electric	Allocated	2020	$ 32,401	To be estimated	To be determined	$ -
Assessments								
Whole Building	Elec.	Pre-Fab Whole House Energy Refurbishment	RNC	2021	$ 6,480	Unknown	Internal Review	$ 2,256
Total Electric Residential Demonstration					**$ 312,892**			**$ 64,968**
Total Electric Residential Assessments					**$ 6,480**			**$ 2,256**

* Actual spend through September 2021

Table 5. Gas Residential Demonstrations and Assessments

Classification	Fuel	Name	Residential Program	Duration	Budget	Savings Estimation	Evaluation	2021 Spend*
Demonstrations								
HVAC	Dual	New Air Sealing and Insulation Products	EnergyWise	2021-2022	$ 77,762	0.1 Therm/sqft	Vendor	$ 4,288
	Gas	Gas Heat Pumps	HVAC	2021-2022	$ 201,445	250 Therms/unit	Independent	$ 4,926
Innovation Pipeline	Gas	Innovation Gas	Allocated	2021	$ 32,401	To be estimated	Independent	$ -
Assessments								
Whole Building	Dual	Pre-Fab Whole House Energy Refurbishment	RNC	2021	$ 19,441	Unknown	Internal Review	$ 4,288
Total Gas Residential Demonstration					**$ 311,608**			**$ 9,214**
Total Gas Residential Assessments					**$ 19,441**			**$ 4,288**

* Actual spend through September 2021

Prepared by or under the supervision of: Ezra McCarthy

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 5189
Attachment PUC 1-127
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PUC 1-128
Pilots, Demonstrations, Assessments

Request:

Referencing Tables 2 and 3 on Bates pages 479-480, for each of the following pilot, demonstration, or assessment (project), please explain why the Company is continuing the project in 2022 after representing in the 2021 Annual Plan that each project had an ending date of 2021. Please explain for each project, why the project was not completed in 2021, why the Company propose to continue the project in 2022, and what the Company expects to learn from the continuation of the project.

- Continuous Energy Improvement (Electric)
- Network Lighting Controls Plus HVAC (electric)
- Smart Valves (electric)
- Gas Demand Response Pilot
- Continuous Energy Improvement (Gas)
- Network Lighting Controls Plus HVAC (gas)
- Smart Valves (gas)

Response:

Continuous Energy Improvement (gas and electric) – The end-date of 2021, as represented on Bates 614-615 of the 2021 Annual Plan, was misstated. The correct expected end-date is February 2022. In 2018, the Company and Cascade Energy, the Continuous Energy Improvement vendor, agreed to a 3-year contract that commenced in March of 2019 and is set to conclude in February of 2022. The continuation of this demonstration into February of 2022, will allow the cohort to perform additional no-cost or low-cost saving messages, while also allowing the vendor to perform the final savings calculations to determine gas and electric savings for participating customers.

Network Lighting Controls Plus HVAC (gas and electric) – The Network Lighting Controls Plus HVAC demonstration project was not completed in 2021 due to issues with customer recruitment, which were exacerbated by the pandemic. The Company underestimated the time customers would need to understand the demonstration and technology, communicate the project internally, and approve the installation. The Company has found two motivated customers for participation and is still in the process of scoping the projects and getting approval. The Company has proposed continuing the demonstration into 2022 to provide enough time for the customers to continue with installations and provide enough time for metering and verification. The Company expects to better understand the actual savings potential and installation barriers through the onsite work.

Prepared by or under the supervision of: Ezra McCarthy

PUC 1-128, page 2
Pilots, Demonstrations, Assessments

Smart Valves (gas and electric) – The Smart Valve demonstration project was not completed in 2021 due to issues with customer recruitment exacerbated by the pandemic. As part of the demonstration, two installations in two separate buildings have been completed, however an unrelated controls issue in a participating building necessitates an extended metering period, into 2022, to fully quantify the smart valve savings through different seasons. Additionally, the Company is extending the demonstration into 2022 to accommodate two additional customers for a more robust demonstration of the technology.

Gas Demand Response Pilot – The Gas Demand Response Pilot is continuing for 2022 in order to gather additional data points on customer load reduction potential under varied weather conditions. More specifically, the relatively mild winters of 2019-20 and 2020-21 saw limited instances of peak winter conditions under which participants would be asked to curtail gas usage. The pilot is also being continued so that the Company may expand outreach and attempt to recruit additional customers to the program. Adding more customers will help provide a clearer picture of the expected load reduction achievable per customer.

PUC 1-129
Pilots, Demonstrations, Assessments

Request:

Referring to the Peak Period Gas Demand Response Pilot and the Expanded Demand Response offering on Bates page 482, please distinguish each offering from the Advanced Gas Technology Program. Please also distinguish each pilot from each other. Assuming you learn something different from each, how would the Company apply those learnings?

Response:

As opposed to the Advanced Gas Technology Program, both the Extended Demand Response ("EDR") and Peak Period Demand Response ("PPDR") offerings under this Pilot focus solely on managing customer use during peak winter days.

The Advance Gas Technology Program ("AGT Program"), established in Docket No. 2025, promotes the development of energy-efficient natural gas technologies that increase the utilization of natural gas during periods of low demand. Technologies such as combined heat and power systems are incentivized under the ATG Program because they generate revenue during non-winter months that supports the fixed costs of infrastructure design to meet peak periods.

The Pilot offerings can also support the efficient utilization of the existing gas system, but do so by lowering Peak Day gas demand rather than increasing non-Peak Day consumption (as in the AGT Program).

The individual Pilot offerings differ from each other in the ability and method by which customers reduce demand. The EDR offering results in the complete elimination of gas consumption for an entire gas day, with no resulting "snapback" effects that move gas use to a later date. In the PPDR offering, customers that do not have the ability to completely eliminate gas usage can instead alter their typical gas usage patterns to flatten their intra-day load profiles and lower gas usage during the hours of a peak day where system demand is greatest.

The resulting learning from the Pilot offerings are intended to support future gas system planning, where temporary customer load reductions may have the potential to alleviate system constraints or support pressure-critical areas of a distribution system.

Prepared by or under the supervision of: Owen Tyrrell

PUC 1-130
Pilots, Demonstrations, Assessments

Request:

Referring to the proposed Gas Demand Response Pilot, the Company writes "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. The Aquidneck Island Long-Term Gas Capacity report (released in Sept-2020) reviewed the benefits of DR, among other solutions, to address localized constraints" (Bates page 482). On October 1, 2021, the Company filed its first monthly status report in Energy Facility Siting Board Docket No. SB-2021-04 (National Grid's License for an Application to Mobilize and Operate a Liquified Natural Gas (LNG) Vaporization Facility at Old Mill Lane), in which it stated "the Company has progressed its analysis of the preferred long-term solution and has identified the seasonal and temporary operation of LNG at Old Mill Lane as a recommended solution for addressing the capacity constraint and capacity vulnerability needs on Aquidneck Island." Does the Company's decision to address the Aquidneck Island capacity constraint via continued operation of LNG at Old Mill Lane alter the objectives and/or benefits of the proposed Gas Demand Response Pilot? Please explain.

Response:

No. While a DR program (combined with other demand-side measures) was not the recommended solution for addressing the capacity constraint on Aquidneck Island, the Pilot can still offer insights that may be applied to other regions within the gas system. In particular, the level of demand reduction by customer and customer type (both by hour and over a full day), customer adoption and price discovery can all be used to refine inputs to future infrastructure alternative scenarios.

Prepared by or under the supervision of: Owen Tyrrell

PUC 1-131
Pilots, Demonstrations, Assessments

Request:

Referencing Bates page 483, the Company notes that it expects to add one to two new customers to the Peak-Period Demand Response Pilot. For each of the 4 testing objectives described on Bates page 482 (first sentence in paragraph 2), explain how an incremental addition of one to two new customers will allow the Company to achieve the testing objective. Explain whether each of the 4 testing objectives are achievable under both pilots.

Response:

Adding additional customers to the Peak-Period Demand Response ("PPDR") Pilot will further the testing objective described in the Plan by diversifying the portfolio of participating customers. The two customer accounts currently participating in the PPDR are both K-12 schools. K-12 schools are unique from other customers in that they have shortened hours of operation (ex. 8am-3pm) and a lower tolerance when it comes to comfort concerns, which can impact the amount of gas they are able to reduce. Outreach to additional customers will also help to serve as a form of price discovery, enabling the Company to weigh the adoption of gas DR and response to current incentive levels. Having a more diverse customer base will add greater clarity to the expected reduction per customer, which can then be evaluated against the expansion of gas benefits described in the 2021 AESC Supplemental Study.

Prepared by or under the supervision of: Owen Tyrrell

PUC 1-132
Pilots, Demonstrations, Assessments

Request:

For both the Commercial & Industrial and Residential Gas Heat Pump demonstrations, will the results of the demonstrations be applicable to all similarly-configured gas heat pumps regardless of natural gas fuel composition, or will the results only apply to similarly-configured gas heat pumps that utilize the same natural gas fuel type as the gas heat pumps installed through the demonstrations? In your response, consider the applicability of results to future gas heat pump systems fueled by renewable natural gas.

Response:

The Company expects any future renewable natural gas fuel mixes, of pipeline quality able to be injected into the gas distribution system, to be applicable to the gas heat pumps examined in these demonstrations. Fuel mix availability and customer economics will be relevant to any future potential of gas heat pumps. The Company plans to undertake the economic cost-effectiveness analysis of the proposed gas heat pumps using current conventional natural gas distribution assumptions.

Prepared by or under the supervision of: Ezra McCarthy

PUC 1-133
Pilots, Demonstrations, Assessments

Request:

What renewable energy compensation programs (e.g. net metering, Renewable Energy Growth) are customers enrolled in the Solar Inverter Direct Load Control demonstration allowed to participate in?

Response:

Customers can participate in the Solar Inverter Direct Load Control demonstration regardless of their participation, or lack of participation, in other renewable energy compensation programs.

Prepared by or under the supervision of: Paul Wassink

PUC 1-134
Pilots, Demonstrations, Assessments

Request:

Regarding the Solar Inverter Direct Load Control demonstration, the Company describes a flat annual incentive for participants and writes "if the customer's solar generation (kWh) is decreased larger than the annual incentive, the customer will be given an additional incentive to guarantee they are not penalized for their participation in this demonstration" (Bates page 496). Using a hypothetical customer example, show how National Grid would effectuate this pay-out of an additional incentive. Show all supporting calculations.

Response:

The program as it is currently structured cannot result in customers' solar generation being decreased, because real power (kW) generation is prioritized over reactive power (kVA) support. The "no harm guarantee" has been established to reassure customers that even in a worst case scenario where the Company made a mistake in applying solar inverters settings and real power generation was affected, the Company would make the customers whole. The "no harm guarantee" also exists to keep the door open to potentially expanding the solar inverter measure one day to include settings that could impact customers solar generation but would have an even larger benefit for the grid.

Since no solar power (kW) generation will be affected by the current solar inverter demonstration, no procedure or calculations have been developed to document how customers would be paid an additional incentive.

Prepared by or under the supervision of: Paul Wassink

PUC 1-135
Pilots, Demonstrations, Assessments

Request:

Referencing Bates page 496, the Company writes "the \ EBU may periodically change the preferred inverter setpoints, which will be pushed out to all participating inverters by our inverter manufacturer partners." Why does the Company pay out the Solar Inverter Direct Load Control incentive to system owners in return for power factor correction when it is the Company's inverter manufacturer partners who execute the power factor correction?

Response:

The solar inverters participating in this program are owned by customers, just as thermostats, batteries, and pool pumps are owned by customers. Customers are incentivized for allowing the Company to have limited control over these devices. Without these customer incentives, the ability to attract customers into these measures would be drastically reduced.

The device manufactures who participate in Connected Solutions in the solar inverter, thermostat, battery, and pool pump measures are paid vendor fees for their work in marketing the Connected Solutions program and help in applying the needed setting changes. Without these vendor fees, these device manufacturers would not participate in Connected Solutions.

Both customer incentives and vendor fees are needed to continue to run the Connected Solutions program.

Prepared by or under the supervision of: Paul Wassink

PUC 1-136
Pilots, Demonstrations, Assessments

Request:

For the proposed $44,380 budget for the Solar Inverter Direct Load Control demonstration, itemize the total budget into the following three categories: participant incentives; evaluation; other expenses.

Response:

Incentives = $24,300
Evaluation = $0*
Other Expenses = $20,080

** Evaluation cost budgeted in the Evaluation budget area.*

Prepared by or under the supervision of: Paul Wassink

PUC 1-137
Pilots, Demonstrations, Assessments

Request:

Will the results of the Solar Inverter Direct Load Control demonstration be applicable to all solar generating facilities (with inverters)? If not, describe the types of solar generating facilities (with inverters) for which the results of the demonstration would not apply. Does the Company expect to enroll new participants in the solar inverter demonstration study during the 2022 program year?

Response:

Yes, the results of the solar inverter direct load control demonstration will be applicable to all solar generating facilities. Part of the demonstration is to develop procedures and methods for calculating the savings for each participating inverter for each hour of the year using metered data from both the solar inverters and the substations. There are parts of the grid that need more reactive power support than others, and so there will be more savings on some parts of the grid than others. The demonstration will develop the process that sums the statewide savings.

Front of the meter (FTM) generating facilities, such as solar farms, are not eligible for energy efficiency program, including Connected Solutions.

Yes, the Company expects to enroll new participants in the 2022 demonstration. There are currently about 480 participating solar inverters and the Company's goal is to increase that to about 1,536 solar inverters in 2022.

Prepared by or under the supervision of: Paul Wassink

PUC 1-138
Pilots, Demonstrations, Assessments

Request:

Referencing Bates page 193, the Company writes "the solar inverter demonstration study… looks to verify the energy savings in kWh and determine customer acceptance of the offering if converted to a full program offering in the future." When does the Company expect to make such determination?

Response:

The EM&V study of the solar inverter demonstration will determine this and will be completed and made public by the summer of 2022.

Prepared by or under the supervision of: Paul Wassink

PUC 1-139
Equity

Request:

Equity.

Please explain how the Company arrived at 80% or below the state median income as the threshold for Moderate Income. Include in your explanation how the 80% threshold varies by family size.

Response:

The Company arrived at the 80% or below state median income (SMI) threshold for Moderate Income customers based on discussions with stakeholders about what an appropriate threshold level should be, with the goal of balancing availability of offerings to as many customers as possible while also ensuring that programs are focused on supporting those customers with greatest need.

This level is also being used by the RGGI funded moderate income offering which began in 2021 and will reduce confusion by aligning the definition. The Company notes that this definition can be further enhanced to include a floor of above 60% state median income. At the 60% of below SMI a customer would be referred to the income eligible programs, where additional services are available to customers at no cost to those participating customers.

In taking family size into account when determining eligibility for moderate income offerings, the Company intends to follow the application of household size and income as utilized in the Low Income Guidelines published by the RI Department of Human Services. Please see https://dhs.ri.gov/programs-and-services/energy-assistance-programs/ffy-2022-low-income-guidelines).

Those guidelines scale the household income threshold for access to income-eligible programs including the Home Energy Assistance Program (LIHEAP), the Weatherization Assistance Program (WAP) and the Appliance Management Program based on household size. The Company's proposed moderate income initiatives will follow the same methodology, simply extrapolating from the current 60% of state median income levels as published in the Low Income Guidelines up to 80% for each household size.

Prepared by or under the supervision of: Angela Li

PUC 1-140
Equity

Request:

Referencing Bates page 81, please explain what the Company means by expanding "collateral for more community groups that serve vulnerable populations." (i.e., what is the "collateral?")

Response:

The Company intends to expand the outreach to more community groups and provide collateral (e.g. flyers and other promotional materials advertising the benefits of energy efficiency programs and pathways to customer participation) for distribution to potential program participants by these groups.

Examples of collateral materials that are provided to organizations to promote energy efficiency opportunities are attached to this response as Attachments 1-140-1, 1-140-2 and 1-140-3. The table below describes each attachment,

Table 1 – Example Community Group Collateral

Attachment	**Description**
1-140-1	Brochure that Rhode Island food banks included in their client distributions in 2019 and 2020. The brochure is also distributed by Community Action Agencies and at other community outreach events.
1-140-2	A flyer that National Grid developed primarily for Housing Works RI, to give to their clients who were struggling with their summer cooling bills
1-140-3	An alternative version of the flyer provided in Attachment 1-140-2, translated into Spanish, in order to meet the language needs of Housing Works RI clients

Prepared by or under the supervision of: Angela Li

Get started

Call your local CAP agency, listed on the back of this brochure, for more information.

Energy saving services are available if your home is heated with:

- Gas
- Electricity
- Oil
- Propane
- Wood

You can qualify as:

- A homeowner
- A renter
- The landlord of a 1- to 4-unit building in which at least half of the residents meet income eligibility requirements

If you live in a building with 5+ units in which at least half of the residents meet income eligibility requirements, you may be eligible to be served by our multifamily program. Please have your landlord or condo association call **1-888-633-7947** to learn more.

Easy energy saving tips

- Close shades and drapes at night to keep heat in during the winter.
- Replace old-fashioned incandescent light bulbs with LED bulbs.
- Use pot lids when cooking on the stove; food will cook faster.
- Run the dishwasher only when it's full.
- Turn off computers, monitors, stereos, radios, and TVs when not in use.
- Set thermostats to 78° in summer, 68° in winter.

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For more information or to find out if you qualify, call **401-351-1800,** visit **ngrid.com/ri-income,** or contact your local CAP agency listed below.

This program is brought to you by National Grid and your local Community Action Program (CAP) agencies:

Blackstone Valley Community Action
bvcap.org | 401-723-4520

Community Action Partnership of Providence cappri.org | 401-273-2000

Community Care Alliance, Woonsocket
communitycareri.org | 401-235-7000

Comprehensive Community Action Program (CCAP), Cranston
comcap.org | 401-467-9610

East Bay Community Action Program, Upper Bay & Lower Bay
ebcap.org | 401-437-1000

Tri-County Community Action, Providence County
tricountyri.org | 401-519-1916

Tri-County Community Action, Washington County
tricountyri.org | 401-515-2434

Westbay Community Action
westbaycap.org | 401-732-4660

EE6788 RI (9/21)

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Discover No-Cost Home Energy Improvements

See if you qualify for our Income Eligible Energy Services Program.

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 5189
Attachment PUC 1-140-1
Page 1 of 2

Our **Income Eligible Energy Services Program** is designed to help make sure you can enjoy a more energy-efficient home that's healthier, more comfortable, and more affordable for you and your family.

How the program works

Once you qualify, your local Community Action Program (CAP) agency will arrange a time when an Energy Specialist can visit your home to complete a no-cost home energy assessment.

The Energy Specialist will look inside and out, from attic to basement, to find places where you can save energy and money.

You may also qualify for no-cost energy saving improvements, such as:

- A no-cost replacement of your heating system
- A no-cost replacement refrigerator, freezer, clothes washer, dehumidifier, and/or window A/C unit if your current appliance is inefficient
- No-cost energy saving services including attic and wall insulation, weather-stripping, and air sealing of leaks
- No-cost installation of energy-efficient lighting and water saving devices

Does my household qualify for no-cost energy efficiency services?

Use the chart below to see if your household meets the income requirement for the Income Eligible Energy Services Program as well as other energy services, such as Fuel Assistance and discount rates.

Number of Household Members	Maximum Annual Household Income	Maximum Monthly Household Income
1 person	$33,645	$2,804
2 people	$43,997	$3,666
3 people	$54,350	$4,529
4 people	$64,702	$5,392
5 people	$75,054	$6,255
6 people	$85,407	$7,117
7 people	$87,348	$7,279
8 people	$89,289	$7,441
9 people	$91,230	$7,603
10 people	$93,171	$7,764

For more information or to find out if you qualify, call **401-351-1800**, visit **ngrid.com/ri-income**, or contact your local CAP agency (listed on back).

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Rhode Island

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Stay cool and save this summer.

If you own your home or rent, we can help you stay comfortable and manage your energy bills.

When you use more energy to cool your home, it increases your energy costs. If you're looking for ways to reduce energy, stay comfortable and manage your energy bill, we can help.

These income-based programs may be right for you.

Energy efficiency for homes with one to four units.

Whether you rent or own a home with one to four units, you may qualify for National Grid's no-cost Home Energy Assessment program to determine the efficiency of your home. An assessment can be conducted remotely by phone or in person at your home. You will receive no-cost energy saving products including:

- ENERGY STAR® certified LED light bulbs
- Energy-saving showerheads and faucet aerators
- Advanced power strip(s)
- Programmable thermostat(s)

After your assessment, you may qualify for rebates or no-cost replacements for cooling equipment and other appliances. Plus, no-cost insulation may be available - keeping you cooler in the summer and warmer in the winter.

To determine program eligibility and next steps, please consult the income eligibility chart below:

Number of People in Household	2021 Annual Household Income	
	Income Eligible Program	Residential Program
1	≤ $32,265	$32,266+
2	≤ $42,193	$42,194+
3	≤ $52,120	$51,121+
4	≤ $62,048	$62,049+
5	≤ $71,976	$71,977+
6	≤ $81,903	$81,904+
7	≤ $83,765	$83,766+
8	≤ $85,626	$85,627+
	If your current **window air conditioner** qualifies for replacement, a new, no-cost energy-efficient appliance will be dropped off for you to install. Or, if you have electric resistance heat, you could qualify for a no-cost **air source heat pump** to realize efficient heating and cooling for your home. You may also receive a new, no-cost replacement refrigerator, freezer, dehumidifier, front-loading clothes washer, and/or a heating system upgrade.* *Existing appliances must meet program eligibility requirements.	You may be eligible for a rebate when purchasing a new ENERGY STAR® certified **room air conditioner** or installing an **air source heat pump**, which provides both a cooling and heating solution.
	Call **1-401-351-1800** to see if you are eligible and schedule your no-cost Home Energy Assessment. You will be advised of the documents needed to verify your income. Visit **ngrid.com/ri-income** to learn more.	Call **1-888-633-7947** to schedule a no-cost Home Energy Assessment. Visit **ngrid.com/ri-home** to learn more.

If you rent a one to four unit home, landlord approval is not required for a home energy assessment
Landlord approval may be required for certain follow-up work.

continued >

Rhode Island

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Energy efficiency for buildings with five or more units

Customers who live in buildings with five or more units will be served by our Multifamily Program. To participate in this program, please ask your landlord to call **1-888-633-7947** to receive information about energy efficiency benefits. Additional information is also available online at **ngrid.com/rimultifamily**.

The first step will be a no-cost energy assessment to find ways to increase energy savings throughout the building.

Affordable housing multifamily facilities may be eligible for no-cost **window air conditioners** in all units or **air source heat pumps** (if the multifamily building has electric resistance heat).

The COVID-19 pandemic has been hard on everyone. National Grid can help you manage your bill.

In addition to no-cost energy efficiency services, income-eligible residential customers may also qualify for:

Discounted natural gas and electric rates

A discount of up to 30% on monthly natural gas and electric bills may be available. Customers who receive Heating Assistance/Home Energy Assistance Program (HEAP) energy grants are enrolled automatically on the discounted rates.

If you receive a different qualifying benefit – like Supplemental Security Income (SSI), Food Stamps/ Supplemental Nutrition Assistance Program (SNAP), Medicaid, General Public Assistance, or the Rhode Island Works Program – you can apply for the discount rate online at **nationalgridus.com/Discount-Rate-Application-RI** or by phone at **1-800-322-3223** (electric) or **1-800-870-1664** (gas).

Payment plans and/or the Forgiveness Program

If you are past due on your utility bill, National Grid will work with you to develop a plan to spread out payments. If you qualify for Heating Assistance/Home Energy Assistance Program (HEAP), owe more than $300, and are more than 60 days past due, you may be eligible for the Forgiveness Program (also known as the Arrearage Management Program) – which could result in forgiveness of a portion of past due balances if you adhere to a structured payment plan.

Please visit **ngrid.com/ridiscount** or call **1-888-211-1313** to learn more.

Other ways to save while staying cool

Close your drapes or blinds on hot, sunny days to help keep the heat out.

Use the microwave, outdoor grill, or multi-cooker instead of the oven.

When possible, avoid placing room or window air conditioners in windows that face south.

Switch to energy-saving LEDs bulbs — they not only use less energy, they also produce less heat.

EE8410 RI (4/21)

Rhode Island

nationalgrid

Manténgase fresco y ahorre este verano.

Si es propietario de su casa o alquila, podemos ayudarlo a mantenerse cómodo y administrar sus facturas de electricidad.

Cuando usa más energía para enfriar su hogar, sus costos de energía aumentan. Si está buscando formas de reducir su consumo de energía, mantenerse cómodo y administrar su factura de electricidad, podemos ayudarlo.

Estos programas basados en ingresos pueden ser adecuados para usted.

Eficiencia energética para viviendas de una a cuatro unidades.

Ya sea que alquile o sea propietario de una casa con una a cuatro unidades, puede calificar para la Evaluación de electricidad doméstica sin costo de National Grid para determinar la eficiencia de su hogar. Se puede realizar una evaluación de forma remota por teléfono o en persona en su hogar. Recibirá productos para ahorrar energía sin costo, incluidos los siguientes:

- Bombillas LED con certificación ENERGY STAR®
- Cabezales de ducha y aireadores de grifo que ahorran energía
- Contactos múltiples avanzados
- Termostatos programables

Después de su evaluación, puede calificar para reembolsos o reemplazos sin costo de equipos de refrigeración y otros electrodomésticos. Además, el aislamiento puede estar disponible sin costo, por lo que podrá mantener su hogar más fresco durante el verano y más cálido durante el invierno.

Para determinar su elegibilidad para el programa y averiguar cuáles son los pasos a seguir, consulte la tabla de elegibilidad de ingresos a continuación:

Número de personas en el hogar	Ingreso familiar anual del año 2021	
	Programa de elegibilidad según ingresos	Programa residencial
1	≤ $32,265	$32,266+
2	≤ $42,193	$42,194+
3	≤ $52,120	$52,121+
4	≤ $62,048	$62,049+
5	≤ $71,976	$71,977+
6	≤ $81,903	$81,904+
7	≤ $83,765	$83,766+
8	≤ $85,626	$85,627+
	Si su actual **aire acondicionado para ventana** califica para un reemplazo, se le entregará un nuevo electrodoméstico de bajo consumo y sin costo para que lo instale. O si calefacciona mediante un aparato con resistencia eléctrica, podría calificar para recibir una **bomba de calefacción con fuente de aire** sin costo para contar con calefacción y refrigeración eficientes en su hogar. También puede recibir un refrigerador, un congelador, un deshumidificador o una lavadora de ropa de carga frontal nuevos, así como una mejora del sistema de calefacción, sin costo.* *Los electrodomésticos existentes deben cumplir con los requisitos de elegibilidad del programa.	Puede ser elegible para obtener un reembolso si compra un **dispositivo de aire acondicionado** con certificación ENERGY STAR o instala una **bomba de calefacción con fuente de aire**, que es una solución tanto de refrigeración como de calefacción.
	Llame al **1-401-351-1800** para verificar si es elegible y programar su Evaluación de electricidad doméstica sin costo. Se le informará qué documentos son necesarios para verificar sus ingresos. Visite **ngrid.com/ri-income** para obtener más información.	Llame al **1-888-633-7947** para programar una Evaluación de electricidad doméstica sin costo. **Visite ngrid.com/ri-home** para obtener más información.

Si alquila una casa de una a cuatro unidades, no se requiere la aprobación del propietario para una evaluación de energía del hogar. Es posible que se requiera la aprobación del propietario para ciertos trabajos de seguimiento.

continued >

Rhode Island

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Eficiencia energética para edificios de cinco o más unidades

Los clientes que vivan en edificios con 5 o más unidades serán atendidos por nuestro Programa multifamiliar. Para participar en este programa, pídale a su propietario que llame al **1-888-633-7947** para acceder a los beneficios de eficiencia energética. También hay información adicional disponible en línea en **ngrid.com/rimultifamily**.

El primer paso será una evaluación de electricidad sin costo para encontrar formas de aumentar el ahorro de energía en todo el edificio.

Las instalaciones multifamiliares de las viviendas asequibles pueden ser elegibles para recibir **aire acondicionado para ventana** sin costo en todas las unidades o **bombas de calefacción con fuente de aire** (si el edificio multifamiliar tiene calefacción con resistencia eléctrica).

La pandemia de COVID-19 ha sido dura para todos. National Grid podemos ayudarlo a pagar su factura.

Además de los servicios de eficiencia energética sin costo, los clientes residenciales elegibles por ingresos también pueden calificar para lo siguiente:

Descuentos en las tarifas de gas natural y electricidad

Un descuento de hasta 30 % en las facturas mensuales de gas natural y electricidad puede estar disponible para usted. Los clientes que reciben subsidios del Programa de Asistencia de Combustible/Programa de Asistencia de Energía para el Hogar (HEAP) están automáticamente inscritos en las tarifas con descuento.

Si recibe un beneficio diferente a estos, pero que también sea elegible, como Ingresos Suplementarios de Seguridad (SSI), cupones para alimentos/Programa de Asistencia Nutricional Suplementaria (SNAP), Medicaid, Asistencia Pública General o el Programa de Obras de Rhode Island, puede solicitar la tarifa con descuento en línea en **nationalgridus.com/Discount-Rate-Application-RI** o por teléfono llamando al **1-800-322-3223** (electricidad) o **1-800-870-1664** (gas).

Planes de pago o Programa de Condonación

Si está atrasado en el pago de su factura de servicios públicos, National Grid trabajará con usted para desarrollar un plan para distribuir los pagos. Si califica para el Programa de Asistencia de Combustible/ Programa de Asistencia de Energía para el Hogar (HEAP), debe más de $300 y tiene más de 60 días de atraso, puede ser elegible para el Programa de Condonación (también conocido como Programa de Gestión de Atrasos); a través de este programa, es posible que se le condone una parte de los saldos vencidos si usted se adhiere a un plan de pago estructurado.

Visite **ngrid.com/ridiscount** o llame al **1-888-211-1313** para obtener más información.

Otras formas de ahorrar sin pasar calor

Cierre las cortinas o persianas en los días calurosos y soleados para ayudar a mantener el calor fuera.

Use el microondas, una parrilla en el exterior o una olla de cocción múltiple en lugar del horno.

Si es posible, evite colocar el aire acondicionado en las habitaciones o en las ventanas que miran al sur.

Cambie las bombillas a LED de bajo consumo: no solo consumen menos energía, sino que también producen menos calor.

EE8127 RI (5/21) Spanish

Redacted

PUC 1-141

EnergyWise Single Family (electric and gas)

Request:

Does the Company have an estimate of how much it will cost to verify customers via the third-party income verification vendor?

Response:

The Company has reached out to the vendor that provides income verification services for the Massachusetts Clean Energy Center income dependent offerings. The current estimate for income verification is [redacted] for each customer verified.

Prepared by or under the supervision of: Angela Li

PUC 1-142
Equity

Request:

Does the Company have an estimate of the number of customer accounts that would be eligible for the moderate income classification but that are not eligible for the income eligible classification? If so, does the Company have an estimation of how many of those customer accounts will take participate in the income verification process?

Response:

The Company estimates that approximately 11% - 14% of residential customers (inclusive of both current market rate and income-eligible customers) fall into the 60%-80% of state median income demographic that is being proposed for the moderate income offering.

Massachusetts has had a similar weatherization offering for several years with low uptake. The sense is that other barriers such as taking time off from work and other life burdens may be influencing participation beyond simply financial barriers to participation. Historical income verification practices may also have been a barrier to participation in the enhanced moderate income offer, given the size of the customer contribution for weatherization work in even market rate settings.

However, given the strong customer participation trends observed during the COVID 100% weatherization offering, the Company is interested in establishing and more fully pursuing (including with new income verification techniques and processes) this opportunity for moderate income customers.

Prepared by or under the supervision of: Angela Li

PUC 1-143
Workforce Development

Request:

Workforce Development Please provide a chart showing the amounts budgeted for workforce development in 2021 (including embedded), the amounts actually spent in 2021, and the amounts proposed for 2022. Include a column showing proposed incremental spending. To the extent possible, please itemize by amount, class (NIE residential, income eligible residential, C&I), type/description of activity and whether the activity is designed to upsize or upskill the labor force.

Response:

- Please see Attachment PUC 1-143-1 for a chart showing workforce development activities that the Company has proposed to continue in the 2022 Annual Energy Efficiency Plan.

- Please see Attachment PUC 1-143-2 for a chart showing new workforce development activities that the Company has proposed for the 2022 Annual Energy Efficiency Plan.

Prepared by or under the supervision of: Joshua Kessler

PUC Attachment 1-143-1: Continued Workforce Development Activities

Sector	Workforce Activity	Description	2021 Budgeted	2021 YTD Spend	2022 Proposed Budget	Increase vs 2021 Budget	Upskill / Upsize
Residential (NIE and IE)	Code compliance	A suite of service which included training sessions, project-specific hotline support, and development and delivery of tools and resources to fill industry gaps	$67,000	$83,850	Please see "All Sectors" row	Please see "All Sectors" row	Upskill
	BPI training for Wx		$115,000	$675	$0	(-$115,000)	Both
	New Construction / Zero Net Energy	High performance building practices training	$86,500	$135,000	$20,000	(-$66,500)	Upskill
	HVAC check training	HVAC installation best practices training	$39,400	$15,600	$39,400	$0	Both
	Income Eligible Single Family Miscellaneous (e.g. WiFi thermostat and ASHP support)	Training on topics such as WiFi thermostats and ASHP	$50,000	$0	$50,000	$0	Both
Commercial and Industrial	Code compliance	(Please see description above)	$63,000	$45,150	Please see "All Sectors" row	Please see "All Sectors" row	Upskill
	Building Operator Training	Building O&M best practices training	$25,000	$6,850	$37,000	$12,000	Both
All Sectors	Code compliance	(Please see description above)	$130,000	$129,000	$200,000	$30,000	Upskill

PUC Attachment 1-143-2: New Workforce Development Activities Proposed for 2022

Sector	Workforce Activity	Description	2021 Budget	2021 YTD Spend	2022 Proposed Budget	Incremental Spend Above 2021 Budget	Upskill / Upsize
Commercial and Industrial	Controls Best Practices (HVAC and Lighting Controls)	ASHRAE Guideline 36 training (Sequence of Operations)	$0	$0	$20,000	$20,000	Upskill
		Lighting Design Lab Training (Lighting Controls)	$0	$0	$30,000	$30,000	Upskill
	Manufacturer-Led Trainings	The Company will coordinate and promote participation in existing manufacturer trainings in the following technology areas:	$0	$0	$50,000	$50,000	
		- Building/HVAC Controls					Upskill
		- Demand Control Ventilation/Energy Recovery Ventilator					Upskill
		- Variable Frequency Drive					Upskill
		- HVAC					Upskill
		- Lighting Controls					Upskill
	Industry Certifications	The Company will increase the number of local certified individuals by sponsoring certifications in the following technology areas	$0	$0	$125,000	$125,000	
		- Controls (ISA Building Automation Systems, BOMA Building Automation Systems Certificate)					Upskill
		- HVAC (NATE Level 4, ASHRAE Certified HVAC Designer)					Upskill
		- RCx (ASHRAE Building Commissioning Professional)					Upskill