

Qualifications of Stephen R. Eckberg

My name is Stephen R. Eckberg. I am employed as a Utility Analyst with the Electric Division of the New Hampshire Public Utilities Commission. My business address is 21 S. Fruit Street, Suite 10, Concord, New Hampshire 03301.

I earned a B.S. in Meteorology from the State University of New York at Oswego and an M.S. in Statistics from the University of Southern Maine.

After receiving my M.S. degree, I was employed as an analyst in the Boston office of Hagler Bailly, Inc, a consulting firm working with regulated utilities to perform evaluations of energy efficiency and demand-side management programs. Subsequently, I was employed as a Statistical Applications Programmer at UMass Lowell supporting epidemiology research projects in the Work Environment Department. From 2000 through 2003, I was employed at the NH Governor's Office of Energy and Community Services (now the Office of Strategic Initiatives) as the Director of the Weatherization Assistance Program. Following that, I was employed at Belknap Merrimack Community Action Agency as the Statewide Program Administrator of the NH Electric Assistance Program (EAP). In that capacity, I presented testimony before the NH Public Utilities Commission in dockets related to the design, implementation and management of the EAP. I have also testified before Committees of the New Hampshire General Court on issues related to energy efficiency and low income electric assistance. From 2007 – 2014 I was employed as a Utility Analyst with the New Hampshire Office of the Consumer Advocate (OCA). During my tenure with the OCA, I attended regulatory training at New Mexico State University's Center for Public Utilities.

In my position with the OCA, I entered pre-filed testimony in the following dockets

- DG 08-048 Unitil Corporation and Northem Utilities, Inc. Joint Petition for Approval of Stock Acquisition (Joint w/ K. Traum)

- DW 08-070 Lakes Region Water Company Financing & Step Increase (Joint w/ K. Traum).
- DW 08-098 Aquarion Water Company of New Hampshire (Joint w/ K. Traum).
- DE 09-035 Public Service of New Hampshire Distribution Service Rate Case (Joint w/K. Traum).
- DT 07-027 Kearsarge Telephone Company, Wilton Telephone Company, Hollis Telephone Company & Merrimack County Telephone Company Petition for Alternative Form of Regulation. Phase II & Phase III.
- DW 08-073 Pennichuck Water Works, Inc. Petition for Rate Increase.
- DW 08-070 Lakes Region Water Company Third Step Increase.
- DW 08-065 Hampstead Area Water Company Petition for Rate Increase.
- DE 09-170 2010 CORE Energy Efficiency Programs.
- DW 10-090 Pittsfield Aqueduct Company Petition for Rate Increase.
- DW 10-091 Pennichuck Water Works Petition for Rate Increase.
- DW 10-141 Lakes Region Water Petition for Rate Increase.
- DE 10-188 2011-2012 CORE and Natural Gas Energy Efficiency Programs.
- DE 11-250 PSNH Installation of a Wet Flue-Gas Desulphurization Scrubber.
- DE 12-262 2013-2014 CORE and Natural Gas Energy Efficiency Programs.
- DE 12-292 PSNH 2013 Energy Service Rate.
- DE 12-262 2014 CORE Energy Efficiency Programs Update Filing.
- DE 13-108 PSNH 2012 Energy Service Reconciliation.
- DG 14-091 Liberty Utilities Special Contract and Lease Agreement with Innovative Natural Gas, LLC dba iNATGAS.

In August 2014, I joined the PUC's Sustainable Energy Division. While employed there, I filed testimony in:

- DE 18-140 Liberty Utilities Petition for Approval of a Renewable Natural Gas Supply and Transportation Contract.

In 2019, I joined the PUC's Electric Division. Since joining the Electric Division I have filed testimony in:

- DE 17-136 2018-2020 New Hampshire Statewide Energy Efficiency Plan - 2020 Third Year Programs.
- DE 19-197 Development of a Statewide, Multi-Use Online Energy Data Platform (Joint Direct and Rebuttal Testimony with Jason Morse).

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-092

Date Request Received: 10/05/2020

Date of Response: 10/19/2020

Request No. STAFF 2-046

Page 1 of 1

Request from: New Hampshire Public Utilities Commission Staff

Witness: Mary Downes

Request:

UNITIL: Reference response to Staff 1-027. The response shows that the planned Measure Life (ML) is 2.74 years for both the Electric and Gas HER program. Please explain why Unitil does not also plan to transition to a one year savings approach as does Liberty per the plan at Bates 161-162.

Response:

Unitil intends to report savings using a measure life of 1 year for 2020.

The response to Staff 1-027 shows planned savings as filed in each for 2018, 2019 and 2020. When Unitil files its 2020 annual report, it will report HER savings using a 1 year measure life, in which persistence savings that was originally anticipated to occur in program years 2021 and 2022 is not claimed.

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-092

Date Request Received: 10/05/2020

Date of Response: 10/19/2020

Request No. STAFF 2-039

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Request from: New Hampshire Public Utilities Commission Staff

Witness: Eric Stanley

Request:

LIBERTY: At Bates 164, footnote 57 provides a link to <http://myheat.ca> which appears to be the Company that Liberty intends to work with to implement the proposed AIM program. Please respond to the following:

- a) Have any of Liberty's utility affiliates engaged with this company to implement a similar program in the US or Canada? If so, please provide details.
- b) Please provide copies of all EM&V studies performed for utility EE programs (as distinguished from research or marketing material produced by myHeat) that Liberty is aware of that support behavioral savings estimates, program savings attribution, and estimates of savings persistence (savings lifetime).
- c) Is the Company's intent to provide a website and information similar to those available for various cities in Canada that are available at <https://heat.myheat.ca/> ?

Response:

- a) No other Liberty affiliates have engaged with the company yet to implement a similar program in the U.S. or Canada.
- b) Attachment Staff 2-039 A is a comprehensive listing of EM&V studies performed for utility EE programs Liberty is aware of regarding behavioral savings estimates, program savings attribution, and estimates of savings persistence. Attachment Staff 2-039 B is a study Liberty is aware of that specifically incorporates the examination of infrared images on behavioral savings, attribution and persistence.
- c) As described on Bates page 166, Liberty will provide customers a visual HEAT Map depiction and HEAT Rating of their home via a private access code protected web-based platform, where customers can view the heat loss details for only their home. The website and information for various cities in Canada that are available at <https://heat.myheat.ca/>, which allows any viewer to look up detailed profiles for any and all homes within a geography is considered MyHeat's public access platform. Liberty will not be providing this type of platform for public access viewing.

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-092

Date Request Received: 10/05/2020

Date of Response: 10/19/2020

Request No. STAFF 2-047

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Request from: New Hampshire Public Utilities Commission Staff

Witness: Eric Stanley

Request:

LIBERTY: Please provide an analysis which includes the costs and energy savings of the AIM program in the Liberty Gas HPwES program. How would doing so change the B/C ratio of the Liberty Gas HPwES program?

Response:

The table below shows the Granite State Test (GST), Utility Cost Test (UCT), and Granite State Test #2 (GST-2) for the Liberty Gas HPwES program with and without the AIM program costs and energy savings included.

Year	HPwES (no AIM)			HPwES + AIM Included		
	GST	UCT	GST-2	GST	UCT	GST-2
2021	1.70	1.47	1.90	1.27	1.10	1.45
2022	1.81	1.56	2.02	1.69	1.46	1.91
2023	1.91	1.63	2.12	1.79	1.54	2.02
Term: 2021-2023	1.82	1.56	2.02	1.58	1.36	1.79

When looking at the Term 2021–2023 period, the GST, UCT, and GST-2 ratios decline by 13%, 12%, and 11% respectively when including the costs and energy savings of the AIM program. However, the GST, UCT, and GST-2 ratios are still well above 1.0 when including the AIM program costs and energy savings. See Excel Attachment Staff 2-047 for the complete backup data.

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-092

Date Request Received: 09/17/2020

Date of Response: 10/01/2020

Request No. STAFF 1-021

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Request from: New Hampshire Public Utilities Commission Staff

Witness: Katherine W. Peters, Mary Downes, Eric Stanley, Carol Woods

Request:

Reference Bates 128 regarding the proposed increase in HEA project incentive maximum from \$8,000 to \$20,000. Please provide data and explanation supporting this value as the appropriate project cap. In other words, why this value rather than \$12,000, \$15,000 or some other value?

Response:

The \$20,000 cap was chosen to cover the majority of HEA projects that are projected in 2020. An in-depth analysis of statewide data showed that 95% of the HEA projects could be completed using a cap of \$20,000.

Cap	Count	Percentage
\$8k	882	65%
\$12k	1113	82%
\$15k	1178	86%
\$20k	1297	95%
>\$20k	68	5%

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-092

Date Request Received: 09/17/2020

Date of Response: 10/01/2020

Request No. STAFF 1-043

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Request from: New Hampshire Public Utilities Commission Staff

Witness: Katherine W. Peters, Mary Downes, Eric Stanley, Carol Woods

Request:

Reference Bates pp. 20 and 201-205 regarding workforce. Please provide a summary of the costs associated with the workforce development by year by utility by program

Response:

Workforce development will be an important focus in 2021-2023. The NH Utilities intend to develop a more formal workforce development plan as soon as practicable during the term as described in Chapter 9. Funding for workforce development efforts will come from the Residential and C&I Education budgets from each utility. The education budgets will also support customer education activities such as Button Up workshops, K-12 Education and Resources and Building Operator Certification. Exact allocations between workforce development and these related activities have not been made to date, as workforce development needs and strategies will continue to develop and education and training opportunities may evolve. Eversource and the NH Electric Co-Op did include additional workforce development and training costs as part of the Home Energy Assistance program. Education budgets and HEA allocations are combined in the charts below.

	2021		2022		2023	
	Residential	C&I	Residential	C&I	Residential	C&I
Eversource	\$1,655,573	\$230,107	\$705,547	\$298,389	\$770,806	\$386,906
Liberty Electric	\$39,800	\$32,960	\$45,424	\$44,746	\$54,434	\$58,186
NHEC	\$195,742	\$46,435	\$98,283	\$48,514	\$68,048	\$22,670
Unitil Electric	\$26,950	\$57,500	\$31,574	\$69,056	\$30,721	\$79,733

	2021		2022		2023	
	Residential	C&I	Residential	C&I	Residential	C&I
Liberty Gas	\$60,174	\$60,600	\$65,127	\$65,171	\$71,047	\$70,615
Unitil Gas	\$26,800	\$25,550	\$26,925	\$29,056	\$18,573	\$30,486

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-092

Date Request Received: 10/06/2020

Date of Response: 10/20/2020

Request No. STAFF 4-001

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Request from: New Hampshire Public Utilities Commission Staff

Witness: Mary Downes

Request:

Reference Staff 1-027 and Staff 1-028. Please provide the reports and live spreadsheets provided by the consultant that supports the following:

- a. The control and treatment group data and the resulting savings estimates using a 3 year (or greater than 1 year) measure life. Please provide the contractor's full analysis.
- b. The calculations (and the supporting data) that switched from a 3 year measure life to a 1 year measure life. In other words, the basis for the savings estimates in the draft 2021-2023 plan that used a 3 year measure life and also the basis for the savings estimates for the one year measure life.
- c. Historical data used for calculating planned and actual savings in the 2018-2020 plan years, including the primary evaluation data for the treatment and control groups.

Response:

- a. The savings estimates for a three year measure life for the 2018-2020 term is based on the implementation vendor's extensive experience running behavior programs across North America, and is not based on NH specific control and treatment group data. The explanation of how the multi-year measure life savings analysis is derived is attached as Attachment Staff 4-001 A.
- b. Behavior programs that are established with a one year measure life compare billed energy usage between a treatment group and a control group to derive reportable or "measured" annual energy savings. However, Liberty's and Unitil's behavior programs, which were modeled upon the HER program proposed by Eversource and approved by the Commission, were established with a three year measure life, in which measured first year savings were assumed to persist for two additional years (hence a 3 year measure life). In years two and three, the kWh and/or MMBtu "measured" savings is a combination of already claimed persistence savings and newly occurring "annual" savings. The basis for savings estimates for 2021-2023 use a one year measure life, but take into account the persistence already claimed from when savings estimates used a three year measure life in the previous triennium. See Attachment Staff 4-001 B for an explanation from the implementation vendor on how this was accomplished, as well as tables showing savings projections using a 1 year and multi-year measure life for Unitil and for Liberty respectively.
- c. There is no "historical data" used by the implementation vendor for planning for 2018-2020. The actual savings are based on a comparison of billing data between the treatment and control groups using the industry standard randomized control trial method as described in Attachment Staff 4-001 C. The primary evaluation data for the treatment and control groups for calculating actual savings for 2018-2020 for Unitil and Liberty was received from our implementation vendor on October 20th and needs to be converted to a usable format (e.g., MS Excel) before being transferred via a secure file transfer protocol to Staff.

000023

F.1 Measurement and Verification Methodology

Oracle uses the following five steps to implement randomized controlled trials to measure savings:

1. Identify eligible households using data requirements and other characteristics, as specified by the given utility
2. From this pool of eligible households, randomly assign participants to control and treatment groups
3. Verify statistical equivalency between the groups
4. Deploy reports to the treatment group to administer the program
5. Measure the ongoing difference in energy use between the control and treatment groups before and after Program communications begin arriving at customers' homes to calculate the difference usage between the groups, which is the energy savings specifically attributable to Opower's Program.

This approach enables us to provide information on how our program affects customers':

- Electricity usage in kWhs (or other desired unit of measure)
- Natural gas usage in therms (or other desired unit of measure)
- Participation in other energy-efficiency, demand-response, and dynamic-pricing programs

Please refer to Figure F-1 for an overview of our M&V methodology.



FIGURE F-1: M&V METHODOLOGY

1. Identify Eligible Households: Use data requirements and program design considerations to screen households.
2. Setup Test and Control: Identify and divide eligible households into statistically equivalent groups.
3. Verify Groups: Verify no historical difference in usage between test and control groups.
4. Deploy Communications: Send materials to test group only, observe usage for control group participants.
5. Measure Impact: Compare differences in average energy usage across both groups.

Oracle's approach has been carefully designed to avoid other flawed M&V methodologies that attempt to count savings from behavior-based programs. These flawed methodologies include:

- Pre-post Analysis – Comparing a household to itself over time creates significant likelihood of bias in savings estimates, which reduces their accuracy.
- Self-selection or Opt-in – Opt-in designs are likely to either: 1) introduce bias issues and reduce the likelihood of statistical equivalency between control and treatment groups, or 2) reduce program scale so that statistically significant results cannot be determined through Experimental Design.

- Self-reporting or Surveys – Surveys cannot establish causation—only correlation—and are less accurate due to propensity for survey-response and attribution bias.

F.2 Working with Independent Evaluators

Oracle is happy to provide program data to an independent evaluation contractor, as we have done for many of our other utility clients. The standard data that we package for independent evaluators includes:

Customer identification

- Opower customer identifier
- Utility customer identifier

Billing information

- Billing period end date (include billing data 1 year prior to program launch)
- Duration of billing period
- Fuel Type
- Energy usage (kWh or therms) during billing period
- Indicator of estimated read

Subscription information

- Test/control indicator
- Program start date
- Opt-out date
- Move-out date

F.3 Persistence

After years of evaluations designed to understand if Opower HER programs deliver energy savings, the validity of behavioral energy efficiency savings is now widely accepted.

Post-treatment persistence of savings has also been well documented in eleven independent evaluations that cover four separate program deployments, citations for which can be found in the Evaluations section below. These studies indicate that a proportion of HER savings persist for at least two years, provided that reports were consistently delivered for at least two years. This persistence is the result of accumulation of what Allcott and Rogers refer to as “capital stock” of energy-saving habits and hardware investments that continue to deliver savings after program suspension. Across each of the four deployments that ran for at least two years prior to suspension, a portion of savings persists into the second year of suspension.

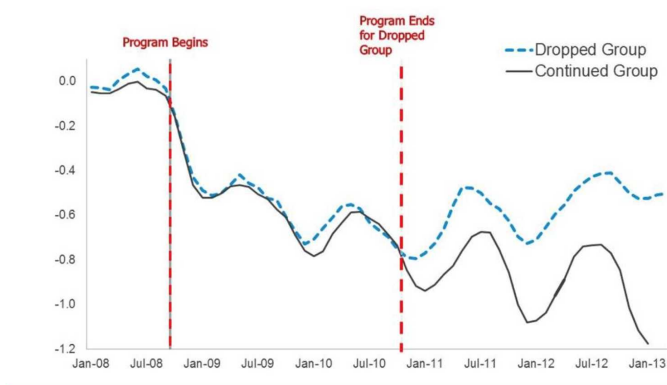


FIGURE F-2: POST-TREATMENT SAVINGS

Figure F-2 is a graphical representation of post-treatment savings. In this program, customers received reports for two years, and then a portion of the recipient customers stopped receiving reports. Once the reports were suspended for the "Dropped Group", savings began to decay gradually, while the "Continued Group" continued to save.

The Cadmus Group published a paper in October 2014, which, among other things, summarizes many of the persistence studies and evaluations of Opower HER programs; Figure F-3 shows the annual decay rates that were observed in these studies.

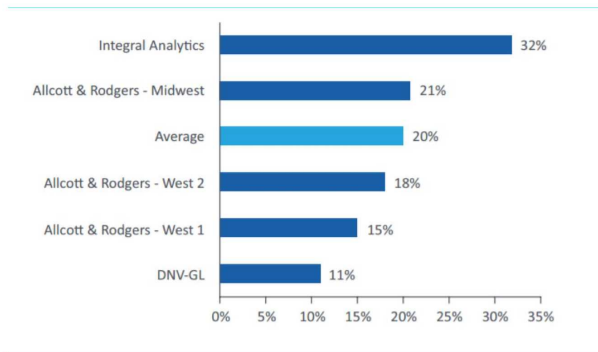


FIGURE F-3: ESTIMATED ANNUAL DECAY RATES (AFTER 2 YEARS OF RECEIVING HERs)

For simplicity, Cadmus recommends assuming a 20% annual decline rate to calculate persistence from future HER programs.

Measure Life & Accounting Implications

The next question that tends to arise is: if savings persist for customers who have stopped receiving reports, then what is the appropriate measure life to assume for an HER program? The measure life for an HER program is a little different than it would be for installed measures because savings decay gradually over time for the HER program, while most installed measures simply assume a single deemed savings value for a certain number of years. Therefore, the measure life of an HER program is actually defined as the lifetime savings divided by the annual savings in a given year (and it will vary over time). There is currently precedence for one-year measure life as well as assuming 2, 3, or 4 years of persistence in different jurisdictions. This is primarily determined by the utility and regulator based on local precedent, availability of persistence data, and policy objectives.

Utilities in NH have included 3 years of persistence at a 20% decay rate. Figure F-4 below depicts the savings accounting breakdown associated with this method. Note that the savings numbers are for illustration purposes only. The first year of savings on a per household basis would look like what is shown in Figure F-4, where "Annual Y1 kWh" refers to the average savings per household that we measure via RCT in the first year of the program, and "Persistence Y1 kWh" refers to the average persistence savings attributable to the first year of the program, assuming 3 years of persistence at a 20% decay rate.

Docket No. DE 20-092
Data Request Staff 4-001
Dated 10/06/2020
Attachment Staff 4-001 A
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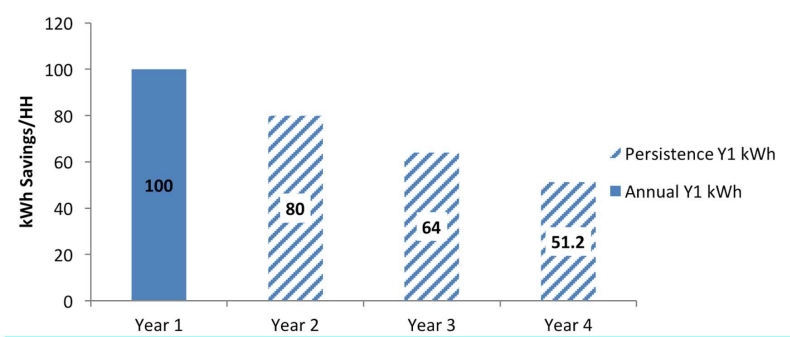


FIGURE F-4: SAVINGS BREAKDOWN

For year one, the savings that would be claimable towards the annual goal would be 100 kWh per household, and the lifetime savings would be 295 kWh per household. This would mean that in year 1, this program would have a measure life of 2.95.

During year 2 of program treatment, the savings would likely look like the green solid and dashed bars in Figure F-5. Notice in Figure F-5 that the overall savings per household we expect to measure in year 2 are higher overall than in year 1 due to the standard program ramp, but the “Annual Y2 kWh” savings that the utility would be able to count towards the annual target are lower. This is because the persistence savings that have already been claimed towards year 1 lifetime savings are subtracted to ensure clear accounting and no double counting of savings. Therefore, for year 2, the utility would count 75 kWh/hh towards their annual target and 262 kWh/hh towards the lifetime savings. Notice that in year 2 the measure life for the program would increase to 3.50.

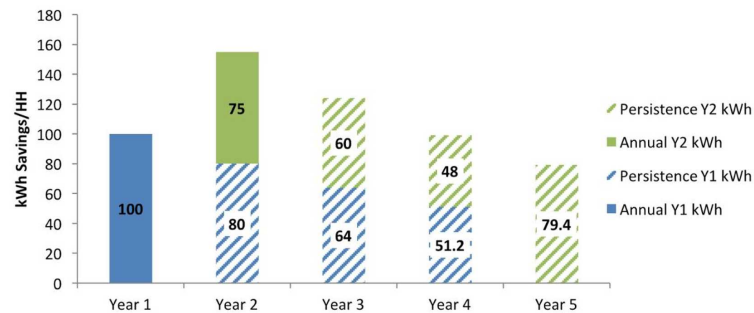


FIGURE F-5

Thus, using a multi-year measure life accounting approach decreases the amount of savings that a utility can claim toward its annual goals, but increases the overall lifetime savings for the program.

Figures F-6 and F-7 show the annual and lifetime allocation of savings for the NH program we’ve proposed.

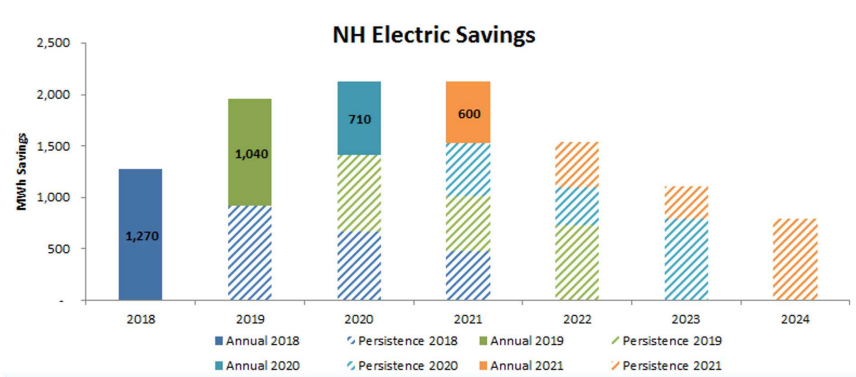


FIGURE F-6: NH ELECTRIC SAVINGS

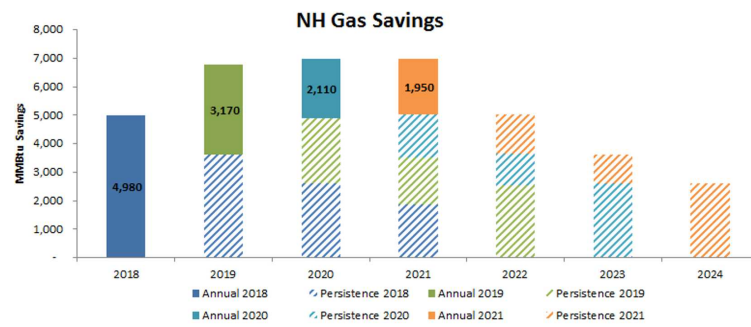


FIGURE F-7: NH GAS SAVINGS

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-092

Date Request Received: 10/05/2020

Date of Response: 10/19/2020

Request No. STAFF 2-014

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Request from: New Hampshire Public Utilities Commission Staff

Witness: Katherine W. Peters, Mary Downes, Eric Stanley, Carol Woods

Request:

Please provide a list of all the contractors that are pre-qualified. For 2019 for each contractor, please provide the total revenues paid to each contractor, the number of projects, and the number of facilities or households served by the contractor.

Response:

In the context of this question, the NH Utilities understand "contractors" to mean companies that install energy efficiency measures at a customer site. The only programs that require customers to utilize pre-qualified contractors are HEA and HPwES.

Excel Attachment Staff 2-014 contains the list of qualified contractors, the amounts paid to each and the number of customers served. The project management system used for these programs does not track the number of projects, facilities or households individually. They are just tracked as number of customers served.

Program	Contractor	Projects	Payments
HEA	Belknap-Merrimack Counties CAP	604	\$1,672,378.57
HEA	CLEARResult	94	\$44,555.70
HEA	Resilient Buildings Group, Inc.	108	\$208,688.00
HEA	Southern NH Services	756	\$3,557,048.06
HEA	Southwestern Community Services Inc	181	\$843,984.94
HEA	Strafford County Community Action Weatherization	279	\$1,837,431.92
HEA	Tri-County Community Action	264	\$1,868,239.70
HPwES	A+ Energy Services	48	\$166,504.92
HPwES	ABC Energy Savings LLC	50	\$165,246.27
HPwES	Build Basic Green	6	\$14,955.20
HPwES	Building Alternatives	16	\$43,930.09
HPwES	CLEARResult	517	\$295,734.12
HPwES	Earthshare Construction LLC	8	\$29,134.24
HPwES	Efficient Home Services, LLC	5	\$23,157.60
HPwES	HomeLock Construction/ Christopher Hayward	3	\$11,910.05
HPwES	Invictus Spray Foam	3	\$6,535.70
HPwES	J MYERS BUILDERS, Inc	37	\$98,308.77
HPwES	Mill City Energy	569	\$278,623.51
HPwES	Newell & Crathern, LLC	292	\$759,105.43
HPwES	P&M Installed Building Solutions	14	\$42,234.41
HPwES	Quality Insulation-Meredith	130	\$377,111.05
HPwES	Quality Insulation-Nashua	119	\$273,342.21
HPwES	Romik Developers, LLC	10	\$31,555.87
HPwES	Shakes to Shingles	56	\$200,839.51
HPwES	Simplified Green Homes	5	\$18,005.65
HPwES	Tri-County Community Action	5	\$11,301.37
HPwES	Turn Cycle Solutions, LLC	160	\$482,755.21
HPwES	Yankee Thermal Imaging	183	\$484,560.46