Single-Family LMI Retrofit Programs Impact Evaluation (2023)

Final Report

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Glossary

- **Advanced Metering Infrastructure (AMI):** In this evaluation, refers to data from advanced meters that are capable of providing consumption data at hourly intervals.
- **Adherence rates:** A percentage showing how closely estimated savings match TRM savings. 100% means estimated savings equal TRM savings.
- **Default TRM savings:** Savings calculated by the evaluation contractor team using TRM algorithms and default values for input variables when available in the TRM.
- **Disadvantaged Communities (DACs):** Communities that meet criteria developed by New York Climate Justice Working Group for disadvantaged communities based on a range of socio-economic factors. This evaluation used criteria established in 2023, though the criteria will be updated by the end of 2025.
- **EmPCalc**: The tool used by the EmPower+ program prior to PY2023 to estimate savings.
- **EmPower+:** The program that is the focus of this evaluation. It is the combination of what was previously known as the EmPower program, which served low-income customers, and the Assisted Home Performance program, which served moderate-income customers.
- **Estimated savings:** Savings estimates calculated by program project management software using inputs provided from contractors and provided by the program for this study.
- **Evaluated savings:** Savings calculated by the evaluation contractor team from billing analysis (i.e., consumption data analysis).
- **kWh:** Kilowatt-hours
- **Low-income (LI):** A descriptor for households with income below 60% State median income (SMI).
- **Low-to-Moderate-Income (LMI):** The combination of low-income and moderate-income households.
- **MMBtu:** Million British thermal units
- **Moderate-income (MI):** A descriptor for households with income below 80% State median income (SMI).
- **New York Home Energy Portal (NYHEP):** The data portal used for program participation that started being used in July 2023.
- **Quality Management Score (QMS**): A 0 to 5 score used by NYSERDA to assess the quality of contractors' work in the program.
- **Realization rates:** The percentage of estimated savings that shows up in the evaluated savings (evaluated savings/estimated savings).
- **Site-specific TRM savings:** Savings calculated by the evaluation contractor team using TRM algorithms and all available site-specific data from the program data.
- **Single-family (SF):** Refers to one-to-four-unit buildings.
- **Technical Reference Manual (TRM):** In this evaluation, refers to Version 10 of the New York Standard Approach for Estimating Energy Savings from Energy Efficiency Program.
- **Verified savings:** Savings calculated by the evaluation contractor use TRM algorithms.
- **Weatherization Assistance Program (WAP):** A program that helps low-income customers weatherize their homes.

1 Introduction

1.1 Program description

The EmPower+ program is part of the Statewide Low and Moderate Income (LMI) Portfolio,[1] and is administrated by NYSERDA.[2] Prior to 2023, EmPower+ was two separate NYSERDA-operated programs: EmPower NY and Assisted Home Performance (AHP). The program includes a comprehensive home energy assessment, followed by the implementation of a selection of energy efficiency and beneficial electrification measures, as shown in Table 1-1. NYSERDA directly pays contractors for work they have done at approved customers' homes based on the pre-approved work scopes. The EmPower+ program serves low-income and moderate-income households.

Table 1-1 provides details about the EmPower+ program, including income eligibility, building eligibility, homeowner incentives, measures offered, and the modeling tool used to calculate savings.

Table 1-1. EmPower+ program details

	EmPower+
Income eligibility	Low-income: household income below 60% State median income (SMI) Moderate-income: A household with income below the higher of 80% of area median income (AMI) and 80% of SMI
Building eligibility	Single family, multifamily (2-4 units) Owner occupied and rental housing (rental housing need landlord consent for all measures except electric reduction measures)
Funding and constraints	• Clean Energy Fund (CEF) and New Efficiency: New York (NENY) – Condition: participants must be a customer of a Systems Benefits collecting utility • Office of Temporary Disability (OTDA) – Condition: household must participate in LIHEAP; no utility restriction • Regional Greenhouse Gas Initiative (RGGI) – Condition: no utility restriction

[1] https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7b7E40641A-263D-4969-9AD2-D68EE6122114%7d

[2] In Q3 2025, NYSERDA completed the Single Family LMI Retrofit Program Evaluation: Natural Gas and Electric Billing Analysis. This updated version of the report adds analysis and findings specific to delivered fuels.

	EmPower+
Homeowner incentives	Tier 1: Up to $10,000 with special projects up to $13,000. OTDA customers receive up to $20,000 plus $5,000 for additional units in two- to four-unit buildings Tier 3: 50% cost covering incentive up to $5,000 for single unit buildings, and an initial $5,000 plus $2,500 for additional units in two- to four-unit buildings
Offered measures	Approximately 110 measures, including: • Shell measures such as insulation and air sealing • HVAC such as gas furnaces, heat pumps, and water heaters • Electric reduction such as refrigerators and light bulbs • health and safety such as CO detectors, smoke detectors, and bath fans
Modeling tool	NY TRM using LMI savings calculations
Project Savings Estimate	The EmPower+ program uses NYHEP to calculate savings by aggregating the measure level savings to create a project level estimate

1.2 Study objectives and background

The evaluation of the NYSERDA EmPower+ single-family (SF) LMI Program focuses on two overarching study objectives, as shown in Table 1-2: (1) evaluating energy and cost savings performance, by measuring first-year and lifetime energy savings and realization rates; and (2) assessing program design, implementation, and participant engagement, including how participants learn about and interact with the program, contractor practices, and barriers to participation.

Table 1-2. Study objectives and methods

Objective	Purpose	Method
Evaluate energy and cost savings performance	Verify first year gross electric and gas savings for program participants	Billing analysis using Uniform Methods Project (UMP)[a] and IPMVP Option C[b]
Assess program design, implementation, and participant, engagement	Provide actional recommendations to improve program design.	Participant survey, contractor survey, program staff interviews, and engineering analysis

a Agnew, K.; Goldberg, M. (2017). *Chapter 8: Whole-Building Retrofit with Consumption Data Analysis Evaluation Protocol, The Uniform Methods Project: Methods for Determining Energy-Efficiency Savings for Specific Measures.* National Renewable Energy Laboratory. NREL/SR-7A40-68564. http://www.nrel.gov/docs/fy17osti/68564.pdf

b *International Performance Measurement and Verification Protocol (IPMVP) Core Concepts - 2022.* Efficiency Valuation Organization. https://evo-world.org/en/products-services-mainmenu-en/protocols/ipmvp

1.3 Activities performed

The evaluation activities for the NYSERDA EmPower+ SF LMI Program include site-level billing analysis to quantify realization rates by specific energy efficiency measures, advanced metering infrastructure (AMI) analysis to estimate peak demand energy savings, and segmentation of sites to assess gross energy savings across various participant and program characteristics, such as income level, fuel-switching technologies (e.g., heat pumps), and contractor performance indicators like Quality and Market Standards (QMS) scores. These methods collectively support a detailed understanding of program impacts and performance drivers.

Table 1-3. Study activities and purpose

Activity performed	Purpose
Site-level billing analysis	Site-level billing analysis is used to quantify realization rate by measure.
Advanced Metering Infrastructure (AMI) analysis	AMI analysis is used in determining peak demand energy savings
Segmentation of sites from billing analysis	Quantify gross energy savings by household, program or contractor characteristics such as income classification, fuel-switching measures (e.g., heat pumps) and contractor Quality and Market Standards (QMS) scores.
Engineering analysis	Engineering analysis is used to assess the adherence of the NYHEP portal savings estimation methodology to the New York Technical reference manual (TRM) Version 10.[a]
Program staff interviews	Identify base-level understanding of program process, knowledge gaps for the program, and inflation reduction act impacts.
Participant survey	Answer process questions relating to how participants entered the program, their satisfaction with various parts of participation, and perceived impacts of participation
Contractor survey	Answer process questions relating to contractors' experience with the program, customer education, barriers to measure uptake, and trainings
Delivered fuel analysis	Quantify energy savings resulting from participation of households that use propane, oil, or wood.
Add-on participant survey	Provide additional insights into beneficial snapback resulting from program participation

a https://dps.ny.gov/technical-resource-manual-version-10-filed-december-30-2022-effective-january-1-2023

2 Results, findings, and recommendations

This section provides detailed findings and recommendations from the participant survey, participant add-on survey, contractor survey, billing analysis, delivered fuel analysis, engineering analysis, and IRA process research.

2.1 Detailed participant survey findings

This section provides detailed findings from the participant survey. The participant survey resulted in the recommendations shown in Table 2-1.

Table 2-1. Recommendations based on participant survey

Category	Recommendations
Program Visibility / Outreach	• Identify ways to increase awareness beyond word of mouth, especially for hard-to-reach groups that the program may underserve. • Explore partnerships to advertise the program, including with utilities and stakeholders.
Contractor Training	• Implement steps to improve training with an emphasis on work quality and professionalism.
Program Clarity	• Develop simple materials explaining the program that can be posted online and shared by contractors with participants.
Communication	• Provide/require clear documentation for participants on work approved and cost (if applicable). • Identify ways to furnish increased program-level support to customers with questions or facing challenges.
Quality Assurance and Resolving Issues	• Ensure that all participants receive NYSERDA/program-level contact information to report issues or get assistance with contractor issues. • Conduct additional research on jobs that report issues to NYSERDA to understand issue causes and, if applicable, to verify if issues were identified during Quality Assurance review.

2.1.1 Program awareness and motivation

Respondents most frequently reported learning about the EmPower+ program through word of mouth. As shown in Table 2-2, the most common information sources were word of mouth (40%), contractors (16%), and NYSERDA or EmPower+ online advertisements (16%). The high percentage of participants who become aware of the program by word of mouth indicates that past participants value their experience and share information with their social network. Compared to low-income participants, moderate-income participants were more likely

to report that the contractor informed them about the program, rather than learning by word of mouth.

Table 2-2. How participants learned of EmPower+

How did you learn about the EmPower+ program?			
Sources of information	**Low-income participants**	**Moderate-income participants**	**All participants**
Observations	**1,059**	**107**	**1,166**
Word of Mouth	40%	32%	40%
Contractor	15%	36%	16%
NYSERDA or EmPower+ Online Advertisement	17%	11%	16%
NYSERDA or EmPower+ Website	14%	20%	14%
Contractor Advertisement	8%	11%	8%
Community Group/Event	6%	8%	6%
NYSERDA or EmPower+ Mailing	6%	0%	6%
Government Program or Community Action Agency	5%	2%	5%
Television or Radio Advertisement	3%	4%	3%
Utility Company	2%	1%	2%
Print Advertisement	1%	0%	1%
NYSERDA Call	1%	0%	1%
Landlord	1%	1%	1%
Canvassing	1%	2%	1%
Previous Participation	1%	0%	1%
Other	1%	1%	1%
Don't Know	5%	4%	5%

Note: Respondents could select more than one response.

The main motivation for respondents reported for participating in EmPower+ was to lower their energy bills. As shown in Table 2-3, more than half of the respondents reported that they participated in EmPower+ to lower energy bills (82%), make the home more comfortable (66%), and replace old equipment (53%). Low-income participants were more likely to report that they participated to replace old equipment and to make the home safer. Moderate-income participants were more likely to report that they participated to improve the environment.

Table 2-3. Participant motivations for EmPower+

Why did you decide to participate in EmPower+?			
Reason for participation	**Low-income participants**	**Moderate-income participants**	**All participants**
Observations	**1,059**	**107**	**1,166**
Lower Energy Bills	81%	90%	82%
Make the Home More Comfortable	66%	71%	66%
Replace Old Equipment	54%	45%	53%
Make the Home Healthier	45%	43%	45%
Make the Home Safer	43%	34%	42%
Help the Environment	32%	41%	33%
Work Needed to be Done	2%	0%	2%
Work was Affordable/No-Cost Services	2%	1%	2%
Make the Home More Efficient	1%	1%	1%
Landlord Told Them To	<1%	1%	<1%
Evaluate Home Efficiency	<1%	0%	<1%
Other	2%	0%	1%
Don't Know	<1%	0%	<1%
Refused	<1%	0%	<1%

Table 2-4 shows that 97% of low-income participants reported that the no-cost services provided by the program were important, and 96% of moderate-income participants stated that program financing was important to their participation.

Table 2-4. Importance of no-cost services or financing

How important was it that the program provided…		
Level of importance	**Low-income participants: No-cost services[a]**	**Moderate-income participants: Financing[b]**
Observations	**1,059**	**107**
Very Important	86%	79%
Important	11%	17%
Neither (Neutral)	1%	1%
Not Important	<1%	2%
Not at All Important	0%	0%
Don't Know	1%	0%
Refused	<1%	0%
Total	**100%**	**100%**

[a] Only low-income Tier 1 respondents were asked this question.

[b] Only moderate-income Tier 3 respondents were asked this question.

The program successfully targets households with vulnerable members. Eighty percent of respondents reported they have an elderly adult and/or a child in the home. As shown in Table 2-5, the majority of respondents reported that their household had an elderly member (59%). While 27% of the low-income participants reported that they had a child in the home, 34% of the moderate-income respondents reported that they had a child in the home. Eight-four percent of moderate-income respondents had either an elderly member or a child in the household.

Table 2-5. Vulnerable household members

Does your household include…						
Response	**Anyone age 65 or older**			**Any children under the age of 18**		
	Low-income participants	**Moderate-income participants**	**All participants**	**Low-income participants**	**Moderate-income participants**	**All participants**
Observations	**1,059**	**107**	**1,166**	**1,059**	**107**	**1,166**
Yes	59%	58%	59%	27%	34%	27%
No	40%	41%	40%	72%	67%	72%
Refused	2%	1%	2%	1%	1%	1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

2.1.2 Satisfaction with EmPower+ program

Satisfaction with the program is high, with 83%satisfied with the program overall (Table 2-6). These results are comparable to similar income-qualified programs targeting energy-saving measures. As shown in Table 2-7 and Table 2-8, there is no difference in satisfaction between job cost category, but there is some variation in satisfaction between utilities.

Table 2-6. Overall satisfaction

Overall, how satisfied or dissatisfied are you with your experience with EmPower+?			
Level of satisfaction	**Low-income participants**	**Moderate-income participants**	**All participants**
Observations	**1,059**	**107**	**1,166**
Very Satisfied	58%	46%	57%
Satisfied	26%	32%	26%
Neither (Neutral)	10%	16%	10%
Dissatisfied	3%	4%	3%
Not at All Satisfied	3%	1%	3%
Don’t Know	1%	1%	1%
Total	**100%**	**100%**	**100%**

Table 2-7. Overall satisfaction by low-income job cost category

Overall, how satisfied or dissatisfied are you with your experience with EmPower+?			
Level of satisfaction	**Job cost category**		
	Less than $1,500	**$1,500-$10,000**	**Over $10,000**
Observations	**221**	**348**	**490**
Very Satisfied	57%	59%	56%
Satisfied	24%	27%	27%
Neither (Neutral)	8%	10%	11%
Dissatisfied	4%	2%	3%
Not at All Satisfied	5%	2%	2%
Don't Know	1%	<1%	<1%
Total	**100%**	**100%**	**100%**

Table 2-8. Overall satisfaction by low-income utility area

Overall, how satisfied or dissatisfied are you with your experience with EmPower+?					
Level of satisfaction	**Utility area**				
	National Grid	**RG&E**	**NYSEG**	**Con Edison**	**Other**
Observations	**277**	**211**	**242**	**141**	**188**
Very Satisfied	61%	60%	53%	46%	61%
Satisfied	24%	23%	30%	34%	24%
Neither (Neutral)	8%	13%	9%	13%	7%
Dissatisfied	3%	2%	3%	2%	4%
Not at All Satisfied	3%	2%	3%	5%	2%
Don't Know	0%	<1%	1%	0%	2%
Total	**100%**	**100%**	**100%**	**100%**	**100%**

More than nine out of ten of low-income participants said that they would recommend the EmPower+ program to a friend, family member, or neighbor (Table 2-9). This exceeds the percent who reported satisfaction, which indicates that many participants who reported dissatisfaction with their experience still believe the program is valuable for their social network to consider.

Table 2-9. Willingness to recommend EmPower+

Would you recommend EmPower+ to a friend, family member, or neighbor?			
Response	**Low-income participants**	**Moderate-income participants**	**All participants**
Observations	**1,059**	**107**	**1,166**
Yes	91%	89%	91%
No	5%	4%	5%
Don't Know	4%	8%	4%
Total	**100%**	**100%**	**100%**

Most participants were satisfied with the program application and enrollment with participants who received higher incentives reporting the highest satisfaction. Table 2-10 shows that 87% of participants were satisfied with the program application and enrollment. Low-income participants were more likely to report that they were very satisfied. Less than 5% of participants reported that they were dissatisfied. As shown in Table 2-11, low-income participants with higher incentives were more likely to be very satisfied with the program application and enrollment. Table 2-12 shows the majority of low-income participants were very satisfied or satisfied with the program application and enrollment across all utility areas, Con Edison customers and Other utility customers were less likely to be very satisfied, though this difference was not statistically significant.

Table 2-10. Satisfaction with program application and enrollment

How satisfied were you with program application and enrollment?			
Level of satisfaction	**Low-income participants**	**Moderate-income participants**	**All participants**
Observations	**1,059**	**107**	**1,166**
Very Satisfied	62%	43%	61%
Satisfied	26%	38%	26%
Neither (Neutral)	8%	12%	8%
Dissatisfied	2%	3%	2%
Not at All Satisfied	2%	2%	2%
Don't Know	1%	2%	1%
Total	**100%**	**100%**	**100%**

Table 2-11. Satisfaction with program application and enrollment by low-income job cost category

How satisfied were you with program application and enrollment?			
Level of satisfaction	**Job cost category**		
	Less than $1,500	**$1,500-$10,000**	**Over $10,000**
Observations	**221**	**348**	**490**
Very Satisfied	58%	63%	62%
Satisfied	25%	26%	26%
Neither (Neutral)	7%	9%	8%
Dissatisfied	4%	1%	1%
Not at All Satisfied	4%	1%	1%
Don't Know	2%	1%	2%
Total	**100%**	**100%**	**100%**

Table 2-12. Satisfaction with program application and enrollment by utility area

How satisfied were you with program application and enrollment?					
Level of satisfaction	**Utility area**				
	National Grid	**RG&E**	**NYSEG**	**Con Edison**	**Other**
Observations	**277**	**211**	**242**	**141**	**188**
Very Satisfied	65%	62%	61%	57%	58%
Satisfied	24%	25%	28%	29%	26%
Neither (Neutral)	8%	9%	7%	8%	8%
Dissatisfied	1%	1%	2%	3%	3%
Not at All Satisfied	2%	1%	1%	4%	2%
Don't Know	<1%	2%	1%	0%	3%
Total	**100%**	**100%**	**100%**	**100%**	**100%**

For every program aspect, the majority of respondents said they were "satisfied" or "very satisfied." However, respondents were least likely to say they were satisfied with the "reduction in energy bills." As shown Table 2-13, more than 60% of respondents said they were "satisfied" or "very satisfied" for every aspect of the program except for 'reduction in energy bills" for which only 51% of respondents said they were "satisfied" or "very satisfied."

Table 2-13. Satisfaction with program aspects

How satisfied were you with…										
Level of satisfaction	**Financing and subsidies[a]**	**Work done in your home**			**Reduction in energy bills**			**Improvement in home comfort**		
	Moderate	**Low**	**Mod**	**All**	**Low**	**Mod**	**All**	**Low**	**Mod**	**All**
Observations	**107**	**1,059**	**107**	**1,166**	**1,059**	**107**	**1,166**	**1,059**	**107**	**1,166**
Very Satisfied	42%	59%	53%	59%	24%	15%	24%	37%	27%	37%
Satisfied	29%	23%	27%	23%	27%	32%	27%	31%	37%	31%
Neither (Neutral)	14%	8%	11%	8%	27%	34%	28%	20%	26%	20%
Dissatisfied	4%	4%	3%	4%	6%	9%	6%	4%	3%	4%
Not at All Satisfied	2%	4%	4%	4%	7%	6%	7%	5%	5%	5%
Don't Know	8%	1%	2%	1%	7%	45	7%	3%	1%	3%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

[a]Only moderate-income Tier 3 respondents were asked this question.

Table 2-14 shows that respondents who had job costs of less than $1,500 were less likely to express satisfaction with each aspect of the program than were respondents with more expensive job costs.

Table 2-14. Satisfaction with program aspects by low-income job cost category

How satisfied were you with…									
Level of satisfaction	**Job cost category**								
	Work done in your home			**Reduction in energy bills**			**Improvement in home comfort**		
	Less than $1,500	**$1,500-$10,000**	**Over $10,000**	**Less than $1,500**	**$1,500-$10,000**	**Over $10,000**	**Less than $1,500**	**$1,500-$10,000**	**Over $10,000**
Observations	**221**	**348**	**490**	**221**	**348**	**490**	**221**	**348**	**490**
Very Satisfied	61%	60%	56%	20%	26%	27%	34%	38%	40%
Satisfied	16%	25%	26%	23%	29%	28%	27%	33%	30%
Neither (Neutral)	10%	6%	10%	32%	26%	27%	20%	20%	19%
Dissatisfied	3%	4%	3%	6%	5%	8%	7%	3%	4%
Not at All Satisfied	7%	3%	4%	10%	7%	6%	7%	5%	5%
Don't Know	1%	2%	1%	10%	7%	5%	6%	1%	2%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

When looking at satisfaction by utility, average customer satisfaction for reduction in energy bills varied from 58% for National Grid to 38% for Con Edison, though the differences were not statistically significant.

Table 2-15. Satisfaction with program aspects by utility area

How satisfied were you with…				
Utility area	**Number of respondents**	**Percent very satisfied or satisfied**		
		Work done in your home	**Reduction in energy bills**	**Improvement in home comfort**
National Grid	277	83%	58%	70%
RG&E	211	79%	51%	71%
NYSEG	242	84%	51%	66%
Con Edison	141	79%	38%	62%
Other	188	83%	46%	68%

Respondents reported high satisfaction with contractor knowledge, communications, work quality, and professionalism. Participants were asked about their satisfaction with contractors, including contractor knowledge, communications, work quality, and professionalism. More than 80% of participants were satisfied across all aspects of their contractor experience, with 84% satisfied with contractor professionalism, followed by contractor knowledge (83%), communications (80%), and work quality (80%).

Table 2-16. Satisfaction with contractor

How satisfied were you with contractor…												
Level of Satisfaction	**Knowledge**			**Communications**			**Work Quality**			**Professionalism**		
	Low	**Mod**	**All**	**Low**	**Mod**	**All**	**Low**	**Mod**	**All**	**Low**	**Mod**	**All**
Observations	**1,059**	**107**	**1,166**	**1,059**	**107**	**1,166**	**1,059**	**107**	**1,166**	**1,059**	**107**	**1,166**
Very Satisfied	61%	50%	61%	59%	53%	59%	58%	51%	58%	65%	58%	64%
Satisfied	22%	36%	22%	21%	30%	21%	22%	29%	22%	19%	27%	20%
Neither (Neutral)	9%	7%	9%	9%	7%	9%	9%	8%	9%	8%	7%	8%
Dissatisfied	2%	2%	2%	5%	5%	5%	5%	6%	5%	2%	3%	2%
Not at All Satisfied	3%	4%	3%	5%	3%	5%	5%	2%	5%	5%	2%	5%
Don't Know	2%	1%	2%	1%	1%	1%	3%	3%	1%	1%	1%	1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Respondents with more expensive projects reported lower satisfaction with contractors than respondents with less expensive projects. Table 2-17 shows that across all job cost categories, for each aspect of the program, more than 77% of low-income participants indicated satisfaction. Participants with higher levels of investment were less likely to be very satisfied with the work quality. While 62% of those with investment levels of less than $1,500 were very satisfied with

the work quality, 54% of those with investment levels over $10,000 were very satisfied with the work quality.

Table 2-17. Satisfaction with contractor by low-income job category

How satisfied were you with contractor…						
Level of satisfaction	**Job cost category**					
	Knowledge			**Communications**		
	Less than $1,500	**$1,500-$10,000**	**Over $10,000**	**Less than $1,500**	**$1,500-$10,000**	**Over $10,000**
Observations	**221**	**348**	**490**	**221**	**348**	**490**
Very Satisfied	60%	61%	62%	57%	62%	57%
Satisfied	21%	24%	20%	20%	21%	22%
Neither (Neutral)	9%	10%	9%	8%	8%	10%
Dissatisfied	2%	2%	4%	7%	4%	5%
Not at All Satisfied	5%	3%	3%	6%	5%	4%
Don't Know	4%	1%	2%	2%	1%	1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
	Work Quality			**Professionalism**		
Very Satisfied	62%	58%	54%	65%	63%	67%
Satisfied	18%	24%	24%	14%	24%	17%
Neither (Neutral)	9%	7%	11%	9%	6%	8%
Dissatisfied	5%	5%	5%	3%	1%	3%
Not at All Satisfied	5%	5%	6%	6%	5%	4%
Don't Know	1%	2%	<1%	2%	1%	<1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Very Satisfied	62%	58%	54%	65%	63%	67%

Table 2-18. Satisfaction with contractor by utility area

How satisfied were you with contractor…					
Utility area	**Number of respondents**	**Percent very satisfied or satisfied**			
		Knowledge	**Communications**	**Work Quality**	**Professionalism**
National Grid	277	82%	82%	82%	86%
RG&E	211	87%	82%	79%	84%
NYSEG	242	83%	80%	79%	84%
Con Edison	141	78%	75%	77%	79%
Other	188	83%	81%	81%	83%

2.1.3 Impact

More than half of respondents (56%) reported that that their energy bills were lower after program participation, with low-income respondents being more likely to report a larger reduction in the bills (Table 2-19). Since a key motivation of participants was to lower energy bills, these results indicate that a majority of customers believe the work did accomplish this goal. As shown in Table 2-20, low-income participants with higher incentives were more likely to report that the program lowered their energy bills. While 49% of those with incentives of less than $1,500 reported a reduction in energy bills, 61% of those with incentives over $10,000 reported a reduction in energy bills. Across all utility areas, the majority of participants reported a reduction in energy bills. The percentage who said their bills declined ranged from 42% for Con Edison customers to 60% for National Grid customers (Table 2-21).

Table 2-19. Changes in energy bills

How do you think the work completed in your home changed your energy bills compared to what they were before you participated?			
Changes	**Low-income participants**	**Moderate-income participants**	**All participants**
Observations	**1,059**	**107**	**1,166**
Lowered Bills a Lot	15%	9%	15%
Lowered Bills a Little	40%	46%	41%
No Change	26%	26%	26%
Increased Bills a Little	5%	8%	5%
Increased Bills a Lot	4%	5%	4%
Don't Know	9%	7%	8%
Refused	<1%	0%	<1%
Total	**100%**	**100%**	**100%**

Table 2-20. Changes in energy bills by low-income job cost category

How do you think the work completed in your home changed your energy bills compared to what they were before you participated?			
Changes	**Job cost category**		
	Less than $1,500	**$1,500-$10,000**	**Over $10,000**
Observations	**221**	**348**	**490**
Lowered Bills a Lot	13%	15%	18%
Lowered Bills a Little	36%	41%	43%
No Change	32%	26%	21%
Increased Bills a Little	7%	5%	5%
Increased Bills a Lot	4%	4%	5%

How do you think the work completed in your home changed your energy bills compared to what they were before you participated?			
Changes	**Job cost category**		
	Less than $1,500	**$1,500-$10,000**	**Over $10,000**
Don't Know	9%	9%	7%
Refused	1%	<1%	0%
Total	**100%**	**100%**	**100%**

Table 2-21. Changes in energy bills by utility area

How do you think the work completed in your home changed your energy bills compared to what they were before you participated?					
Changes	**Utility Area**				
	National Grid	**RG&E**	**NYSEG**	**Con Edison**	**Other**
Observations	**277**	**211**	**242**	**141**	**188**
Lowered Bills a Lot	19%	16%	12%	9%	14%
Lowered Bills a Little	41%	39%	43%	33%	43%
No Change	23%	23%	27%	43%	22%
Increased Bills a Little	4%	10%	4%	4%	6%
Increased Bills a Lot	4%	5%	4%	4%	1%
Don't Know	8%	7%	10%	7%	12%
Refused	1%	0%	0%	0%	1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**

The percent of low-income respondents indicating it was easy or very easy to pay their utility bill increased from 10% before participation to 20% after participation (Table 2-22). The change was somewhat smaller for the moderate-income participants. Participants who had incentives job costs of less than $1,500 were more likely to say that their bill was difficult or very difficult to pay after participating in the program (Table 2-23). Table 2-24 shows results by utility.

Table 2-22. Difficulty paying energy bills before and after participation

How easy or difficult was it to pay your energy bill before/after participating in the program?						
Level of difficulty	**Low-income participants**		**Moderate-income participants**		**All participants**	
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**
Observations	**1,059**		**107**		**1,166**	
Very Easy	2%	3%	6%	6%	3%	3%
Easy	8%	17%	13%	19%	8%	18%
Neither (Neutral)	36%	43%	51%	42%	36%	43%

How easy or difficult was it to pay your energy bill before/after participating in the program?						
Level of difficulty	**Low-income participants**		**Moderate-income participants**		**All participants**	
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**
Difficult	37%	24%	26%	26%	36%	24%
Very Difficult	14%	9%	3%	5%	13%	9%
Don't Know	2%	2%	0%	1%	2%	2%
Refused	1%	1%	1%	1%	1%	1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Table 2-23. Difficulty paying energy bills before and after participation by low-income job cost category

How easy or difficult was it to pay your energy bill before/after participating in the program?						
Level of difficulty	**Job cost category**					
	Less than $1,500		**$1,500-$10,000**		**Over $10,000**	
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**
Observations	**221**		**348**		**490**	
Very Easy	4%	3%	2%	3%	2%	4%
Easy	5%	14%	10%	19%	7%	18%
Neither (Neutral)	33%	37%	36%	45%	39%	43%
Difficult	39%	33%	35%	20%	38%	24%
Very Difficult	15%	11%	14%	8%	12%	8%
Don't Know	3%	1%	2%	4%	1%	1%
Refused	1%	1%	1%	1%	1%	2%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Table 2-24. Difficulty paying energy bills before and after participation by utility area

How easy or difficult was it to pay your energy bill before/after participating in the program?										
Level of difficulty	**Utility area**									
	National Grid		**RG&E**		**NYSEG**		**Con Edison**		**Other**	
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**
Observations	**277**		**211**		**242**		**141**		**188**	
Very Easy	3%	3%	5%	7%	2%	3%	0%	<1%	2%	2%
Easy	10%	21%	10%	20%	9%	18%	2%	6%	4%	14%
Neither (Neutral)	34%	40%	36%	43%	43%	42%	33%	42%	35%	52%
Difficult	33%	22%	40%	25%	32%	27%	41%	31%	45%	23%
Very Difficult	17%	10%	7%	4%	12%	8%	19%	18%	10%	6%
Don't Know	3%	3%	1%	1%	<1%	2%	3%	2%	3%	2%
Refused	1%	2%	<1%	0%	1%	1%	2%	<1%	1%	1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Participants reported improved comfort levels after work completion in the winter (70%) and summer (46%) which was one motivation cited by participants for participating in the program (Table 2-25). Impacts were greatest for low-income participants with the highest incentives job cost levels. While 55% of participants with incentives job costs of less than $1,500 said that the winter temperature improved, 36% said the summer temperature improved. In contrast, 79% of participants with incentives job costs over $10,000 reported that the winter temperature improved, and 56% said the summer temperature improved (Table 2-23). The percentage of participants that said that summer temperatures improved ranged from 38% in Other utility areas to 52% for participants in RG&E's service territory (Table 2-27).

Table 2-25. Reported impact on comfort levels

Since the work was completed in your home, how has the comfort level changed during the winter/summer?						
Level of improvement	**Winter**			**Summer**		
	Low	**Mod**	**All**	**Low**	**Mod**	**All**
Observations	**1,059**	**107**	**1,166**	**1,059**	**107**	**1,166**
Improved a Lot	36%	33%	36%	22%	32%	22%
Improved a Little	33%	37%	34%	24%	28%	24%
Neither (Neutral)	23%	27%	23%	46%	36%	45%
Worsened a Little	4%	3%	4%	2%	2%	2%
Worsened a Lot	2%	0%	2%	1%	0%	1%
Don't Know	2%	0%	2%	5%	2%	5%
Refused	<1%	0%	<1%	<1%	0%	<1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Table 2-26. Reported impact on comfort levels by low-income job cost category

Since the work was completed in your home, how has the comfort level changed during the winter/summer?						
Level of improvement	**Job cost category**					
	Winter			**Summer**		
	Less than $1,500	**$1,500-$10,000**	**Over $10,000**	**Less than $1,500**	**$1,500-$10,000**	**Over $10,000**
Observations	**221**	**348**	**490**	**221**	**348**	**490**
Improved a Lot	26%	39%	40%	16%	21%	27%
Improved a Little	29%	32%	39%	20%	24%	29%
Neither (Neutral)	34%	22%	15%	52%	49%	35%
Worsened a Little	4%	4%	3%	2%	1%	2%

Since the work was completed in your home, how has the comfort level changed during the winter/summer?						
Level of improvement	**Job cost category**					
	Winter			**Summer**		
	Less than $1,500	**$1,500-$10,000**	**Over $10,000**	**Less than $1,500**	**$1,500-$10,000**	**Over $10,000**
Worsened a Lot	3%	1%	1%	2%	0%	1%
Don't Know	3%	1%	2%	7%	4%	5%
Refused	<1%	0%	0%	1%	<1%	0%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Table 2-27. Reported impact on comfort levels by utility area

Since the work was completed in your home, how has the comfort level changed during the winter/summer?										
Level of Improvement	**Utility Area**									
	Winter					**Summer**				
	NGrid	**RG&E**	**NYSEG**	**ConEd**	**Other**	**NGrid**	**RG&E**	**NYSEG**	**ConEd**	**Other**
Observations	**277**	**211**	**242**	**141**	**188**	**277**	**211**	**242**	**141**	**188**
Improved a Lot	39%	37%	37%	28%	31%	24%	24%	21%	16%	19%
Improved a Little	34%	30%	31%	41%	34%	24%	28%	24%	27%	19%
Neither (Neutral)	18%	21%	27%	27%	29%	45%	40%	47%	47%	52%
Worsened a Little	4%	7%	2%	3%	3%	1%	2%	1%	3%	2%
Worsened a Lot	1%	2%	2%	1%	1%	1%	1%	1%	0%	<1%
Don't Know	3%	2%	<1%	<1%	2%	5%	5%	5%	7%	6%
Refused	<1%	0%	0%	0%	0%	0%	1%	0%	1%	1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Almost half of respondents (42%) indicated that program participation improved safety at their homes and more than a third (37%) indicated participation improved health conditions at their home (Table 2-28). Respondents with projects over $10,000 were more likely to indicate that participation improved health conditions at their home (Table 2-29). When looking at utilities, the percentage of participants that said safety conditions improved ranged from 36% in NYSEG's service territory to 49% in RG&E's service territory. The percentage of participants that said health conditions improved ranged from 33% in NYSEG's service territory to 44% in RG&E's service territory (Table 2-30).

Table 2-28. Reported impact on health and safety

How do you think the safety/health conditions in your home have changed because of the work completed in your home?						
Level of improvement	**Safety conditions**			**Health conditions**		
	Low	**Mod**	**All**	**Low**	**Mod**	**All**
Observations	**1,059**	**107**	**1,166**	**1,059**	**107**	**1,166**
Improved a Lot	22%	20%	22%	18%	13%	18%
Improved a Little	20%	21%	20%	19%	28%	19%
Neither (Neutral)	49%	53%	49%	50%	53%	50%
Worsened a Little	1%	0%	1%	3%	2%	3%
Worsened a Lot	1%	1%	1%	1%	1%	1%
Don't Know	6%	6%	6%	8%	3%	8%
Refused	1%	0%	1%	<1%	0%	<1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Table 2-29. Reported impact on health and safety by low income job cost category

How do you think the safety/health conditions in your home have changed because of the work completed in your home?						
Level of improvement	**Job cost category**					
	Safety conditions			**Health conditions**		
	Less than $1,500	**$1,500-$10,000**	**Over $10,000**	**Less than $1,500**	**$1,500-$10,000**	**Over $10,000**
Observations	**221**	**348**	**490**	**221**	**348**	**490**
Improved a Lot	16%	24%	24%	14%	20%	17%
Improved a Little	22%	19%	19%	19%	15%	26%
Neither (Neutral)	50%	51%	46%	52%	52%	46%
Worsened a Little	2%	<1%	2%	3%	3%	2%
Worsened a Lot	1%	1%	2%	2%	1%	2%
Don't Know	8%	4%	7%	10%	7%	7%
Refused	<1%	1%	1%	1%	<1%	<1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Table 2-30. Reported impact on health and safety by low-income utility area

How do you think the safety/health conditions in your home have changed because of the work completed in your home?										
Level of improvement	**Utility area**									
	Safety conditions					**Health conditions**				
	NGrid	**RG&E**	**NYSEG**	**ConEd**	**Other**	**NGrid**	**RG&E**	**NYSEG**	**ConEd**	**Other**
Observations	**277**	**211**	**242**	**141**	**188**	**277**	**211**	**242**	**141**	**188**
Improved a Lot	24%	26%	17%	19%	21%	21%	21%	12%	19%	13%
Improved a Little	17%	23%	19%	22%	22%	15%	23%	21%	21%	21%

How do you think the safety/health conditions in your home have changed because of the work completed in your home?										
Level of improvement	**Utility area**									
	Safety conditions					**Health conditions**				
	NGrid	**RG&E**	**NYSEG**	**ConEd**	**Other**	**NGrid**	**RG&E**	**NYSEG**	**ConEd**	**Other**
Neither (Neutral)	52%	24%	56%	47%	45%	50%	45%	56%	47%	53%
Worsened a Little	1%	2%	1%	<1%	1%	3%	4%	2%	3%	1%
Worsened a Lot	1%	0%	1%	2%	1%	2%	1%	1%	<1%	<1%
Don't Know	4%	5%	6%	8%	10%	7%	7%	6%	9%	12%
Refused	1%	0%	<1%	<1%	<1%	1%	0%	<1%	0%	<1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

More respondents reported changing thermostat temperature setpoints after participation in ways that would reduce energy consumption than in ways that would increase energy consumption. Participants were asked about changes made to their energy usage after the upgrades in their home. As shown in Table 2-31, more than half of the participants reported that they changed the usual temperature setting in the winter (53%), but a majority of the participants reported that they did not change the temperature setting in the summer (60%) or change the hot water temperature setting (73%). Low-income respondents were more likely than moderate-income respondents to report that they changed their hot water setting.

Respondents who reported changing their usual temperature settings in the winter or summer were asked about whether they raised or lowered the temperature. Thirty-eight percent of participants reported that they lowered the temperature in the winter, and 18% reported that they raised the temperature in the summer. Fewer respondents reported increasing the temperature in the winter or lowering the temperature in the summer (Table 2-32). Note the program does provide education on how thermostat setpoint can save energy.[3]

[3] https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Publications/Fact-Sheets/Thermostat-Savings-Worksheet.pdf

Table 2-31. Changes to energy use

Since the upgrades were completed in your home, have you made any of the following changes to how you use energy?									
Response	**Changed the usual temperature setting of the home in the winter**			**Changed the usual temperature setting of the home in the summer**			**Changed the hot water temperature setting**		
	Low	**Mod**	**All**	**Low**	**Mod**	**All**	**Low**	**Mod**	**All**
Observations	**1,059**	**107**	**1,166**	**1,059**	**107**	**1,166**	**1,059**	**107**	**1,166**
Yes	53%	51%	53%	33%	36%	33%	22%	15%	22%
No	43%	47%	43%	61%	57%	60%	73%	76%	73%
Don't Know	3%	0%	2%	5%	2%	5%	4%	3%	4%
Refused	1%	0%	1%	1%	1%	1%	1%	1%	1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Table 2-32. Changes to temperature settings

How did you change the usual temperature setting in the winter/summer?						
Changes	**Winter**			**Summer**		
	Low	**Mod**	**All**	**Low**	**Mod**	**All**
Observations	**1,059**	**107**	**1,166**	**1,059**	**107**	**1,166**
Lowered the Temperature	38%	32%	38%	10%	11%	10%
Raised the Temperature	12%	18%	13%	18%	21%	18%
No Change	43%	47%	43%	61%	57%	60%
Don't Know	6%	2%	5%	9%	6%	8%
Refused	1%	0%	1%	1%	2%	1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

More respondents reported adding or upgrading an appliance after participating than reported removing an appliance. As shown in Table 2-33, the survey also asked about changes made to major appliances in the home, including removing a regularly used appliance and adding or upgrading an old appliance. The table shows that 23% of participants removed a major appliance, and 42% of participants added or upgraded a new major appliance after the upgrades were completed.

Table 2-33. Changes to major appliances

Since the upgrades were completed in your home, have you made any of the following changes to how you use energy?						
Response	**Removed a major appliance that had been regularly used**			**Added a new major appliance or upgraded an old appliance**		
	Low	**Mod**	**All**	**Low**	**Mod**	**All**
Observations	**1,059**	**107**	**1,166**	**1,059**	**107**	**1,166**
Yes	23%	19%	23%	42%	37%	42%
No	73%	77%	73%	55%	60%	56%
Don't Know	2%	0%	2%	1%	0%	1%
Refused	1%	1%	1%	1%	0%	1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

2.1.4 Communication

About one-third of respondents reported communicating with either NYSERDA or a Regional Energy Hub. As shown in Table 2-34, 27% of participants reported that they talked to NYSERDA about the program, and 10% reported that they talked to a Regional Home Energy Hub about the program.

Table 2-34. Communication with NYSERDA or Regional Home Energy Hub

Did you talk to anyone at NYSERDA or a Hub about the program?			
Response	**Low-income participants**	**Moderate-income participants**	**All participants**
Observations	**1,059**	**107**	**1,166**
Did Not Talk to NYSERDA or a Hub	42%	47%	42%
Talked to NYSERDA	27%	26%	27%
Talked to a Regional Home Energy Hub	11%	8%	10%
Don't Know	25%	18%	24%
Refused	1%	1%	1%
Total	**100%**	**100%**	**100%**

The majority of respondents indicated that contractors communicated what to expect, what and why work was being done, how to operate equipment and ways to save energy. While most participants reported that the contractor explained the program (90%) and the work that was

being done (89%),[4] 64% reported that the contractors provided instructions on operating equipment, and 68% reported that the contractors provided energy saving tips. The moderate-income respondents were somewhat more likely to report that the contractors provided tips for saving energy (Table 2-35).

Table 2-35. Communication with contractor

Please indicate which of the following items the contractor did or did not do.												
Response	**Explained the program and what to expect**			**Explained the planned work and why it was being done**			**Provided information or instructions on how to operate or maintain equipment**			**Provided tips for how you could save energy**		
	Low	**Mod**	**All**	**Low**	**Mod**	**All**	**Low**	**Mod**	**All**	**Low**	**Mod**	**All**
Observations	**1,059**	**107**	**1,166**	**1,059**	**107**	**1,166**	**1,059**	**107**	**1,166**	**1,059**	**107**	**1,166**
Yes	90%	93%	90%	89%	90%	89%	64%	61%	64%	67%	73%	68%
No	6%	6%	6%	6%	6%	6%	28%	29%	28%	23%	18%	23%
Don't Know	2%	2%	2%	3%	3%	3%	5%	6%	5%	8%	6%	8%
Refused	<1%	0%	<1%	<1%	0%	<1%	1%	1%	1%	1%	0%	1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

2.1.5 Participant recommendations for improvement

During the survey, participants were asked an open-ended question to provide feedback and recommendations for the program. The analysis of this open ended-question was split into two sets: 1) recommendation from participants who had measures implemented at their home and 2) recommendations from participants who only had an audit. APPRISE reviewed and coded the responses for analysis. Table 2-36 and Table 2-37 summarize the recommendations from each group respectively.

The primary areas that participants who implemented measures highlighted for improvement were contractor and work quality, program guidelines and processes, and program measures (Table 2-36). Table 2-38 shows example verbatims for each type or recommendation.

F**or audit-only participants, key suggestions included clear and prompt communication from the program (32%), providing complete measures (10%), and screening contractors**

[4] The percent of respondents who said "yes" for the contractor "explaining the program" and "explaining the planned work" was statistically different from the percent who said "yes" for "provide information" or "provide tips".

selected for the program (9%; Table 2-37). Table 2-39 shows example verbatims for each type or recommendation.

Table 2-36. Recommendations from program participants with implemented measures

Do you have any recommendations on how NYSERDA could improve the program?			
Improvements recommended	**Low-income participants**	**Moderate-income participants**	**All participants**
Observations	**1,059**	**107**	**1,166**
Better Contractors and Subcontractors	8%	3%	8%
Include More Measures	8%	7%	8%
Improve Work Quality	5%	6%	5%
Provide More Quality Assurance/Audits	4%	4%	4%
Provide More Clarity Regards Processes	4%	5%	4%
Increase Outreach and Marketing	3%	4%	3%
Streamline Processes and Approvals	3%	6%	3%
Clear Guidelines and Requirements	3%	0%	3%
Clear/Prompt Communication from Contractor	2%	3%	2%
Increase Quality of Equipment/Measures	2%	2%	2%
More Communication from NYSERDA	2%	2%	2%
Provide More Education	2%	0%	2%
Allow for More Control in Project Scope	1%	0%	1%
Expand Eligibility and Funding	1%	8%	1%
Other	2%	1%	2%
No Recommendations	60%	62%	60%

Note: Respondents could select more than one response.

Table 2-37. Recommendations from audit only program participants

Do you have any recommendations for how NYSERDA could improve the program?[1]			
Recommended improvements	**Low-income participants**	**Moderate-income participants**	**All participants**
Observations	**51**	**22**	**73**
Clear/Prompt Communication	32%	36%	32%
Provide Complete Measures	10%	9%	10%
Screen Contractors	10%	5%	9%
Consistent/Clear Program Requirements	6%	18%	7%
Include More Measures	6%	5%	6%
Reduce Job Timeline	5%	0%	4%
More Funding	4%	5%	4%
Other	6%	5%	5%

Do you have any recommendations for how NYSERDA could improve the program?[1]			
Recommended improvements	**Low-income participants**	**Moderate-income participants**	**All participants**
None	31%	27%	30%

[1]Only respondents who indicated that the contractor

Table 2-38. Example recommendation verbatims from program participants with implemented measures

Recommendation type	Recommendations
Better Contractors and Subcontractors	Need a review process for contractors. Drastically different experiences between contractors. Need a rating system for contractors so you have a general idea of how good the service will be.
Include More Measures	A window upgrade would be the most beneficial and efficient way to save energy and lower heating and cooling costs.
Improve Work Quality	Make sure work is completed properly, they did not install the air conditioner correctly, and my furnace does not work correctly
Provide More Quality Assurance/Audits	Should come back and do another audit to see the real improvements made. How can we know how good the house is now.
Provide More Clarity Regards Processes	Somone needs to check or explain the work that's done. I have no clue about standards for insulation, so how can I know if my attic/house. More transparency on what is covered and benefit amount. Sometimes was told $10,000, sometimes 5,000 and sometimes 1,500. Was told that X was covered but then told that it was no longer covered.
Increase Outreach and Marketing	Need more outreach. Many people don't know or don't understand the program. Most people don't think they can afford a heat pump, but the program will help. People either don't know about the program, or they think that it only covers insulation.
Streamline Processes and Approvals	Improve application processing time. It took very long to complete the approval.
Clear Guidelines and Requirements	It's unclear what is covered and what isn't. Clarification on what is covered under the program and what is not covered.
Clear/Prompt Communication from Contractor	Needs better communications between contractors and the customers. Contractors came in, looked around, did the work, said some tips, then left.
Increase Quality of Equipment/Measures	The program replaced an older refrigerator with a new, higher efficiency unit. However, the new unit, which came from Lowe's, was not a good quality unit. A shelf in the freezer compartment broke within several weeks of installation. The refrigerator and freezer still function properly, though. Perhaps the program could review its procedures for evaluating equipment quality and durability.
More Communication from NYSERDA	NYSERDA should contact you to let you know that in case you aren't happy with work, who you should contact to discuss this. Should let you know if have any questions, you can contact them at a certain number to discuss them.
Provide More Education	Make residents aware of heat pump operation and what to expect using it.
Allow for More Control in Project Scope	I think better communication on scope of project listening to homeowner since they live in the home all year and not such a long process.
Expand Eligibility and Funding	Expand offerings to help lower middle class families like ours - we were just outside of the qualification for expanded support, and our home efficiency hasn't really changed because there is a lack of insulation.

Recommendation type	Recommendations
Other	It helped us last year but now New York State utilities are raising the rates so we are feeling a pinch. The insulation and hot water heater definitely lowered it last year, but our bills are steadily rising due to New York State.

Table 2-39. Example recommendation verbatims from audit-only program participants

Recommendation Type	Recommendations
Clear/Prompt Communication	Get in touch with participants. Seems like contractor looked around the home, made a comment about the draftiness, and never followed up with participant. They also reached out to NYSERDA and didn't get much help from them either, the original person that they worked with it was no longer with NYSERDA. They spoke with someone else too and they did not follow up either.
Provide Complete Measures	It was my understanding that the program included upgrading to LED light bulbs, and that wasn't done. The program was offering some sort of insulation for the attic, and we didn't move forward with that.
Screen Contractors	My contractor had self interest in his estimate. Heating company he owned. I was not asking for help with a heater.
Consistent/Clear Program Requirements	Maybe have more details/information in writing so there are no discrepancies when determining eligibility.
Include More Measures	Include windows in the program. Participant participated because they thought windows were included. Better fridge replacements too.
Reduce Job Timeline	Needs to move faster
More Funding	Put more money in investment in the program for remote areas which are not NYC.
Other	I was not impressed with the quality of the inspection of our home.

2.2 Detailed contractor survey findings

This section provides detailed findings from the contractor survey. The findings from the contractor survey resulted in the recommendations shown in Table 2-40.

Table 2-40. Recommendations based on the contractor survey

Contractor Concerns	Recommendations
Poor communication channels / difficulty getting assistance	• Improve training for program support staff, including technical knowledge. • More guidelines for support staff to ensure consistent responses to contractor questions.
Lengthy and Complicated Program Processes and Approvals	• Continue to explore ways to simplify and streamline the process.

Contractor Concerns	Recommendations
High Pace of Programmatic Changes	• As much as possible, provide advanced and repeated notice of upcoming changes. • Improve communication in highlighting and explaining program changes perhaps by using additional channels or creating summaries of key changes.
Challenges using the NYSERDA Portals	• Provide more Portal training and resources. • Address unresolved issues or bugs. • Work with contractors to identify ways to simplify user interface.
Slow Payment Process	• Provide clear information on contractor payment timelines. • Assess possibility of providing more timely payment.

2.2.1 Contractor characteristics and experience

Most participating contractors have been involved with the program for six years or more. Table 2-41 displays the number of years contractors reported participating in EmPower+ or its predecessor programs. Almost half of the contractors have been involved with the Program for more than 10 years, 13% have participated for six to ten years, and about one-fourth have participated for 2 years or less.

Table 2-41. Contractor years in the program

How long has your company been involved with the Program?		
Years involved	**Contractors**	
	#	**%**
Less than 1 Year	12	13%
1-2 Years	13	15%
3-5 Years	9	8%
6-10 Years	14	13%
More than 10 Years	48	49%
Don't Know	3	2%
Total	**99**	**100%**

More than 80% of contractors had completed an EmPower+ job in the six months prior to taking the survey. Table 2-42 shows that most contractors (82 %) completed EmPower+ jobs in the past six months, but about 15% had not completed any recent jobs.[5]

Table 2-42. Contractor EmPower+ jobs in the last six months

Have you completed any EmPower+ jobs in the past six months?		
Response	**Contractors**	
	#	**%**
Yes	80	82%
No	16	15%
Not Asked[a]	3	3%
Total	**99**	**100%**

[a]This question was added in the survey after the survey pretesting.

Contractors indicated that on average their staff have more experience performing assessments than they do installing specific measures. Table 2-43 presents the average years of experience of staff performing assessments or installing equipment or measures. On average, The majority of assessment staff are reported to have more than two five years of experience. In comparison, the distribution of experience levels for staff installing equipment or measures shows a slightly higher percentage of less experienced staff with 41% having between two and five years of experience.

Table 2-43. Contractor staff average years of experience

What are the average years of experience of staff…				
Years of experience	**Performing assessments**		**Installing equipment or measures**	
	#	**%**	**#**	**%**
Less than 1 Year	4	4%	2	2%
2-5 Years	27	29%	40	41%
6-10 Years	26	25%	21	19%
More than 10 Years	42	42%	35	37%
Don't Know	0	0%	1	1%
Total	**99**	**100%**	**99**	**100%**

[5] For a description of the contractor survey sample, see Section 3.3.1.

Three-fourths of contractors expressed having difficulty hiring staff in the last 12 months. Table 2-44 shows the most difficult positions to fill were insulation/building shell or envelope installers.

Table 2-44. Contractor challenges hiring staff

Which positions, if any, has your company found challenging to fill in the last 12 months?		
Staff positions	**Contractors**	
	#	**%**
Observations	**99**	
Insulation/Building Shell or Envelope Installers	46	47%
Energy Auditors	32	33%
HVAC/Mechanical Installers	31	33%
Project Managers or Supervisors	15	15%
Administrative Staff	15	15%
None	26	25%
Other	10	11%
Overall	74	75%

Note: Respondents could select more than one response.

Retaining qualified staff was a challenge for more than one-third of contractors. As shown in Table 2-45, the most common staffing challenge reported was difficulty retaining qualified staff, with 38% of contractors reporting this. Approximately one-third of contractors noted issues with their ability to pay competitive wages or provide enough work for available staff. The least reported challenge was training and certifying staff, but 23% still reported this issue.

Table 2-45. Contractor detailed staffing challenges

Response	**In the last 12 months, has your company faced any of the following challenges and barriers?**							
	Training and certifying staff		**Retaining qualified staff**		**Paying competitive salary/wages**		**Providing enough work for available staff**	
	#	**%**	**#**	**%**	**#**	**%**	**#**	**%**
Yes	24	23%	40	38%	35	34%	33	32%
No	73	75%	57	60%	58	59%	65	67%
Don't Know	2	3%	2	2%	6	7%	1	1%
Total	**99**	**100%**	**99**	**100%**	**99**	**100%**	**99**	**100%**

2.2.2 Program training

The most common type of trainings for that contractors provide to their staff are course and technical training from the companies to their own staff. As shown in Table 2-46, 98 out

of 99 contractors reported that their staff receive at least one type of training, and on average, assessment and installation staff are reported to receive four of the six types of training.

Table 2-46. Contractor types of training

Please indicate if your assessment and installation staff receive…		
Training	**Contractors**	
	#	**%**
Observations	**99**	
Received at least one type of training	**98**	
Average number of types of training received	**4**	
Classes or Courses	93	95%
Technical Training from the Company	89	90%
Customer Service Training from the Company	74	77%
Training at Conferences	72	75%
Technical Training from Equipment or Product Manufacturers	62	63%
Other	24	26%

Note: Respondents could select more than one response.

The most common certification held by contractors is a Building Analyst certification. As shown in Table 2-47, the most common certifications are Building Analyst (88%), Building Analyst Professional (71%), Energy Auditor (70%), and Envelope Professional (70%). Overall, 98 contractors (99%) reported that their staff hold one or more certifications, and on average, assessment and installation staff are reported to hold four certifications (across their staff members).

Table 2-47. Contractor types of certifications

What certifications do your assessment and installation staff hold?		
Certifications	**Contractors**	
	#	**%**
Observations	**99**	
Holds one or more certifications	**98**	
Average number of certifications held	**4**	
Building Analyst	87	88%
Building Analyst Professional	72	71%
Energy Auditor	72	70%
Envelope Professional	69	70%
Building Analyst Technician	55	54%
Air Leakage Control Installer	18	15%

What certifications do your assessment and installation staff hold?		
Certifications	**Contractors**	
	#	**%**
Retrofit Installer Technician	16	13%
Other	42	42%
Don't Know	1	1%

Note: Respondents could select more than one response.

Table 2-48 shows that 51% of contractors do not feel they receive sufficient training.

Table 2-48. Contractor satisfaction with training for program

Do you feel that you receive sufficient training to complete high-quality work in the Program?		
Response	**Contractors**	
	#	**%**
Yes	42	39%
No	49	51%
Don't Know	8	9%
Total	**99**	**100%**

The EmPower+ contractor support website, training webinars, and manual and guides were each considered useful by about half of respondents. Table 2-49 presents six different program resources that respondents were asked if they found helpful. The most common helpful resources were the contractor support website (58%), training webinars (54%), and program manuals and guides (52%). While less common, a significant number of contractors still reported that the technical assistance for specific measures (30%), centralized help desk (22%), and support ticket system (23%) were helpful.

Table 2-49. Contractor perspectives on program resources

What program resources, if any, have you found helpful?		
Program resources	**Contractors**	
	#	**%**
Observations	**99**	
Contractor Support Website	59	58%
Training Webinars	52	54%
Program Manuals and Guides	49	52%
Technical Assistance for Specific Measures	30	30%
Centralized Help Desk	22	22%
Support Ticket System	21	23%
Other	14	13%
Don't Know	4	4%

Note: Respondents could select more than one response.

About two-thirds of contractors who participated in NYSERDA IRA trainings found the training useful. Table 2-50 shows that 64% of contractors participated in NYSERDA's contractor training sessions on the Inflation Reduction Act (IRA) funds. Out of the 60 contractors that reported that they participated in the IRA trainings, 37 contractors found the sessions helpful in providing the information needed for service delivery.

Table 2-50. Inflation Reduction Act training

Response	**Did you or your staff participate in NYSERDA's contractor training sessions on the IRA funds?**		**Did the IRA training provide you with the information you needed to deliver services with these funds?[a]**	
	#	**%**	**#**	**%**
Yes	60	64%	37	42%
No	24	23%	15	14%
Don't Know	15	13%	7	7%
Not Applicable	-	-	40[b]	37%
Total	**99**	**100%**	**99**	**100%**

[a] Only respondents who indicated that they participated in IRA training were asked this question.
[b] Includes one respondent who preferred not to say.

2.2.3 Challenges faced by contractors

Contractors indicated asbestos and mold were the most common health and safety barriers they encountered during EmPower+ project. Contractors were asked to select up to three health and safety items they encountered most often that prevent service delivery or limit the potential work scope. Table 2-51 shows the most common challenges were asbestos-like

substances (65%), mold-like substances (50%), roof leaks (37%), and moisture (32%). Contractors reported other items that were not listed, such as unsanitary or unsafe units or working conditions, carbon monoxide, and plumbing issues.

Table 2-51. Health and safety barriers

Please select the top three health and safety items you encounter most often that prevent service delivery or limit the potential work scope.		
Health and safety barriers	**Contractors**	
	#	**%**
Observations	**99**	
Asbestos-like Substance	61	65%
Mold-like Substance	49	50%
Roof Leaks	37	37%
Moisture	33	32%
Knob & Tube Wiring	29	30%
Inaccessible Attics	26	27%
Structure Issues	22	21%
Other	11	11%
Not Applicable – No Barriers Encountered	1	1%
Don't Know	2	2%

Note: Respondents could select up to three responses.

Almost one in six (17%) of contractors indicated they encounter a health and safety issue in the majority of their jobs (Table 2-52). One-third of contractors reported that they implement measures to overcome these challenges in more than half of their jobs and 37% said that they ask customers to remediate the barriers before service delivery in more than half of the jobs.

Table 2-52. Health and safety remediation

How often do you…						
Percentage	**Encounter one or more of these barriers?**		**Implement measures to overcome the barrier(s) when encountered?**		**Ask to remediate the barrier(s) before service delivery when encountered?**	
	#	**%**	**#**	**%**	**#**	**%**
76-100%	3	4%	14	13%	28	29%
51-75%	13	13%	18	20%	9	8%
26-50%	21	21%	15	13%	7	8%
1-25%	59	59%	35	37%	39	39%
Never	-	-	10	11%	5	5%
Don't Know	0	0%	4	4%	8	8%
Refused	3	3%	3	3%	3	3%

How often do you…						
Percentage	**Encounter one or more of these barriers?**		**Implement measures to overcome the barrier(s) when encountered?**		**Ask to remediate the barrier(s) before service delivery when encountered?**	
	#	**%**	**#**	**%**	**#**	**%**
Total	**99**	**100%**	**99**	**100%**	**99**	**100%**

Half of contractors indicated having challenges with NYHEP portal. As illustrated in Table 2-53, 50% of contractors reported that it was very or somewhat difficult to complete tasks in NYHEP, and 43% reported it was very or somewhat difficult to complete tasks in the NYSERDA Partner Portal.

Table 2-53. Contractor challenges with program data systems

How difficult or easy is to complete tasks in…				
Level of difficulty	**NY Home Energy Portal (NYHEP)**		**NYSERDA Partner Portal (Salesforce)**	
	#	**%**	**#**	**%**
Very Easy	9	10%	8	9%
Somewhat Easy	14	13%	21	21%
Neither Easy nor Difficult	25	25%	19	18%
Somewhat Difficult	25	25%	28	30%
Very Difficult	23	25%	14	13%
Don't Know	3	2%	9	8%
Total	**99**	**100%**	**99**	**100%**

More than half of contractors indicated limited engagement from customers as a challenge. Table 2-54 shows that the most significant outreach challenges that affected contractors' ability to work and communicate with customers efficiently were limited response or engagement from customers (56%) and lack of program support and guidance (44%). While less common, 38% reported challenges with incorrect or incomplete customer contact information, and 30% said there was lack of time or resources for outreach. Note the limited response from customers in this table includes customers who may be contacted by the customer contractor but never pursue a project.

Table 2-54. Contractor challenges with outreach

Have any of the following outreach challenges impacted your ability to work and communicate with customers efficiently?								
Response	**Lack of program support and guidance**		**Limited response or engagement from customers**		**Lack of time or resources for outreach**		**Incorrect or incomplete customer contact information**	
	#	**%**	**#**	**%**	**#**	**%**	**#**	**%**
Yes	43	44%	55	56%	29	30%	37	38%
No	46	46%	37	37%	61	61%	53	54%
Don't Know	10	10%	6	6%	8	7%	9	8%
Refused	0	0%	1	1%	1	1%	0	0%
Total	**99**	**100%**	**99**	**100%**	**99**	**100%**	**99**	**100%**

Contractors use a mix of phone calls, emails and in-person visits to conduct outreach to customers and typically make at least three attempts for each customer. As shown in Table 2-55, at least 75% of contractors each reported using phone calls, emails, or in-person visits to conduct outreach to customers. Table 2-56 shows that 36% reported that they make three attempts to reach assigned customers, and 25% reported that they make four or more attempts. Twenty-three percent of contractors have no set limit, and make outreach attempts until they make contact. Seven contractors reported other number of attempts, where some noted that they adjust their outreach based on the stage in the process or that it depends on the ability to reach the customer (e.g., no voicemail, changed numbers).

Table 2-55. Outreach methods

What forms of outreach do you provide to assigned customers?		
Outreach method	**Contractors**	
	#	**%**
Observations	**99**	
Phone	89	90%
Email	79	82%
In-person Visits	71	75%
Mail	50	50%
None	1	1%
Other	12	11%
Don't Know	2	2%

Note: Respondents could select more than one response.

Table 2-56. Outreach attempts

How many outreach attempts, in total, do you make to reach out to assigned customers?		
# of attempts	**Contractors**	
	#	**%**
1 Attempt	2	2%
2 Attempts	9	8%
3 Attempts	36	36%
4 or More Attempts	23	25%
No Specific Limit, Until Contact	22	23%
Other	7	6%
Total	**99**	**100%**

Most customer education from contractors happens in person. Table 2-57 shows that the most widely offered customer education was in-person consultation (94%), followed by printed materials (68%), and online resources (42%). Five contractors reported other types of education, including customer reports and phone calls.

Table 2-57. Customer education

What types of education do you offer to customers regarding energy efficiency, audits, or installations?		
Types of Education	**Contractors**	
	#	**%**
Observations	**99**	
In-person Consultation	94	94%
Printed Materials	66	68%
Online Resources	40	42%
Other	5	5%

Note: Respondents could select more than one response.

Table 2-58 shows that more than half contractors (54%) said that the IRA funding in the program did not affect the way they do their work.

Table 2-58. Inflation Reduction Act funding impacts

Have the IRA funds that are now available in EmPower+ at all changed the way you do your work?		
Response	**Contractors**	
	#	**%**
Yes	35	37%
No	53	54%

Have the IRA funds that are now available in EmPower+ at all changed the way you do your work?		
Response	**Contractors**	
	#	**%**
Don't Know	11	9%
Total	**99**	**100%**

2.2.4 Project processes

Contractors appear to be completing Home Energy Assessments that are detailed and include active customer participation. Almost every contractor indicated that their Home Energy Assessments include customer education about reducing usage (99%), customer interviews about energy issues (97%), and NYSERDA assessment requirements (96%; Table 2-59). Eighty-seven percent of contractors reported that they conduct additional testing as needed including blower door testing, visual inspections, and additional required testing procedures required by WAP.

Table 2-59. Home energy assessments

Which elements are included in home energy assessments?		
Elements	**Contractors**	
	#	**%**
Observations	**99**	
Customer Education about Ways to Reduce Usage	98	99%
Customer Interview about Energy Issues	95	97%
NYSERDA Assessment Requirements	95	96%
Additional Testing as Needed	85	87%
Other	17	18%

Note: Respondents could select more than one response.

Contractors use testing results, equipment condition and age, and customer concerns to select measures. As shown in Table 2-60, the most common methods for measure selection are testing results (96%), age or condition of existing equipment and measures (86 %), customer concerns and requests (87%), and the eligible measures list (73[6].[7] Eighteen contractors listed

[7] http://hpwescontractorsupport.com/wp-content/uploads/2025/10/5.15-EmPower-Eligible-Measures-and-Accessories-October-2025.pdf

other items used to select measures, such as the WAP's Savings-to-Investment Ratio (SIR), and health and safety standards.

Table 2-60. Measure selection

Which of the following items are used to select the measures to install in a home?		
Items	**Contractors**	
	#	**%**
Observations	**99**	
Testing Results	95	96%
Age or Condition of Existing Equipment/Measure(s)	84	86%
Customer Concerns/Requests	83	87%
Eligible Measures List	71	73%
Other	20	18%

Note: Respondents could select more than one response.

One-third of contractors coordinate EmPower+ projects with the Weatherization Assistance Program (WAP) and of those, half found it challenging to navigate the varying requirements between the programs. As shown in Table 2-61 about one-third of the participating contractors work on coordinated jobs (33%) and half do not (53%). Table 2-62 shows that out of the 37 contractors that worked on jobs coordinated with WAP, the most common challenges and barriers were different policies and procedures (50%), and different priorities (25%). Although less common, contractors reported challenges with different eligibility (19%) and funding allocation (17%). Thirty-five percent of contractors who coordinate with WAP reported other challenges and barriers, such as redundant or constantly changing paperwork, and misaligned timeframes. Still, more than two-thirds (68%) of contractors who coordinate EmPower+ with WAP thought it was effective in providing a more comprehensive or cost-effective audit services for the customer (Table 2-63).

Table 2-61. Number of jobs with WAP coordination

What percentage of jobs you work on for EmPower+ are coordinated with WAP?		
# of jobs	**Contractors**	
	#	**%**
None (0%)	49	53%
1-25%	21	20%
26-50%	5	4%
51-75%	0	0%
76-100%	11	9%
Don't Know	13	13%

What percentage of jobs you work on for EmPower+ are coordinated with WAP?		
# of jobs	Contractors	
	#	%
Total	**99**	**100%**

Table 2-62. Challenges with WAP coordination

What are the main challenges and barriers regarding coordination with WAP?[a]		
Challenges/barriers	Contractors	
	#	%
Observations	**37**	
Different Policies and Procedures	19	50%
Different Priorities	10	25%
Different Eligibility	8	19%
Funding Allocation	7	17%
No Challenges or Barriers	8	23%
Other	14	35%
Don't Know	1	4%

Note: Respondents could select more than one response.

[a] Only respondents who indicated that they work on jobs for EmPower+ that are coordinated with WAP were asked this question.

Table 2-63. Effectiveness levels of coordination with WAP

How effective or ineffective is coordination with WAP in providing services to participants in a more comprehensive and/or cost-effective manner?[a]		
Level of Effectiveness	Contractors	
	#	%
Very Effective	13	35%
Somewhat Effective	13	33%
Not at All Effective	7	19%
Don't Know	4	12%
Total	**37**	**100%**

[a] Only respondents who indicated that they work on jobs for EmPower+ that are coordinated with WAP were asked this question.

2.2.5 Perceived challenges faced by customers

Contractors indicated that customers are most commonly concerned about the program's effects impact on energy bills and about which measures are selected. The most common customer concerns about the program, as reported by contractors, in Table 2-64, are mainly related to the program's impact on energy bills (42%) and selected measures (42%). Nineteen percent of contractors noted that customers had concerns about installation disruptions, while

18% mentioned concerns about future maintenance. Some other customer concerns include customers being skeptical, having unrealistic expectations or limited understanding of the program, and costs of participation.

Table 2-64. Common customer concerns

What are the most common customer concerns about the Program?		
Customer concerns	**Contractors**	
	#	**%**
Observations	**99**	
Impact on Energy Bills	42	42%
Measures Selected	42	42%
Installation Disruptions	20	19%
Future Maintenance	19	18%
Other	31	30%
Not Applicable – No Customer Concerns	10	9%
Don't Know	4	4%

Note: Respondents could select more than one response.

Table 2-65 shows that the main challenges and barriers when interacting and working with customers were limited awareness or understanding of the program (65%), financial constraints (52%), and difficulty obtaining landlord approval (46%). While six contractors reported that they faced no challenges or barriers, 14 contractors reported that they faced other challenges, such as program paperwork and the communication between landlord and tenant.

Table 2-65. Challenges with customers

What are the main challenges and/or barriers when interacting and working with customers?		
Challenges/barriers	**Contractors**	
	#	**%**
Observations	**99**	
Limited Awareness or Understanding	64	65%
Financial Constraints	45	52%
Difficulty Obtaining Landlord Approval	44	46%
Resistance to Change	32	32%
Language Barrier	21	20%
Lack of Access to Property	20	19%
Other	14	13%
No Challenges or Barriers	6	5%
Don't Know	1	1%

Note: Respondents could select more than one response.

2.2.6 Satisfaction with EmPower+ program and staff

Two-thirds of contractors (65%) were satisfied with NYSERDA program staff while only 52% were satisfied with CLEAResult staff. This led to 61% of respondents saying they were satisfied with the program (Table 2-66).

Table 2-66. Contractor satisfaction with program aspects

How satisfied or dissatisfied are you with…						
Level of satisfaction	**Program**		**CLEAResult (program implementation contractor)**		**NYSERDA program staff**	
	#	**%**	**#**	**%**	**#**	**%**
Very Satisfied	18	20%	16	15%	22	20%
Somewhat Satisfied	42	41%	35	37%	40	45%
Neither Satisfied nor Dissatisfied	14	15%	22	24%	24	22%
Somewhat Dissatisfied	19	19%	21	20%	10	9%
Very Dissatisfied	6	6%	5	4%	2	3%
Don't Know	0	0%	0	0%	1	1%
Total	**99**	**100**	**99**	**100**	**99**	**100**

Half of contractors (52%) indicated they are assigned the right number of jobs, while one-third (36%) said they are assigned too few. Only four contractors (4%) expressed that they are assigned too many jobs.

Table 2-67. Contractor satisfaction with number of assigned jobs

How would you describe the number of jobs that are assigned to your company for the NYSERDA EmPower+ Program?		
Level of satisfaction	**Contractors**	
	#	**%**
Assigned about the Right Number	50	52%
Assigned too Few	36	36%
Assigned too Many	4	4%
Don't Know	9	8%
Total	**99**	**100%**

When asked about their satisfaction with program rules and procedures, contractors reported the most dissatisfaction for rules and procedures relating to documenting work

completion and developing work scopes. As shown in Table 2-68, a higher proportion of contractors were dissatisfied with the rules and procedures for documenting work completion (45%) and developing work scopes (40%).

Table 2-68. Contractor satisfaction with rules and procedures

How satisfied or dissatisfied are you with the rules and procedures for…										
Level of satisfaction	**Accepting new assignments**		**Home Energy Assessments (audits)**		**Developing work scopes**		**Completing measure installation**		**Documenting work completion**	
	#	**%**	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**
Very Satisfied	25	27%	19	20%	8	8%	10	10%	10	9%
Somewhat Satisfied	31	34%	38	39%	33	33%	44	44%	28	30%
Neither Satisfied nor Dissatisfied	21	20%	16	17%	18	18%	21	21%	17	16%
Somewhat Dissatisfied	16	14%	17	16%	20	20%	12	13%	26	26%
Very Dissatisfied	5	4%	7	7%	19	20%	10	11%	17	19%
Don't Know	1	1%	2	1%	1	1%	2	1%	1	1%
Total	**99**	**100%**	**99**	**100%**	**99**	**100%**	**99**	**100%**	**99**	**100%**

Almost two-thirds (60%) of contractors were satisfied with the level of cooperation and communication from customers (Table 2-69). A smaller number of contractors reported that they were somewhat dissatisfied (11%), but no contractors reported being very dissatisfied. Note unlike in Table 2-54, respondents to this question were focusing on customers who were already engaging with them for a project.

Table 2-69. Contractor satisfaction with customers

How satisfied or dissatisfied are you with the level of cooperation and communication from customers?		
Level of satisfaction	**Contractors**	
	#	**%**
Very Satisfied	16	16%
Somewhat Satisfied	42	44%
Neither Satisfied nor Dissatisfied	28	28%
Somewhat Dissatisfied	12	11%
Very Dissatisfied	0	0%
Don't Know	1	1%
Total	**99**	**100%**

2.2.7 Recommendations for improvements

Contractors want to see improved communication channels, responsiveness, and training materials from the program. Table 2-70 shows that a majority of contractors want to see improved communication channels (70%), improved responsiveness and availability (69%), or more comprehensive training materials or resources (56%). Twenty percent of contractors recommended other improvements, including having dedicated, direct and central account contacts or managers.

Table 2-70. Contractor suggestions for improvements to program resources

What improvements would you like to see in the resources, assistance, and training NYSERDA and CLEAResult provide?		
Improvements	**Contractors**	
	#	**%**
Observations	**99**	
Improved Communication Channels	68	70%
Improved Responsiveness and Availability	65	69%
More Comprehensive Training Materials or Resources	54	56%
Additional Training Materials	46	46%
Improved Feedback Mechanism for Suggestions	42	46%
More Frequent Training Sessions	41	42%
No Additional Features or Improvements Necessary	4	4%
Other	22	20%

Note: Respondents could select more than one response.

When asked an open-ended question about ways to improve the program, contractors primarily highlighted process simplification, better communication, and more contractor support. Eighty-one percent of contractors provided at least on recommendation to improve the program. Key suggestions included streamlining processes and approvals (22%), implementing consistent requirements (17%), and improving the portal (15%) and support systems (15%).

Table 2-71. Contractor recommendations for program

Do you have any recommendations on how NYSERDA could improve the Program?		
Improvements recommended	**Contractors**	
	#	**%**
Observations	**99**	
Streamline Processes and Approvals	22	22%
Have Consistent Program/Documentation Requirements	17	17%
Improve Portal System	15	15%

Do you have any recommendations on how NYSERDA could improve the Program?		
Improvements recommended	**Contractors**	
	#	**%**
Clear/Prompt Contractor Support	15	15%
Clear/Prompt Communication of Program Changes	13	13%
Improve Training	9	9%
Reduce Timeline for Payments	8	8%
Gradually Implement Program Changes	7	7%
Heed Contractor Feedback	6	6%
Bring Back Account/Project Managers	6	6%
Simplify Photo Upload Process	6	6%
Adjust Equipment Requirements	6	6%
Improve Support from CLEAResult	5	5%
Include More Measures	4	4%
Other	11	11%
Not Applicable	1	1%

2.3 Detailed billing analysis findings

This section presents the NYSERDA EmPower+ billing analysis findings. The evaluation contractor team used site-level billing analysis as part of the UMP Chapter 8 methods to calculate electric and gas savings impact. The billing analysis results focus on three key metrics:

1. Evaluated savings: the weather-normalized average annual energy savings per household.
2. Realization rates (RR): The ratio of evaluated savings to estimated savings (the savings projected by the program based on the Technical Reference Manual (TRM) formulas), indicating the accuracy of the program's estimated savings.
3. Savings as a percentage of baseline usage: evaluated energy savings per participant divided by the average annual energy consumption per participant during the pre-period (i.e., before program participation).

The billing analysis estimates program impact by comparing participant weather normalized energy usage to that of a matched comparison group.[8] This method assumes that the comparison group reflects how the participant group would have behaved without the program. If the control group is not a good match to participants, there might be differences in how the control and

[8] See Section 3.4.4, Matched comparison group selection, for a description of the matched comparison group methodology.

participant would have behaved in absence of the program. These differences can affect the evaluated savings results, even though they are not directly visible in the calculations.

2.3.1 Overall evaluated savings

Average annual per-customer evaluated savings were 8.1 MMBtu for gas and 127 kWh for electricity, based on a sample of 1,560 gas sites and 4,182 electric sites. Table 2-72 presents the overall gas (MMBtu) and electric (kWh) evaluated savings achieved through the program. Evaluated gas savings account for 8% of baseline consumption, while evaluated electric savings are relatively smaller, only 1% of baseline usage (see Row E).

Table 2-72. Overall savings summary

Parameter	Gas (MMbtu)			Electricity (kWh)		
	Overall	LI	MI	Overall	LI	MI
Sample count	1,560	1,517	43	4,182	4,142	40
A. Estimated savings (kWh or MMBtu/yr)	40	40	17	707	712	223
B. Average evaluated baseline usage (kWh or MMBtu/yr)	106.6	106.6	95.0	8,590	8,596	7,987
C. Average estimated % savings (kWh or MMBtu/yr; A/B)	38%	38%	18%	8%	8%	3%
D. Average evaluated savings (kWh or MMBtu/yr)	8.1	8.1	10.2	127	128	68
E. Average evaluated % savings (kWh or MMBtu/yr; D/B, 90% CI)	8% ±1%	8% ±1%	11% ±3%	1% ±1%	1% ±1%	1% ±5%
F. Realization rate (D/A), 90% CI	20% ±16%	20% ±17%	58% ±46%	18% ±60%	18% ±60%	31% ±998%

The realization rates are 20% for gas savings and 18% for electric savings (row F). Realization rates show how evaluated savings compare to estimated savings. In addition to being impacted by the estimation formulas and work quality, they are impacted and are influenced by factors like end-uses present in the home, usage patterns, and existing efficiencies of installed measures. They are an imperfect measure of a program's impact. Various factors can cause

differences between actual savings and estimated savings, including assumptions made during the estimation process. If both estimated and evaluated savings perfectly matched actual savings, realization rates would be 1. Rates below 1 usually result from differences between assumed inputs and what actually occurred, unrealistic projections or issues with energy-saving opportunities, barriers to installation, or work quality. Realization rates are not being recommended for use. For a full discussion on the limitations of realization rates, see Appendix B, Realization rate limitations.

The low realization rate may be attributable to overestimates of estimated savings, especially for gas. As discussed further in Section 2.3.2, a contributing factor to the low gas realization rate is the high estimated savings, which represent 38% of baseline usage, an unrealistic estimate for the EmPower+ program. The estimated gas savings in PY2023 were much higher than previous years. On the electric side, the estimated savings are more in line with previous years; however the evaluated savings appear to be decreasing. Additionally, the possibility of direct install electric measures being present in a portion of the pre-period could lead to a slight underestimation of evaluated savings.

2.3.2 Savings historical trends

This section provides additional context and comparisons with prior evaluations. The focus is on Low-Income (LI) participants. 97% of projects in the program population were classified as LI, and the remaining projects were identified as serving Moderate-Income (MI) participants.[9]

Historically high estimated gas savings are causing the low realization rates for PY2023. Historically, LI gas evaluated savings have been between 8 and 12 MMBtu per year (Table 2-73), and this study is in line with those results. However, the estimated savings increased by nearly 54%, rising from 26 to 40 MMBtu when comparing the 2017 – Q1 2019 evaluation to the current program.

[9] After data cleaning and applying the attrition criteria, only 40 MI projects are in the electric sample and 43 in the gas sample, which represent ~1% and ~3% of the electric and gas sample respectively.

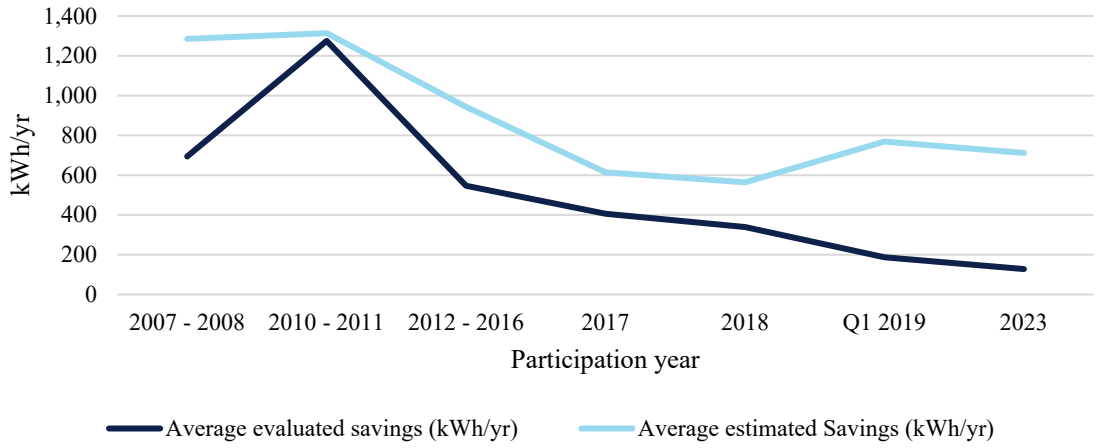
Table 2-73. Historical LI gas evaluated savings, estimated savings and realization rates

Participation year	Average evaluated savings (MMBtu/yr)	Average estimated savings (MMBtu/yr)	Realization rate
2007–2008	10	14	71%
2010–2011	2	4	50%
2012–2016	12	27	44%
2016–mid 2017	8	26	31%
2017–Q1 2019	9	26	35%
2023 (Current study)	**8**	**40**	**20%**

The increase in estimated savings is driven partially by a change in the methodology used to calculate tracked savings. According to conversations held between the evaluation contractor team and program staff, under instruction from DPS, the method for calculating tracked savings was updated in 2023 to use the Technical Reference Manual (TRM), replacing the proprietary tool, EmPCalc, NYSERDA previously used. The new approach to estimating savings does not account for interactions between measures installed within the same household, which can lead to inflated estimated savings. Additionally, EmPCalc was calibrated to evaluation results of previous evaluations.

For electric savings, the evaluated and estimated savings, as well as the realization rates, are consistent with patterns seen in earlier studies, but savings are decreasing over time. Figure 2-1 shows the historical trend for electric evaluated and estimated savings that depicts a steady decline in evaluated savings (dark blue line) since 2012, while the estimated savings have remained relatively stable since 2017.

Figure 2-1. LI electric evaluated and estimated savings historical trend



While evaluated electric savings have decreased over time, the rate of the decrease has slowed. Table 2-74 shows the percent change per year in average evaluated electric savings. For this evaluation, the average percent decrease per year has decreased to single digits, compared to double digit rate of reductions found in the previous studies.

Table 2-74. LI electric evaluated and estimated savings, RR, and percent change per year

Participation year	Average evaluated savings (kWh/yr)	Average estimated Savings (kWh/yr)	Realization rate (%)	Years between measurements	Percent change per year
2007–2008	694	1,285	54%	NA	NA
2010–2011	1,275	1,314	97%	~2	42%
2012–2016	547	943	58%	~3	-19%
2017	406	614	66%	1	-26%
2018	339	564	60%	1	-17%
Q1 2019	187	769	24%	1	-45%
2023	128	712	18%	4	-8%

Challenges relating to measure installation dates present a limitation to direct install measures in this and previous studies. The EmPower+ program includes direct install measures (e.g., LEDs, power strips, aerators) that are typically installed during an energy assessment and other measures (e.g., insulation and HVAC replacement) that are installed at later dates. An ideal billing analysis would compare a pre-period that is entirely before the installation of any measures to a post-period that is entirely after the installation of any measures. Unfortunately, clear data on the dates of initial installation for individual measures, was not available in this study nor appear to have been available in earlier studies. Therefore, the evaluation contractor delineated the pre- and post-periods based on the project completion date including a one-month blackout period before and after the completion date. In conversations with program staff, the evaluation contractor determined that in some cases, direct install measures may be installed more than a month before the completion date and therefore may be installed for a portion of the pre-period. Using information from the program staff and available date data, the evaluation contractor determined that the possibility of direct install measures being present for a portion of the pre-period could lead to up to a 20% underestimate of electric evaluated savings brining the electric realization rate from 18% to 22% and electric evaluated savings from 1% of baseline usage to 1.2% of baseline usage. The potential impact on gas evaluated savings is much smaller

since direct install measures represent a much smaller portion of gas savings than they do for electricity.

2.3.3 Measure-level evaluated savings

This section presents results by measure group. The evaluation contractor team identified 31 measures in the tracking data, but it's not possible to isolate savings with confidence for many of them due to limitations further discussed in Section 3.4.6, Measure-level savings. To address this, measures were grouped into categories where separate savings estimates could be developed with reasonable confidence.

Some measures included in this section do not have statistically significant savings estimates. These were retained because they represent a large portion of the program activity and excluding them would risk blending distinct effects into a single, unclear result. Additionally, measures such as equipment repair, which may show negative effects, were kept separate to avoid distorting the overall findings.

The analysis reveals that the largest share of evaluated gas savings is attributed to Air Sealing and Insulation and Domestic Hot Water (DHW) replacement measures. Table 2-75 shows the gas evaluated savings by measure group.[10] On average, these measures yielded significant savings per home of 6 MMBtu and 4.8 MMBtu, respectively.

No other measures yielded statistically significant results, and therefore, their evaluated savings should be interpreted with caution. Equipment repair measures showed negative savings, although the result was not statistically significant. This outcome may reflect beneficial snapback effects, where repaired equipment, such as a previously non-functioning furnace, returns to normal energy consumption levels, thereby increasing energy usage post-repair.

[10] Please refer to Appendix A for a comprehensive list of measure-to-measure group mappings.

Table 2-75. Gas measure-level evaluated savings summary

Measure group	Number of sites with measure (N = 32,049)	Average evaluated savings per home that has the measure (MMBtu/yr))	Total evaluated savings (MMBtu/yr)	Average estimated savings per home (MMBtu/yr)	Realization rate (evaluated savings/ estimated savings)
Air sealing and/or insulation	22,882	6.0[b]	137,755	31	19% [b]
DHW replacement (gas)[c]	2,406	4.8 [b]	11,545	11	44% [b]
Thermostat	6,876	1.9	13,065	2.6	74%
Heating replacement[1]	4,346	1.9	8,381	19.1	10%
Other (Pipe insulation, aerators, lighting)	7,745	0.2	1,564	1.4	14%
Equipment repair	12,145	-0.3	-3,453	1.1	-26%

[a] Excludes projects with heat pump installations.

[b] Indicates the result is significant at the 90% confidence level

[c] Measure group includes only sites where gas water heating is the identified fuel type.

Electric evaluated savings were mostly driven by Refrigerator/Freezer Replacement and DHW Replacement measures. Table 2-76 summarizes the evaluated electric savings by measure group. On average, these measures yielded significant savings per home of 218 kWh and 904 kWh, respectively. No other measure type had statistically significant results, and Equipment repair showed negative but non-significant savings, which may suggest snapback effects. Both patterns were consistent with the gas measure-level findings. Finally, Thermostats had negative electric evaluated savings, which is in line with evaluations of other programs, which have found smart thermostats can lead to an increase in electric consumption.

Table 2-76. Electric measure-level savings summary

Measure group	Number of sites with measure (N = 33,099)	Average evaluated savings per home that has the measure (kWh/yr)	Total evaluated savings (kWh/yr)	Average tracked savings per home	Realization rate
Refrigerator/Freezer Replacement	12,012	218	2,620,386	465	47%[a]
DHW Replacement (electric)[b]	727	904	657,203	2,107	43%[a]
Other (Pipe insulation, aerators, lighting)	19,803	23	457,509	305	8%
Air sealing and/or insulation	22,882	11	248,878	357	3%
Equipment repair	12,145	-3	-31,235	14	-19%
Thermostat	6,876	-24	-83,220	25	-48%

a Indicates the result is significant at the 90% confidence level

b Measure group includes only sites where electric water heating is the identified fuel type.

2.3.4 Evaluated savings by utility

This section examines how evaluated electric and gas savings vary across participating utilities.

Gas evaluated savings generally ranged between 6% and 8% of baseline usage. New York State Electric and Gas (NYSEG) achieved the highest savings ratio, evaluated gas savings relative to baseline usage, of approximately 12% (Table 2-77). In contrast, Consolidated Edison reported the lowest savings ratio at less than 1%, National Grid, which accounted for over half of the sample (823 sites), showed a savings ratio of 8% and contributed significantly to the overall average. The current study shows a slight decline in average performance from the prior study. which reported savings ratios of 9.0% for low-income (LI) and 11.7% for moderate-income (MI) participants.

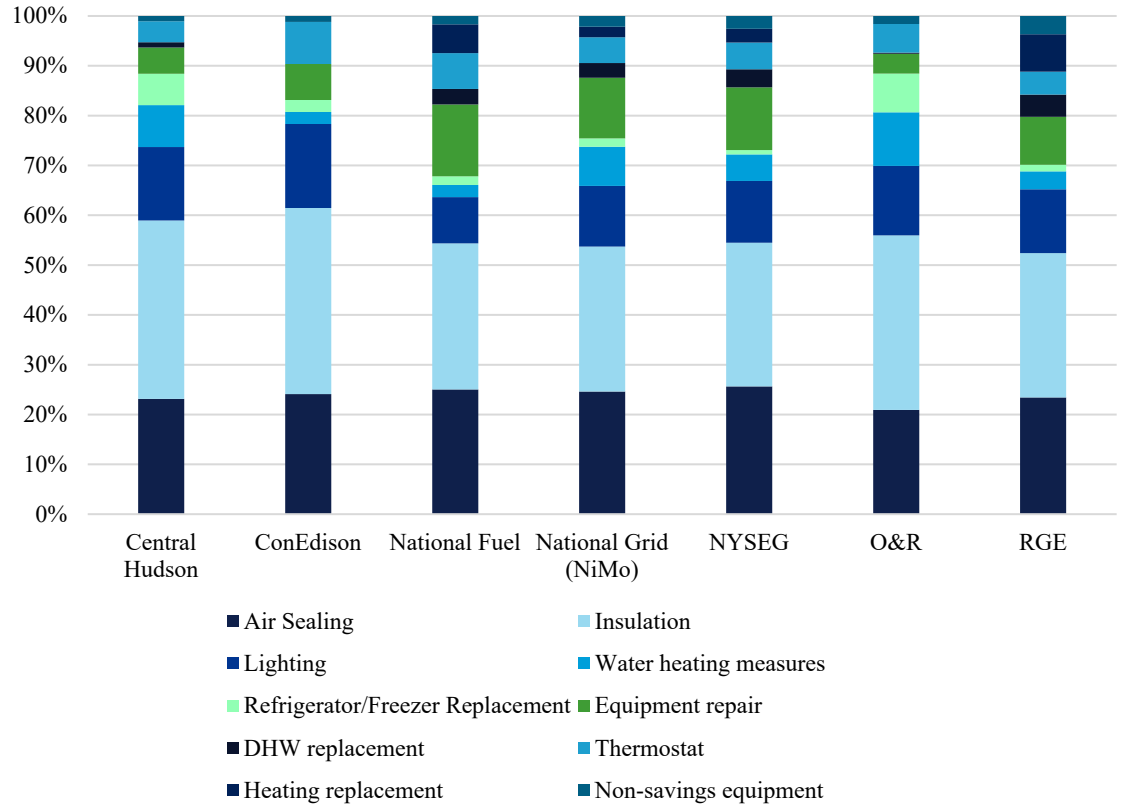
On average, the evaluation contractor estimates customers saved $134 on their annual gas bills. Although National Grid showed lower evaluated gas savings than NYSEG, its customers experienced higher average cost savings due to NYSEG's lower gas rates. Consolidated Edison had the highest cost per MMBtu, which resulted in relatively large cost savings despite modest evaluated savings.

Table 2-77. Average gas evaluated savings by utility

Utility	Number of sites	Average evaluated savings MMBtu/yr	Average baseline usage MMBtu/yr	Annual cost savings ($)	Savings ratio = evaluated savings / baseline usage
Central Hudson	20	3.6	97.7	$60	4% ± 8%
Consolidated Edison	18	0.9	96.8	$24	1% ± 16%
National Fuel Gas Distribution	253	6.7	120	$117	6% ± 3%
National Grid	823	8.8	106.2	$153	8% ± 2%
New York State Electric and Gas	90	10.2	85.3	$142	12% ± 6%
Orange and Rockland	104	9	130.4	$166	6% ± 5%
Rochester Gas and Electric	252	7	87.9	$87	8% ± 4%
Grand Total	**1560**	**8.1**	**105.7**	**$134**	**8%** ± 1%
Prior Study (2017-2019)	2543 LI	9.3 LI	103.7 LI		8.98% LI
	1789 MI	11.4 MI	97.1 MI		11.73% MI

The distribution of the number of measures across utilities does not suggest any meaningful differences in composition that could explain the variation in evaluated savings (Figure 2-2). Notably, approximately 60% of all measures correspond to air sealing or insulation, and this proportion is consistent across all utilities.

Figure 2-2. Distribution of measures by utility – Gas sites



Electric evaluated savings range from 2% to 7% of baseline usage, excluding Orange & Rockland (O&R). Rochester Gas and Electric and Central Hudson reported the highest evaluated savings ratios, both at approximately 7%. O&R was the only utility to report negative savings, indicating the program led to an increase in consumption. As shown in Figure 2-2, O&R also has the highest proportion of Refrigerator/Freezer Replacement measures among the utilities. It is possible that these new appliances were not replacing functioning units, but rather replacing broken units, thereby increasing overall energy consumption, which would explain the utility's negative average savings.

When compared to the prior study (2017–2019), the current results show a decline in electric savings performance. The prior study reported savings ratios of 5% for low-income participants and 2.94% for moderate-income participants, both higher than the current overall average. However, as shown in Figure 2-1, evaluated electric savings have had a negative trend over the years.

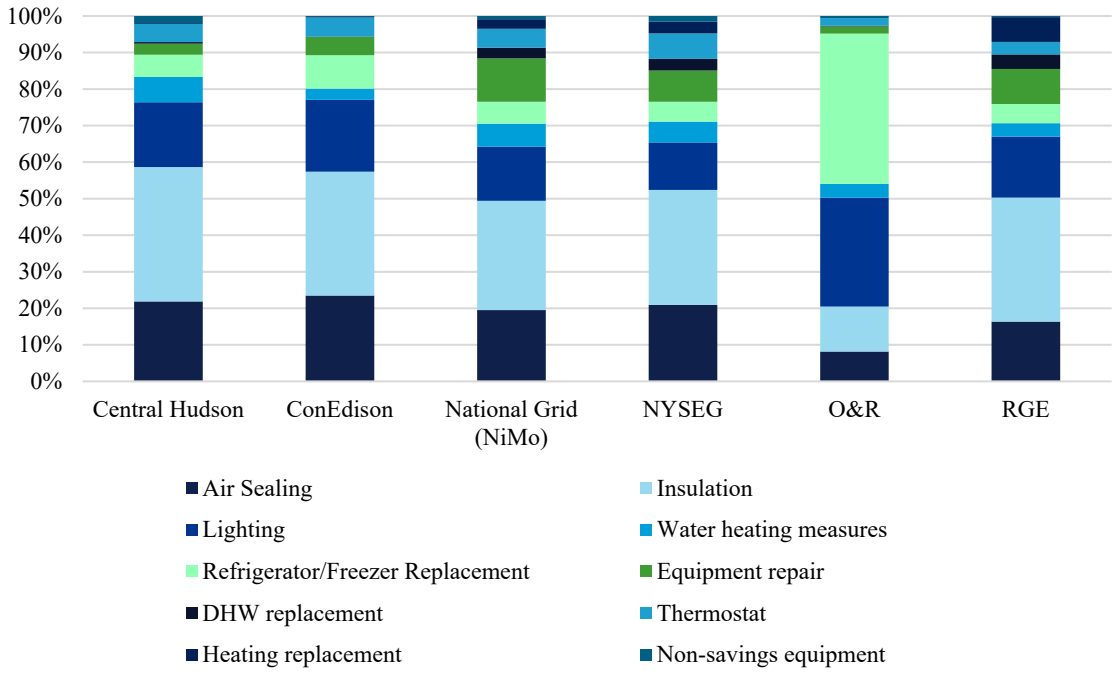
On average, customers saved an estimated $25 on their annual electric bills as shown in Table 2-78. While NYSEG showed higher evaluated savings than Consolidated Edison, the latter's higher cost per kWh led to larger cost savings. This mirrors the behavior for gas savings, where higher unit costs translated into larger financial impacts despite lower energy savings. In fact, NYSEG's customers achieved nearly half the cost savings of those served by Consolidated Edison.

Table 2-78. Average electric evaluated savings by utility

Utility	Number of sites	Average evaluated savings kWh/yr	Average baseline usage kWh/yr	Cost savings ($/yr)	Savings ratio = Evaluated savings / baseline usage
Central Hudson	111	601	8,348	151	7% ± 6%
Consolidated Edison	514	201	6,148	63	3% ± 3%
National Grid	2,827	146	8,378	25	2% ± 1%
New York State Electric and Gas	63	230	9,430	36	2% ± 7%
Orange and Rockland	559	-176	11,701	-41	-2% ± 2%
Rochester Gas and Electric	68	593	8,094	96	7% ± 8%
Grand Total	**4,182**	**127**	**8,590**	**25**	**1%** ±1%
Prior Study (2017-2019)	5400 LI	357 LI	7669 LI		4.66% LI
	1407 MI	238 MI	8079 MI		2.94% MI

O&R had a disproportionate number of refrigerator and freezer replacements. The distribution of measures in Figure 2-3 shows that around 50% of measures across utilities correspond to Air Sealing, Insulation, or Lighting. The only exception is O&R, where New Refrigerator/Freezer Replacement is the largest portion of the measures.

Figure 2-3. Distribution of measures by utility – Electric sites



2.3.5 Fuel-switching results: Heat pump savings

This section presents findings from the 2023 participant sample who installed heat pumps. The number of sites with heat pump measures that also had enough billing data for analysis was relatively small: 26 electric sites and 19 gas sites.

Heat pump installations led to a 40% increase in electricity usage compared to baseline consumption, alongside a 52% reduction in gas usage relative to gas baseline levels (Table 2-79). These shifts reflect the expected transition in energy sources associated with heat pump adoption. Looking only at the electric analysis, heat pumps installations lead to an increase in utility bills of $635/yr, while looking only at gas analysis lead to a decrease in utility bills of $910/yr.[11] This suggests a net reduction of $275, but electric and gas results were not available for all of these jobs.

[11] For the methodology to calculate utility bill savings, see Section 3.2.1.4

Table 2-79. Evaluated savings for sites with heat pump installations

Commodity	Number of Sites	Average baseline usage (MMBtu/yr)	Average evaluated savings (MMBtu/yr)	Evaluated savings / baseline usage	Utility bill savings ($/yr)
Electric	26	30.5 8,935 kWh	-12.1 -3,555 kWh	-40%	($635)
Gas	19	99.8	52.3	52%	$910

For heat pump sites that had enough electric and gas billing data to look at utility bill impacts as a whole, the average net savings for participation was $999/year. Only six sites in the sample had both gas and electric data available, allowing for a combined energy analysis of heat pump measures. Table 2-80 presents the aggregated energy savings for these sites, with electricity and gas consumption converted to a common unit (MMBtu). The results indicate total annual savings of 77.8 MMBtu, representing a 47% reduction relative to baseline energy usage. Overall, the homes saved $999/yr. This highlights the substantial impact of heat pump installations on overall energy consumption when both fuel types are considered, though these results may not be representative of broader trends due to the small sample size, and the gas savings for this smaller sample are significantly higher than the estimated gas savings across all sites with sufficient gas usage data.

Table 2-80. Heat pump evaluated savings for sites with both electric and gas data

Commodity	Number of Sites	Average baseline usage (MMBtu/yr)	Average evaluated savings (MMBtu/yr)	Evaluated savings / baseline usage	Utility bill savings ($/yr)
Electric	6	35.1 10,286 kWh	-12.3 -3,615 kWh	-35%	($701)
Gas	6	129.3	90.2	70%	$1701
Electric and Gas	**6**	**164.4**	**77.8**	**47%**	**$999**

2.3.6 Evaluated savings by contractor QMS score

There was no significant difference in savings between contractors. Additionally, the distribution of projects was relatively scattered, with no single contractor representing a disproportionately large share of the sample.

Since NYSERDA typically removes contractors who get poor quality scores, there was no correlation between savings outcomes and contractor quality. Figure 2-4 and Figure 2-5 show the analysis of gas and electric savings by contractor Quality Management System (QMS) score. The results show no clear correlation between savings outcomes and contractor performance ratings. Since NYSERDA typically removes contractors with scores below 2 from the program due to performance concerns, the bins are from 2 upward. The majority of contractors score 3 or higher. In fact, 65% of contractors receive scores between 4 and 5, indicating generally high performance across the evaluated group.

Figure 2-4. Electric savings by contractor QMS score (average kWh savings by contractor score bin with 90% CI)

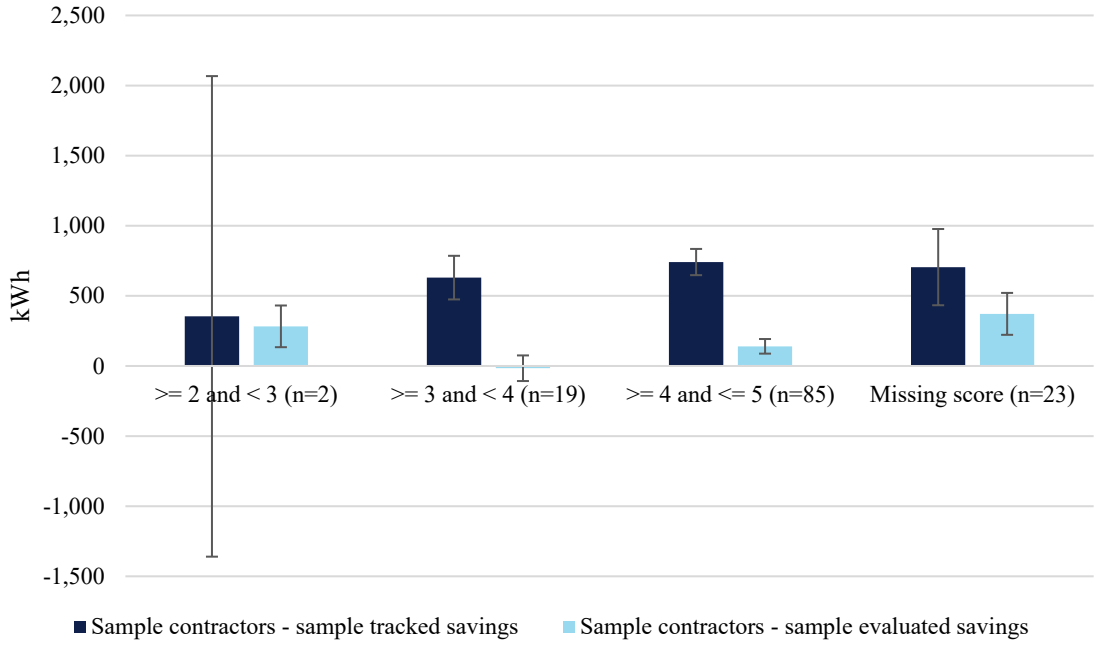
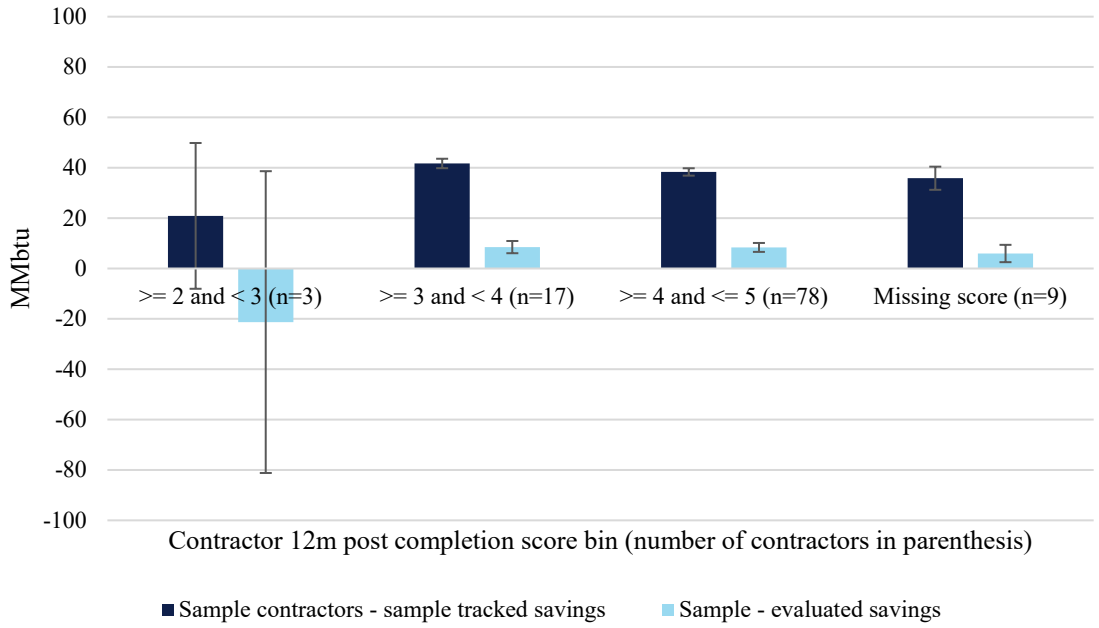


Figure 2-5. Gas savings by contractor QMS score (average MMBtu savings by contractor score bin with 90% CI)



2.3.7 Evaluated savings by DAC geographic status

There was no statistically significant difference between evaluated savings for DAC and non-DAC participants. Using NYSERDA's current criteria for identifying Disadvantaged Communities (DAC), the evaluation contractor team conducted a comparative analysis of average savings by DAC geographic status. This included comparisons across income classifications (LI, MI) and regions (Downstate, Long Island, Upstate), as shown in Table 2-81. Approximately 97% of gas projects and 99% of electric projects are classified as Low-Income, and roughly 88% of all projects are in Upstate New York. The observed evaluated savings per household yielded no statistically significant differences between DAC and non-DAC participants, either overall or within the defined subgroups.

Table 2-81. Average Evaluated savings by DAC geographic status

	Variable	Category	Non-geographic DAC			Geographic DAC			Statistical difference test	
			Count	Avg evaluated savings	SE	Count	Avg evaluated savings	SE	T-statistic	P value (*)
Electric savings (kWh)	**Overall**	**Overall**	**2,774**	**126.84**	**58.49**	**1408**	**128.25**	**75.97**	0.014	0.989
	Income Classification	LI	2,747	123.54	58.87	1394	137.16	76.45	0.138	0.891
		MI	26	513.98	518.37	14	-759.30	633.13	-1.505	0.141
	Region	Downstate	24	133.48	555.35	52	1122.55	377.94	1.471	0.145
		Long Island	311	109.86	140.14	131	27.35	153.73	-0.347	0.729
		Upstate	2439	128.94	63.87	1225	96.83	84.07	-0.297	0.766
Gas savings (MMbtu)	**Overall**	**Overall**	**895**	**7.55**	**1.11**	**665**	**8.92**	**1.22**	**0.825**	**0.409**
	Income Classification	LI	862	7.52	1.14	655	8.80	1.24	0.750	0.454
		MI	33	8.14	3.28	10	16.85	5.75	1.289	0.205
	Region	Downstate	8	-12.82	12.10	12	8.01	12.32	1.152	0.264
		Long Island	128	6.01	2.61	32	14.05	5.35	1.370	0.173
		Upstate	759	8.02	1.22	621	8.67	1.26	0.368	0.713

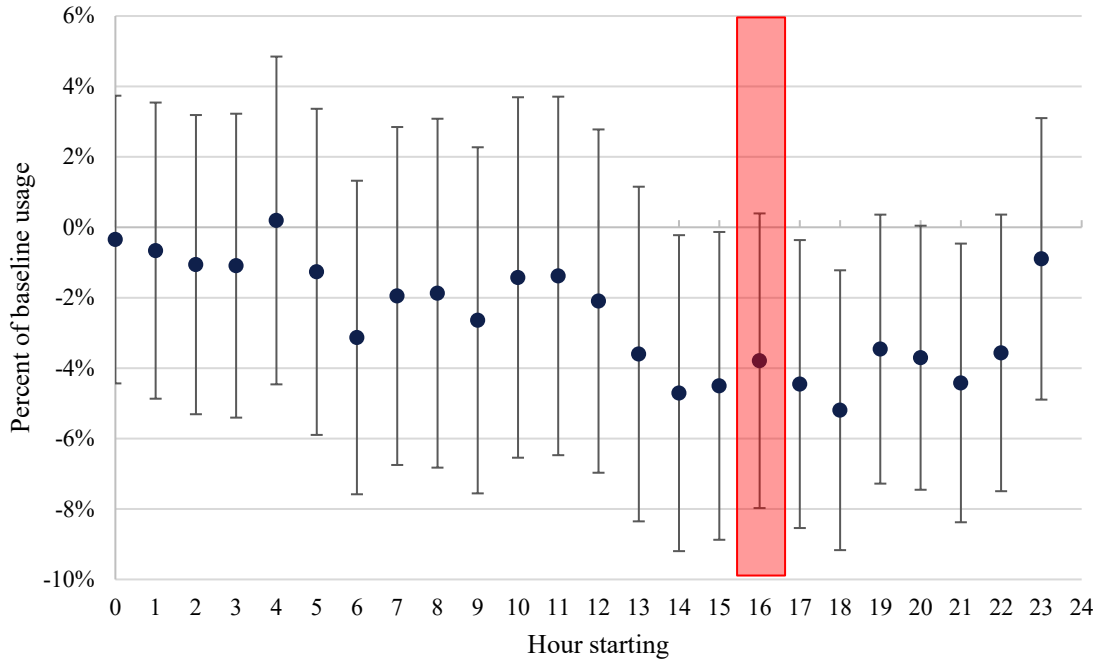
(*) P-values less than 0.10 are statistically significant at the 90% confidence

2.3.8 Detailed AMI analysis findings

Although electric savings is not the focus of the program, the analysis was performed using electric AMI data from Consolidated Edison as an exploratory exercise. See more details about the methodology in Section 3.4.7, Electric peak demand energy savings.

The program may have a slight negative impact on peak electric demand savings. Specifically, during peak demand period (hour starting 16), evaluated savings were not statistically significant at the 90% confidence level (confidence interval crosses the 0-horizontal axis). As shown in Figure 2-6, across all hours of the day, negative savings (i.e., increased kWh consumption) were observed, except for hour 4. However, only the two hours before and after hour 16 showed statistically significant differences from zero.

Figure 2-6. Average hourly savings as percent of baseline usage over the 5 hottest days at 90% confidence interval (n=300)



2.3.9 Cost of energy saved

The study included an evaluation of the cost of energy saved of the different measure groups by calculating the dollars spent per unit of evaluated energy savings, measured in $/MMBtu for gas and $/kWh for electric, across both sample and population data, shown in Table 2-82. The overall $ per kWh and $ per MMBtu values include all measures with associated costs, even if those

measures did not have tracked savings. In contrast, the measure group savings only account for measures that have tracked savings.[12]

Cost per energy saved is presented for all evaluated measures. Statistically significant savings estimates are highlighted, while non-significant values are included for transparency but should be interpreted with caution, as they may reflect uncertainty in the savings estimate rather than true cost-effectiveness.

For gas measures, on average, the program spent $67.1 per MMBtu saved in the sample and $55.1 per MMBtu saved in the population. Among the gas measure groups, Air Sealing + Insulation and DHW replacement had similar cost per energy saved, with a cost of $47 and $46 per MMBtu saved in the sample, respectively. However, the population values differed, with the cost per MMBtu saved for Air Sealing + Insulation being $14 higher than that for DHW replacement. As mentioned in Section 2.3.3, Measure-level evaluated savings, equipment repair measures tend to increase energy consumption, resulting in negative cost of saved energy.

For electric measures, the overall cost-effectiveness was $3.6 per kWh in the sample and $3.5 per kWh in the population. DHW replacement was the most cost-effective electric measure group in the population, with $0.2 per kWh saved, followed by Refrigerator/Freezer replacement, with $0.8 per kWh saved in the population. Thermostats and Equipment Repair have negative dollars per kWh due to increases in electricity consumption from those measures.

Table 2-82. Cost per unit saved by measure group

GAS		
Measure group	**$/ MMBtu**	
	Sample	**Population**
Air Sealing + Insulation	$ 47.0[a]	$ 54.2[a]
DHW replacement	$ 46.0[a]	$ 39.8[a]
Equipment repair	$ (209.6)	$ (210.4)
Heating replacement	$ 110.5	$ 102.3
Thermostat	$ 8.0	$ 8.0
WH + Other	$ 79.5	$ 160.9
Overall (*)	**$ 67.1**	**$ 55.1**

[12] Costs reflect only those directly attributed to individual measures in the program tracking data. Overhead, administrative, or other indirect costs are not included.

ELECTRIC		
Measure group	**$/ kWh**	
	Sample	**Population**
Air Sealing + Insulation	$ 33.5	$ 29.6
DHW replacement	$ 0.8 [a]	$ 0.2 [a]
Equipment repair	$ (24.0)	$ (23.0)
Refrigerator/Freezer replacement	$ 0.4 [a]	$ 0.5 [a]
Thermostat	$ (1.0)	$ (1.3)
WH + Lighting	$ 0.5	$ 0.5
Overall (*)	**$ 3.6**	**$ 3.5**

a Indicates the result is significant at the 90% confidence level.

(*) The overall $ per kWh and $ per MMBtu values include all measures with associated costs, even if those measures did not have tracked savings, such as assessment fees. In contrast, the measure group savings only account for measures that have tracked savings.

2.4 Detailed delivered fuel analysis findings

Using a pooled analysis, average annual per-customer evaluated delivered fuels savings appear was 32.1 MMBtu. However, the results were not significantly different from zero (Table 2-83). When looking at heat pump projects only, there is 60% decrease in the evaluated savings magnitude, and the results are also not statistically significant. As mentioned in Section 3.5, the small sample sizes and limited data available for each site led to statistically insignificant results.

When comparing gas and delivered fuels, it is important to note that although the delivered fuel savings were not statistically significant, the evaluated savings for delivered fuels were approximately four times greater than those for gas. In contrast, the program's estimated savings were lower for delivered fuels than for gas, despite baseline consumption for delivered fuels being nearly twice that of gas. This results in higher realization rates for delivered fuels than for gas.

Table 2-83. Delivered fuels evaluated savings summary

Delivered fuels (MMBtu) 2023	Pooled analysis		
	Overall	**Non-HP**	**HP**
Sample count (2023 Participants and 2024 participants pre period)	123	115	56
Treatment sites (2023 participants)	75	67	8
A. Estimated savings (kWh or MMBtu/yr)	37.4	29.9	100.3
B. Average evaluated baseline usage (kWh or MMBtu/yr)	221.5	231.7	160.0
C. Average estimated % savings (kWh or MMBtu/yr; A/B)	17%	13%	63%
D. Average evaluated savings (kWh or MMBtu/yr)	33.4 ± 77.1	32.1 ± 83.3	12.6 ± 132.1
E. Average evaluated % savings (kWh or MMBtu/yr; D/B)	15%	14%	8%
F. Realization rate (D/A)	89%	109%	13%

To complement the pooled regression, a secondary analysis was performed by scaling the gas savings results. The gas dataset was larger and more robust, and since both gas and delivered fuels are primarily used for space heating and typically exhibit similar thermal load characteristics, gas savings provide a reasonable foundation for estimating delivered fuel savings in the absence of direct data.

The results from these scaling methods showed substantial variation, reflecting the uncertainty inherent in the assumptions that gas and delivered fuels behave similarly. Due to these limitations and the potential for misleading interpretations, the results from this secondary analysis are not presented in the report

2.5 Delivered fuels recommendations and NYSERDA responses

1. **Finding 1: For delivered fuel customers, participation in the LMI Retrofit Program appears to decrease delivered fuel consumption by about 14%.** Delivered fuel consumption (14%) achieved a larger impact as a percentage of baseline usage than achieved for natural gas (8%) but comes with more uncertainty given the lower sample size of delivered fuel data. While the associated realization rate is 109% for all fossil fuels, these findings were not statistically significant.

    - **Recommendation 1: Do not adopt the delivered fuels realization rates due to high levels of uncertainty and lack of statistical significance.**

        - **NYSERDA Response to Recommendation 1:** Implemented. Results are being published for informational purposes only. A follow-up study is anticipated to begin in 2026 and provide an update to the delivered fuel realization rate.

2. **Finding 2**: The evaluation found the program is more effective at achieving natural gas and delivered fuel savings than electric savings, which have been diminishing over time. New York State climate goals also call for electrification of heating and water heating systems, which increases electric consumption. As electric baselines get more efficient, achieving measurable electric savings by updating equipment may become increasingly difficult, and the associated payback on electric measures decline accordingly.

    - **Recommendation 2: Consider emphasis on measurement and tracking of fossil fuel savings and beneficial electrification.** A focus on fossil fuel savings and electrification may better align the program with real-world limitations and New York state climate goals.

        - **NYSERDA Response to Recommendation 2:** Implemented. NYSERDA has a focus on beneficial electrification and will continue to measure fossil fuel and electric savings where reasonable.

3. **Finding 3:** Delivered fuel consumption data collection and analysis was significantly constrained by limited cooperation from fuel suppliers and homeowners. There is no

clear path obliging delivered fuel dealers to comply with data requests. Some dealers would only provide data when required by regulators, while other dealers relied on third-party call centers to field incoming inquiries, making it difficult to reach fuel dealer staff with decision making authority. The current consent structure proved insufficient as a few fuel suppliers required customers to request data directly. In addition, even when suppliers or homeowners were responsive, the evaluators found data gaps due varied delivery windows, cash-on-delivery practices without associated invoicing statements, and changes in fuel suppliers during the analysis period.

- **Recommendation 3:** To improve the feasibility and quality of future delivered fuel analyses of its programs, NYSERDA should consider alternative strategies for obtaining delivered fuel bills. NYSERDA should enhance relationships with large-scale delivered fuel providers and consolidate data requests.

- **NYSERDA Response to Recommendation 3:** Pending development of comprehensive delivered fuels strategy.

2.6 Detailed engineering analysis findings

The evaluation contractor team conducted an engineering analysis to assess if measure-level estimated savings from the tracking data adhered to savings estimates using the New York Standard Approach for Estimating Energy Savings from Energy Efficiency Program Version 10 (i.e., "Technical Reference Manual" or "TRM"), which was in effect for PY2023. This engineering analysis also sheds some light on potential reasons for the historically high estimated savings found in the tracking data .

When participating in EmPower+, contractors enter project-specific data into the NYHEP portal, and the portal's software uses those inputs to calculate estimated savings. The engineering analysis shows how well the NYHEP modeling software aligns with the TRM's algorithms and assumptions at the time of the project. The evaluation contractor team created a term to quantify this alignment: *adherence rate*. The adherence rate is the ratio of the independently verified savings using the TRM methodology to the savings from the NYHEP portal. If the two savings values match, the adherence rate is 100%, indicating the NYHEP software aligns with the TRM methodology.

Overall, site MMBtu estimated savings adhere reasonably well to the TRM, indicating that the program software aligns well with the TRM methodology. Table 2-84 shows the estimated savings from the NYHEP software, verified savings from the evaluation contractor using the TRM methodology with site-specific tracked information, and the resulting adherence rate for each measure (the ratio of the two).[13] The site MMBtu savings are the combined gas and electric savings converted to MMBtu. The overall adherence rate shown in the "Totals" row is 101%, indicating close adherence to the TRM. The overall adherence rate is driven by the program's two highest-saving measures, "Insulation – Opaque Shell" and "Air Leakage Sealing," which accounted for 83% of the estimated savings in the sample and exhibited adherence rates close to 100%. Other lower-saving measures exhibited lower adherence rates primarily due to issues with savings claims for fuel-switching measures as discussed in more detail below.

Table 2-84. Site-specific adherence rates electric and fossil fuel combined (site MMBtu)

Measure	A. Estimated Savings (NYHEP Calculated)	B. Verified Savings (DNV Calculated)	C. Adherence Rate (B/A)
Air Leakage Sealing	51,024	51,571	101%
Low Flow Showerheads	1,339	1,220	91%
Insulation - Hot Water and Steam Pipe	1,836	1,297	71%
Insulation - Opaque Shell	124,786	134,223	108%
Heat Pump - Air Source (ccASHP)	16,590	14,176	85%
Heat Pump Water Heater (HPWH) - Air Source	7,859	7,972	101%
Storage Tank and Instantaneous Domestic Water Heater	445	321	72%
Refrigerator and Freezer	4,256	3,677	86%
Interior and Exterior Lighting	4,315	NA	NA
Totals	**212,450**	**214,457**	**101%**

There are opportunities to improve the NYHEP software's adherence to TRM methodology especially for electric savings estimates. Table 2-85 shows site-specific adherence rates by fuel. The MMBtu adherence rates for fossil fuel measures (primarily natural gas, oil, and propane) are

[13] The estimated and verified savings values include only savings from the projects for which DNV received site-specific project-level detail for the engineering analysis.

typically close to 100%, indicating that the NYHEP portal software is generally adhering to the TRM methodology. The electric adherence rates, however, vary substantially from 100%.

Table 2-85. Site-specific adherence rates by fuel

Measure	Fossil adherence rates	Electric adherence rates
Air Leakage Sealing	100%	112%
Low Flow Showerheads	73%	3201%
Insulation - Hot Water and Steam Pipe	65%	1186%
Insulation - Opaque Shell	107%	125%
Heat Pump - Air Source (ccASHP)	96%	154%
Heat Pump Water Heater (HPWH) - Air Source	112%	-201%
Storage Tank and Instantaneous Domestic Water Heater	106%	6%
Refrigerator and Freezer	N/A	87%
Interior and Exterior Lighting	N/A	100%

The volatility in electric adherence rates results from the following issues:

- **Low-flow showerheads:** About one-third of homes had electric water heaters, but fossil fuels comprised nearly all the savings claims for low-flow showerheads. There were homes with only electric water heaters that had fossil fuel savings estimated for this measure. Due to the erroneously low estimated electric savings and relatively higher verified savings, the electric adherence rate is extremely high.
- **Insulation – Hot Water Pipe:** Similarly, for homes that received heat pump water heaters and hot water pipe insulation, fossil fuels comprised nearly all estimated savings. The high adherence rate results from the evaluation contractor's savings were estimated as fossil savings but should have been estimated as electric savings.
- **Heat Pump – Air Source (ccASHP):** About half of the records either underestimated or did not account for an electric penalty associated with a heat pump fuel switch. Note that the claimed and verified electric impacts are negative for ccASHPs. As a result, a higher adherence rate indicates lower verified savings.
- **Heat Pump Water Heater (HPWH) – Air Source:** The electric penalty was underestimated by about 35% compared with TRM algorithm and assumptions. The negative value indicates that, on average, estimated electric savings were positive when the evaluation contractor team's verified savings were negative.
- **Storage tank and instantaneous domestic water heater:** About one-third of the records include positive savings estimates for both electric and fossil fuels when only one fuel should have been estimated. Additionally, about 7% of records involved a gas-to-electric fuel switch but did not include an electric penalty.
- **Refrigerator and Freezer:** 11% of the model numbers for energy efficient refrigerators or freezers were not actually ENERGY STAR-certified models in PY2023. It is unclear if

incorrect model numbers were recorded. The program is limited to ENERGY STAR-certified equipment.

Using TRM default values for savings calculations results in higher estimated savings than does using site-specific values. The TRM offers default values for some inputs to estimated savings calculations for when site-specific information is not available. For measures for which the evaluation contractor team had site-specific information, and for which the TRM offered default values for data inputs, the evaluation contractor team calculated adherence rates two ways: 1) using all site-specific information available and 2) replacing all site-specific information with default values from the TRM. Table 2-86 compares average verified savings between the two methods for no-electric measures. For most measures, the method using default values resulted in higher average savings, with "Insulation – Opaque Shell" showing a drastic difference. The differences result from assumptions in the TRM not matching the sites included in the engineering analysis sample. This could be due to some assumptions being based on the entire market while the EmPower+ program serves only low- and moderate-income customers. Below are some examples of TRM assumptions not matching values from the engineering analysis sample:

- Insulation – Opaque Shell: The TRM defaults to a baseline R-value of 2.5 while the engineering analysis sample had an average baseline R-value of 8.0. A lower assumed baseline R value leads to higher estimated savings.
- Storage tank and instantaneous water heater: The TRM defaults to 2.7 occupants per household while the engineering analysis sample had an average of 2.3 occupants per household. More occupants lead to higher estimated savings.
- Insulation – Hot water steam pipe. The TRM defaults to a UEF of 2.2 for electric water heaters over 55 gallons, while the engineering analysis sample had an average UEF of 3.5. A lower UEF leads to higher estimated savings.

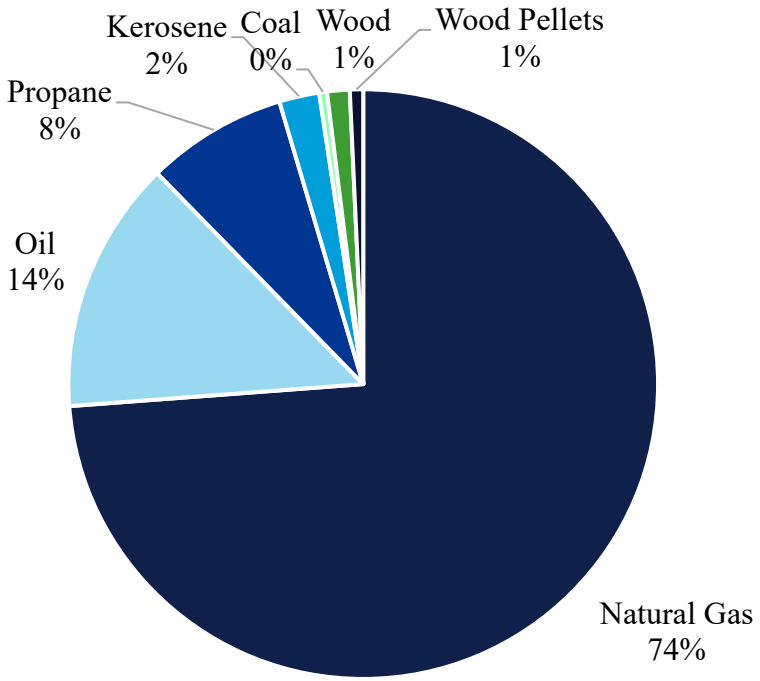
Note, the EmPower+ program uses site-specific data whenever available.

Table 2-86. Comparison of average verified MMBtu savings based on site-specific and default data inputs

Measure	Average Verified MMBtu Savings	
	Site-specific	Default
Air Leakage Sealing	12.0	11.4
Low Flow Showerheads	2.3	2.3
Insulation - Hot Water and Steam Pipe	2.2	2.5
Insulation - Opaque Shell	9.8	30.5
Storage Tank and Instantaneous Domestic Water Heater	3.9	4.9

Savings can be reported by fuel using currently available tracked data, offering insights into New York Climate Goals. The tracking data includes fields on preexisting space heating and water heating fuels. The evaluation contractor team classified the verified savings using these fuel types, with results across the engineering sample shown in Figure 2-7. Different fuels have different global warming potentials. Therefore, it is important to report savings by fuel.

Figure 2-7. Shares of verified MMBtu savings by fuel type



3 Methods

3.1 Detailed participant and contractor survey methods

This section provides information on the participant survey sample and methodology.

3.1.1 Participant survey sample

The sample frame for the survey was furnished by NYSERDA and included all active EmPower+ participants from July to December 2023. Two subprogram groups were low-income participants (Tier 1), who receive no-cost services, and moderate-income participants (Tier 3) who contribute to higher-cost jobs.

APPRISE stratified low-income participants by electric utility area, and cost category (less than $1,500, $1,500 to $10,000, or greater than $10,000), resulting in 15 distinct strata.[14] Within each stratum, sampling rates were set to achieve the targeted number of completes based on the response rate goals. Higher-cost incentive groups were sampled at higher rates to allow for detailed analysis of this key program segment.

There were many fewer moderate-income participants. Therefore, the full sample frame of these participants was targeted for the survey.

The final survey sample was comprised of 3,000 customers who participated in EmPower+. Survey results were weighted to present results that are representative of the program population. The weighting adjusts for differential sampling and response within strata[15][16]

[14] The cost category is based on project incentives in the program database. Review of the data show that any customer contributions are not included. However, it is expected that only a small share of projects include customers contributions on these low-income projects. Even in cases where the measure costs are higher than the allowable NYSERDA amount, there can be other sources of funding to cover additional project costs.

[16] Table 3-1 to Table 3-5 show unweighted results for the respondents. All other tables show weighted estimates.

3.1.2 Participant survey design and implementation

APPRISE designed the EmPower+ Participant Survey as a mixed mode web/telephone survey. NYSERDA reviewed and approved the survey instrument and APPRISE programmed the survey using Qualtrics. The survey was approximately 15 minutes in length. Topics included:

- Respondent Characteristics
- Program Awareness
- Motivation for Program Participation
- Temperature Setting and Home Equipment Changes
- Program Impacts
- Satisfaction and Recommendations

The survey was pretested in January 2025 and fielded with the full sample in February through April of 2025. Table 3-1 summarizes the outreach conducted for the survey.

- Advance Letter: Participants were fielded for the survey in batches. Batch 1 of participants were sent an advance letter on 2/14/25, Batch 2 on 3/6/25, and the final third batch was sent an advance letter on 3/23/25. The advance letter explained the purpose of the survey, and provided information to complete the survey online or by phone.
- Inbound Calling: Trained APPRISE interviewers completed surveys with respondents who called the APPRISE toll-free phone number.
- Outbound Calling: Telephone calls were made to participants who had not completed the survey beginning on 2/19/25 for Batch 1, 3/12/25 for Batch 2, and 3/31/25 for Batch 3. Calls were made at varying times on weekdays, evenings, and weekends. A total of six attempts were made to live cases.
- Emails: Outreach and reminder emails were sent to participants with available email addresses. A total of six emails were sent to live cases with email addresses.

The survey was closed on April 16, 2025, after exceeding the targeted survey completion goal. The survey did not provide a monetary incentive to respondents.

Table 3-1. Participant survey outreach

Contact method	Sample group		
	Batch 1	Batch 2	Batch 3
First Advance Letter	2/14/25	3/6/25	3/25/25
First Advance Email	2/19/25	3/10/25	3/28/25
Survey Calling Implementation	2/20/25	3/12/25	3/31/25
First Reminder Email	2/24/25	3/14/25	4/2/25
Second Reminder Email	2/27/25	3/19/25	4/7/25
Third Reminder Email	3/4/25	3/24/25	4/10/25

Contact method	Sample group		
	Batch 1	Batch 2	Batch 3
Fourth Reminder Email	3/13/25	4/1/25	-
Final Reminder Email	4/11/25	4/11/25	4/14/25
Survey Closed	4/16/25	4/16/25	4/16/25

3.1.3 Participant survey response

Table 3-2 furnishes information on the final disposition for the entire sample.

- Surveys were completed with 1,166 of the 3,000 total participants, for a 39% completion rate.
- Seven percent of the sample was found to be ineligible because they did not recall participating in the program, moved, or did not have work completed.
- After removing ineligible cases, the survey response rate was 42%.
- Overall, 84% of participants who were reached and able to complete the survey cooperated and participated.
- Fifty-five percent of survey respondents completed the survey on the telephone with an APPRISE interviewer and 45% completed the survey online.

The survey margin of sampling error is 2% with a 90% confidence level.

Table 3-2. Participant survey response

Survey response status	Survey sample	
	#	%
Total	**3,000**	**100%**
Ineligible – Does Not Recall	57	2%
Ineligible – Audit Only	94	3%
Ineligible - Moved	60	2%
Non-working Number	113	4%
Wrong Number	102	3%
Too Ill to Participate	13	<1%
Hearing/Language Barrier	9	<1%
Deceased	5	<1%
Voicemail / No Answer	1,156	39%
Refusal	165	6%
Not Available for Duration of Survey	20	1%
Busy Signal	16	1%
Promised to Complete Online	12	<1%
Partial Complete	9	<1%
Said They Already Completed	3	<1%
Completed Survey	**1,166**	**39%**
Completed via Phone	639	55%

Survey response status	Survey sample	
	#	%
Completed Online	527	45%
Eligibility Rate	-	**93%**
Cooperation Rate	-	**84%**
Response Rate	-	**42%**

3.1.4 Program participant and survey respondent characteristics

Table 3-3 compares the survey respondents, survey sample, and the survey frame by three key participant characteristics: Disadvantaged Communities Criteria (DAC) designation, email availability, and program income tier. The distribution of participants by income tier differs for the sample frame and the full sample because all moderate-income participants were selected, while low-income participants were selected based on stratified sampling.

The distribution of survey respondents by DAC designation and income tier closely matches the survey sample with 30% located in a DAC area, 91% low-income, and 9% moderate-income participants. Compared to the 49% in the sample, there was a higher percentage of survey respondents who had emails, as these customers received additional email outreach to encourage participation.

Table 3-3. Participant characteristics

Characteristic	All participants (sample frame)	Survey sample	Survey respondents
Observations	**8,371**	**3,000**	**1,166**
Located in a DAC area	-	32%	30%
Has Email	47%	49%	58%
Low-Income	97%	90%	91%
Moderate-Income	3%	10%	9%

Note: DAC status was coded for the survey sample addresses but was not coded for the full sample frame.

Table 3-4 presents the distribution of the survey respondents, survey sample, and the survey frame by utility area. The distribution differs for the sample frame and the full sample because the smaller utilities were oversampled, but the distribution of participants who responded to the survey generally matches the survey sample.

Table 3-4. Participant utility area

Utility area	All participants (sample frame)	Survey sample	Survey respondents
Observations	**8,371**	**3,000**	**1,166**
National Grid	38%	27%	28%
RG&E	19%	20%	20%
NYSEG	18%	19%	22%
Con Edison	11%	16%	13%
Other	14%	18%	17%
Total	**100%**	**100%**	**100%**

Note: Other includes Central Hudson Gas and Electric, Long Island Power Authority (LIPA), Municipal Electric, Orange and Rockland, and Public Service Enterprise Group (PSEG).

Table 3-5 and Table 3-6 display the distribution of the sample frame, sample, and respondents by job cost category for low-income and moderate-income participants. Lower-income participants with higher job costs were somewhat overrepresented in the sample and were more likely to complete the survey. Moderate-income participants were also more likely to respond to the survey.

Table 3-5. Participant survey low-income job cost category

Job cost	All participants (sample frame)	Survey sample	Survey respondents
Observations	**8,082**	**2,711**	**1,059**
< $1,500	26%	26%	21%
$1,500-$10,000	46%	33%	33%
> $10,000	28%	40%	46%
Total	**100%**	**100%**	**100%**

Table 3-6. Participant survey moderate-income job cost category

Job cost	All participants (sample frame)	Survey sample	Survey respondents
Observations	**289**	**289**	**107**
≤ $6,000	48%	48%	42%
> $6,000	52%	52%	58%
Total	**100%**	**100%**	**100%**

The survey collected demographic information to ensure that the survey reached a variety of households and participants. Table 3-7 shows the distribution of participants' age ranges. More

than 60% of participants, regardless of income tier, were in the 55 years old or older age range. Less than 10% of participants were 34 years old or younger.

Table 3-7. Participant survey respondent age

What is your age?			
Age range	**Low-income participants**	**Moderate-income participants**	**All participants**
Observations	**1,059**	**107**	**1,166**
18-24 years old	1%	1%	1%
25-34 years old	5%	4%	5%
35-44 years old	12%	20%	12%
45-54 years old	10%	12%	10%
55-64 years old	18%	10%	18%
65-74 years old	32%	34%	32%
75-85 years old	17%	15%	16%
86 years old or older	5%	3%	5%
Refused	2%	2%	2%
Total	**100%**	**100%**	**100%**

Table 3-8 shows the primary language spoken in the home. The most common primary language was English (91%), followed by Yiddish (4%), Spanish (1%), and Bengali (1%).

Table 3-8. Participant survey respondent language

What is the primary language spoken in your home?			
Response	**Low-income participants**	**Moderate-income participants**	**All participants**
Observations	**1,059**	**107**	**1,166**
English	91%	98%	91%
Yiddish	4%	0%	4%
Spanish	1%	1%	1%
Bengali	1%	0%	1%
Chinese	<1%	0%	<1%
Other	2%	0%	2%
Refused	1%	1%	1%
Total	**100%**	**100%**	**100%**

Table 3-9 displays the race and ethnicity of EmPower+ participants.

Table 3-9. Participant survey respondent race/ethnicity

Please share your race/ethnicity to help us understand the diversity of EmPower+ participants.			
Response	**Low-income participants**	**Moderate-income participants**	**All participants**
Observations	**1,059**	**107**	**1,166**
White	67%	70%	67%
Black or African American	17%	16%	17%
Hispanic or Latino	4%	4%	4%
Asian	2%	2%	2%
American Indian or Alaska Native	2%	1%	2%
Middle Eastern or North African	<1%	1%	<1%
Native Hawaiian or Pacific Islander	<1%	0%	<1%
Other	3%	1%	3%
Refused	7%	8%	8%

Note: Respondents could select more than one response.

3.2 Detailed participant add-on survey methods

3.3 Detailed contractor survey methods

3.3.1 Contractor survey sample

The sample frame for the survey was all active EmPower+ participating contractors. NYSERDA provided APPRISE with a list of participating contractors and APPRISE identified a total of 207 active participating contractor contacts. APPRISE classified contractors into two strata, contractors that participated in EmPower+ only and contractors that participated in both EmPower+ and NYSERDA's Residential Energy Audit (REA) program.

APPRISE selected a sample for the survey that included all EmPower+-only contractors and half of the EmPower+/REA contractors. The other half of the EmPower+/REA contractors were reserved for the REA contractor survey. The final survey sample was comprised of 145 participating contractors.

3.3.2 Contractor survey design and implementation

A mixed mode web/telephone survey was conducted with a representative sample of active participating contractors. The survey was approximately 15 minutes in length. Topics included the following.

- Program Satisfaction and Experiences
    - EmPower+ Rules and Procedures
    - NYSERDA Program Staff
    - The Implementation Contractor
    - Program Training and Resources
- Contractor Staff
- Home Health and Safety Issues
- EmPower+ Recommendations

To encourage survey participation, a $50 Amazon e-gift card was provided to contractors that completed the survey.

The survey was pretested in November 2024 and fielded with the full sample in November and December of 2024.

- Advance Letter: Participating contractors that only worked on EmPower+ projects were sent an advance letter on 11/15/24, and contractors that worked on both EmPower+ and REA projects were sent an advance letter on 11/18/24. The advance letter explained the purpose of the survey, and provided information to complete the survey online or by phone.
- Outbound Calling: Telephone calls were made to contractors who had not completed the survey or called in beginning on 11/20/24 for the EmPower+ Only sample group and 11/22/24 for the EmPower+ and REA group. Calls were made at varying times of day on weekdays. A total of six attempts were made to live cases.
- Emails: Outreach and reminder emails were sent to contractors with available email addresses. A total of four emails were sent to live cases with email addresses.

The survey was closed on December 13, 2024, after exceeding the targeted survey completion goal.

3.3.3 Contractor survey response

Table 3-10 furnishes information on the final disposition for the entire sample.

- Surveys were completed with 99 of the 145 participating contractors, for a 68% completion rate.
- Five percent of the sample was found to be ineligible because they were Regional Clean Energy Hubs or were new contractors that had not received or completed assignments.
- After removing ineligible cases, the survey response rate was 72%, exceeding the target goal of 50%.

- Overall, 99% of contractors who were reached and able to complete the survey cooperated and participated.
- Eighty-four percent of the survey respondents completed the survey online, and 16% completed the survey on the telephone with an APPRISE interviewer.

The survey margin of sampling error is 6% with a 90% confidence level.

Table 3-10. Contractor survey response

Survey response status	Survey sample	
	#	%
Total	145	100%
Ineligible – Regional Clean Energy Hub	6	4%
Ineligible – New Contractors	1	1%
Voicemail / No Answer	38	27%
Promised to Complete Online	1	1%
Completed Survey	99	68%
Completed via Phone	16	16%
Completed Online	83	84%
Eligibility Rate	-	95%
Cooperation Rate	-	99%
Response Rate	-	72%

Table 3-11 compares the survey respondents, survey sample, and the survey frame by contractor type. As expected, the distribution of contractors by contractor type differs for the sample frame and the full sample because of the sampling approach. The distribution of contractors that responded to the survey matches the survey sample with 57% EmPower+ Only contractors and 43% EmPower+ and REA contractors. This indicates that there are no differences in survey participation by contractor type. The completed cases were weighted in the analysis to match all EmPower+ participating contractors.

Table 3-11. Contractor type

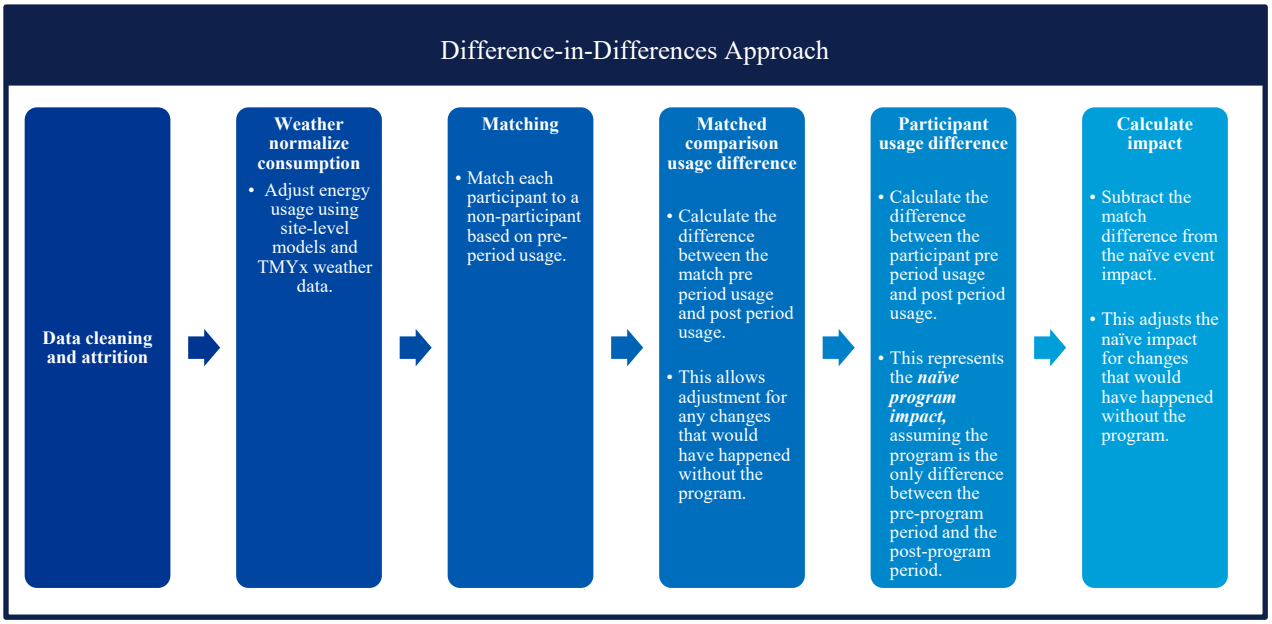
Contractor Type	All Participating Contractors (Sample Frame)		Survey Sample		Survey Respondents	
	#	%	#	%	#	%
EmPower+ Only	82	40%	82	57%	56	57%
EmPower+ and REA	125	60%	63	43%	43	43%
Total	207	100%	145	100%	99	100%

3.4 Detailed billing analysis methods

The impact evaluation used a difference-in-differences methodology to estimate annual program impacts. Difference-in-differences methods calculate the difference in annual usage before versus after participation, and subtracts the corresponding change for a comparison group of nonparticipants from the participants' change. The comparison group represents the change the participants would have had absent the program, so that the difference of differences is the program effect.

The team begins with data cleaning, followed by weather normalization, then matches participants to control sites, and finally calculates savings using a difference-in-differences approach. Figure 3-1 presents a conceptual overview of what each step does and how they are combined to create the most accurate impact estimates.

Figure 3-1. Difference-in-differences approach



3.4.1 Data sources

The evaluation contractor team used a comprehensive set of data sources that enabled robust analysis of energy savings, participant experience, and program performance. These included program tracking data provided by NYSERDA, monthly utility billing data, weather data from NOAA, energy cost data based on utility tariffs, and Advanced Metering Infrastructure (AMI) data from Con Edison. Together, these datasets allowed for detailed site-level billing analysis,

weather normalization, peak demand estimation, and segmentation of households by key characteristics such as income level, fuel type, and contractor performance.

3.4.1.1 Tracking data

The evaluation contractor team received tracking data from NYSERDA on the EmPower+ program, which contained building and project measure details for 50,833 projects. This analysis used the following key parameter fields: utility providers, address, zip code, project installation end date, and main heating fuel, main water heating fuel, measure category, kWh tracked savings and MMBtu tracked savings. NYSERDA shared complementary data containing contractors' quality scores.

Although EmPower+ primarily serves single-family homes, some small multifamily properties are also included. During the review of project billing accounts, the evaluation contractor team identified instances where electric and heating accounts overlapped across multiple projects. This occurred for two main reasons: either a single-family home participated in the program more than once, or a multifamily building was involved. The latter presents more complexity, since analyzing multifamily properties ideally requires building-level data, and identifying which units belong to the same building can be challenging.

To accurately capture the overall change in energy consumption attributable to the program, the evaluation contractor team consolidated overlapping accounts into a single site-level record. This site-level aggregation forms the basis of the analysis. In the majority of cases, each site is associated with one electric account and one gas account.

The evaluation contractor team initiated the data request process by manually retrieving program applications for each project from NYSERDA's Salesforce system. The team verified if each program applicant had provided consent to share their billing data by providing a signature on their application. For those who provided the billing data consent, the team redacted the applications to exclude all sensitive information not related to the billing data consent and gave the applications back to NYSERDA to request data from the utilities.

3.4.1.2 Monthly billing data

The evaluation contractor team received monthly gas and electricity usage data, referred to as billing data, from six utility providers.[17] The bills spanned from December 2021 through August 2024. The evaluation contractor team obtained monthly billing data from two sources: Electronic Data Interchange (EDI) and utility archive data requests. The EDI data, accessed through NYSERDA's internal connection with the utilities, includes records going back two years. Because the analysis focused on projects completed in 2023, the team supplemented the EDI data with archive requests submitted to the utilities. These requests covered accounts with signed consent forms and EmPower+ projects finalized in 2023. Upon review, the team identified overlapping records between the two sources. A comparison confirmed that the datasets were consistent, with no discrepancies observed.

3.4.1.3 Weather data

The evaluation contractor team mapped each site by ZIP code to the closest National Oceanic and Atmospheric Administration (NOAA) primary station. The team then collected hourly weather data from these NOAA stations, covering the period from December 2021 through July 2024. The team also collected TMYx[18] data of vintage 2004 to 2018 for the same weather station for use in determining weather-normalized annual energy savings.

3.4.1.4 Energy cost data

The evaluation contractor team conducted an assessment of residential energy bill savings in New York State by actively collecting energy cost data for both natural gas and electricity from publicly available sources. For natural gas, the team reviewed utility-specific tariff information, which includes supply, delivery, and customer charges. The team calculated a cost metric in dollars per MMBtu assuming 100 therms of usage per home to enable consistent comparisons across utilities. For electricity, the team used data from the U.S. Energy Information Administration's Form EIA-861, focusing on residential sales and revenue reported by New York State utilities. By dividing total residential revenue by total residential kilowatt-hour (kWh) sales,

[17] Con Edison, Central Hudson, National Fuel, National Grid, NYSEG, Orange and Rockland, and Rochester Gas and Electric.

[18] TMYx - https://climate.onebuilding.org/WMO_Region_4_North_and_Central_America/USA_United_States_of_America/index.html#IDNY_New_York-

the team derived a bundled cost in dollars per kWh, which reflects both supply and delivery charges.

3.4.1.5 AMI data

The evaluation contractor team received electric AMI data for only Con Edison. Only data for participants in the matching sample, explained in Section 2.4.8, Detailed AMI analysis findings, was used for peak demand savings calculations.

3.4.2 Data cleaning and attrition

The evaluation contractor team consolidated the six utilities' billing datasets into one standardized dataset for analysis. The team categorized the different read type codes from each utility into actual and estimated readings. To maintain continuity and accurately reflect usage over time, estimated meter reads were combined with subsequent actual reads. This is important because actual reads often correct cumulative usage across both the estimated and actual billing periods, resulting in more accurate consumption data.

While the data received was of high quality, there was some attrition. Attrition occurs when projects are removed from the analysis during data cleaning due to inadequate program tracking or utility billing data. The evaluation contractor team required a minimum of six actual bills before and after installation for gas and electric meters, with at least one actual reading in each season—winter, summer, and shoulder—within the 14-month pre- and post-installation period. These requirements ensure sufficient data coverage capturing key seasonal variations—summer, winter, and shoulder months—allowing the team to reflect typical usage patterns. While UMP Chapter 8 methods suggest longer periods when possible, six bills provide a reliable balance between statistical robustness and data availability, especially in cases where a full year of pre- and post-installation billing data is not available.

The evaluation contractor team identified multiple sites that contained zero or null estimated energy savings (kWh or MMBtu). These sites were excluded from the electric and gas savings analyses, respectively. Additionally, sites with heat pump installations were removed from the primary results and analyzed separately, as detailed in Section 2.4.5, Fuel-switching results: Heat pump savings.

When there was a variable indicating solar production, the evaluation contractor team removed those accounts. This information was not available for all utilities. A total of 4,182 sites were included in the electric billing analysis, while 1,560 sites were included in the gas billing analysis (Table 3-12).

Table 3-12. Monthly billing analysis attrition for electricity and gas

Step	Data requirement	Number of sites	
		Electric	Gas
A	Population	34,361	33,311
B	Projects with at least one good electric or gas account number	12,001	
C	Projects with confirmed consent forms	9,364	
Initial	Received billing data for 2023 Participants	5,970	4,233
1	Sites with at least 6 actual or combined bills in pre period	5,620	3,313
2	Sites with at least 1 bill each in summer, winter, and shoulder season in pre period	5,444	3,255
3	Sites with at least 6 actual or combined bills in post period	5,131	2,773
4	Sites with least 1 bill each in summer, winter, and shoulder season in post period	5,102	2,758
5	Sites with a match to a control	4,607	2,272
6	Sites where Tracked Savings were not 0	4,207	1,579
7	Sites that didn't install a Heat Pump	4,182	1,560
	Final Count	4,182	1,560

3.4.3 Weather-normalized energy consumption:

To accurately isolate program impacts and control for weather-related fluctuations in energy usage, the evaluation contractor team developed site-level models to estimate weather-normalized consumption before and after program implementation. These models are based on the Princeton Scorekeeping Method (PRISM®[19]) methodology, which estimates each site's energy response to outdoor temperatures and identifies the temperature thresholds (base or balance points) that trigger heating and cooling. The site level model is given by Equation 1 below.

[19] Fels, M. F. (1986). PRISM: An introduction. *Energy and Buildings, 9*(1–2), 5–18. http://www.princeton.edu/~marean/publications/prism_intro.pdf

Equation 1. Energy consumption regression model

$$E_m = \mu + \beta_H H_m(\tau_H) + \beta_c C_m(\tau_C) + \epsilon_m$$

where:

- E_m is averaged daily usage during period m
- μ is the base load usage (intercept)
- τ_H and τ_C are base temperatures that indicate the temperature that triggers heating or cooling usage, respectively. The base temperatures are determined from a grid search.[20]
- $H_{im}(\tau_H)$ is the heating degree days (HDD) at base temperature (τ_H)
- $C_{im}(\tau_C)$ is the cooling degree days (CDD) at base temperature (τ_C)
- β_H represents the increased energy use per increase in heating degree days
- β_C represents the increased energy use per increase in cooling degree
- ϵ_m is the regression residual

The evaluation contractor team estimated the base load consumption $\hat{\mu}$, the coefficients for heating degree days $\hat{\beta}_H$, and cooling degree days $\hat{\beta}_C$ for each site, both before and after the installation. The team then calculated normalized annual consumption (NAC) for the pre- and post-installation periods for each site and analysis time frame by combining the estimated coefficients $\widehat{\beta_H}$ and $\widehat{\beta_C}$ with the TMYx degree days H_0 and C_0 calculated at the site-specific degree-day base(s), $\hat{\tau}_H$ and $\hat{\tau}_C$. Normalized annual consumption is given by Equation 2:

Equation 2. Normalized annual consumption

$$NAC_i = (365\ x\ \hat{\mu}_i) + \hat{\beta}_H H_0 + \hat{\beta}_c C_0$$

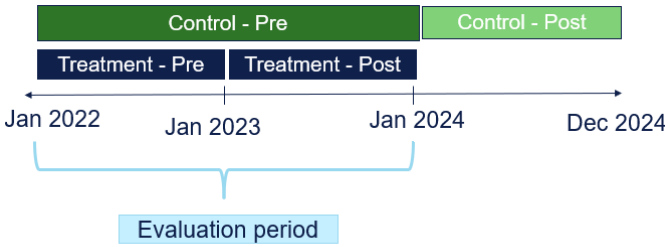
3.4.4 Matched comparison group selection

The second step of the impact evaluation process is selecting the matched comparison group. In this step, each participant in the program is matched with a similar comparison customer. Matched groups were created on a rolling-participation basis to account for customers enrolling

[20] Grid search involves systematically testing all possible combinations of heating and cooling balance points. By default, this process examines heating balance points ranging from 55°F to 65°F and cooling balance points from 65°F to 75°F. The optimal model is then selected based on the smallest Coefficient of Variation of the Root Mean Square Error (CVRMSE)

in the program at different times. Figure 3-2 shows an example diagram of how the comparison group (i.e., “Control”) was built for January 2023 participants (i.e., “Treatment”).

Figure 3-2. Example diagram of control group selection for January 2023 participants



All matched groups were created by finding nonparticipants within subgroups by region (Downstate, Long Island, Upstate) and main heating fuel (electricity, natural gas or other) with the most similar weather-normalized pre-period annual consumption, summer-shoulder, and winter-shoulder ratios. Using these three characteristics, the evaluation contractor team found the nonparticipants using the minimum Euclidean distance from participants. The team then selected the one nearest neighbor for each participant, with replacement. This means that each nonparticipating match could be used multiple times for different participants. The team tested different combinations of subgroups and characteristics, concluding that region and main heating fuel achieved good similarity without over-repeating controls.

Figure 3-3 and Figure 3-4 show the average monthly electric and gas consumption by treatment group before program participation. The green line is the treatment, and the blue line is the control group. In the background, the bars represent the number of sites with data for each month. Overall, the consumption patterns between the two groups are closely aligned, particularly in months with higher site counts, indicating that the treatment and control participants had similar energy usage prior to program participation. This supports the validity of the matched comparison approach used in the analysis.

Figure 3-3. Average monthly pre-period gas consumption by treatment and control groups

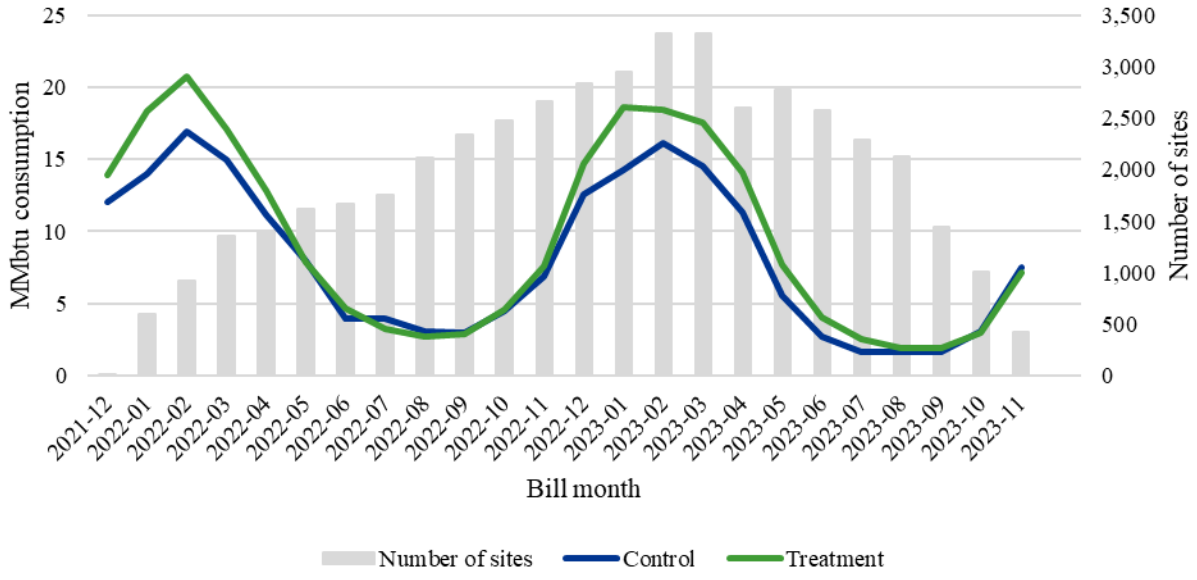
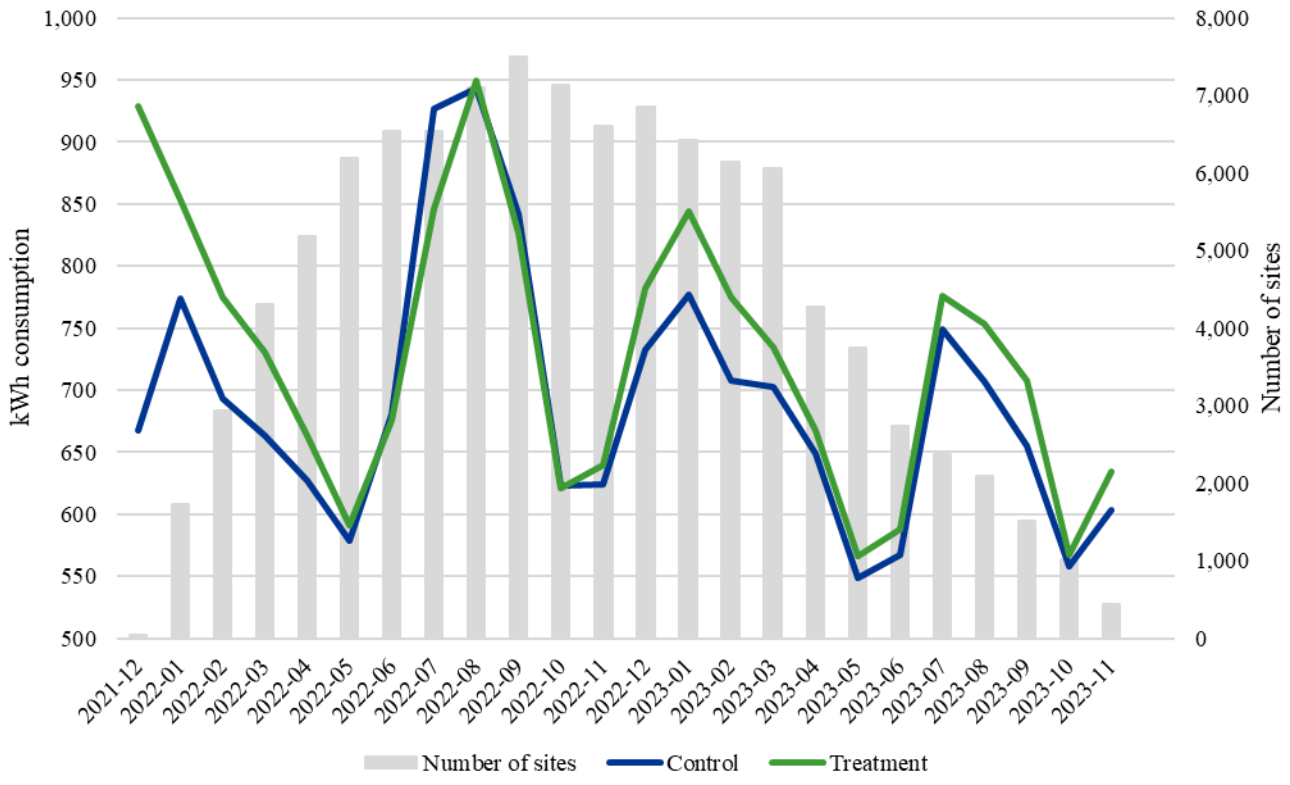


Figure 3-4. Average monthly pre-period electric consumption by treatment and control groups



3.4.5 Difference-in-differences load impact estimation

In the last step of the impact evaluation analysis, the difference-in-difference calculation, the matches found for every program participant are used to correct for differences between the pre-period and the post period. To make this adjustment, the evaluation contractor team takes the pre-vs-post usage difference for program participants and subtracts the pre-vs-post difference observed in the match group. Energy savings are therefore calculated for each participant as:

$$savings_t = (pre_t - post_t) - (pre_c - post_c)$$

Where $savings_t$ represents the weather-normalized annual energy savings for participant t, pre and $post$ represent the weather normalized annual energy consumption in the pre and post period for participant t or non-participant c.

Savings estimates were calculated at the annual level. We aggregated savings results across several different dimensions to understand program performance and variations. These results are shown in Section 2.4, Detailed billing analysis findings.

3.4.6 Measure-level savings

To better understand how individual measures contribute to overall program savings, the evaluation contractor team conducted a regression analysis using program data. The objective was to estimate the portion of evaluated savings attributable to each measure type.

Several model specifications were tested to identify the one that best explained the variation in evaluated savings. In all cases, the dependent variable was the evaluated savings derived from the billing analysis, while independent variables were drawn from program tracking data. These included indicators for whether a measure was present in a home and the tracked savings associated with each measure.

The final model selected used estimated savings per measure group as independent variables, with the following considerations to improve model performance and interpretability:

- Air Sealing and Insulation measures were grouped due to high correlation between them.

- Equipment Repair was kept separate to isolate the impact of measures that could result in negative savings (e.g., beneficial snapback, such as a repaired furnace transitioning from zero to active energy consumption).
- Smaller measures were grouped into an "Other" category to limit the number of independent variables and reduce noise.

The regression produced coefficients representing the proportion of estimated savings that were realized, effectively serving as measure-level realization rates. By multiplying the estimated savings by these coefficients, the evaluation contractor team derived the evaluated savings per measure. The regression follows the specification below:

$$evaluated\ savings_i = \sum_{mg} \beta_{mg}\ estimated\ savings_{mg,i} + \epsilon_i$$

Where:

- $evaluated\ savings_i$ corresponds to the evaluated savings of site i
- $estimated\ savings_{mg,i}$ corresponds to the estimated savings for measure group mg of site i
- β_{mg} corresponds to the portion of estimated savings that are reflected in the evaluated savings
- ϵ_i is the error term

Finally, these results were scaled to the full program population using measure counts from the tracking data, allowing for a comprehensive view of measure-level performance across the program.

3.4.7 Electric peak demand energy savings

The goal of the AMI data analysis was to move beyond traditional monthly billing methods and explore the program's potential for peak demand reduction. Specifically, the analysis aimed to assess what insights AMI data could provide about the EmPower+ program's impact on summer coincident peak demand.

For this study, summer coincident peak demand was defined according to NYSERDA's criteria: the hottest non-holiday weekday between June and August, focusing on the hour ending at 5 p.m.

To isolate the effects of the EmPower+ program on peak demand, the evaluation contractor team leveraged the matched comparison group developed for the monthly billing analysis. Table 3-13 outlines the attrition steps. From the original sample of 4,182 treatment sites, only 556 sites were located within Con Edison's service territory. The final sample used for peak demand analysis includes 300 sites, where both the treatment and matched control groups had adequate data coverage to support hourly, weather-normalized comparisons.

Table 3-13. Electric peak demand analysis attrition

Attrition	Number of sites
Original electric sample	4,182
ConEd in electric sample	556
Treatment with AMI data	553
Treatment and matched control with AMI data	303
Treatment and matched control with enough pre and post AMI data	**300**

The evaluation contractor team estimated hourly, weather-normalized energy usage for both pre and post program periods using actual summer weekday non-holiday AMI consumption data, similar to the model used on the monthly billing data. To identify peak conditions, TMYx data was used to select the five hottest non-holiday weekdays during the summer season. Based on this selection, the team calculated the average hourly savings across the full 24-hour period.

3.4.8 Cost of energy saved

The cost per unit of evaluated savings was calculated using the direct measure-level costs reported in the program tracking data. These costs were annualized based on the expected measure life. Specifically, we summed the total costs for both the sample and population, divided by the average measure life and the number of sites, to estimate the annualized cost per site. This value was then divided by the evaluated annual savings to derive the cost per kWh or MMBtu saved. For measure group-level estimates, only the costs and measure lives of the measures within each group were included, along with the evaluated savings presented in Section 2.4.3, Measure-level evaluated savings.

3.5 Detailed delivered fuel analysis methods

Delivered fuels data is inherently challenging to work with due to its limited availability and variability across projects. In this evaluation, the evaluation contractor team received data for 104 projects performed in 2023 and 89 in 2024. However, only 45 projects from 2023 and 17 from 2024 included at least five utility bills in both the pre- and post-installation periods. This limited billing data reduces the ability to generate statistically significant savings estimates.

3.5.1 Primary analysis: Pooled regression

To maximize the use of available data, the evaluation contractor team conducted a primary analysis using a pooled regression model that only required a minimum of two bills in the pre and post period for each site. In addition to 2023 participants, the analysis include the pre-period for 2024 participants so that a comparison could be made between post-participating consumption data for 2023 participants and pre-participation consumption data for 2024 participants. The impact of program usage was estimated as follows:

$$daily\ usage_{j,t} = \alpha_j + \beta\ HDD_{j,t} + d_0\ P_{j,t} + d_1\ P_{j,t} \times HDD_{j,t} + \epsilon_{j,t}$$

Where

$daily\ usage_{j,t}$ is the average energy usage per day for billing period t of customer j

α_j is a customer-specific intercept for customer j

$HDD_{j,t}$ average heating degree days per day, at a 60ºF reference temperature for billing period t of customer j

$P_{j,t}$ is a dummy variable that takes the value of 1 if customer j participated in the program in period t, 0 otherwise

β is the heating slope across all customers

d_0 represents the average non-heating change in usage associated with program participation

d_1 represents the change in heating slope associated with program participation

$\epsilon_{j,t}$ model residual

The energy savings of the model are calculated as:

$$savings = -365 \times (\widehat{d_0} + \widehat{d_1} HDD_0)$$

Where

HDD_0 is the average normal annual degree-days per day at 60ºF

While the results of this model were positive, they were not statistically significant.

3.5.2 Secondary analysis: leverage gas results as basis for delivered fuels analysis

To complement the pooled regression, a secondary analysis was performed by scaling the gas savings results. The gas dataset was larger and more robust, and since both gas and delivered fuels are primarily used for space heating and typically exhibit similar thermal load characteristics. The analysis assumes gas savings provide a reasonable foundation for estimating delivered fuel savings in the absence of direct data.

Several variations were tested to approximate delivered fuel savings, including assuming they were equal to gas savings as percent of baseline usage, scaling gas savings based on program-estimated savings, adjusting for differences in baseline energy use, and accounting for variations in measure mix and tracked savings between gas and delivered fuel households. These methods provided alternative perspectives on how delivered fuel savings might compare to gas when direct evaluation data is limited.

The results from these scaling methods showed substantial variation, reflecting the uncertainty inherent in the assumptions that gas and delivered fuels behave similarly. Due to these limitations and the potential for misleading interpretations, the results from this secondary analysis are not presented in the report

3.6 Detailed engineering analysis methods

The objective of the engineering analysis was to compare NHYEP-estimated savings from the program tracking data to verified savings resulting from DNV calculations using the New York Standard Approach for Estimating Energy Savings from Energy Efficiency Program Version 10 (i.e., "Technical Reference Manual" or "TRM").

The evaluation contractor team requested and received data for all projects completed between July 2023 and December 2023. This period reflects the projects that went through the NYHEP portal since the program shifted to NYHEP in July 2023. Data for earlier projects was unobtainable. The received data included all site-specific inputs necessary to calculate savings using the TRM for each of the examined measures shown in Table 3-14.

Table 3-14. Engineering analysis project counts by measure

Measure	Numbers of projects
Air Leakage Sealing	4,339
Low Flow Showerheads	653
Insulation - Hot Water and Steam Pipe	754
Insulation - Opaque Shell	4,794
Heat Pump - Air Source (ccASHP)	243
Heat Pump Water Heater (HPWH) - Air Source	816
Storage Tank and Instantaneous Domestic Water Heater	134
Refrigerator and Freezer	2,808
Interior and Exterior Lighting	4,278

The evaluation contractor team calculated verified savings using the site-specific data from the program tracking data for each measure in each project using the methodology from the TRM. The team then compared the verified savings to the estimated savings to calculate an adherence rate using the following equation:

$$Adeherence\ Rate = \frac{Verified\ Savings}{NYHEP\ Estimated\ Savings}$$

The adherence rate illustrates preventable discrepancies between estimated savings and NY TRM requirements; however, the adherence rate is not a measure of actual measure performance. An adherence rate of 100% means the NYHEP estimated savings match the verified savings.

The engineering analysis also allowed comparison of site-specific measure data with NY TRM default assumptions. For some measures, the TRM offers default values for certain savings algorithm inputs. For measures for which default values were offered by the TRM, DNV calculated adherence rates two ways:

1. Using all site-specific information available.
2. Replacing site-specific values with default inputs when available from the TRM.

This analysis illustrated differences between participant characteristics and TRM default values, indicating areas for possible refinement in future TRM updates