Energy Efficiency Portfolio Standard (EEPS-2) Program

Quarterly Report to the Public Service Commission

Quarter Ending March 31, 2020

Final Report | June 2020

NEW YORK STATE OF OPPORTUNITY. | NYSERDA

NYSERDA's Promise to New Yorkers:

NYSERDA provides resources, expertise, and objective information so New Yorkers can make confident, informed energy decisions.

Mission Statement:

Advance innovative energy solutions in ways that improve New York's economy and environment.

Vision Statement:

Serve as a catalyst – advancing energy innovation, technology, and investment; transforming New York's economy; and empowering people to choose clean and efficient energy as part of their everyday lives.

NYSERDA Record of Revision

Document Title
Energy Efficiency Portfolio Standard (EEPS-2) Program Quarterly Report to the Public Service Commission Quarter Ending March 31, 2020 June 2020

Revision Date	Description of Changes	Revision on Page(s)
	Original Issue	Original Issue

Energy Efficiency Portfolio Standard (EEPS-2) Program

Quarterly Report to the Public Service Commission

Quarter Ending March 31, 2020

Final Report

Prepared by:

New York State Energy Research and Development Authority

Albany, NY

June 2020

Table of Contents

List of Tables

1 Introduction

This quarterly report reflects progress on Energy Efficiency Portfolio Standard (EEPS-2) Program evaluation activities administered by the New York State Energy Research and Development Authority (NYSERDA). The report contains the anticipated schedule and status of current and upcoming evaluation studies, summaries of recently completed evaluations, and the status of evaluation recommendations through March 31, 2020. Information contained within the report corresponds with the guidance received from the New York State Department of Public Service (DPS) and has been discussed with the Evaluation Advisory Group in July 2012 and the E2 Working Group in March 2014.

2 Evaluation Reports Completed

There were two reports finalized in the first quarter of 2020: The Commercial and Multifamily Close-Out Impact Evaluation and the Residential Retrofit Impact Evaluation.

3 Evaluation Status Update

Tables 3-1 and 3-2 provide the anticipated schedule and status of current and upcoming impact, process, and market evaluation activities by program. As applicable, table notes further clarify information about study timing. Planned evaluation projects and timing may change based on input from stakeholders, the EEPS-2 evaluation review, and program progress. Likewise, evaluation project schedules are subject to change based on progress in administering the evaluation studies themselves. Future quarterly reports will highlight any timeline revisions. Timeline revisions made this quarter are designated by cell shading—PY denotes program year and Q denotes quarter.

Table 3-1. Impact Evaluation Schedule and Status

EEPS Program	Impact Evaluation Schedule					
	Workplan Submittal	Project Kickoff	Data Collection Complete	Draft Report	Final Report	Notes
Industrial & Process Efficiency	Completed	Completed	Completed	Completed	Completed	Future Impact Evaluation plans are defined in NYSERDA's CEF Investment Plan.
Existing Facilities	Completed	Completed	Q4 2019	Q4 2019	Completed	Report Finalized
Agriculture	N/A	N/A	N/A	N/A	N/A	Future Impact Evaluation plans are defined in NYSERDA's CEF Investment Plan.
New Construction	Completed	Completed	Q4 2019	Q4 2019	Completed	Report Finalized
Agriculture Disaster	Completed	Completed	Completed	Completed	Completed	No future evaluation plans in this area.
FlexTech	Completed	Completed	Completed	Completed	Completed	Future Impact Evaluation plans are defined in NYSERDA's CEF Investment Plan.
Commercial Existing Buildings Non-Participant Spillover Study	Completed	Completed	Completed	Completed	Completed	No future evaluation plans in this area.
Multifamily Performance Program	Completed	Completed	Q4 2019	Q4 2019	Completed	Report Finalized

Table 3-1 continued

EEPS Program	Impact Evaluation Schedule					
	Workplan Submittal	**Project Kickoff**	**Data Collection Complete**	**Draft Report**	**Final Report**	**Notes**
Point-of-Sale Lighting	Completed	Completed	Completed	Completed	Completed	No future evaluation plans in this area.
EmPower New York Closeout evaluation	Completed	Completed	Completed	Q1 2020	Completed	Report Finalized
Home Performance with ENERGY STAR® Closeout evaluation	Completed	Completed	Completed	Q1 2020	Completed	Report Finalized
New York ENERGY STAR® Certified Homes	N/A	N/A	N/A	N/A	N/A	No future evaluation plans in this area.

Table 3-2. Process and Market Evaluation Schedule and Status

EEPS Program	Process and Market Evaluation Schedule					
	Workplan Submittal	Project Kickoff	Data Collection Complete	Draft Report	Final Report	Notes
Existing Facilities	Completed	Completed	Completed	Completed	Completed	Future Market Evaluation plans are defined in NYSERDA's CEF Investment Plan.
Agriculture	n/a	n/a	n/a	n/a	n/a	Future Market Evaluation plans are defined in NYSERDA's CEF Investment Plan.
New Construction	Completed	Completed	Completed	Completed	Completed	Future Market Evaluation plans are defined in NYSERDA's CEF Investment Plan.
Agriculture Disaster	Completed	Completed	Completed	Completed	Completed	Program closed with no further evaluations planned.
FlexTech	Completed	Completed	Completed	Completed	Completed	Future Market Evaluation plans are defined in NYSERDA's CEF Investment Plan.
Multifamily Performance Program	Completed	Completed	Completed	Completed	Completed	Future Market Evaluation plans are defined in NYSERDA's CEF Investment Plan.
Point-of-Sale Lighting	Completed	Completed	Completed	Completed	Completed	Program closed with no future evaluations planned.

Table 3-2 continue

EEPS Program	Process and Market Evaluation Schedule					
	Workplan Submittal	**Project Kickoff**	**Data Collection Complete**	**Draft Report**	**Final Report**	**Notes**
Empower New York	Completed	Completed	Completed	Completed	Completed	Future Market Evaluation plans are defined in NYSERDA's CEF Investment Plan.
Home Performance with ENERGY STAR®	Completed	Completed	Completed	Completed	Completed	Future Market Evaluation plans are defined in NYSERDA's CEF Investment Plan.
New York ENERGY STAR® Certified Homes	n/a	n/a	n/a	n/a	n/a	No future evaluation plans in this area.
C&I Natural Gas Market Characterization	Completed	Completed	Completed	Completed	Completed	No future evaluation plans in this area.

3.1 Recommendation Tracking

Recommendations generated from NYSERDA evaluation studies are tallied in Table 3-3 and categorized as follows:

- Total number of recommendations made to date:[1] cumulative number of recommendations contained in NYSERDA final evaluation reports.
- Total number of recommendations implemented to date: cumulative number of recommendations contained in NYSERDA final evaluation reports that have been implemented and incorporated into programs.
- Total number of recommendations rejected to date: cumulative number of recommendations contained in NYSERDA final evaluation reports that have been rejected.
- Total number of recommendations currently in progress: cumulative number of recommendations contained in NYSERDA final evaluation reports that are still under consideration.

Table 3-3. Recommendation Tracking

Total Number of Recommendations	Through March 31, 2020
Made to date	258
Implemented to date	208
Rejected to date	41
Currently in progress	9

[1] The total number of recommendations made to date only includes recommendations made in final (not interim) evaluation reports.

4 Other Information

Per the DPS reporting guidance, this section provides an opportunity to report significant activities or events not already reflected in the report. There are no other significant activities requiring explanation for the first quarter of 2020.

Appendix A: Completed Evaluation Summaries

This appendix contains a high-level summary of each recently completed evaluation study. The full report on each evaluation study is available on the NYSERDA website. The Commercial and Multifamily Close-Out and Residential Retrofit Impact Evaluations were finalized in the first quarter of 2020.

NYSERDA EEPS Commercial and Multifamily Close-Out Impact Evaluation: Evaluation Summary

Evaluation Conducted by: ERS, March 2020

PROGRAM SUMMARY

This impact evaluation studies the gross impact of three NYSERDA Energy Efficiency Portfolio Standard (EEPS)–funded[2] legacy programs. The projects included in the evaluation were initiated through NYSERDA's Energy Efficiency Portfolio Standard (EEPS-2).[3] A brief summary of the three programs included in this evaluation are the following:

Existing Facilities (EFP) encouraged the adoption of electric and natural gas energy efficiency measures[4] across a range of sectors, including commercial and industrial businesses, health care facilities, universities and colleges, state and local governments, and mission-critical facilities such as data centers and communications facilities.

Multifamily Performance Program (MPP) was developed in 2006 by consolidating the multifamily components of various NYSERDA programs to better serve the market by providing building owners and developers with a single portal of energy efficiency solutions. The MPP offers staged incentives to reduce overall energy use in multifamily buildings by a minimum of 15%.

The **Commercial New Construction Program** (CNCP) provided technical assistance and financial incentive to business customers building new facilities or undertaking extensive renovations of existing buildings.

NYSERDA's EFP has ended. CNCP and MPP are continuing under a new funding source but in substantially altered form.

---

2 In May 2007, the New York Public Service Commission (PSC) issued an order instituting a proceeding to develop an Energy Efficiency Portfolio Standard (EEPS1). In October 2011, the PSC issued a further order reauthorizing EEPS programs through December 31, 2015. In December 2015, the PSC issued an order extending the Energy Efficiency Portfolio Standard (EEPS2) through Feb 29, 2016. Collectively, EEPS1 and EEPS2 activities and funding sources are referred to as EEPS.

3 Department of Public Service, Filing #4779 Case No. 07-M-0458, 2016

4 EFP's promotion of demand management ended in 2011, when demand management measures were transitioned to the Technology and Market Development Program (T&MD) portfolio of programs.

EVALUATION OBJECTIVE

The primary objective was to determine verified gross savings (VGS)[5] for electric energy, electric demand, and natural gas energy and calculate corresponding realization rates for each of the four programs, with no worse than 10% relative precision at 90% confidence. The evaluated period of performance covered projects completed in 2014 through 2018 Q2 for EFP natural gas, and MPP, and 2016 through 2018 Q2 for EFP electricity and NCP.

DETAILED IMPACT EVALUATION FINDINGS

EFP

Evaluation results for EFP is presented below for gas and electric projects.

The evaluation of the EFP electric projects included some projects that also received incentives under NYSERDA's Demand Management Program (DMP). Those demand savings were also evaluated, but the results are not statistically representative of the DMP population. Tables 1 through 3 provide these summaries.

Table 1. Existing Facilities Overall Electric Results

Subset	Achieved Sample	Total Reported Savings (MWh)	Total Evaluated Savings (MWh)	Evaluated Gross RR	Relative Precision at 90% Confidence Interval
Upstate	8	20,878	21,173	1.01	3.0%
Downstate	17	109,380	106,724	0.98	2.4%
Total	**25**	**130,259**	**127,897**	**0.98**	**2.0%**

Table 2. Existing Facilities Demand Management Program Results

Subset	Achieved Sample	Total Reported Savings (MW)	Total Evaluated Savings (MW)	Evaluated Gross RR	Relative Precision at 90% Confidence Interval
DMP	12	3.20	3.26	1.02	N/A
DMP projects were not sampled for specifically and, consequently, although an RR was calculated, it is not representative of the DMP population.					

[5] Called "evaluated gross savings" in prior NYSERDA evaluation reports.

Table 3. Existing Facilities NYSERDA Natural Gas Results

Subset	Achieved Sample	Total Reported Savings (MMBtu)	Total Evaluated Savings (MMBtu)	Evaluated Gross RR	Relative Precision
Upstate	21	215,158	211,850	0.98	0.8%
Downstate	5	48,023	47,516	0.98	1.3%
Total	**26**	**264,182**	**259,366**	**0.98**	**0.7%**

MPP

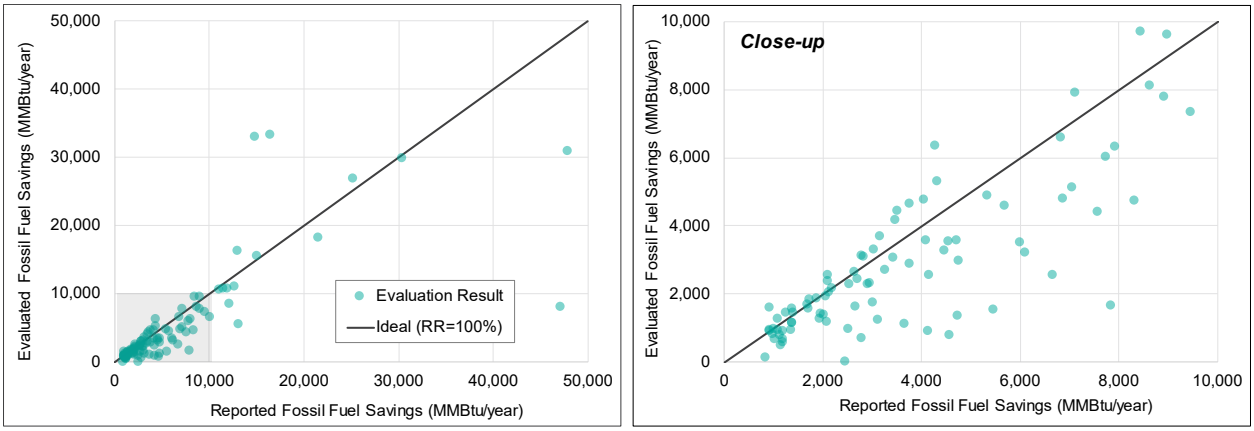
As seen in Table 4, the MPP realized 81% of reported fossil fuel MMBtu savings over the studied program years.[6] As observed in prior evaluation cycles and hypothesized for this study, the projects that received the performance payment performed better than those that did not. The evaluation results are more precise than predicted, due to lower than expected variability in results (actual error ratio [ER] = 0.6) compared with assumed variability in the sample design (ER = 1.0). Figure 1-1 illustrates performance and variability of evaluated projects, with the rightmost figure a close-up of the gray box in the left.

Table 4. Multifamily Performance Program Results Summary

Upper-Level Stratum		Count Projects 2014 – Q2 2018	Reported Savings (All Fossil Fuels, MMBtu/year)	Evaluated Savings (All Fossil Fuels, MMBtu/year)	Evaluated Gross RR	Relative Precision at 90% Confidence
Affordable	100% Complete	220	536,823	392,528	0.73	5.6%
Affordable	Performance Payment	50	127,709	150,106	1.18	5.2%
Market Rate	100% Complete	77	345,142	263,951	0.77	10.3%
Market Rate	Performance Payment	12	59,872	57,404	0.96	4.4%
Total		**359**	**1,069,545**	**867,301**	**0.81**	**4.0%**

[6] Electricity savings analysis was omitted from this MPP evaluation. Electricity savings for the evaluated period were very small; it was likely that savings would not show up in billing analysis and metering to assess savings would have been cost-prohibitive.

Figure 1-1. MPP Impact Evaluation Results: Overall (Left) and Close-Up (Right)



Overall, the key contributors to the 81% realization rate include differences in equipment efficiency (-4% impact to the overall RR), weather normalization (-4%), and occupancy (4% increase).

CNCP

Tables 5 and 6 summarize the CNCP evaluation results. Key differences underlying the 99% electric RR include incorrect baselines (-4% impact to the overall RR), differences in operations (+1%), changes in the as-built equipment quantity (+1%), and incorrect algorithm or Technical Resource Manual (TRM) references (+1%). Key contributors to the 71% gas RR include differences in operation (-11%), errors in the reported tracking savings (-10%), measures not installed (-7%) and incorrect baselines (-3%).

Table 5 . CNCP Overall Electric Results

Measure Type	Count Projects: 2016–Q2 2018 (EEPS 2)	Sampled Projects	Reported Savings (MWh/year)	Evaluated Savings (MWh/year)	Evaluated Gross Realization Rate	Relative Precision at 90% Confidence	
Electric	251	50	85,004	84,548	0.99	5.52%	

Table 6. CNCP Overall Natural Gas Results

Measure Type	Count Projects: 2016–Q2 2018 (EEPS 2)	Sampled Projects	Reported Savings (MMBtu/year)	Evaluated Savings (MMBtu/year)	Evaluated Gross Realization Rate	Relative Precision at 90% Confidence	
Gas	27	17	141,869	101,191	0.71	6.81%	

EVALUATION METHODS AND SAMPLING

EFP

This evaluation developed estimates of project RRs for program-reported natural gas savings between 2014–Q2 2018, and electric custom savings for 2016–Q2 2018. Methods included verifying the installation of efficiency measures and the generation of an independent savings analysis. All sites in a representative sample of participating custom electric and natural gas projects underwent desk review of project documentation and phone or email communication with site personnel to verify equipment installation and operational parameters. The evaluators did not conduct site visits or metering; billing analysis was conducted for those gas sites where billing data was available.

MPP

Methods included verifying the installation of efficiency measures and the generation of an independent savings analysis. The sample was stratified to develop results by market (affordable housing[7] versus market rate) and payment stage (receiving performance payment[8] or not). The evaluators most frequently assessed the sampled MPP projects using site-specific analysis of pre- and post-project utility consumption data, normalized to reflect any fluctuations in occupancy. The evaluation team quantified savings persistence among 49 sampled projects for which at least two years of post-project consumption data was available.

CNCP

Methods included verifying the installation of efficiency measures and the generation of an independent savings analysis. The evaluation team used multiple sources–measure operation profiles and as-built conditions (verified through phone interviews), as-built drawings and billing data, commissioning reports, and post-installation inspection reports – to update technical analysis energy savings calculations for whole building, custom, and prequalified projects.

PROGRAM FINDINGS AND RECOMMENDATIONS

The impact evaluation team concluded the following recommendations for each program.

---

7 NYSERDA defines affordable housing as buildings in which at least 25% of the residential units are, or are expected to be, occupied by households earning 80% or less of the regional or statewide median income, whichever is higher.

8 Participating facilities are eligible for a bonus incentive payment (the "performance payment" or payment #4) if the target energy reduction is demonstrably achieved when comparing at least 12 months of pre- and post-project utility consumption data.

EFP

Overall, the RRs in the EFP evaluation were very close to 1. The impact evaluation team found that the program estimated savings well for both electric and natural gas saving measures. The evaluators did, however, encounter challenges with the tracking data and project documentation in several instances. Some projects had missing files or the files contained information that did not match the tracking database. Additionally, the tracking data itself did not contain all the information needed to evaluate the programs effectively. As this program is not continuing, these issues do not justify a recommendation, but the need for accurate tracking data correlated with project documentation is relevant to other ongoing NYSERDA programs.

MPP

1. **The MPP achieves aggressive reductions in fossil fuel consumption at multifamily buildings.** While this evaluation addressed fossil fuels only[9], the evaluators found that MPP projects result in a 23% reduction in pre-project fossil fuel consumption on average.
2. **The program's MMBtu savings claims have become more accurate**. The prior impact evaluation[10] of the MPP (2013-14) determined a fossil fuel performance factor[11] of 0.60, whereas this evaluation found a fossil fuel realization rate of 0.81.
3. **Projects receiving the performance payment performed significantly better (RR = 111%) than those that did not (RR = 74%).** The evaluators found no significant differences in performance between affordable and market rate projects.
4. **The evaluators commend the MPP for its comprehensive data tracking and archiving practices.**
5. **The MPP does not, however, adequately track impacts by specific fuel type.** The program frequently claimed all fossil fuel impacts as natural gas, even when fuel conversions occurred (e.g., #2 fuel oil to natural gas). Such inaccuracies underestimate the program's carbon emissions reduction impacts.

---

9 As noted previously, electric savings analysis was omitted from this MPP evaluation due to the small amount of savings making billing analysis difficult and metering cost prohibitive.

10 The evaluators note that projects over the program years previously evaluated, 2009-11, were primarily SBC-funded. Therefore, fossil fuel savings were not the focus of such projects, but the program nonetheless reported those impacts and evaluators assessed them in the prior study.

11 In the prior study, the term was used in place of realization rate to denote that the Impact Evaluation Team did not recommend the application of this factor during future program reporting. The term "performance factor" was associated with ancillary fossil fuel impacts as well as any supplemental analysis findings for which statistical significance was not planned to be achieved.

- **Recommendation:** The program should enhance its savings tracking protocols to allow more accurate reporting of fuel-specific impacts. After discussions with program staff, the evaluators
  are encouraged to hear that such improvements are underway.

6. **Projects with an "anchor" measure–a high-impact upgrade of a building's central heating or hot water system–performed better than those without.** For example, projects with a boiler measure (n = 71) achieved 87% of reported MMBtu savings, while projects without a boiler measure (n = 35) achieved 70%.

7. **The program's savings models generally differed from real-world performance in three cases:**

   a. Condensing boilers typically did not achieve the modeled performance efficiencies due to higher-than-expected return water temperatures (RWTs).

      - **Recommendation:** Modeled condensing boiler measures should reflect a realistic efficiency value based on the installed boiler's performance curve and the RWTs identified in the post-installation inspection report.

   b. Controls and weatherization measures are difficult to characterize using modeling software.

      - **Recommendation:** The program should require supplemental supporting evidence, such as measurement-based justification for model inputs, for any proposed controls, weatherization, or re-commissioning measures that claim savings of more than 10% of pre-project whole-building consumption.

   c. The program's simulation software uses TMY3 weather files to represent typical weather conditions, whereas evaluators used 11-year (2008–2018) NOAA weather averages to define typical conditions. This difference resulted in slightly lower Heating Degree Days (HDD) and evaluated savings.

      - **Recommendation:** The MPP (and NYSERDA) should establish a uniform definition of typical weather.

8. **The evaluators found that MPP savings persist from the first year after project completion to the second year.** In fact, savings are constant from the first to second year, while third-year savings increase slightly.

CNCP

1. **Baseline-related discrepancies had the largest impact (-4%) on program electric RR and a notable impact (-3%) on gas RR.** Most baseline discrepancies were due to the baseline energy models not being developed correctly or the wrong value being used in the model to define a baseline parameter.
2. **There were two occurrences where energy savings from other fuels were reported as natural gas savings.** For these two projects, the evaluators assigned a realization rate of 0 as no natural gas savings were obtained even though the project may have saved on the non-incented fuel. As more emphasis is placed on carbon reduction, accurate fuel characterization is important.
3. **The evaluators recorded 18 instances where reported measures were not installed, resulting in a -2% impact on the electric RR and a -7% impact on the gas RR.** The evaluators confirmed that the measures were not installed either through a phone interview with the site contact or via the post-inspection and commissioning reports present in the project files. Because post-inspection and commissioning reports indicated that measures were not installed yet tracking savings did not reflect this, the evaluators believe the tracking savings are not consistently updated to reflect post-installation and commissioning report findings.
4. **There were at least 14 occurrences where the evaluators observed discrepancies in the Technical Assistant (TA) calculations of TRM values (hours, energy savings factor, etc.) for the application.**
5. **For several project files, neither the as-built mechanical drawings nor the complete modeling files were available, preventing the evaluators from replicating the TA evaluator modeling approach.** Referencing these documents would have improved the efficiency and accuracy of the evaluation.

Residential Retrofit Impact Evaluation
(PY 2012-2016)

Evaluation Conducted by: NMR Group, Inc., March 2020

PROGRAM SUMMARIES

EmPower

EmPower provides income-eligible participants[12] with home energy assessments conducted by qualified Building Performance Institute (BPI)-Gold Star (accredited) contractors. Along with the home energy assessments, participants were provided with in-home energy education on ways to manage their energy use and costs.

Home Performance with ENERGY STAR® (HPwES)

The HPwES Program under EEPS2 provided homeowners with home energy assessments to identify ways to improve the energy efficiency of homes. The HPwES Program also offered a 10% discount on eligible measures, including, but not limited to building envelope, primary heating and cooling, water heating, appliances, and lighting.

PURPOSE STATEMENT

The purpose of this study was to estimate first year energy savings using a billing analysis and to assess realization rates (RR) for the programs.

EVALUATION OBJECTIVE

The analysis incorporates residential electricity and natural gas consumption data and NYSERDA Program tracking data of participating program homes to estimate first year energy savings using a billing analysis. This evaluation spans program years (PY) 2012 through 2016 and focuses on residential retrofit programs funded by the Energy Efficiency Portfolio Standard (EEPS2) and supplemented by Regional Green House Gas Initiative (RGGI).[13]

---

12 NYSERDA defines low-income households as those that are income-eligible for the NYS HEAP (Heating Energy Assistance Program); households with incomes at or below 60 percent of state median income (SMI). NYSERDA defines moderate-income households as those with incomes above the HEAP threshold, but less than or equal to 80 percent of the greater of state median income and area median income for the household's geographic area. Moderate-income households are not eligible for HEAP, but are often income-eligible for housing programs.

13 Measures that did not qualify for funding under EEPS2 Electric or Gas were funded by RGGI. More information visit https://www.nyserda.ny.gov/Researchers-and-Policymakers/Regional-Greenhouse-Gas-Initiative

DETAILED IMPACT EVALUATION FINDINGS[14]

EmPower

The results indicate that the EmPower program achieved energy savings for participants. On average, customers reduced their electricity consumption by 547 kilowatt-hours (kWh) and natural gas by 12 MMBtu (**Table 1**). The electric and natural gas results do not take into account ancillary savings. For the 2012 to 2016 time period, evaluated electricity savings are 58% of the program-reported savings. Evaluated natural gas savings are 44% of the program-reported savings.

Table 1: Summary of Reported and Evaluated Energy Savings for EEPS2 funded EmPower Projects Installed in PY 2012-2016

	Annual Electric Savings (MWh)a	Annual Natural Gas Savings (MMBtu)b
Funding	**EEPS2 Electric**	**EEPS2 Gas**
Program-reported savings	**40,765**	**638,436**
Realization Rate	**0.58**	**0.44**
Realization Rate 90/10 confidence interval	**0.49 – 0.68**	**0.42 – 0.47**
Evaluated gross savings	**23,644**	**280,912**
Evaluated savings per participant	**574 (kWh)**	**12**

[a] NYSERDA program-reported savings to the DPS were 43,392 MWh. Applying the realization rate resulted in evaluated gross savings of 25,167 MWh.

[b] NYSERDA program-reported savings to the DPS were 700,030 MMBtu. Applying the realization rate resulted in evaluated gross savings of 308,013 MMBtu.

An analysis was conducted to ascertain possible reasons for the lower-than-anticipated realization rates. Some explanations included:

- Bias created by high billing analysis attrition rates
- Evaluator practice in preparing and conducting the billing analysis
- Assumptions guiding deemed savings estimates
- Installations not of sufficient quality to achieve evaluated savings
- Customer behavior such as snapback (using efficient equipment more than estimates assume) or removal of items from service

The scope of the evaluation limited the exploration of the reasons behind the observed RRs. However, the Impact Evaluation Contractor examined the potential for bias created by attrition, evaluator practice, the sensitivity of the analysis to various weather datasets, and home performance contractor variation.

[14] Current Clean Energy Fund (CEF) initiatives are estimating energy impacts using updated methodologies and algorithms from those used in the EEPS period; it is anticipated that these currently-implemented initiatives are addressing some of the findings as described within this EEPS evaluation study. An updated analysis of energy impacts for the CEF period is currently underway and will be made available upon completion.

While none of these factors played a large role in reducing EmPower RRs for either electricity or natural gas, the Impact Evaluation Contractor believes that the assumptions underlying deemed energy estimates, customer behavior, and home and household characteristics may vary from actual conditions, ultimately explaining the differences in program reported versus evaluated estimates of energy savings.

Home Performance with ENERGY STAR®

Table 3 shows that on average, HPwES customers reduced their electricity consumption by 724 kWh and natural gas by 13 MMBtu and AHPwES customers reduced their electricity consumption by 387 kWh and natural gas by 15 MMBtu. The electric and natural gas results do not take into account ancillary savings. RGGI predominantly funded fuel oil projects; RGGI electric and natural gas savings for HPwES and AHPwES were negligible.

Electricity RRs based on the program-reported savings were 51% for HPwES and 43% for AHPwES, and for gas RRs were 42% for HPwES and 43% for Assisted Home Performance with Energy Star (AHPwES).

Table 3: Summary of Reported and Evaluated Electricity and Natural Gas Savings for EEPS2 funded HPwES and AHPwES Projects Installed in PY 2012–2016

	Annual Electric Savings (MWh)a		Annual Natural Gas Savings (MMBtu)b	
Funding	**HPwES - EEPSE**	**AHPwES - EEPSE**	**HPwES - EEPSG**	**AHPwES - EEPSG**
Program-reported savings	**2,546**	**2,292**	**94,035**	**142,879**
Realization Rate	**0.51**	**0.43**	**0.42**	**0.43**
Realization Rate 90/10 confidence interval	**0.42 – 0.68**	**0.18 – 0.51**	**0.40 – 0.45**	**0.40 – 0.46**
Evaluated gross savings	**1,298**	**986**	**39,495**	**61,438**
Evaluated savings per participant	**724 (kWh)**	**387 (kWh)**	**13**	**15**

[a] NYSERDA program-reported savings to the DPS were 5,250 MWh for HPwES and 2,200 for AHPWES. Applying the realization rate resulted in evaluated gross savings of 2,678 MWh for HPWES and 946 MWh for AHPWES.

[b] NYSERDA program-reported savings to the DPS were 354,409 MMBtu for HPwES and 192,995 MMBtu for AHPwES. Applying the realization rate resulted in evaluated gross savings of 148,852 MMBtu for HPWES and 82,988 MMBtu for AHPwES.

An analysis was conducted to ascertain possible reasons for the lower-than-anticipated realization rates. Some explanations included:

- Bias created by high billing analysis attrition rates
- Evaluator practice in preparing and conducting the billing analysis
- Assumptions guiding deemed savings estimates

- Installations not of sufficient quality to achieve evaluated savings
- Customer behavior such as snapback (using efficient equipment more than estimates assume) or removal of items from service

The scope of the evaluation limited the exploration of these reasons behind the observed RRs. However, the Impact Evaluation Contractor examined the potential for bias created by attrition, evaluator practice, the sensitivity of the analysis to various weather datasets, and contractor variation. The exploration concluded that attrition bias (for natural gas) and the selection of weather data (for electricity) may have affected RRs for HPwES and AHPwES. These factors alone, however, do not fully explain the divergence between program reported savings and evaluated savings for the participant included in the analysis models. The Impact Evaluation Contractor believes that, in addition to attrition and weather-related discrepancies, the assumptions underlying deemed energy estimates, customer behavior, and home and household characteristics may vary from actual conditions, further explaining the differences in program reported versus evaluated estimates of energy savings.

EVALUATION METHODS AND SAMPLING

As noted previously, the study analysis incorporated residential electricity and natural gas consumption data and program tracking data of participating program homes to estimate first year energy savings using a billing analysis.

Using utility data as well as program data, significant data cleaning was undertaken.

Two situations created the first primary source of attrition, incomplete or missing billing account information data: 1) the installation or home energy assessment contractor input the wrong account number, failed to collect it, or it was not provided and 2) the tracking system created errors in the account number (especially for Con Edison). The second and third primary sources of attrition rest with utility billing data: 1) the customer did not have 12 months of usable pre- and post-participation billing data or, 2) the billing data included more than 50% estimated reads, which renders them unreliable (this was most common for natural gas). Table 4 provides the program attrition as a result of the cleaning process.

Table 4: Summary of Program Attrition

	Number of Homes with Non-Zero Savings	% of Homes Retained	% of Homes Excluded
EmPower Electric	39,957	29%	71%
EmPower Natural Gas	23,253	24%	76%
HPwES Electric[a]	13,203	28%	72%
HPwES Natural Gas[a]	19,077	27%	73%

[a] Includes AHPwES.

RECOMMENDATIONS and ADDITIONAL FINDINGS

EmPower and HPwES

Recommendation 1: In order to most accurately close out its reporting on these legacy EEPS programs, NYSERDA should apply the following RR to its programs for the 2012 to 2016 period:

Program	Electric RR	Gas RR
EmPower	0.58	0.44
HPwES	0.51	0.42
AHPwES	0.43	0.43

Recommendation 2: NYSERDA should streamline Program Database Tracking for the EmPower and HPwES Programs as well as make certain project- and measure-level tracking align, a process that is already underway.

While the EmPower and HPwES Programs are evaluated as separate programs, streamlining the datasets using common field names and practices where feasible may result in evaluator efficiency gains for future interim and full impact billing analyses. This is especially important because households taking part in AHPwES often take part in both EmPower and HPwES. Likewise, inability to link participants across the project- and measure-level databases served as one of the top four factors driving attrition. The main report offers specific points to consider.

Critical Finding 1: The DPS required NYSERDA to report ancillary EEPS2 savings separately, which fails to account for the full savings achieved by the program. The current program under the CEF is being administered and reported on a fuel blind basis, which will provide a more complete accounting of its impacts

Critical Finding 2: This study reinforces other research conducted by NYSERDA that documents that TMY3 may no longer represent the current weather conditions in New York. NYSERDA and NFGDC program staff and Home Performance Contractors may want to explore updating engineering models to include a vetted replacement to TMY3.

Critical Finding 3: NYSERDA has recognized the importance of conducting frequent interim impact billing analyses to identify potential challenges and take corrective action as soon as possible. A separate and earlier billing analysis of CEF- funded projects is in progress.

Critical Finding 4: NYSERDA program staff should work with Home Performance Contractors to improve the frequency and accuracy of utility account number collection. This is especially true given the fuel blind nature of CEF-funded projects.

NYSERDA, a public benefit corporation, offers objective information and analysis, innovative programs, technical expertise, and support to help New Yorkers increase energy efficiency, save money, use renewable energy, and reduce reliance on fossil fuels. NYSERDA professionals work to protect the environment and create clean-energy jobs. NYSERDA has been developing partnerships to advance innovative energy solutions in New York State since 1975.

To learn more about NYSERDA's programs and funding opportunities, visit nyserda.ny.gov or follow us on Twitter, Facebook, YouTube, or Instagram.

New York State Energy Research and Development Authority

17 Columbia Circle
Albany, NY 12203-6399

toll free: 866-NYSERDA
local: 518-862-1090
fax: 518-862-1091

info@nyserda.ny.gov
nyserda.ny.gov

State of New York
Andrew M. Cuomo, Governor

New York State Energy Research and Development Authority
Richard L. Kauffman, Chair | Doreen M. Harris, Acting President and CEO

EEA-EEPS2-2020-Q1-r-1-v1
6/20