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| Program REPORT  New Jersey Natural Gas Quick Home Energy Checkup (QHEC) Program Year-1 Evaluation  **Date:** January 16, 2023 |
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Abstract

This report presents the findings from the Program Year 1 (PY1) Process and Impact Evaluation of New Jersey Natural Gas’ (NJNG) Quick Home Energy Checkup Program (QHEC). The goals of this study were to complete “snapshot” Process and Impact evaluations for PY1 to get a preliminary understanding of the program implementation process, participation rates, and measure-level impacts and energy savings achieved.

The NJNG PY1 QHEC Process and Impact Evaluation included the following research:

* **Document Review:** Review and analysis of available program documentation
* **Interviews:** In-depth telephone interviews with program staff
* **Participant Surveys:** Exploratory participant surveys of an unweighted sample
* **Program Data Analysis:** Review of the QHEC database and generation of statistics
* **Evaluability Assessment:** Assessment of available data for an Enhanced Rigor Evaluation[[1]](#footnote-2)
* **Program Comparisons:** Comparison of these findings to similar home energy audit programs offered in other jurisdictions across the country.

Findings and Recommendations

Process evaluation

Findings

* PY1 program participation rate was 63% of program goal (944 QHEC visits completed of 1,500 goal).
* PY1 achieved energy savings was 43% of program goal (832 therms achieved of 1,964 therms goal).
* 90% of PY1 program participants chose the more comprehensive QHEC+ pathway over the more basic, free QHEC
* Almost 93% of program energy savings resulted from participation in the QHEC+ pathway.
* Preliminary participant interviews showed high rates of program satisfaction.

Recommendations

* Conduct nonparticipant research to investigate reasons for nonparticipation, with a focus on customers who received program marketing but chose not to participate.
* Explore participant motivation behind choosing standard QHEC vs. QHEC+, to understand how best to target market and outreach to optimize participation.
* Assess the extent to which QHEC participation drives participation in other NJNG programs.
* Continue the program’s varied marketing and outreach channels. Consider an assessment to determine whether there is an opportunity to improve the reach and effectiveness of marketing channels. Activities might include an analysis of web traffic, email click-through rates, and tracking snail mail campaigns.

Impact evaluation

Findings

* Overall, evaluators found that the equipment claimed through the QHEC program was installed and operating as intended.
* The deemed savings values for Low Flow Aerators and Showerheads in Q1 and Q2 were updated in Q3 and the total savings for the subprogram were trued in the Annual Progress Report filing in October 2022.

Recommendations

* Use measure savings per the latest Coordinated Measure List[[2]](#footnote-3) and the New Jersey TRM recommendations.
* To improve the accuracy of aerator, showerhead, and pipe wrap savings calculations, NJNG’s QHEC auditors should start collecting relevant measure-specific data, most notably for heating system type and heating system efficiency.
* If lighting continues to be a QHEC measure (based on the baseline updates to lighting measures), include heating penalties and associated natural gas impacts in therms savings calculations for interior energy-efficient lighting measures.
* To improve the accuracy of smart thermostat[[3]](#footnote-4) savings calculations, QHEC auditors should start collecting the following measure-specific data and update deemed savings estimations accordingly:
* Heating fuel type
* Cooling system type

Executive Summary

DNV conducted impact and process evaluations of NJNG’s Existing Homes Quick Home Energy Checkup (QHEC) Program for the period beginning July 1, 2021, and ending June 30, 2022, classified as Program Year 1 (PY1).

Process evaluation

Across select programs, including QHEC, DNV conducted an initial 'snapshot' evaluation in Year 1 to develop a more integrated view of the portfolio as a whole and to prioritize resources for more in-depth enhanced process evaluation activities in the subsequent years.

Summary of methods

To assess QHEC program processes, DNV conducted both primary and secondary data collection. Primary data collection consisted of in-depth interviews (IDIs) with NJNG program staff, and a limited set of exploratory interviews with QHEC participants.

The DNV evaluation team also conducted a secondary review of the SAVEGREEN Project Program Plan (Settlement 12/21/2020, approved on 3/3/2021), the Residential Eligible Measures List, Q1-Q3 NJNG reporting tables, and the Annual Progress Report for PY1.

Key findings and recommendations

**Findings**

* PY1 program participation rate was 63% of program goal (944 QHEC visits completed of 1,500 goal).
* PY1 achieved energy savings was 43% of program goal (832 therms achieved of 1,964 therms goal).
* 90% of PY1 program participants chose the more comprehensive QHEC+ pathway over the more basic, free QHEC
* Almost 93% of program energy savings resulted from participation in the QHEC+ pathway
* Preliminary participant interviews showed high rates of program satisfaction.

**Recommendations**

* Conduct nonparticipant research to investigate reasons for nonparticipation, with a focus on customers who received program marketing but chose not to participate in the QHEC program.
* Explore participant motivation behind choosing standard QHEC vs. QHEC+, to understand how best to target marketing and outreach to optimize participation.
* Assess the extent to which QHEC participation drives participation in other NJNG programs.
* Continue the program’s varied marketing and outreach channels. Consider an assessment to determine whether there is an opportunity to improve the reach and effectiveness of marketing channels. Activities might include an analysis of web traffic, email click-through rates, and tracking snail mail campaigns.

Impact evaluation

Summary of methods

The evaluators conducted a review of program tracking data, in-depth interviews with program participants, and desk reviews of random sample of sites. The evaluators completed participant interviews for nine randomly selected customers from quarter 1 (Q1) and Q2 in PY1 and reported unweighted site-level results in this report. DNV evaluated both natural gas and electric savings calculations for the sampled sites.

Key findings and recommendations

The impact evaluation found the following gross impact results by measure for the QHEC program, in annual natural gas therms savings:

Table ES-1. Gross impact results by measure, annual natural gas therms savings

|  |  |  |  |
| --- | --- | --- | --- |
| Measure Name | Reported Per-unit Savings (therms) | | Evaluated Per-unit Savings (therms) |
| **Q1** | **Q2** |
| LED Nightlight | 0.0 | 0.0 | -0.085 |
| LED Screw-in General Service Lamp | -0.58 | 0.0 | -2.708 |
| Low Flow Aerator | 1.98 | 0.237 | 15.58 |
| Low Flow Showerhead | 8.69 | 0.314 | 18.06 |
| Pipe wrap (hot water) | 4.63 | 8.25 | 8.25 |
| Water Heater set to 120°F | 3.6 | 3.6 | 3.6 |

It is important to note that the savings estimates for Low Flow Aerator and Low Flow Showerhead used in Q1 and Q2 were updated in Q3, and they matched the evaluated per-unit savings. The total savings were updated for all projects in PY1 and trued up in the Annual Progress Report (Q4) filing. Also note that the penalties for lighting savings were included in the evaluation but not in the tracking calculations.

The following table shows gross impact results by measure in peak kW (electric demand) savings:

Table ES-2. Gross impact results, peak kW savings

|  |  |  |  |
| --- | --- | --- | --- |
| Measure Name | Reported Per-unit Savings (kW) | | Evaluated Per-unit Savings |
| **Q1** | **Q2** | **kW** |
| Advanced Power Strip - Tier 2 | 0.0 | 0.039 | 0.039 |
| LED Nightlight | 0.0 | 0.0004 | 0.0004 |
| LED Screw-in General Service Lamp | 0.0 | 0.0133 | 0.0133 |

The following table shows gross impact results by measure in annual kWh (electric energy) savings:

Table ES-3. Gross impact results by measure, annual kWh savings

|  |  |  |  |
| --- | --- | --- | --- |
| Measure Name | Reported Per-unit Savings (kWh) | | Evaluated Per-unit Savings (kWh) |
| **Q1** | **Q2** |
| Advanced Power Strip - Tier 2 | 346 | 346 | 346 |
| LED Nightlight | 29.57 | 5.547 | 5.547 |
| LED Screw-in General Service Lamp | 37.1 | 177.51 | 177.51 |

In addition to these values, the impact evaluation yielded the following findings and recommendations:

* Evaluators found that most measures in Q1 reported savings utilize outdated savings calculation assumptions since statewide EM&V guidance on measure assumptions and savings estimations did not exist when NJNG planned for reported savings estimations in Q1. Additionally, NJNG followed the 2020 NJ TRM algorithm for low-flow aerators and showerheads in Q2, but there was an error within the 2020 NJ TRM algorithm where aerator run “hours” was used instead of “minutes.”
* **Recommendation:** Update measure savings per the most up-to-date guidance from the Coordinated Measure List[[4]](#footnote-5) and the PY2021 New Jersey TRM recommendations.
* The natural gas savings estimated per New Jersey TRM for the aerator, showerhead and pipe wrap measures did not consider the home’s actual heating system type and efficiency, but default assumptions were provided in the TRM.
* **Recommendation:** To improve the accuracy of the aerator, showerhead, and pipe wrap savings calculations, NJNG’s QHEC auditors should start collecting relevant measure-specific data, most notably for heating system type and efficiency. Additionally, for pipe wrap measures, QHEC auditors should start collecting measure-specific data on fluid temperature and space temperature.
* Heating system penalties from reduced waste heat were not considered for energy-efficient lighting measures.
* **Recommendation:** If lighting continues to be a QHEC measure (based on the baseline updates to lighting measures), include heating penalties and associated natural gas impacts in therms savings calculations for interior energy-efficient lighting measures.
* **Recommendation:** To improve the accuracy of smart thermostat[[5]](#footnote-6) savings calculations, QHEC auditors should start collecting the following measure-specific data and update deemed savings estimations accordingly:
* Heating fuel type
* Cooling system type

# Introduction

This report provides the results of the impact and process evaluations of New Jersey Natural Gas’s (NJNG) Existing Homes Quick Home Energy Checkup (QHEC) Program for the period beginning July 1, 2021, and ending June 30, 2022, classified as Program Year 1 (PY1).

## Background

The QHEC subprogram is an additional utility-led initiative designed to help customers identify energy-saving opportunities through a no-cost in-home audit that includes directly installed energy-saving measures. NJNG also offers a more comprehensive "QHEC+" option for a fee, which includes a blower door test, a Department of Energy Home Energy Score, and the potential for the installation of a smart thermostat (when purchased from the NJNG marketplace, and where savings are captured in the EE Products program). This QHEC+ option is an independent option for customers that want a comprehensive assessment of their building shell and mechanical systems. For both QHEC paths, NJNG uses in-house auditors who have Building Performance Institute (BPI) certifications.

The auditor performs a walkthrough of the customer’s home with the customer and educates them on the opportunities to save energy. The auditor will identify any health and safety issues observed and larger energy savings opportunities. Additionally, the auditor will share information about the products and incentives available under the Energy Efficient Products program and the potential for comprehensive upgrades through either the Home Performance with ENERGY STAR (“HPwES subprogram”), the Moderate-Income Weatherization subprogram, or the Comfort Partners program.

## Program Design and Implementation

NJNG administers and oversees all aspects of the QHEC, including training, engagement, and Quality Control (QC). The QHEC subprogram is available to all single-family and single-family attached (up to 4 units) natural gas and some[[6]](#footnote-7) electric customers, including homeowners and renters. Direct installed measures may include LED bulbs, showerheads, faucet aerators, gaskets, power strips, smart thermostats (QHEC+, Moderate Income customers who have received an energy assistance grant), and other energy-saving measures. All participants receive a QHEC report, including the audit findings and recommendations. Participants in the QHEC+ option receive a blower door test and a more detailed audit report that summarizes the results of diagnostic tests performed at the participant's home and provides a DOE Home Energy Score.

Customers interested in the QHEC+ option are charged a $49 fee, which NJNG can offer at a discount during promotional periods to drive activity. Auditors provide information to customers on other NJNG energy efficiency programs, available rebates, and incentives to assist with upfront costs of efficiency upgrades. In addition, the customer is given two options

1. They can have their audit posted on NJNG’s contractor bidding portal. This portal allows up to three contractors to view customers’ audit results and provide a cost estimate for recommended upgrades.
2. Alternatively, customers can search for participating contractors on the SAVEGREEN website (without posting the audit the bidding portal).

Table 1‑1 displays NJNG’s goals for QHEC participation[[7]](#footnote-8) and energy savings from PY1 through PY3.

Table 1‑1. Residential QHEC triennial goals[[8]](#footnote-9)

|  |  |  |  |
| --- | --- | --- | --- |
| Metric | PY1 | PY2 | PY3 |
| Estimated Participants (Count of completed visits) | 1,500 | 1,650 | 1,733 |
| Projected Net Annual Natural Gas Savings (therms) | 19,636 | 21,600 | 22,680 |

Table 1‑2 presents the actual participation for PY1 based on the Annual Progress Report filing in October 2022. In PY1, NJNG completed 944 visits with a net savings of 8,323 therms, which is 63% of the participant and 42% of the annual therms savings target.

Table 1‑2. PY1 actual participation

|  |  |  |  |
| --- | --- | --- | --- |
| PY1 metrics | Target | Achieved | % Achieved |
| Participants  (Count of completed visits) | 1,500 | 944 | 63% |
| Annual Savings (therms) | 19,636 | 8,323 | 42% |
| Annual Gas Savings per participant (therms/participant) | 13 | 9 | 69% |

Table 1‑3 presents the program participation by pathway, showing that the vast majority (90%) of participants chose the QHEC+ option. As a result, nearly 93% of PY1 savings achieved through the subprogram were from the QHEC+ pathway. NJNG Residential Supervisor said that the preference to QHEC+ could be due to the option to install the smart thermostat.

Table 1‑3. Participation by pathway

|  |  |  |
| --- | --- | --- |
| Pathway | Participants  (visits) | Annual Savings  (therms) |
| QHEC | 94 | 602 |
| QHEC+ | 850 | 7,721 |
| **Total** | **944** | **8,323** |

**Program Data Management**

Auditors record initial QHEC project inspection information in SnuggPro, the energy modelling software). The final project audit data secured in SnuggPro is then transferred to NJNG’s iEnergy Project Management (iEPM) system (tracking system). Any data for shared costs with other utilities, is transferred to the respective utility through the Statewide Coordinator System (SWC[[9]](#footnote-10)).

# Process Evaluation

Across select programs, including QHEC, DNV conducted an initial 'snapshot' evaluation in Year 1 to develop a more integrated view of the portfolio as a whole and to prioritize resources for more in-depth enhanced process evaluation activities in the subsequent years of the triennium.

## Research conducted

To assess QHEC program processes, DNV conducted both primary and secondary data collection. Primary data collection included in-depth interviews (IDIs) with NJNG program staff and exploratory interviews with a limited (n=9) set of participants.

The DNV evaluation team also conducted a secondary review of the following documents:

* The SAVEGREEN Project Program Plan (Settlement 12/21/2020, approved on 3/3/2021)
* Coordinated Measure List[[10]](#footnote-11)
* Q1-Q3 NJNG reporting tables.
* Annual Progress Report for PY1[[11]](#footnote-12)

## Program staff in-depth interviews

DNV conducted in-depth interviews with three NJNG energy efficiency program implementation staff members in June 2022. We used these interviews to learn about and document the following:

* Roles and responsibilities with the programs
* Program design and processes, including marketing and outreach
* Program metrics and performance against goals
* Challenges and opportunities

As part of our residential program staff interviews, we spoke with the Residential Supervisor, the Director of SAVEGREEN, and the Manager of EE Marketing. The Residential Supervisor had been in this role for approximately one year, while the other two staff members had more than a decade’s experience working in these roles with NJNG’s energy efficiency programs.

### Program delivery

Program staff noted that they implement the bulk of the program themselves, using internal NJNG audit staff (BPI certified) and only a few external implementers. The Director preferred this internal delivery approach, saying that it fosters an ability to cultivate closer customer relationships, provide information, and address any complaints directly with the customer. It is important to note that the Quick Home Energy Checkup is a new program and was not previously run by the BPU as part of New Jersey’s Clean Energy Program. It has similarities to a prior Home Energy Assessments program that NJNG has had in place since January 2019.

### Program design and processes

Program staff described the Quick Home Energy Checkup program process during our interview. They explained that customers may choose from two QHEC pathways – a no-cost home audit, and a “QHEC+” option, which costs $49 and includes diagnostic tests to evaluate the efficiency of the insulation and potentially identify air leakages. Participants in both pathways receive an auditor-led visual walkthrough of their home and free energy-saving products such as pipe wrap, LED lightbulbs, and showerheads. Participants in QHEC+ additionally receive blower door and infrared camera diagnostic tests, as well as a more detailed report and a DOE Home Energy Score. NJNG auditors inform all customers of available programs, rebates for energy efficient appliances, HVAC equipment, water heating, and other upgrades. NJNG tracks savings associated with both the gas and electric measures.

### Program marketing

NJNG actively markets its residential programs, using similar tactics and channels with QHEC and Energy Efficient Products. The NJNG marketing manager described various marketing and outreach channels, including direct customer outreach, direct mail (postcards and letters), email communications, community events, social media campaigns, digital advertising and contractor education and training. In addition, the marketing manager said NJNG works with electric utilities to cross-promote for energy efficiency programs. Program staff also described dedicated outreach to disadvantaged communities.

When asked about the effectiveness of the various marketing and outreach efforts, the marketing manager said that email performed better than direct mail, but digital was the best performing. The manager reported that, across programs, messaging focused on cost savings was more effective than messaging around cutting one’s carbon footprint.

### Tracking metrics and performance

The program manager explained that NJNG is bound by the June 10, 2020, BPU order to report program metrics within 75 days[[12]](#footnote-13) of the close of the program year. Program years run from July 1 through June 30. The QHEC program tracks program applicants, therms savings, customer information, measure-level information, etc. It is also required to track the relative participation of overburdened communities. According to the Annual Progress report11, QHEC staff completed 75 audits in the overburdened community saving nearly 540 therms of natural gas.

There was steady growth in the program throughout the year, with Q3 performing the best in PY1, as shown in Table 2‑1. Some of the measures’ deemed savings estimates used in Q1 and Q2 were updated later in the year based on the Coordinated Measure List that was developed from the Joint-Utility discussions. The actual savings by quarter clearly show (in Table 2‑1) the increase in savings for the first three quarters. Q2 and Q3 were the best quarters with 2,930 and 2,758 therms in PY1. But for filing purposes, the changes in savings due to the updates were trued up in the Q4 savings estimate and presented in the Annual Progress Report filing[[13]](#footnote-14). Measure-specific savings assumptions are discussed in the Impact section of this report, but the increase in savings in Q4 is due to the trueing up of savings from previous quarters' projects.

Table 2‑1. Program participation (visits) in PY1

|  |  |  |  |
| --- | --- | --- | --- |
| Quarter (timeline) | Participants | Quarterly Reported Savings (therms) | Actual Savings (therms) |
| Q1 (07/21-09/21) | 89 | 1,063 | 1,130 |
| Q2 (10/21-12/21) | 229 | 1,687 | 2,930 |
| Q3 (01/22-03/22) | 388 | 1,524 | 2,758 |
| Q4 (04/22-06/22) | 238 | 4,049\* | 1,505 |
| Total | **944** | **8,323** | **8,323** |

*\*Year-end trued up value*

### Challenges and opportunities

The program staff mentioned that there was an initial ramp up period for the marketing and customers to learn about the program as it was a new program. Program staff did not name any other barriers associated with QHEC.

## Participant in-depth interviews

In July and August of 2022, concurrent with the impact evaluation’s engineering desk reviews, DNV’s evaluation team attempted to conduct a brief process interview (approximately ten questions) with each of the nine completed desk review respondents.[[14]](#footnote-15) DNV team contacted 35 customers and succeeded in connecting with 9 (Of these nine participants, eight participated in the QHEC+ and one participated in the basic QHEC pathway. There were no refusals during recruitment, but they were unresponsive. Of the nine, evaluators completed seven interviews (six QHEC+ and 1 QHEC participant). Due to the limited sample, findings presented are considered preliminary. The Evaluation Team spoke with only one participant in the standard QHEC pathway. The goal was to obtain a high-level, anecdotal understanding of participants’ perceptions of QHEC, including:

* Overall experience and satisfaction with the program
* Familiarity with other energy efficiency programs and measures
* Future plans and expectations for energy efficiency projects or program participation.

Key findings of the QHEC participant interview process include:

* Respondents were very satisfied with the program overall.
* Respondents learned about the QHEC program through various channels, including the NJNG website, word-of-mouth, postal mail, and email. Most respondents decided to participate in the program to reduce their energy bills and receive discounts on purchased products.
* Respondents offered mixed feedback on realized changes to the comfort of their homes. Of the six respondents who answered the question, half (3) stated they did notice a change in the comfort of their homes. Two of those three also said they had noticed a reduction in their energy bills, while one additional respondent who did not notice a change in comfort noticed a bill reduction. Three of the respondents expressed high satisfaction with the measures themselves, with one saying, “Yes, I love the night light and bulbs, nice spectrum, and I noticed my bill decreased by $18 the following months after installing everything.” Some customers perceived a bill benefit, but evaluation team did not verify savings. In addition, the program staff noted that it is not QHEC’s goal to dramatically reduce energy bills. Rather, it is to educate, engage, and introduce customers to other NJNG program offerings.
* DNV asked respondents to rate their satisfaction with seven different aspects of the program:

1. Process for scheduling an audit
2. Waiting time to receive the audit
3. The audit itself
4. Professionalism of the auditor
5. Recommendations received
6. Energy-efficient products installed
7. The QHEC program as a whole.

Nearly all respondents rated each aspect of the program 8 or higher, with only one rating the audit scheduling and process at 7. Elaborating on these ratings, respondents explained that the auditors were thorough and informative, the process was easy, and the program was helpful.

* When asked what other measures they would like to see included in the program, 4 of the 5 respondents who answered the question named various measures, including insulation, water heaters, windows, and general weatherization. In future evaluations, the evaluation team will revisit the goal of this question, and determine whether and how to pose it, as the measures named do not necessarily align with the QHEC program design and objectives.
* When asked about their plans for energy efficiency upgrades in the next 12 months, only 1 of 7 responded, saying they were interested in a pool heater upgrade. SAVEGREEN does not offer any incentives for pool heating equipment.

## Findings and Recommendations

Based on the results of this evaluation, our key process findings, and recommendations for the QHEC program are as follows:

**Findings**

* PY1 program participation rate was 63% of program goal (944 QHEC visits completed of 1,500 goal).
* PY1 achieved energy savings was 43% of program goal (832 therms achieved of 1,964 therms goal).
* 90% of PY1 program participants chose the more comprehensive QHEC+ pathway over QHEC.
* Almost 93% of program energy savings resulted from participation in the QHEC+ pathway
* Preliminary participant interviews showed high rates of program satisfaction.

**Recommendations**

* Conduct nonparticipant research to investigate reasons for nonparticipation, with a focus on customers who received program marketing but chose not to participate.
* Explore participant motivation behind choosing standard QHEC vs. QHEC+, to understand how best to target marketing and outreach to optimize participation.
* Assess the extent to which QHEC participation drives participation in other NJNG programs.
* Continue the program’s varied marketing and outreach channels. Consider an assessment to determine whether there is an opportunity to improve the reach and effectiveness of marketing channels. Activities might include an analysis of web traffic, email click-through rates, and tracking snail mail campaigns.

# Impact Evaluation

This section outlines the techniques used by the evaluators to collect relevant project-level data, a description of how the data was used to verify measure-level savings, and key drivers for differences in impacts leading to program-level findings and recommendations.

NJNG launched QHEC in 2021. Being a newly launched program, the Statewide EM&V guidance on measure assumptions and savings estimations did not exist when NJNG planned for reported savings estimations in Q1. The eventual measure savings calculation recommendations from the EM&V working group required NJNG to change its planning, tracking, and reporting infrastructure, which happened in Q2 of PY1.

## Evaluability Assessment

DNV has received program tracking data from the following data sources:

1. NJNG energy program tracking system (iEPM[[15]](#footnote-16) system)
2. Q1-Q3 NJNG reporting tables
3. Coordinated Measure List10
4. Annual Progress Report for PY111

Data from the iEPM system was downloaded directly from the web source at the end of each quarter. The download includes data for all customer information in the system. DNV completed a preliminary engineering analysis review of a sample of participants from the first two quarters of PY1. A full sample selected using statistical analysis (per Statewide Evaluator guidance) from all four quarters is currently being developed, and the results will be presented in the next evaluation report.

Table 3‑1: Measure level savings for PY1 (gas only)

|  |  |  |
| --- | --- | --- |
| Program | Measure Name | Savings  (therms) |
| QHEC | Low Flow Aerator | 203 |
|  | Low Flow Showerhead | 253 |
|  | Pipe wrap (hot water) | 57 |
|  | Water Heater set to 120F | 86 |
|  | Weather stripping | 2 |
| QHEC Total |  | **602** |
| QHEC+ | Low Flow Aerator | 2,524 |
|  | Low Flow Showerhead | 3,408 |
|  | Pipe wrap (hot water) | 770 |
|  | Water Heater Adjustment | 7 |
|  | Water Heater Pipe Wrap | 13 |
|  | Water Heater set to 120F | 968 |
|  | Weather stripping | 31 |
| QHEC+ Total | | **7,722** |
| Grand Total |  | **8,323** |

Table 3‑1 presents the measure level savings by pathway. On the gas side, nearly 77% of the total savings are from Low Flow Aerators (33%) and Low Flow Showerheads (44%) in the subprogram. Pipe wrap and Water Heater set to 120F save nearly 21% of the total subprogram savings.

## Participant interviews

The evaluators completed participant interviews for nine randomly selected customers from Q1 and Q2 in PY1 and reported unweighted site-level[[16]](#footnote-17) results in this report.

The evaluation team recruited participants of sampled QHEC projects using the contact information in the tracking database. Recruitment involved scheduling a date and time for evaluation engineers to conduct a phone interview with the participants for all sampled projects. During the interviews, the evaluators collected critical project- and measure-level information about the following to aid the impact evaluation process:

* Measure installation and operability
* Verify selected measure quantities and technology details (e.g., number of showerheads installed)
* Project completion date confirmation
* Measure operational setpoints and/or controls characteristics

The evaluators also used email as a medium to collect relevant project information from customers who preferred this channel over a phone interview. Evaluators made a minimum of five calls (at different times of the day and week) before the evaluators replaced the unresponsive site with an alternate site.

## Desk review analysis

This report utilized an enhanced rigor1 desk review approach for site-specific evaluation analysis. The evaluators used a combination of tracking data provided by NJNG and the phone interview responses provided by participants to verify the installation of efficiency measures and obtain key measure parameters that affected the energy savings associated with the project. The evaluators also reviewed reported savings associated with each measure type to verify assumptions against the New Jersey TRM[[17]](#footnote-18) (NJCEP 2021 Protocols) and other industry standards valid at the time of implementation. The evaluators then performed an independent estimation of measure level savings with revised inputs per phone interview responses or QHEC measure savings algorithm guidance provided in the Coordinated Measure List10, where necessary.

## Overview of impacts

This section provides results achieved for the QHEC sites that completed a desk review. Overall, evaluators found that the equipment claimed through the QHEC program was installed and operating as intended, except:

* Based on the participant's phone interview, the hot water temperature set point was not reduced to 120°F as required for one of the temperature turndown measures claimed by the program.

Table 3‑2, Table 3‑3, and Table 3‑4 provide the per-unit natural gas therms, peak kW, and annual kWh savings by measure, respectively. The evaluated per-unit savings in these tables were estimated based on guidance provided in the Coordinated Measures List10 and NJ TRM 2021. It is important to note that the deemed savings values for unit Low Flow Aerators and Showerheads presented in Table 3‑2 were updated to match evaluated estimates and the total savings were trued up in the Annual Progress Report filing (see Table 2‑1).

Table 3‑2. Unweighted QHEC gross impact results by measure (annual natural gas therms savings)

|  |  |  |  |
| --- | --- | --- | --- |
| Measure Name | Reported[[18]](#footnote-19) Per-unit Savings (therms) | | Evaluated Per-unit Savings (therms) |
| **Q1** | **Q2** |
| LED Nightlight | 0.0 | 0.0 | -0.085 |
| LED Screw-in General Service Lamp | -0.58 | 0.0 | -2.708 |
| Low Flow Aerator\* | 1.98 | 0.237 | 15.58 |
| Low Flow Showerhead\* | 8.69 | 0.314 | 18.06 |
| Pipe wrap (hot water) | 4.63 | 8.25 | 8.25 |
| Water Heater set to 120°F | 3.6 | 3.6 | 3.6 |

Table 3‑3. Unweighted QHEC gross impact results by measure (peak kW savings)

|  |  |  |  |
| --- | --- | --- | --- |
| Measure Name | Reported Per-unit Savings (kW) | | Evaluated Per-unit Savings  (kW) |
| **Q1** | **Q2** |
| Advanced Power Strip - Tier 2 | 0.0 | 0.039 | 0.039 |
| LED Nightlight | 0.0 | 0.0004 | 0.0004 |
| LED Screw-in General Service Lamp | 0.0 | 0.0133 | 0.0133 |

Table 3‑4. Unweighted QHEC gross impact results by measure (annual kWh savings)

|  |  |  |  |
| --- | --- | --- | --- |
| Measure Name | Reported Per-unit Savings (kWh) | | Evaluated Per-unit Savings (kWh) |
| **Q1** | **Q2** |
| Advanced Power Strip - Tier 2 | 346 | 346 | 346 |
| LED Nightlight | 29.57 | 5.547 | 5.547 |
| LED Screw-in General Service Lamp | 37.1 | 177.51 | 177.51 |

Table 3‑5 shows key contributing factors to QHEC gross impacts variance and related recommendations.

Table 3‑5. Key contributors to gross impact variance and recommendations

|  |  |  |
| --- | --- | --- |
| Measure Name | Summary of Savings Difference | Recommendation |
| Advanced Power Strip - Tier 2 | * Peak kW savings were not claimed for three Q1 sites for which the desk review was completed | * None. Corrective action has been implemented by NJNG beginning in Q2. |
| LED Nightlight and LED Screw-in General Service Lamp | * Claimed kWh savings were higher than deemed savings recommended by the EM&V working group for three Q1 sites for which the desk review was completed * Heating system penalties from reduced waste heat were not considered for natural gas impacts | * None. Corrective action has been implemented by NJNG beginning in Q2. * Update savings algorithms for nightlights and screw-in general service lamps to include heating penalties and associated natural gas therms impacts. |
| Low-flow aerators and showerheads | * This measure's deemed savings value was originally underestimated in Q1 and Q2 filings but was fixed in the PY1 annual progress report filing. The annual report used NJ TRM 2021 addendum17 algorithm. | * Update measure savings algorithm per FY2021 addendum |
| Hot water pipe wrap | * Natural gas savings were not estimated using algorithms provided in 2020 NJ TRM for Q1 sites for which the desk review was completed | * None. Corrective action has been implemented by NJNG beginning in Q2. |

## Conclusions and recommendations

Key findings and the relevant recommendations are as follows:

* As noted in the previous section, evaluators found that most measures in Q1 reported savings utilizing outdated savings calculation assumptions since statewide EM&V guidance on measure assumptions and savings estimations did not exist when NJNG planned for reported savings estimations in Q1. Additionally, NJNG followed the 2020 NJ TRM algorithm for low-flow aerators and showerheads in Q2, but there was an error within the 2020 NJ TRM algorithm where aerator run “hours” was used instead of “minutes.”
* **Recommendation:** Update measure savings per the most up-to-date Coordinated Measure List and the PY2021 New Jersey TRM recommendations.
* The natural gas savings estimated per New Jersey TRM for the aerator, showerhead, and pipe wrap measures did not consider the home’s actual heating system type and efficiency, but default assumptions were provided in the TRM.
* **Recommendation:** To improve the accuracy of aerator, showerhead, and pipe wrap savings calculations, NJNG’s auditors should start collecting relevant measure-specific data, most notably for heating system type and heating system efficiency. Additionally, for pipe wrap measures, NJNG auditors should start collecting measure-specific data on fluid temperature and space temperature.
* Heating system penalties from reduced waste heat were not considered for energy-efficient lighting measures.
* **Recommendation:** If lighting continues to be a QHEC measure (based on the baseline updates of lighting measures), include heating penalties and associated natural gas therms impacts in savings calculations for interior energy-efficient lighting measures.
* **Recommendation:** To improve the accuracy of smart thermostat[[19]](#footnote-20) savings calculations, QHEC auditors should start collecting the following measure-specific data and update deemed savings estimations accordingly:
* Heating fuel type
* Cooling system type

# Program Comparisons

This section reviews Process and Impact Evaluation findings from a sampling of other residential home audit programs similar to QHEC around the country and compares them to QHEC.

As noted earlier, this is an initial 'snapshot' evaluation, the current evaluation did not include a full participant survey. Therefore, participant survey results, NTG and realization rates for NJNG are not reported for NJNG in this report but they will be part of the next round of evaluation. Table 4‑1 and Table 4‑2 below provide a quick overview of Process and Impact findings for similar programs in other jurisdictions.

Table 4‑1. QHEC and similar programs from other states, process findings

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| State/Region | PA | MO | IN | NJNG |
| PY | 2017 | 2016 | 2019 | 2022 |
| FR | 7% | 33% | Electric-17%  Gas-6% | Not reported |
| SP | 9% | 2% | Electric- 0%  Gas- 0% | Not reported |
| NTG | 102% | 82% | Electric-83%  Gas-94% | Not reported |
| Recommendation | change the channel through which customers receive the kits/equipment | more targeted marketing to increase participation | identify outreach and marketing strategies to  better engage customers | Conduct nonparticipant research to investigate reasons for nonparticipation, with a focus on customers who received program marketing but chose not to participate. |
| Customers in Sector | Residential | Residential | Residential | Residential |
| Participant Count | 3,550 jobs. | 6,575 jobs | 721 assessments | 944 visits |
| Participant Satisfaction | 87% (Very Satisfied) | 84% (Very Satisfied) | 89% (Satisfied) & 65% (very Satisfied) | Not reported |
| Program Awareness | Not reported | Utility Website | Utility website (30%), bill insert (19%), word of mouth (18%) | Not reported |

Table 4‑2. QHEC and similar programs from other states, impact findings

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| State/Region | PA | MO | IN | NJNG |
| PY | 2017 | 2016 | 2019 | 2022 |
| Total Savings claimed (kWh/year), (therms/year) | Reported: 1,494,000[[20]](#footnote-21) (kWh/year) | Reported:  224,223 (kWh/year) | Reported:  Electric- 234,034 (kWh/year)  Gas- 51,335 (therms/year) | 8,323 therms/year |
| Energy Realization Rate (RR) | 69% | 116% | Electric-128%  Gas-68% | Not reported |
| Demand Realization Rate (RR) | 71% | 162% | Electric- 60% | Not reported |
| Implementation Strategy/Program Design | Other (Mailing the kits to customers directly when customer sign up for audit) | Direct Install | Direct Install | Existing Homes/Mail-in[[21]](#footnote-22) |
| Measure Mix | Showerheads, Faucet Aerators, Pipe insulation, weatherstripping | Advanced power strip, Showerheads, Faucet Aerators, Pipe insulation, weatherstripping | Showerheads, Faucet Aerators, Pipe insulation, weatherstripping | Advanced power strip, Showerheads, Faucet Aerators, Pipe insulation, weatherstripping |
| Savings Methodology | TRM Deemed | TRM Deemed | Unknown | TRM Deemed |

###### Program staff feedback

General information

1. Can you explain what your role and responsibilities are for this program and also for your company?
2. Is there anything, in particular, you are interested in having the evaluators study?

Communication and structure

1. [If not already mentioned] What are the goals of the program? How are they set? [PROBE: segment targets, measure targets, EE savings, geographic targets, customer satisfaction, etc.]
2. What metrics do you use to measure the success of the program?
   1. Are there any metrics you would like to see incorporated into measuring and reporting on this program?
3. How is the program currently progressing against its goals? How have they performed historically?
   1. Are you considering any revisions to program goals?
4. How are program tracking metrics shared? What is the frequency and format of this reporting?
5. What data tracking systems are used for tracking program outreach? Participation? Savings? Project status? How are those integrated, if at all?
6. How, if at all, has the COVID-19 pandemic affected participation in the program? (PROBE: Effects on participation, marketing, deployment of program specifics, events/engagement)

Program process

1. [FOR REBATES] Can you describe the participation process for the program from the customer’s perspective, from first contact through rebate payment (or program completion)? At what stage of participation/customer decision-making do you typically get involved?
2. Have you received any feedback on the participation process from customers?
3. How do you decide what energy savings measures are included in the program?
4. What other measures, if any, have you thought about including in the program?

Marketing and outreach

1. How is the program currently marketed? What types of outreach activities does your team do?
2. Do you conduct any community outreach or engagement? What do you do? [PROBES: how do they elicit input, WHO do they elicit it from, and do they make any special efforts to engage LI or minorities (certain programs target LI customers)?]
3. How do you measure/judge the effectiveness of program marketing? What metrics does the team capture, and how are they used? Do you have specific goals?
4. Is there any cross-marketing between other programs?
5. What do you believe are the most persuasive marketing messages/themes for your program? How is this different for different customers and measures?
6. Is there a particular time/event that is the most effective moment to market your program? How is this different for different customers and measures?

Barriers to participation

1. What do you see as some of the main barriers to getting a customer to participate in the program?
   1. Do you have any plans on how to address these barriers?

Opportunities

1. Are there any interesting trends you’ve encountered in implementing the program, or what kinds of feedback do customers provide about their experience?
2. Do you see other opportunities for program growth? If there were one thing you would add or change about the program, what would it be?

###### Participant feedback

Program awareness & expectations

1. How did you learn about the program?
2. What benefits were you hoping to get from your participation in the program?

QHEC participation details

1. Did you participate in the "QHEC+" option? This option includes a blower door test, a Department of Energy Home Energy Score, and the potential for the installation of a smart thermostat (thermostats are purchased off the marketplace and savings are captured in the EE Products program) for an additional fee.
2. Which energy-saving activities did the auditor perform?
   1. Blower door test
   2. Water heater adjustment
   3. Water heater temperate change (change to 120F)
   4. Other, please explain:
3. Which energy-saving equipment did you install?
   1. LED lightbulb(s)
   2. LED nightlight
   3. LED – other (specialty bulbs, i.e., candelabras)
   4. Low-flow showerhead(s)
   5. Low-flow aerator
   6. Advanced power strip
   7. Pipe wrap (hot water)
   8. Water heater pipe wrap
   9. Weather stripping
   10. Smart thermostat (through QHEC+)
   11. Other, please explain:
4. Did you install this equipment at your home address?
   1. Which, if any, did you install somewhere else?
5. Since they were installed, did you remove any of these items from the locations where you installed them?
   1. Which item(s) did you remove?
      1. Why was/were the **[MEASURE TYPE]** removed?

Program experience

1. Since completing your audit and installing **[EQUIPMENT]**, have you noticed a change in the comfort of your home?
   1. **[IF YES]** Please explain.
2. Have you participated in any other energy efficiency programs provided by NJNG? **[IF YES]** Which ones?
   1. Do you plan to participate in any other NJNG energy-efficiency program in the future?

Satisfaction

Now I’d like to ask you a few questions about how satisfied you were with different aspects of the program. Please answer these questions on a scale of 0 to 10, where 0 is not ***satisfied,*** and 10 is ***very dissatisfied***.

1. How satisfied or dissatisfied were you with the…?
   1. Process for scheduling an audit
   2. Wait time to receive your audit
   3. The audit process itself
   4. The professionalism of the auditor
   5. The recommendations you received
   6. Energy efficient products you installed
   7. QHEC program as a whole

**[Q11 ONLY ASKED FOR ANY PROGRAM ASPECT THAT THE RESPONDENT RATES AS LESS THAN A 3]**

1. Why do you give that rating?
2. Are there any energy-efficient products you would like to see included in the program in the future?
3. Do you plan to make new energy-efficient improvements to your home in the next 12 months?

**[IF YES]**

* 1. What improvements do you plan to make?

1. Do you have any additional comments about your experience with the program?

Thank you very much for taking the time to speak with me today.

DNV

DNV is a global quality assurance and risk management company. Driven by our purpose of safeguarding life, property and the environment, we enable our customers to advance the safety and sustainability of their business. We provide classification, technical assurance, software and independent expert advisory services to the maritime, oil & gas, power and renewables industries. We also provide certification, supply chain and data management services to customers across a wide range of industries. Operating in more than 100 countries, our experts are dedicated to helping customers make the world safer, smarter and greener

1. New Jersey Guidelines for Enhanced Rigor Clean Energy Program Utility Evaluations. Statewide Evaluator, July 22, 2022. [↑](#footnote-ref-2)
2. <https://www.njcleanenergy.com/files/file/BPU/2022/10.14/NJ%20Coordinated%20Measures%20List%20-%20EMV%207_22_22.xlsx> [↑](#footnote-ref-3)
3. Note that there are no claimed savings from the Smart Thermostats in QHEC program. Smart thermostats are bought through the Marketplace pathway of the Energy Efficient Products Program, but the customers have an option to get them installed through the QHEC+ pathway. [↑](#footnote-ref-4)
4. <https://www.njcleanenergy.com/files/file/BPU/2022/10.14/NJ%20Coordinated%20Measures%20List%20-%20EMV%207_22_22.xlsx> [↑](#footnote-ref-5)
5. Smart thermostats are bought through the Marketplace and savings will be claimed in Energy Efficient Products Program, but the customers have an option to get them installed through the QHEC+ pathway. [↑](#footnote-ref-6)
6. Includes Electric customers that are served by NJNG for natural gas. [↑](#footnote-ref-7)
7. Participation is the count of completed visits. [↑](#footnote-ref-8)
8. Per The SAVEGREEN Project Program Plan (NJNG) -12/21/2020 [↑](#footnote-ref-9)
9. SWC is still under development. The electric utilities have not claimed these savings in PY1. The savings will be rolled over into utilities’ PY2 estimates. NJNG is currently in the process of QC of that data and plans to deliver it the respective utilities by Spring 2023. [↑](#footnote-ref-10)
10. <https://www.njcleanenergy.com/files/file/BPU/2022/10.14/NJ%20Coordinated%20Measures%20List%20-%20EMV%207_22_22.xlsx> [↑](#footnote-ref-11)
11. <https://www.njcleanenergy.com/files/file/UTILITY%20REPORTING/4Q%20FY22/NJNG%20-%20NJ%20Annual%20Report-Executive%20Summary%20-%2010_17_22.pdf> [↑](#footnote-ref-12)
12. For PY1 filing, the utilities have been given an extension of 30 days and the annual progress report was filed on October 17, 2022. [↑](#footnote-ref-13)
13. <https://www.njcleanenergy.com/main/public-reports-and-library/financial-reports/clean-energy-program-financial-reports> [↑](#footnote-ref-14)
14. See section 3 for details of the impact evaluation. [↑](#footnote-ref-15)
15. Inspection data collected at each home is recorded in SnuggPro and secured in the iEPM system for tracking purposes. DNV did not review raw data from SnuggPro. [↑](#footnote-ref-16)
16. Each customer location is classified as a “Site” in this report. [↑](#footnote-ref-17)
17. <https://www.njcleanenergy.com/files/file/Library/FY21/FY21%20Savings%20Protocols.pdf> [↑](#footnote-ref-18)
18. Reported in Q1 and Q2 quarterly progress reports. [↑](#footnote-ref-19)
19. Installed through the QHEC+ pathway but savings are captured in EEP program. [↑](#footnote-ref-20)
20. Includes online assessment and in-home audit components; Both channels delivered energy efficiency kits to customers. [↑](#footnote-ref-21)
21. NJNG offer customers that receive energy assistance free kits. The customer could contact NJG via email/phone-call and request one of the kits if they hadn’t received one already. [↑](#footnote-ref-22)