

Energy Solutions for Business EM&V Report

Jersey Central Power & Light

PY22: July 1, 2021-June 30, 2022

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1 Abstract

On May 23, 2018, New Jersey's Governor signed into law the Clean Energy Act of 2018¹ (CEA). It calls for a significant overhaul of New Jersey's energy systems while growing the economy, building sustainable infrastructure, creating well-paying local jobs, reducing carbon emissions, and improving public health to ensure a cleaner environment for current and future residents. The CEA plays a key role in achieving the State's goal of 100 percent clean energy by 2050 by establishing aggressive energy reduction requirements, among other clean energy strategies. Specifically, the CEA directs the Board of Public Utilities (BPU) to require that:

- Each electric public utility to achieve annual reductions of at least 2 percent of the average annual electricity usage in the prior three years within five years of implementation of its electric energy efficiency program.
- Each natural gas public utility to achieve annual reductions in the use of natural gas of at least 0.75 percent of the average annual natural gas usage in the prior three years within five years of implementation of its gas energy efficiency program.

The CEA requires that evaluation, measurement, and verification activities are used to review the electric and gas energy usage reductions and peak demand reductions for the utility's energy efficiency programs. A Statewide Evaluator (SWE), hired by the BPU to coordinate the evaluations for all utilities, provided guidelines for basic and advanced rigor evaluations that apply to new or changed programs and established programs, respectively. The SWE also required at least two full impact and process evaluations during the first triennium, with the CEA required triannual report due at the end of the first triennium. This report conforms to the SWE's basic rigor guidance for evaluations for all JCP&L programs and aligns with approved M&V Plans from June 2, 2022.

For programs that produce both electricity and gas savings, the lead utility is responsible for evaluating both fuels, and reported savings that are held on behalf of the partner utility will be passed via the Statewide Coordinator system in 2023. Therefore, program gas savings are included in this report.

ADM is under contract with Jersey Central Power & Light Company (JCP&L) to provide evaluation, measurement, and verification (EM&V) services of its energy efficiency programs, including the Energy Solutions for Business (ESB) program. The contract provides for annual EM&V reporting covering a three-year period from July 1, 2021, through June 30, 2024, culminating in a final report that covers the triennium to be

¹ P.L. 2018, c.17 (N.J.S.A. 48:3-87.8 et seq.).

delivered to the BPU. This report summarizes findings from an initial evaluation of the program, covering activities in the first year of implementation (PY22).

Both reported (or *ex-ante*) and verified (or *ex-post*) impacts in this report are constructed with calculation methods prescribed in the NJ Coordinated Measures List (NJCML or CML)^{2,3}. The NJCML serves as the technical reference manual (TRM) for the CEA's first triennium. The NJ FY20 Protocols and the FY21 Protocols Addendum are the primary documents referenced in the CML. The CML also prescribes sections from other TRMs for measures that are not yet included in the NJ Protocols.

1.1 PY22 Achievements

The reported and verified annual electric energy, electric demand, and gas energy impacts⁴ for the program are shown in Table 1-1 below.

Table 1-1: ESB Program PY22 Gross Energy and Demand Impacts

Impact	Reported	Verified
Electric Energy (kWh)	4,608,300	4,702,303
Demand (kW)	881.27	926.75
Gas Energy (Therms)	(14,577.38)	(13,355.72)

1.2 PY22 Evaluation Results

1.2.1 Gross Verified Impacts and Realization Rates

The Energy Solutions for Business (ESB) Program contains four program components which are described in Section 0 of this report. Only two of the four programs, Prescriptive and Custom downstream rebates and Appliance Recycling, have savings for PY22. The other two components, Engineered Solutions and Energy Management, involve long-term projects such as retro-commissioning, design assistance, and new construction. Gross impact evaluation results by energy saving sub-program are reported in Table 1-2 and Table 1-3 below.

² Per [BPU DOCKET NOS. QO19010040. Agenda Date: 10/12/2022. Agenda Item: 8D. Page 7](#): "Calculations used by the utilities to determine program savings counted toward compliance are cataloged in the Joint Utility Coordinated Measures List, which references the FY20 Protocols, the FY21 Protocols Addendum, and TRMs from other states when no applicable New Jersey specific measure calculation was available."

³ While the NJ CML served as the basis for evaluation, ADM determined site-specific lighting hours of use for sampled projects. This would typically be reserved for enhanced-rigor activities, but ADM opted for site-specific hour of use to facilitate concurrent measurement and verification for JCP&L's offers in PJM's forward capacity market.

⁴ Evaluated therms and MMBtus include heating penalties where included in applicable protocols.

Table 1-2: ESB PY22 Gross Energy and Demand Impacts

Program	Ex-ante kWh	Ex-post kWh	RR kWh	Ex-ante kW	Ex-post kW	RR kW
Prescriptive/Custom	4,566,280	4,660,283	102%	874.82	920.30	105%
Appliance Recycling	42,020	42,020	100%	6.45	6.45	100%
Total	4,608,300	4,702,303	102%	881.27	926.75	105%

Table 1-3: ESB PY22 Gross Annual Retail Therms and MMBtu Savings⁵

Program	Ex-ante therms	Ex-post therms	Ex-ante MMBtu	Ex-post MMBtu	RR
Prescriptive/Custom	(14,577.38)	(13,355.72)	(1,457.74)	(1,335.57)	92%
Appliance Recycling	-	-	-	-	-
Total	(14,577.38)	(13,355.72)	(1,457.74)	(1,335.57)	92%

1.2.2 Summary of Key Parameters Collected by the Evaluation Effort

The evaluation effort collected data on key parameters that are inputs to TRM algorithms used for reporting impacts in PY22. These parameters are summarized in Table 1-4 below. ADM has separately provided a similar table to the SWE to support the ongoing TRM update process.

Table 1-4: Summary of Key Parameters

Measure	Parameter Name	Sector	Parameter Mean	Parameter Standard Deviation	Number of Observations	Relative Precision at 90%
Lighting	Verification Rate	-	0.96	0.187	84	0.035
Lighting	Hours of Operation	Education Secondary School	1351	-	1	-
Lighting	CF	Education Secondary School	0.02	-	1	-
Lighting	Hours of Operation	Exterior	4305	-	6	-

⁵ Evaluated therms and MMBtus include heating penalties where included in applicable protocols.

Measure	Parameter Name	Sector	Parameter Mean	Parameter Standard Deviation	Number of Observations	Relative Precision at 90%
Lighting	Hours of Operation	Grocery	6304	1533	3	0.231
Lighting	CF	Grocery	1	-	3	-
Lighting	Hours of Operation	Other	2504	-	1	-
Lighting	CF	Other	0.68	-	1	-
Lighting	Hours of Operation	Retail Large	4978	2193	5	0.324
Lighting	CF	Retail Large	1	-	5	-
Lighting	Hours of Operation	Retail Small	5431	2700	3	0.472
Lighting	CF	Retail Small	0.97	0.06	3	0.057

1.3 Evaluation Recommendations

ADM has provided the recommendations summarized in Table 1-5 for continued improvement of tracking and reporting for the ESB Program. All recommendations have been accepted and are incorporated into JCP&L's business practices for the ESB program.

Table 1-5: Summary of Tracking and Reporting Recommendations

Recommendation	JCP&L Disposition	Status of Follow-Up Items	Verified by ADM
Continue mitigation of evaluation risk with upfront evaluation of large projects, both custom and prescriptive	Accepted	Complete	Yes
Continue quality check of claimed savings through the review of energy impacts by measure if they fall out of the expected boundaries.	Accepted	Complete	Yes
Continue to provide evaluator with ex-ante calculator for review as New Jersey Coordinated Measure List is updated.	Accepted	Complete	Yes
Implementation team quality control checks for: measure unit quantities, accurate classification of facility type, maintaining consistency with the coordinated measure list (CML), and ensuring appropriate use of measure reference listed in the CML, for example, compressed air.	Accepted	Ongoing	Yes

<p>The Evaluator should provide feedback on the New Jersey protocols for continuous improvement: The 2020 NJ Protocols provide exterior hours of use for Multifamily Lighting but not for general commercial and industrial facilities. While the utilities have agreed to use exterior hours of use from the New York TRM it would be beneficial to include lighting exterior hours for additional facility types.</p>	Accepted	Ongoing	Yes
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1.4 TRM Updates

Recommendations for technical reference manual (TRM) updates and evaluation data collected to support the effort are included in the Cross Cutting Program Results document submitted in conjunction with this report. Since the initial draft of this report, many draft TRM sections have been made available to utilities and their evaluators for review. In this process we have confirmed that the VSD Air Compressors (< 75 HP) measure in this program that lacked entries in the NJ Protocols has been added to the Protocols for the next Triennium.

1.5 Process Evaluation Activity Summary

To date, process evaluation activities have served two objectives. The first objective is to ensure that program tracking and reporting systems and processes are established, accurate, and contain sufficient information to support upcoming enhanced-rigor evaluations. The second objective is to gather information and develop sufficient context to conduct deeper process evaluation activities in PY23. The first objective was accomplished through active participation in the launch of the data tracking and reporting systems. The ADM team reviewed all measure attributes that should be tracked and recorded and helped in the implementation of quality assurance rules related to key data fields for each measure. JCP&L has developed a process which applies logical and quantitative quality assurance rules to incoming program tracking data. Any outliers are flagged for further review and investigated to resolution by JCP&L's evaluation and implementation staff.

To build context for upcoming process evaluations, the ADM team has reviewed documentation such as policy documents drafted by BPU staff, evaluation guidance documents drafted by the SWE, and JCP&L's Energy Efficiency and Conservation plan. The ADM team has also conducted initial interviews with JCP&L's Energy Efficiency program managers and overall implementation managers to identify researchable issues for process evaluation.

Evaluators for utilities that participate in the CEA jointly gathered data to facilitate program benchmarking. The ADM team used benchmarking data primarily to identify gaps in

energy efficiency measures or delivery that may be offered by CEA programs. The benchmarking study gathered program metrics such as realization rates, participation rates (normalized to 100,000 participants). In most cases, direct comparison of realization rates and participation rates is significantly qualified by differences in program maturity and state-to-state differences in reporting and evaluation conventions. This is particularly true for PY22, which was a startup year for New Jersey.

2 Executive Summary

2.1 Introduction

The CEA requires that evaluation, measurement, and verification activities are used to review the electric and gas energy usage reductions and peak demand reductions for the utility's energy efficiency programs. A Statewide Evaluator (SWE), hired by the BPU to coordinate the evaluations for all utilities, provided guidelines for basic and advanced rigor evaluations that apply to new or changed programs and established programs, respectively. The SWE also required at least two full impact and process evaluations during the first triennium, with the CEA required triannual report due at the end of the first triennium. This report conforms to the SWE's basic rigor guidance for evaluations for all JCP&L programs and aligns with approved M&V Plans from June 2, 2022.

For programs that produce both electricity and gas savings, the lead utility is responsible for evaluating both fuels, and reported savings that are held on behalf of the partner utility will be passed via the Statewide Coordinator system in 2023. Therefore, program gas savings are included in this report.

ADM is under contract with JCP&L to provide evaluation, measurement, and verification (EM&V) services of its energy efficiency programs. The contract provides for annual EM&V reporting covering a three-year period from July 1, 2021, through June 30, 2024, culminating in a final report that covers the triennium to be delivered to the BPU. This report summarizes findings from an initial evaluation of the program, covering activities in the first year of implementation (PY22).

2.2 Program Description

The ESB program is the commercial umbrella program for all commercial sector programs except the Small Business Direct Install (SBDI) program. The ESB program provides incentives to Commercial and Industrial (C&I) customers to purchase and install energy-efficient products. Additionally, the program provides midstream incentives and support to manufacturers, distributors, contractors, and retailers that sell select energy-efficient products.

This is done through four sub-programs:

- **Prescriptive & Custom.** The Prescriptive & Custom sub-program includes prescriptive downstream rebates for lighting, HVAC equipment, refrigeration, appliances, office equipment, agricultural equipment, and commercial food service equipment. Prescriptive incentives are offered for individual applications and retrofit projects employing standard efficient technologies where the anticipated energy savings are consistent. Performance-based

incentives are provided to customers based upon an analysis of potential energy savings and peak demand reduction on a case-by-case basis. Midstream lighting is also included in this sub-program. As part of the Prescriptive & Custom sub-program, the midstream option offers discounts through distributors on lighting, food services, and HVAC measures. For projects with instant discounts of less than \$7,500, the streamlined process allows customers to receive program-eligible equipment without having to submit an application.

Custom measures provide calculated or performance-based incentives for electric and/or natural gas efficiency opportunities for commercial, industrial, and other non-residential customers that are non-standard and not captured by prescriptive equipment. Typical custom measures that are eligible for incentives are either less-common measures or efficiency opportunities in specialized applications that may include manufacturing processes, or non-traditional use cases. In many cases, custom efficiency projects are more complex than prescriptive equipment replacement.

- **Appliance Recycling.** The Appliance Recycling sub-program removes older, inefficient appliances from the electric system by offering small and large commercial customers a financial incentive and pick-up and disposal service for eligible residential size/style refrigerators, freezers, dehumidifiers, and room air conditioners.
- **Engineered Solutions.** The Engineered Solutions sub-program provides tailored energy-efficiency assistance and turnkey engineering services to public service entities, such as municipalities, universities, schools, hospitals, healthcare facilities, non-profit entities, and multifamily buildings with an average annual demand above 200 kW. The program targets comprehensive upgrades of electric and gas measures for multiple building systems, including lighting, HVAC, motors and drives, refrigeration, and appliances. An energy audit of a customer's facilities is completed to identify energy-efficiency improvement opportunities. Energy savings and incentives are calculated on a project-by-project basis to assist in developing a work plan of the most cost-effective measures to be recommended for installation in a customer's facilities.
- **Energy Management.** The Energy Management sub-program provides a comprehensive approach to improving building energy performance and savings to nonresidential customers with an average annual demand above 200 kW through three offerings: Building Tune-up, Retro-Commissioning, and Strategic Energy Management.

Only the Prescriptive & Custom and Appliance Recycling sub-programs generated energy savings during PY22. The overall program savings are driven by lighting measures.

Sub-programs are administered by contracted program implementers. The Appliance Recycling and Prescriptive & Custom sub-programs are administered by ARCA Recycling and TRC. Energy Solutions and Energy Management are administered by Willdan.

The ESB Prescriptive & Custom and the Appliance Recycling subprograms were launched effectively and promptly on July 1, 2021. The Engineered Solutions sub-program launched in October 2021. PY22 was spent recruiting program allies, developing the tools to be used by program allies, and educating program allies and customers on the benefits of the Engineered Solutions sub-program. There were no completed projects in PY22.

2.3 Evaluation Summary

Both reported and verified impacts in this report are constructed with calculation methods prescribed in the NJCML⁶. The NJCML serves as the TRM for the CEA's first triennium. The NJ FY20 Protocols and the FY21 Protocols Addendum are the primary documents referenced in the CML. The CML also prescribes sections from other TRMs for measures that are not yet included in the NJ Protocols.

Gross impact evaluations for the sub-programs generally followed the same logic and process:

- Review program tracking data to inform sample design and target sample sizes
- Pull samples and compute gross impacts in accordance with agreed-upon TRM protocols as specified in the NJ CML using the following data:
 - Verified installation derived from customer interviews, site visits, and/or documentation review
 - Installation locations and hours of operation⁷
 - Additional equipment data as needed (size, capacity, etc.)
- Develop gross realization rates as the ratios of reports (or ex-ante) and verified (or ex-post) impacts for sampled projects or measured within each sampling stratum

⁶ Per [BPU DOCKET NOS. QO19010040. Agenda Date: 10/12/2022. Agenda Item: 8D. Page 7](#): "Calculations used by the utilities to determine program savings counted toward compliance are cataloged in the Joint Utility Coordinated Measures List, which references the FY20 Protocols, the FY21 Protocols Addendum, and TRMs from other states when no applicable New Jersey specific measure calculation was available."

⁷ ADM verified that the implementation team applies the prescribed hours of use and coincidence factors from the NJ Protocols. ADM used site-specific hours of use for this evaluation to compile data in support of the ongoing TRM updates. This methodological difference drives realization rates for this program in PY22. Had ADM used the TRM hours of use, the realization rates would have been close to 100 percent.

While gross realization rates are an important evaluation outcome, other key evaluation findings include specific recommendations for implementation, tracking, and reporting in subsequent program years. This initial evaluation yielded the following important information:

- A list of measures that are not currently covered by the NJ Protocols (but are covered by the NJ CML)
- Specific recommendations for additions or enhancements of TRM protocols (whether in the NJ Protocols or other regional TRMs cited by the NJ CML)
- Measured values for key parameters such as hours of use for exterior lighting in commercial spaces not currently covered by the NJ Protocols.

More detailed descriptions of each sub-program evaluation effort and findings are provided in Section 3, with detailed results provided in subsequent appendices.

This report does not include results from a full round of process evaluations. Process activities to date have been of two kinds. The first kind is *embedded evaluation* in the sense that the evaluation team works closely and concurrently with the implementation and tracking and reporting teams to ensure that important data is collected and saved for each program. The outcome of this effort is that the tracking and reporting process is properly established and maintained. The second kind of process evaluation activity conducted thus far is to gather data to provide context for upcoming process evaluations to be completed in PY23.

2.3.1 Evaluation Methods

Evaluation of the ESB program included an impact analysis and a condensed process evaluation. ADM calculated ex-post kWh savings through program data review, measure verification, and using industry standard protocols to calculate energy impacts. Energy savings algorithms for the ESB program are dependent on the measure type and feasible level of rigor. This includes the use of engineering algorithms from the New Jersey Protocols and references from the New Jersey Coordinated Measure List (NJ CML)⁸ with algorithm variables based on primary data collection.

⁸ Per [BPU DOCKET NOS. QO19010040. Agenda Date: 10/12/2022. Agenda Item: 8D. Page 7](#): "Calculations used by the utilities to determine program savings counted toward compliance are cataloged in the Joint Utility Coordinated Measures List, which references the FY20 Protocols, the FY21 Protocols Addendum, and TRMs from other states when no applicable New Jersey specific measure calculation was available."

Prescriptive & Custom

The NJ CML provided algorithmic protocols to calculate Prescriptive & Custom lighting savings. Primary sources included program tracking data and customer interviews and site visits.

Appliance Recycling

The NJ CML provided partially and fully deemed protocols to calculate appliance recycling savings. Primary sources included program tracking data and customer interviews and site visits.

Process Evaluation

For PY22, the process evaluation consisted of an in-depth interview with JCP&L program staff and the implementation team. Expanded process evaluation activities for PY23 will also include customer surveys.

2.4 Evaluation Results

Gross impact evaluation results by sub-program are reported in Table 2-1 and Table 2-2 below. The ESB program contributed roughly five percent of the overall portfolio savings during PY22, producing 4,710,671 kWh of savings, with a 102 percent realization rate.

Table 2-1: ESB PY22 Gross Energy and Demand Impacts

Program	Ex-ante kWh	Ex-post kWh	RR kWh	Ex-ante kW	Ex-post kW	RR kW
Prescriptive/Custom	4,566,280	4,660,283	102%	874.82	920.30	105%
Appliance Recycling	42,020	42,020	100%	6.45	6.45	100%
Total	4,608,300	4,702,303	102%	881.27	926.75	105%

Table 2-2: ESB PY22 Gross Annual Retail Therms and MMBtu Savings⁹

Program	Ex-ante therms	Ex-post therms	Ex-ante MMBtu	Ex-post MMBtu	RR
Prescriptive/Custom	(14,577.38)	(13,355.72)	(1,457.74)	(1,335.57)	92%
Appliance Recycling	-	-	-	-	-
Total	(14,577.38)	(13,355.72)	(1,457.74)	(1,335.57)	92%

⁹ Evaluated therms and MMBtus include heating penalties where included in applicable protocols.

In addition, to installation rates, the evaluation effort collected data on key parameters that are inputs to TRM algorithms used for reporting impacts in PY22. These parameters are summarized in Table 2-3 below. ADM has separately provided a similar table to the SWE to support the ongoing TRM update process. While the PY22 evaluation found hours of operation for various facility types, the overall sample size for each facility type was small. As of this writing ADM sees no indication that the lighting hours of use in the NJ Protocols are inaccurate. The most useful enhancements would be through additions of new space or facility types, rather than revisions of values for existing facilities.

Table 2-3: Summary of Key Parameters

Measure	Parameter Name	Sector	Parameter Mean	Parameter Standard Deviation	Number of Observations
Lighting	Verification Rate	-	0.96	0.187	84
Lighting	Hours of Operation	Education Secondary School	1351	-	1
Lighting	CF	Education Secondary School	0.02	-	1
Lighting	Hours of Operation	Exterior	4305	-	6
Lighting	Hours of Operation	Grocery	6304	1533	3
Lighting	CF	Grocery	1	-	3
Lighting	Hours of Operation	Other	2504	-	1
Lighting	CF	Other	0.68	-	1
Lighting	Hours of Operation	Retail Large	4978	2193	5
Lighting	CF	Retail Large	1	-	5
Lighting	Hours of Operation	Retail Small	5431	2700	3
Lighting	CF	Retail Small	0.97	0.06	3

2.5 Recommendations and Next Steps

2.5.1 Tracking and Reporting Updates

ADM has provided the recommendations summarized in Table 2-4 for continued improvement of tracking and reporting for the ESB Program. As of this writing, all of the recommendations have been accepted, 3 of which have follow-up actions completed and 2 with follow-up actions ongoing.

Table 2-4: Summary of Tracking and Reporting Recommendations

Recommendation	JCP&L Disposition	Status of Follow-Up Items	Verified by ADM
Continue mitigation of evaluation risk with upfront evaluation of large projects, both custom and prescriptive	Accepted	Complete	Yes
Continue quality check of claimed savings through the review of energy impacts by measure if they fall out of the expected boundaries.	Accepted	Complete	Yes
Continue to provide evaluator with ex-ante calculator for review as New Jersey Coordinated Measure List is updated.	Accepted	Complete	Yes
Implementation team quality control checks for: measure unit quantities, accurate classification of facility type, maintaining consistency with the coordinated measure list (CML), and ensuring appropriate use of measure reference listed in the CML, for example, compressed air.	Accepted	Ongoing	Yes
The Evaluator should provide feedback on the New Jersey protocols for continuous improvement: The 2020 NJ Protocols provide exterior hours of use for Multifamily Lighting but not for general commercial and industrial facilities. While the utilities have agreed to use exterior hours of use from the New York TRM it would be beneficial to include lighting exterior hours for additional facility types.	Accepted	Ongoing	Yes

2.5.2 TRM Updates

Recommendations for technical reference manual (TRM) updates and evaluation data collected to support the effort are included in the Cross Cutting Program Results document and are summarized below:

Table 2-5: Summary of Tracking and Reporting Recommendations

Measure	Recommendation
Lighting: Commercial Exterior Hours of Use.	The 2020 NJ Protocols provide exterior hours of use for Multifamily Lighting but not for general commercial and industrial facilities. While the utilities have agreed to use exterior hours of use from the New York TRM it would be beneficial to include lighting exterior hours for additional facility types. Add this deemed variable to the NJ Protocols.
< 75 HP VSD Air Compressors	Add this measure to the NJ Protocols.

2.5.3 Next Steps

The ADM team is carrying out a second round of basic-rigor evaluations for the program. In PY23, the ADM team will also conduct process evaluations and enhanced-rigor studies

for sub-programs that are expected to continue into PY24: Prescriptive & Custom, Appliance Recycling, Engineered Solutions and Energy Management.

3 Evaluation Methods

This section discusses gross impact evaluation approaches and process evaluation activities for each sub-program. The ADM team relied primarily on on-site visits for measure verification and determination of key parameter values. Project documentation such as ex-ante energy savings analysis, participant application, invoices, specification sheets, trend data, and pre-and-post-implementation inspection reports, served to determine and verify key attributes of the efficient equipment rebated or distributed by the program.

Both reported (or ex-ante) and verified (or ex-post) impacts in this report are constructed with calculation methods prescribed in the NJCML. The NJCML serves as the TRM for the CEA's first triennium. The NJ FY20 Protocols and the FY21 Protocols Addendum are the primary documents referenced in the CML. The CML also prescribes sections from other TRMs for measures that are not yet included in the NJ Protocols.

3.1 Description of the ESB Program

The ESB program is the commercial umbrella program for all commercial sector programs except the Small Business Direct Install program. The ESB program provides incentives to C&I customers to purchase and install energy-efficient products. Additionally, the program provides midstream incentives and support to manufacturers, distributors, contractors, and retailers that sell select energy-efficient products.

This is done through four sub-programs:

- **Prescriptive & Custom.** The Prescriptive & Custom sub-program includes prescriptive downstream rebates for lighting, HVAC equipment, refrigeration, appliances, office equipment, agricultural equipment, and commercial food service equipment. Prescriptive incentives are offered for individual applications and retrofit projects employing standard efficient technologies where the anticipated energy savings are consistent. Performance-based incentives are provided to customers based upon an analysis of potential energy savings and peak demand reduction on a case-by-case basis. Midstream lighting is also included in this sub-program. As part of the Prescriptive & Custom sub-program, the midstream option offers discounts through distributors on lighting, food services, and HVAC measures. For projects with instant discounts of less than \$7,500, the streamlined process allows customers to receive program-eligible equipment without having to submit an application.

Custom measures provide calculated or performance-based incentives for electric and/or natural gas efficiency opportunities for commercial, industrial, and other non-residential customers that are non-standard and not captured by prescriptive equipment. Typical custom measures that are eligible for incentives are either less-common measures or efficiency opportunities in specialized applications that may include manufacturing processes, or non-traditional use cases. In many cases, custom efficiency projects are more complex than prescriptive equipment replacement.

- **Appliance Recycling.** The Appliance Recycling sub-program removes older, inefficient appliances from the electric system by offering small and large commercial customers a financial incentive and pick-up and disposal service for eligible residential size/style refrigerators, freezers, dehumidifiers, and room air conditioners.
- **Engineered Solutions.** The Engineered Solutions sub-program provides tailored energy-efficiency assistance and turnkey engineering services to public service entities, such as municipalities, universities, schools, hospitals, healthcare facilities, non-profit entities, and multifamily buildings with an average annual demand above 200 kW. The program targets comprehensive upgrades of electric and gas measures for multiple building systems, including lighting, HVAC, motors and drives, refrigeration, and appliances. An energy audit of a customer's facilities is completed to identify energy-efficiency improvement opportunities. Energy savings and incentives are calculated on a project-by-project basis to assist in developing a work plan of the most cost-effective measures to be recommended for installation in a customer's facilities.
- **Energy Management.** The Energy Management sub-program provides a comprehensive approach to improving building energy performance and savings to nonresidential customers with an average annual demand above 200 kW through three offerings: Building Tune-up, Retro-Commissioning, and Strategic Energy Management.

Only the Prescriptive & Custom and Appliance Recycling sub-programs generated energy savings during PY22. The overall program savings are driven by lighting measures.

Sub-programs are administered by contracted program implementers. The Appliance Recycling and Prescriptive & Custom sub-programs are administered by ARCA Recycling and TRC. Energy Solutions and Energy Management are administered by Willdan.

The ESB Prescriptive & Custom and the Appliance Recycling subprograms were launched effectively and promptly on July 1, 2021. The Engineered Solutions sub-program launched in October 2021. PY22 was spent recruiting program allies, developing the tools to be used by program allies, and educating program allies and customers on

the benefits of the Engineered Solutions sub-program. There were no completed projects in PY22.

3.2 Gross and Net Savings

Gross savings reflect the change in energy consumption directly resulting from program-related actions taken by participants, regardless of why they participated. Net savings refer to savings that are attributed to the program efforts after accounting for free ridership (the portion of gross energy impacts that would have occurred even in the absence of the program) and spillover (additional program-induced energy savings, generated by both participants and non-participants, for which the program didn't provide any specific financial incentive). Net savings are calculated by multiplying gross savings by a net-to-gross (NTG) ratio. NTG equals one minus free ridership plus spillover.

The New Jersey Board of Public Utilities has stipulated that NTG is set to 1.0¹⁰ for the first triennium of the program. The data to calculate NTG will be collected using an approved battery of free ridership and spillover questions in customer surveys that are run during the first triennium.

3.3 Sampling

For the Prescriptive & Custom sub-program, ADM used a random stratified sampling approach to determine a sample of projects to represent the population of projects. ADM developed a stratified sample plan to verify and calculate program savings for PY22. The stratification plan isolates projects by type and size including lighting and non-lighting categories such as HVAC or Food Services each divided into smaller groups per sample size. The sample is designed to statistically represent the population within +/- 10 percent precision at the 90 percent confidence level. The stratification scheme shown in Table 3-1 identified the measure strata by measure category. Table 3-2 lists the measures in each stratum. Lighting 1 – 4 strata have the same measures and are sorted by size. Lighting 1 strata has smaller projects and Lighting 4 strata has the largest.

The sample resulted in ± 8.7 percent relative precision at the 90 percent confidence interval. The coefficients of variation shown are error ratios which reflect the correspondence between ex-ante and ex-post gross energy savings. The error ratios for lighting projects are comparable to error ratios that we observe in other prescriptive lighting programs. The error ratios for most non-lighting projects are lower than typical, which indicates better correspondence between ex-ante and ex-post results. This is likely

¹⁰ [BPU Docket Nos. QO1901040, QO19060748 & QO17091004, Agenda Date : 6/10/2020, Agenda Item : 8D](#), page 31.

driven by the simplicity of prescriptive evaluation protocols (for example, appliance recycling has fully-deemed impacts) in New Jersey.

Table 3-1: Sample Design and Results for Prescriptive & Custom

Stratum	Reported kWh	Population	Sampled Size*	Observed CV	Relative Precision at 90% CL
Lighting 1	1,387,260	416	45	0.49	2%
Lighting 2	994,499	37	6	0.49	11%
Lighting 3	672,179	11	3	0.49	19%
Lighting 4	560,755	5	1	0.49	64%
Midstream Lighting	488,177	21	17	0.50	0.9%
Custom	362,884	2	2	0.00	0.0%
Food Service 2	55,633	2	2	0.01	0.0%
Food Service 1	43,989	14	2	0.00	0.0%
HVAC	904	1	1	0.00	0.0%
Appliance Recycling	42,020	46	16	0.00	0.0%
Total	4,608,300	555	95		8.7%

***Populations and sample sizes here correspond to unique line items in the tracking and reporting system. Individual projects may contain multiple line items.**

Table 3-2: Measures in Each Sampling Strata

Sampling Strata	Measure Type
Lighting 1	LED Fixture External
	LED Fixture Internal
	LED Lamp
	LED Linear
	LED Reach in Refrig / Frzer Light
	Lighting Control (Daylight & Occupancy)
	Street & Area Lighting (Customer Owned)
Lighting 2	LED Fixture External
	LED Fixture Internal

	LED Linear
	Lighting Control (Daylight & Occupancy)
	Street & Area Lighting (Customer Owned)
Lighting 3	LED Fixture External
	LED Fixture Internal
	LED Linear
	Lighting Control (Daylight & Occupancy)
	Street & Area Lighting (Customer Owned)
Lighting 4	LED Fixture Internal
Midstream Lighting	High-Bay/Low-Bay Luminaries for Commercial and Industrial Buildings
	LED direct/indirect linear ambient 4 ft. new luminaire
	LED Linear Replacement Lamps – 4 ft – Type A Only
Custom	Compressed Air
	VFDs 10-99 HP
Food Service 2	ECM Evap Fan Motor
	Refrigerator – Reach In
Food Service 1	Convection Oven
	Freezer – Reach In
HVAC	Air Conditioning - Level 1 >5.4 < 20 Tn
Appliance Recycling	Dehumidifier Recycling
	Freezer Recycling
	Refrigerator Recycling
	Room Air Conditioner Recycling

ADM verified savings for a sample of each stratum, from which a realization rate was calculated to apply to the entire stratum. The calculation sample precision is then performed on the ex-post extrapolated annual energy savings for the program to ensure the statistical significance of ex-post annual energy savings.

Site-specific verifications were performed on a randomly selected sample of Prescriptive & Custom projects. Site verifications are used for the verification of baseline conditions, efficient equipment specifications, quantities, and operating conditions. For PY22, verification visits were achieved physically on-site or virtually through a combination of phone interviews or email exchanges. Virtual visits were provided as an option for

participants. Projects evaluated in which on-site/virtual verification were unsuccessful due to participant refusal or unresponsiveness are considered engineering desk reviews.

Table 3-3 reports the counts of each type of verification effort undertaken.

Table 3-3: ESB Project Verification Effort

Project Category	Population Projects	Sample Projects	On-Site	Interview	Desk Review
Lighting	121	17	11	3	3
Midstream Lighting	17	17	0	0	17
Food Service	16	4	1	3	0
Custom	2	2	1	1	0
HVAC	1	1	0	0	1
Appliance Recycling	31	16	0	16	0
Total	157	41	13	23	21

3.4 Gross Verified Savings Calculations

ADM calculated gross verified energy impacts (also referred to as ex-post savings throughout the report) for measures in this sub-program using savings algorithms from the NJ Protocols as listed in Table 3-4. ADM also utilized the methods summarized by measure type in Table 3-5 to calculate savings.

Table 3-4: Prescriptive & Custom TRM Summary¹¹

Measure	TRM
Lighting	FY2020 NJ TRM (Pg. 86)
Lighting Control	FY2020 NJ TRM (Pg. 92)
Lighting Linear	FY2020 NJ TRM (Pg. 86)
Lighting High-Bay/Low-Bay	FY2020 NJ TRM (Pg. 86)
Compressed Air	Custom - varies
VFDs 10-99 HP	Custom - varies
Evaporator Fan Motor	FY2020 NJ TRM (Pg. 96)
Refrigerator – Reach In	2021PA TRM (Pg. 171)

¹¹ Source: NJ CML.

Convection Oven	NJ FY2020 (Pg. 135)
Freezer – Reach In	2021 PA TRM (Pg. 171)
Air Conditioning	FY2020 NJ TRM (Pg. 99)
Dehumidifier Recycling	FY2020 NJ TRM (pg. 68)
Freezer Recycling	FY2020 NJ TRM (pg. 68)
Refrigerator Recycling	FY2020 NJ TRM (pg. 68)
Room Air Conditioner Recycling	FY2020 NJ TRM (pg. 68)

Table 3-5: Typical Methods to Determine Savings

Type of Measure	Method to Determine Savings
Lighting	NJ Protocols with site-specific data on wattages before and after installation of measures and hours of use data from field monitoring where applicable.
HVAC	<p>Non-prescriptive HVAC projects will be evaluated through one of the following options, depending on data availability, assigned level of rigor, and project-specific opportunities and constraints. The project's site-specific M&V plan will motivate the evaluation approach.</p> <p><u>Energy Simulation models:</u> Evaluation may employ eQUEST or EnergyPlus models for estimating HVAC loads and includes a pre-processor that uses billing data for a site to prepare a benchmark for the site.</p> <p><u>Billing Data Analysis:</u> In certain projects or facilities, the HVAC-related savings are significant compared to the facility-level energy usage. In these cases, billing data analysis may be possible.</p> <p><u>EMS or Submetering Data Analysis:</u> Evaluation may use data from building energy management systems or data gathered from power loggers, along with other data to characterize building occupancy and weather to determine energy savings and demand reduction.</p>
Motors and VFDs	Measurements of power and run-time obtained through monitoring. If baseline data are not available, they can be imputed from post-installation metering data.
Refrigeration	<p>Simulations with eQUEST engineering analysis model</p> <p>Retrofit Isolation with Pre/Post metering</p> <p>Post-Only metering coupled with engineering simulation or calculations</p> <p>Indirect metering, such as with door open/close times and space temperatures for infiltration reduction measures.</p>
Compressed-Air System	Engineering analysis, with monitored data on load factor and schedule of operation
Process Improvements	Engineering analysis, with monitored data on load factor and schedule of operation

Type of Measure	Method to Determine Savings
Appliance Recycling	Confirm that deemed impacts are correctly reported and verify recycling with participant surveys.

All available project documentation was acquired for sampled projects in the Prescriptive & Custom sub-program. Project documentation includes ex-ante energy savings analysis, participant application, invoices, specification sheets, trend data, and pre-and-post-implementation inspection reports. In the situation where all data and information requested is not available during a site verification, these project documents may be relied on to support evaluation results.

Data for Prescriptive & Custom sub-program evaluation analysis is primarily collected through customer interviews, engineering desk reviews, site trend data such as energy management system (EMS) data, and data collected during evaluation site visits.

For lighting measures, primary data is generally gathered regarding hours of use, mechanical heating and cooling systems, baseline equipment, and efficient equipment. Lighting upgrades in operationally complex facility types, such as educational facilities, will generally be evaluated with deemed hours of use from the NJ Protocols unless it is feasible to accurately account for the hours of use across all operating conditions.

Prescriptive non-lighting projects are evaluated using applicable protocols with the goal of verifying the values of all key parameters in the algorithms. Depending on the total impacts represented by the project, the level of documentation provided by the applicant, and results from a preliminary desk review by ADM, data gathering may involve an on-site visit. On-site visits are typically required if key parameters required by algorithms cannot be determined otherwise, or if the initial desk review discovers significant data inconsistencies or omissions.

Custom projects are evaluated with project-specific data collection and analysis protocols. These procedures generally follow the International Performance Measurement and Verification Protocols (IPMVP), with occasional modifications required to suit post-hoc evaluations or to address data-gathering limitations.

After determining the ex-post savings for each sampled project, results are extrapolated to the program population using project-specific weights. This allows for the estimation of program-level evaluated annual energy savings with a given amount of sampling precision and confidence. A realization rate is constructed as the ratio of the total impacts, as constructed by the evaluator for the selected projects, to the total reported impacts. The ex-post energy and demand impacts for the sampling stratum were obtained as the product of gross ex-ante impacts, and the realization rates.

3.5 Process Evaluation Activities

For PY22, the process evaluation consisted of an in-depth interview with JCP&L's program manager, the Prescriptive & Custom sub-program implementer, and the Energy Management and Engineered Solutions sub-programs implementer. Expanded process evaluation activities for PY23 will also include customer surveys and interviews with trade allies, and retailers. Appendix C includes PY23 process evaluation plans.

4 Process Evaluation

The ESB program is the commercial umbrella program for all commercial sector programs except the Small Business Direct Install program. The ESB program provides incentives to C&I customers to purchase and install energy-efficient products. Additionally, the program provides midstream incentives and support to manufacturers, distributors, contractors, and retailers that sell select energy-efficient products.

The JCP&L ESB program encourages business customers to install energy-efficient equipment and increase the efficiency of their buildings' processes and operations. Prescriptive, custom, and midstream incentives are used to reduce capital investment needs for the equipment. Consultative services and comprehensive American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) audits assist customers in identifying and undertaking large, extensive energy-efficient projects.

The evaluator interviewed JCP&L program staff and program implementation staff to evaluate program operations.

The ESB Program includes 2 sub-programs with savings in PY22 that fall into the following categories:

- Product discounts and rebates (appliances, HVAC, lighting)
- Appliance Recycling

4.1 Prescriptive & Custom

4.1.1 Program Design and Implementation

The Prescriptive & Custom sub-program focus on capital equipment replacement or process improvement investments through an online application portal and a midstream approach, working with distributors for select measures, including HVAC, lighting, and food service equipment.

4.1.2 Marketing

Both third-party implementation contractors (TPICs), as well as JCP&L are responsible for program outreach. Presentations to internal JCP&L groups, outdoor events, and outreach to program allies, distributors, and customers through webinars, e-blast, and virtual and in-person meetings were used to promote the programs. Both TPICs have outreach activities focused on engagement with businesses in overburdened and other disadvantaged communities.

4.1.3 Implementation and Barriers to Participation

JCP&L and the program implementers are conducting program outreach through multiple channels. The program ally network has been most successful in driving program participation, specifically for Building Tune-ups and Prescriptive & Custom projects. Additionally, program implementers have outreach activities focused on engagement with businesses in overburdened and other disadvantaged communities.

Growing the number of distributors participating in the midstream offering, which provides nonresidential customers with an option to get instant program discounts, is taking longer than anticipated. As part of the Prescriptive & Custom sub-program, the midstream option offers discounts through distributors on lighting, food services, and HVAC measures. For projects with instant discounts of less than \$7,500, the streamlined process allows customers to receive program-eligible equipment without having to submit an application. The Prescriptive & Custom implementer plans to present JCP&L with recommendations for potential program changes that may assist with making the Midstream offering more attractive to non-participating distributors.

The availability and use of the National Energy Improvement Fund (NEIF) financing option does not appear to significantly alter the sub-programs' application, inspection, verification, or payment processes. Most program allies are NEIF-certified contractors and offer to finance when the project is eligible.

Supply chain constraints associated with the COVID-19 pandemic have impacted projects differently, depending on the sub-program. Prescriptive lighting projects have continued with limited impact and account for approximately 85 percent of PY22 energy savings. The Prescriptive & Custom implementer and Energy Management and Engineered Solutions implementer reported that project completion dates frequently are extended six to twelve months due to supply chain constraints or lack of labor resources. Process changes have been made to accommodate payments for completed portions of projects to help keep customers and program allies engaged with energy efficiency programs.

4.2 Appliance Recycling

4.2.1 Program Design and Implementation

The Appliance Recycling program offers customers an incentive to recycle older, inefficient appliances in their homes or businesses. The program provides pickup and disposal services. The program kicked off at the beginning of July 2021.

The Appliance Recycling program is available to all customers, whether residential or commercial. However, most marketing efforts have been focused on residential customers. Commercial program goals and participation has been much lower.

Through the Appliance Recycling program, customers can recycle refrigerators, freezers, dehumidifiers, and room air conditioners (RACs). The utility offers an incentive for the pick-up and removal of an appliance to prevent the customer from maintaining the appliance as a second unit or transferring it to another customer.

4.2.2 Marketing

To market the appliance recycling program, JCP&L does email blasts and bill inserts. The utility has seen a high response to these marketing efforts. JCP&L markets the program on its website, letting customers know about the program, why it's beneficial to them, and a link to schedule a pick-up appointment.

4.2.3 Implementation and Barriers to Participation

JCP&L contracts with ARCA Recycling to deliver the program. ARCA Recycling also does First Energy's Pennsylvania and Maryland programs, and the program aims to be consistent across states.

The only challenge that the program manager (PM) reported was managing the high volume of participants. However, he thinks the team has done a good job managing the large number of pickups. On average, the recyclers pick up appliances 4.79 days after enrollment. In the month of May, 99.77 percent of appliances were picked up in less than 14 days.

5 Key Findings and Recommendations

5.1 Energy Impacts Achieved in PY22

The ESB Program PY22 results by sub-program are reported in Table 5-1 and Table 5-2.

Table 5-1: ESB PY22 Gross Energy and Demand Impacts

Program	Ex-ante kWh	Ex-post kWh	RR kWh	Ex-ante kW	Ex-post kW	RR kW
Prescriptive/Custom	4,566,280	4,660,283	102%	874.82	920.30	105%
Appliance Recycling	42,020	42,020	100%	6.45	6.45	100%
Total	4,608,300	4,702,303	102%	881.27	926.75	105%

Table 5-2: ESB PY22 Gross Annual Retail Therms and MMBtu Savings¹²

Program	Ex-ante therms	Ex-post therms	Ex-ante MMBtu	Ex-post MMBtu	RR
Prescriptive/Custom	(14,577.38)	(13,355.72)	(1,457.74)	(1,335.57)	92%
Appliance Recycling	-	-	-	-	-
Total	(14,577.38)	(13,355.72)	(1,457.74)	(1,335.57)	92%

The ESB program accounted for approximately five percent of the total portfolio savings during the first year of operations.

5.2 Program Launch and Benchmarking

The ESB program was launched relatively early in PY22, with the first approved rebates entering the tracking and reporting system in October of 2021 (the installations associated with the rebates occurred as early as July 2021). The first few months of the program year involved establishing program eligibility requirements, data needs, and tracking and reporting processes. The program implementer recruited and trained trade allies as the data infrastructure was developing. In PY22, the program scaled to approximately 9 percent of the assumed levels in JCP&L's Energy Efficiency and Conservation (EE&C) plan. As of this writing, the program is on track to increase throughput by tenfold in PY23

¹² Evaluated therms and MMBtus include heating penalties where included in applicable protocols.

to over 50,000 MWh and is closing the gap to the assumed throughput values in JCP&L's EE&C plan.

The four FirstEnergy Companies in Pennsylvania launched similar programs starting June 2021. The program launch in PA was faster than the one in New Jersey: the first-year savings in Pennsylvania were approximately 12,800 MWh, compared to 4,600 MWh in New Jersey. The faster launch in Pennsylvania can possibly be attributed to the preexisting trade ally network in the state, since June 2021 marked the start of the 13th year of continuous energy efficiency program offerings in the state. The same companies in Pennsylvania achieved just under 6,200 MWh during their initial launch in Act 129 PY1 – a number that is comparable to JCP&L's initial program year for the CEA.

The ESB program's gross realization rate of 102 percent was comparable to realization rates for comparable programs in Pennsylvania, which ranged from 95 percent to 106 percent and averaged 98 percent. This gross realization rates for JCPL are primarily driven by methodological differences between reporting and evaluation. The implementation team correctly applied the prescribed hours of use and coincidence factors for lighting projects, but ADM utilized hours of use as determined through customer interviews and monitoring. Had ADM also used TRM hours of use and coincidence factors in savings calculations, the realization rates for energy and demand would have been closer to 100 percent. ADM opted for as-found hours of use in case the findings would inform the TRM updates for the next triennium and for measurement and verification to support JCP&L's offers in PJM's forward capacity market.

5.3 Key Evaluation Findings

The following are key findings from the PY22 evaluation effort.

- The program resulted in positive electricity savings of 4,710,671 kWh, 926.75 kW demand reduction, and -13,960 therms savings. The ESB program accounted for approximately five percent of the total portfolio savings during the first year of operations. The program is well-positioned to increase its impact in PY23 now that many of the start-up challenges have been ironed out.
- The ESB program realization rates were 102 percent for electric savings and 105 percent for peak demand reduction. Realization rates reflect the ratio of ex-ante savings to ex-post savings. Realization rates close to 100 percent reflect an accurate forecast of program performance.
- Appliance Recycling and Prescriptive & Custom sub-programs launched promptly for an initial year of implementation.
- Tracking and reporting systems were established, commissioned, and include sufficient detail to enable upcoming enhanced-rigor evaluations.

- Communication channels for fast evaluation impact have been established, and many areas of improvement identified in the PY22 evaluation have been implemented by JCP&L and implementation and data tracking vendors.
- Energy and demand realization rates, on the whole, are near 100 percent.
- The utilities that participate in the NJ CEA have launched and managed their programs in close coordination.
 - One of the key startup activities was the establishment of the New Jersey Coordinated Measures List, which support uniform reporting by utilities and incorporates protocols for measures that were not in the New Jersey Protocols.

5.4 Recommendations

5.4.1 Appliance Recycling

The evaluation effort did not find any significant opportunities to improve program operations or data tracking and reporting accuracy. ADM reviewed tracking data to ensure that each measure met program qualifications, that each was installed in the PY22, and that there were no duplicates or otherwise erroneous entries.

5.4.2 Prescriptive & Custom

Recommendations include:

Continue quality control measures such as mitigation of evaluation risk with upfront evaluation of large projects, both custom and prescriptive, review of energy impacts by measure if they fall out of the expected boundaries and review ex-ante calculators as needed.

Implementation team quality control checks for: measure unit quantities, accurate classification of facility type, consistency with the coordinated measure list, and appropriate use of measure reference listed in the CML.

The Evaluator provides feedback on the New Jersey protocols for continuous improvement. The 2020 NJ Protocols provide exterior hours of use for Multifamily Lighting but not for general commercial and industrial facilities. While the utilities have agreed to use exterior hours of use from the New York TRM it would be beneficial to include lighting exterior hours for additional facility types.

Appendix A. Prescriptive & Custom Impact Evaluation Detail

The Prescriptive & Custom program includes prescriptive downstream rebates for lighting, HVAC equipment, refrigeration, appliances, office equipment, agricultural equipment, and commercial food service equipment. Prescriptive incentives are offered for individual applications and retrofit projects employing standard efficient technologies where the anticipated energy savings are consistent. Performance-based incentives are provided to customers based upon an analysis of potential energy savings and peak demand reduction on a case-by-case basis.

Custom measures provide calculated or performance-based incentives for electric and/or natural gas efficiency opportunities for commercial, industrial, and other non-residential customers that are non-standard and not captured by prescriptive equipment. Typical custom measures that are eligible for incentives are either less-common measures or efficiency opportunities in specialized applications that may include manufacturing processes, or non-traditional use cases. In many cases, custom efficiency projects are more complex than prescriptive equipment replacement.

Gross Impact Evaluation Results

Prescriptive & Custom sub-program savings are summarized in Table A-1 and Table A-2.

Table A-1: Prescriptive & Custom Gross Annual Electric Savings and Demand Reduction

Measure Category	Qty	Ex-ante kWh	Ex-post kWh	RR kWh	Ex-ante kW	Ex-post kW	RR kW
Prescriptive Lighting	469	3,614,693	3,720,663	103%	624.74	668.91	107%
Midstream Lighting	21	488,177	476,614	98%	95.92	91.60	95%
Custom	2	362,884	363,825	100%	146.79	145.47	99%
Food Service	16	99,622	98,414	99%	6.86	13.81	201%
HVAC	1	904	767	85%	0.51	0.51	99%
Total	509	4,566,280	4,660,283	102%	874.82	920.30	105%

Table A-2: Prescriptive & Custom Gross Annual Gas Savings¹³

Measure Category	Ex-ante therms	Ex-post therms	Ex-ante MMBtu	Ex-post MMBtu	RR
Prescriptive Lighting	(10,539)	(9,090)	(1,054)	(909)	86%
Midstream Lighting	(4,038)	(4,265)	(404)	(427)	106%
Custom	-	-	-	-	-
Food Service	-	-	-	-	-
HVAC	-	-	-	-	-
Total	(14,577)	(13,356)	(1,458)	(1,336)	92%

Discussion of Realization Rates

In the discussions that follow, the term “realization rate” without any qualifiers refers to the electric energy realization rate. In almost all cases, resolution of an underlying issue would also push peak demand and gas savings realization rates toward 100 percent. While ADM offers some recommendations to align ex-ante and ex-post reported impacts, we note that the absolute difference between ex-ante and ex-post reported impacts is very small when compared to total portfolio or sector impacts.

Prescriptive Lighting

The realization rate for electric savings for prescriptive lighting is 103 percent, and for demand reduction, it is 107 percent. The driver of the realization rate was lighting operating hours of use for two classifications, Retail Large buildings, and Exterior fixtures. For Retail Large buildings, the ex-ante calculation used NJ Protocols deemed hours of use while the ex-post calculation used as-found hours from the site visits and customer interviews. For Exterior fixtures during PY22, there was a statewide agreement amongst the utilities and noted in the CML to adopt commercial exterior hours of use from the New York Technical Reference Manual. Projects completed prior to adoption were not updated. Table A-3 includes the average ex-ante and ex-post hours of use that drove lighting realization rates.

¹³ Evaluated therms and MMBtus include heating penalties were included in applicable protocols.

Table A-3: Prescriptive Lighting Annual Hours of Use

Building Classification	Ex-ante Annual Hours of Use	Ex-post Annual Hours of Use
Retail Large	4,926	3,365
Exterior	3,338	4,305

Other minor impacts on the realization rates come from efficient wattage and quantity differences. The ex-ante calculations used the incorrect efficient wattage in one of the sites sampled. The ex-post used the wattage found on the cutsheet/DLC, which were found using the new fixture model numbers on the invoices. Site visits confirmed less fixtures for one of the sampled projects, impacting the overall quantity.

Midstream Lighting

Lighting hours of use were the primary (and only significant) source of variance between ex-ante and ex-post savings calculations for the midstream lighting program. Both ex-ante and ex-post savings calculations relied on the FY2020 NJ Protocols, but there were differences in the assignment of facility type to participants' facilities. As one example, a nursing home was mapped to "Hospital" in ex-ante calculations, and to "Other" in ex-post calculations. Such occasional differences are to be expected given that TRMs generally contain ten to twenty distinct facility types. The differences did not systematically favor higher or lower hours of operation, as indicated by the 99% gross realization rate.

Custom Lighting

Projects classified as custom often utilize site-specific analysis methodologies that vary based on the measure and operational conditions.

The realization rate for electric savings for custom measures is 100 percent, and for demand reduction, 99 percent. This realization rate is due to differing savings references. The ex-ante utilized NJ Protocols to estimate savings for a compressed air site, while the ex-post used Mid-Atlantic TRM as per the NJ Coordinated Measure list.

Food Service

The demand reduction realization rate for food service is 201 percent. This is due to the ex-ante calculation failure to multiply the refrigerator peak demand savings by the number of units purchased at a project site sampled. This site had five refrigerators, the ex-post kW for this one site was five times greater than the ex-ante due to this.

HVAC

There was one HVAC site rebated in PY22, this site was in the evaluators sampling initiative. The realization rate for electric savings for HVAC measures is 85 percent, and for demand reduction, it is 99 percent. This realization rate is due to differing Equivalent Full Load Hours (EFLH). The ex-ante utilized Retail Large EFLH of 1,068 from the NJ Protocols to estimate savings, while the ex-post used Retail Small EFLH of 882 as this facility is a gas station.

Lifetime Savings

Lifetime savings were calculated for each measure by multiplying ex-post annual savings by the expected useful lifetime (EUL). Lifetime savings results are reported Table A-4 and Table A-5. The EUL was sourced from the Coordinated Measure List for non-lighting measures and the specification sheet rated life for lighting measures.

Table A-4: Prescriptive & Custom Lifetime Electric Savings and Demand Reduction

Measure Category	Qty	EUL	Ex-post Annual Saving kWh	Ex-post Lifetime Savings kWh	Ex-post kW	Ex-post Lifetime Demand Reduction kW
Prescriptive Lighting	469	13	3,720,663	46,670,655	668.91	8,390.54
Midstream Lighting	21	17	476,614	7,872,237	91.60	1,521.41
Custom	2	15	363,825	5,402,214	145.47	2,159.99
Food Service	16	13	98,414	1,315,134	13.81	184.53
HVAC	1	15	767	11,509	0.51	7.65
Total	509		4,660,283	61,271,749	920.30	12,264.12

Table A-5: Prescriptive & Custom Lifetime Gas Savings

Measure Category	Ex-post Savings Therms	Ex-post Savings MMBtu	EUL	Ex-post Lifetime Savings Therms	Ex-post Lifetime Savings MMBtu
Prescriptive Lighting	(9,090.35)	(909.03)	13	(114,026.01)	(11,402.60)
Midstream Lighting	(4,869.50)	(486.95)	17	(80,429.47)	(8,042.95)
Custom	-	-	15	-	-
Food Service	-	-	13	-	-
HVAC	-	-	15	-	-
Total	(13,959.84)	(1,395.98)		(194,455.48)	(19,445.55)

Data Review

ADM reviewed program tracking data for all measures included in PY22 as part of its first year in a multi-year evaluation cycle. The review ensures that each measure meets program qualifications, was installed in the project year, and that there were no duplicates or otherwise erroneous entries. ADM determined that the participant tracking data contained enough detail for the impact evaluation to be completed.

To assist with quality control, ADM identified boundaries for annual energy impacts and peak demand reduction by measure. If claimed savings for any measure falls outside of these boundaries, then ADM completes an engineering desk review to either approve the measure or request modification.

The evaluator found no errors or omissions in the program tracking data to report.

Appendix B. Appliance Recycling Impact Evaluation Detail

The Appliance Recycling Program removes older, inefficient appliances from the electric system by offering small and large commercial customers a financial incentive and pick-up and disposal service for eligible residential size/style refrigerators, freezers, dehumidifiers, and room air conditioners.

Gross Impact Evaluation Results

Appliance Recycling sub-program savings are summarized in Table B-1. No gas savings were generated through this sub-program.

Table B-1: Appliance Recycling Gross Annual Electric Savings and Demand Reduction

Measure	Qty ¹⁴	Ex-ante kWh	Ex-post kWh	kWh RR	Ex-ante kW	Ex-post kW	kW RR
Dehumidifier Recycling	1	196	196	100%	0.11	0.11	100%
Freezer Recycling	4	2,860	2,860	100%	0.43	0.43	100%
Refrigerator Recycling	35	38,430	38,430	100%	5.74	5.74	100%
Room Air Conditioner Recycling	6	534	534	100%	0.17	0.17	100%
Total	46	42,020	42,020	100%	6.45	6.45	100%

Discussion of Realization Rates

The realization rate for this measure was 100 percent. There were no data tracking issues.

Lifetime Savings

Lifetime savings were calculated for each measure by multiplying ex-post annual savings by the expected useful lifetime (EUL). EUL was sourced from the Coordinated Measure List. Appliance Recycling sub-program lifetime savings and demand reduction are summarized in Table B-2.

¹⁴ Quantity refers to number of measures in appliance recycling of measures installed in commercial applications . This quantity of measures differs from the quantity of projects in the PY22 Q4 Report.

Table B-2: Appliance Recycling Lifetime Electric Savings and Demand Reduction

Measure	EUL	Ex-post Annual Savings kWh	Ex-post Lifetime Savings kWh	Ex-post kW	Ex-post Lifetime kW
Dehumidifier Recycling	3	196	588	0.11	0.34
Freezer Recycling	4	2,860	11,440	0.43	1.71
Refrigerator Recycling	5	38,430	192,150	5.74	28.70
Room Air Conditioner Recycling	3	534	1,602	0.17	0.50
Total		42,020	205,780	6.45	31.26

Data Review

ADM reviewed tracking data to ensure that each measure met program qualifications, that each was installed in the PY22, and that there were no duplicates or otherwise erroneous entries.

Appendix C. Evaluation Activities Planned for PY23

The following subsections present evaluation goals of the impact and process evaluation of PY23 for the Energy Solutions for Business Program.

Process Evaluation Activities Planned for PY23

The New Jersey Clean Energy Act Programs Final Evaluation Plan described the data collection activities to support the ESB program's comprehensive process and NTG evaluation. The plan also outlined the researchable questions and the associated data collection activity. For ease of reference, this section briefly summarizes the proposed evaluation activities.

The evaluation team will complete the following activities to address the key research issues:

- Review or draft a logic model to use as a reference to help guide the process and NTG evaluation work, such as measuring the program's influence on customer satisfaction, identifying patterns in data to help refine program design and marketing, and overall program awareness.
- Conduct interviews with the JCP&L program manager and program implementation contractors. We will reach out to the program manager and the program implementers to check in on program progress and changes to the program and discuss any additional researchable issues they would like addressed. These discussions will help to ensure all survey instruments and topic guides are accurate and appropriately focused.
- Conduct participating customer surveys. Surveys will be conducted with customers to understand experiences with different program aspects and customer decision-making processes to aid in determining NTG for use in Triennium 2. As part of the sampling plan, strata will be developed to capture different measures and cover the various offerings. Sampling will be conducted in conjunction with the impact evaluation when possible.
- Conduct trade ally interviews. Surveys will be conducted with a sample of trade allies to capture a range of equipment types and experiences for each offering.
- Conduct distributor interviews. Interviews will be conducted with a sample of distributors to capture feedback on the Midstream program on a range of equipment.
- Perform benchmarking review. A benchmarking review will be conducted to see how the JCP&L utilities' incentives and qualifying criteria compare to other programs across the country and in the region. The benchmarking results will be used to inform future program design and provide information on how

current incentive levels and qualifying criteria may impact customer participation. Where possible, this review will be coordinated with other utilities.

Impact Evaluation Activities Planned for PY23

The evaluation team will complete the following activities as part of the PY23 evaluation:

- Review program tracking data for systematic issues, inconsistencies, and data entry errors. The evaluator performs a quality check on program tracking data by identifying measures in which annual energy savings and peak demand reduction fall outside of expected boundaries.
- Continue to review ex-ante calculators/tools as updated versions are released or new measures are added.
- The evaluator will be involved with new energy management and engineered solutions projects.
- Perform onsite visits for projects selected in our evaluation sample. These visits will incorporate the range of measure types and project sizes.
- Continue to review above-threshold projects. The evaluator performs upfront evaluation on lighting projects over 750 MWh and custom projects over 500 MWh.