



# Residential Lighting Program Evaluation Report

Evaluation Cycle 1 – Program Year 1

**Prepared for:**

**Atlantic City Electric**



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## Abstract

Guidehouse conducted an impact evaluation of Atlantic City Electric’s (ACE) Residential Lighting Program for program year 1 (July 1st, 2021 – June 30th, 2022). The program transitioned from the New Jersey (NJ) Board of Public Utilities (BPU) to ACE on July 1st, 2021. We conducted a tracking database review to verify savings calculations and conducted interviews with program staff and implementers to deepen our understanding of the program. Guidehouse’s impact evaluation results are summarized below in Table AB-1.

**Table AB-1: ACE Residential Lighting Program Impact Evaluation Results**

Types of Savings	Tracked Savings	FY 2020		FY 2022	
		Evaluated Savings	Realization Rates	Evaluated Savings	Realization Rates
Energy Savings (MWh)	4,159	4,257	1.02	4,144	1.00
Utility Peak Demand Savings (kW)	312	310	1.00	310	1.00

Our recommendations from the impact evaluation are described in Table AB-2.

**Table AB-2: Residential Lighting Program Impact Findings and Recommendations**

Evaluation Area	Recommendation
Impact	Savings algorithms and deemed values must align with the NJ Coordinated measure list which is agreed upon by utilities and the SWE.
	Efficient fixture wattages must be picked from the most up-to-date reference material from ENERGY STAR.
	Include the version of the ENERGY STAR database that was used for calculating savings at the time of implementation, in the program/project documentation.
	All data required to calculate energy and demand savings must be included in the tracking data.

Our interaction with the program managers suggests that the program will discontinue in 2023 due to the impact of EISA regulations. Therefore, we decided not to conduct a process evaluation in PY 1. For Net-to-gross, Guidehouse used the results from a statewide study conducted by Apex Analytics for the Residential Lighting program.

## Executive Summary

Guidehouse conducted an impact evaluation for Atlantic City Electric’s (ACE) Residential Lighting program, a sub-program of the Efficient Products Program, for PY 1. This program offers instant, in-store discounts when customers purchase ENERGY STAR certified lighting at participating retailers. Guidehouse’s activities in the first program year focused on developing a robust understanding of the program and the implementer’s data collection activities and establishing a foundation for future evaluations. Guidehouse used the tracking data to verify wattage and savings from ENERGY STAR’s list of certified lighting fixtures. Guidehouse compared the savings calculated by the implementers with Guidehouse calculations using the New Jersey’s protocols. We also calculated savings using FY 2022 protocols which are the updated savings algorithms that are likely to be incorporated in the next version of the TRM. Table E-1 below shows the impact evaluation results using the FY 2020 and FY 2022 protocols.

**Table E-1: ACE Residential Lighting Program Impact Evaluation Results**

Types of Savings	Tracked Savings	FY 2020		FY 2022	
		Evaluated Savings	Realization Rates	Evaluated Savings	Realization Rates
Energy Savings (MWh)	4,159	4,257	1.02	4,144	1.00
Utility Peak Demand Savings (kW)	312	310	1.00	310	1.00

The evaluation team’s impact findings and recommendations to improve data collection, documentation, and savings calculations are outlined in Table E-2.

**Table E-2: Residential Lighting Program Impact Findings and Recommendations**

Findings	Recommendation
The HVACe (interactive factor) in the tracking data was different from the value specified in the NJ Coordinated measure list. The tracking data value is from an updated version of the NJ TRM.	Savings algorithms and deemed values must align with the NJ Coordinated measure list which is agreed upon by utilities and the SWE.
A small number of measures were found to have unexplained discrepancies between the evaluated and reported savings. We are working with the implementers to identify the source of these discrepancies.	
Some of the implementer’s fixture wattage values did not agree with the Energy Star Certified Lighting Reference table.	Efficient fixture wattages must be picked from the most up-to-date reference material from ENERGY STAR.

A small number of measures had ENERGY STAR IDs that were not present in the ENERGY STAR Certified Lighting Reference Table. We noticed that this was because the IDs were included in an older version of the ENERGY STAR database that was valid at the time of implementation but, were subsequently removed in later versions.

Include the version of the ENERGY STAR database that was used for calculating savings at the time of implementation, in the program/project documentation.

Implementers referenced fixture baseline wattages from the NJ Coordinated Measures List, however baseline wattage values were not listed in the tracking data. They were in a separate reference/look up table that was not integrated with the tracking data.

All data required to calculate energy and demand savings must be included in the tracking data.

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Guidehouse used a net-to-gross (NTG) value of 10.7% for the Residential Lighting program. This NTG value is based on a statewide study conducted by Apex Analytics for the program.

# 1. Introduction

## 1.1 Program Description

The Residential Lighting program was previously administered by the New Jersey Board of Public Utilities (NJ BPU) and was transitioned to ACE on July 1, 2021. The upstream incentives for this program are paid to the manufacturers or distributors and passed down to retailers and customers through discounted costs of ENERGY STAR certified LED bulbs and fixtures.

Table 1-1 below provides PY 1 program participation and reported savings. The PY 1 population consisted of 34,565 unique customers and a total of 96,780 measures installed.

**Table 1-1: PY 1 Program Participation and Reported Savings**

Measure	Planned Savings*	Reported Savings	Reported Energy Savings as a % of Portfolio Energy Savings
Energy Savings (MWh)	4,487	4,159	16%
Peak Demand Savings (kW)	42	312	

*Note: The planned savings in the table is estimated based on ACE's planned savings filed for Efficient Products program.*

### 1.1.1 Program Population

Guidehouse organized the impact results on measure types. This allows for the investigation of savings results from specific measures and provides more focused recommendations. Table 1-2 shows the total number of participants and savings by measure type from the program in PY 1.

**Table 1-2: PY 1 Residential HVAC Program Survey Population**

Measure Type	Total Measures	Total Tracked Energy Savings (MWh)	Total Tracked Peak Demand Savings (kW)
Standard	77,327	3,207	240
ER30, BR30, BR40, or ER40	6,781	470	35
Decorative	9,158	309	23
Non-G40 Globe	756	32	2
R-20	209	10	1
All Other	2,549	132	10
Total	77,327	4,159	312

## 1.2 Conclusions and Recommendations

Guidehouse had the following conclusions from the PY 1 evaluation:

- Evaluability
  - We noticed fields such as baseline fixture wattage were missing from the tracking data. We recommend that all fields required to evaluate energy and peak demand savings, such as ENERGY STAR IDs, type of fixtures, quantities, wattages, waste heat factors, coincidence factors. etc., be listed out within the primary database extract.
- Impact Evaluation
  - Waste heat factors used to calculate savings were referenced from a more updated version of the TRM and not the NJ Coordinated measure list. This resulted in differences in the evaluated and tracked savings. We recommend conducting additional review to align algorithms and inputs with the NJ Coordinated measure list.
  - The efficient fixture wattage used in savings calculations did not match the wattage specified on the ENERGY STAR database. Some fixtures IDs were also found to be missing from the ENERGY STAR list. We recommend making sure that the efficient wattage values match those in the ENERGY STAR database and keeping records of the version of the database that was used during implementation to compare ENERGY STAR IDs.

## 2. Evaluation Analysis

This section presents the results of our PY 1 evaluation. Section 2.1 of this report compares our results with similar utilities. Section 2.2 speaks to the evaluability concerns for this program. Sections 2.3 discuss the methodology and results from our impact study. Section 2.4 includes our cost-effectiveness results.

### 2.1 Benchmarking

Guidehouse compared the savings and realization rates (RRs) of ACE's Residential Lighting program with similar programs offered by other utilities. Table 2-1 shows the difference between ACE's savings and realization rates and the savings and realization rates of peer utilities.

**Table 2-1: Residential Lighting Program Impact Evaluation Benchmarking**

Utility	Program Size - Gross Reported Energy Savings (MWh)	Energy Savings per Participant (kWh)	Peak Demand Savings per Participant (kW)	Energy Savings RR	Peak Demand RR
SMECO	14,348	106	0.01	1.03	1.03
Potomac Edison	33,593	147	0.02	1.04	1.02
<b>ACE</b>	4,159	617	0.05	1.02	1.00
BGE	156,409	694	0.09	0.93	0.96
Delmarva	15,577	861	0.12	0.82	0.81
Pepco	64,752	923	0.13	0.83	0.83
ComEd	281,013	NA*	NA*	1.13	NA**
DTE	221,829	NA*	NA*	0.92	0.92

\*ComEd and DTE impact evaluation reports did not provide number of participants

\*\*ComEd did not report peak demand savings for residential lighting

### 2.2 Evaluability

Guidehouse checked the program tracking database for all necessary calculation inputs, such as ENERGY STAR IDs, type of fixtures, manufacturers, quantities, wattages, waste heat factors, and coincidence factors. Retailer information (such as retailer name and address) was also included at the purchase level within the database.

The tracking database was found to be well populated for the inputs above but lacked information on baseline fixture wattage that is required to calculate energy and peak demand

savings. We recommend including all relevant fields in the tracking data that would be needed to:

- Recalculate energy and peak demand savings
- Verify wattage values with baseline fixture type and ENERGY STAR database

## 2.3 Impact Evaluation

### 2.3.1 Impact Evaluation Overview and Methodology

Guidehouse applied industry-standard methods and approaches to conduct the evaluation as established in the following documents:

- Uniform Methods Project (UMP)<sup>1</sup>
- NJ Coordinated measure list – approved by NJ utilities for estimating savings for PY 1.
- New Jersey’s Clean Energy Program Protocols (NJCEP) FY 2020<sup>2</sup> and FY 2022

To obtain impact findings, Guidehouse used the tracking data to verify wattage and savings from ENERGY STAR’s list of certified lighting fixtures.

#### 2.3.1.1 Evaluation Objectives

The following are the key objectives this first impact evaluation addresses:

- Review the data being collected by the implementation contractor (IC) and establish data collection requirements for different types of measures offered by the program.
- Establish a smooth process for transfer of tracking data and project files with the aim of streamlining the process for future evaluations.
- Determine the evaluability of the program based on the data collected by the implementer.
- Review similar programs implemented by other utilities that can serve as benchmarks for this program.
- Calculate evaluated gross energy and peak demand savings using the agreed savings protocols.
- Calculate savings using new and revised measures developed by New Jersey’s TRM working group.
- Highlight areas for the implementation team to improve data collection, estimate savings, etc.

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<sup>1</sup> See Department of Energy, Office of Energy Efficiency and Renewable Energy website at <http://energy.gov/eere/about-us/ump-home>.

<sup>3</sup> See New Jersey’s Clean Energy Program website at [https://njcleanenergy.com/files/file/NJCEP%20Protocols%20to%20Measure%20Resource%20Savings%20FY20\\_FIN\\_AL.pdf](https://njcleanenergy.com/files/file/NJCEP%20Protocols%20to%20Measure%20Resource%20Savings%20FY20_FIN_AL.pdf)

- Highlight gaps or inaccuracies in the savings algorithms.

### 2.3.1.2 Evaluation Methods and Tools

Guidehouse evaluated the savings using a tracking data review to check whether the savings methodologies and inputs used by the implementers match the algorithms in the NJ Coordinated measure list and ENERGY STAR specifications for efficient lighting fixtures.

## 2.3.2 Impact Evaluation Results

### 2.3.2.1 Program-Level Verified Gross Energy and Peak Demand Savings

The evaluation team calculated savings for lighting and found that the FY2022 Addendum calculations yielded lower energy savings results than the savings calculated using the methodology specified in the FY2020 New Jersey Protocols. This was due to the implementer's use of the FY 2022 HVACe factor instead of the FY 2020 HVACe factor. The program's energy realization rate is 1.02 and peak demand realization rate is 1.00. The results of the program-level calculations are shown in Table 2-2 and Table 2-3.

**Table 2-2: PY 1 Residential Lighting Program Savings Using FY 2020**

<i>Program</i>	<i>Tracked Energy (MWh)</i>	<i>Tracked Peak Demand (kW)</i>	<i>Evaluated Energy FY 2020 (MWh)</i>	<i>Evaluated Peak Demand FY 2020 (kW)</i>	<i>FY 2020 Energy RR</i>	<i>FY 2020 Peak Demand RR</i>
Residential Lighting	4,159	312	4,257	310	1.02	1.00

**Table 2-3: PY 1 Residential Lighting Program Savings Using FY 2022**

<i>Program</i>	<i>Tracked Energy (MWh)</i>	<i>Tracked Peak Demand (kW)</i>	<i>Evaluated Energy FY 2022 (MWh)</i>	<i>Evaluated Peak Demand FY 2022 (kW)</i>	<i>FY 2022 Energy RR</i>	<i>FY 2022 Peak Demand RR</i>
Residential Lighting	4,159	312	4,144	310	1.00	1.00

### 2.3.2.2 Measure-Level Verified Gross Energy and Peak Demand Savings

In addition to program-level savings, Guidehouse also calculated measure-level savings. All measure calculation results are shown in Table 2-4.

**Table 2-4: PY 1 Residential Lighting Measure-Level Savings Calculated Using FY 2020**

Measure	Ex Ante Energy (MWh)	Ex Ante Peak Demand (kW)	Ex Post Energy FY2020 (MWh)	Ex Post Peak Demand FY2020 (kW)	Energy RR	Peak Demand RR
Standard	3,207	240	3,275	239	1.02	0.99
ER30, BR30, BR40, or ER40	470	35	483	35	1.03	1.00
Decorative	309	23	317	23	1.03	1.00
All Other	132	10	135	10	1.03	1.00
Non-G40 Globe	32	2	36	3	1.13	1.10
R-20	10	1	10	1	1.03	1.00

**Table 2-5: PY 1 Residential Lighting Measure-Level Savings Calculated Using FY 2022**

Measure	Ex Ante Energy (MWh)	Ex Ante Peak Demand (kW)	Ex Post Energy FY2022 (kWh)	Ex Post Demand FY2022 (kW)	Energy RR	Peak Demand RR
Standard	3,207	240	3,188	239	0.99	0.99
ER30, BR30, BR40, or ER40	470	35	470	35	1.00	1.00
Decorative	309	23	309	23	1.00	1.00
All Other	132	10	132	10	1.00	1.00
Non-G40 Globe	32	2	35	3	1.10	1.10
R-20	10	1	10	1	1.00	1.00

### 2.3.3 Key Findings and Recommendations

#### 2.3.3.1 Recommendation Summary

Table 2-6 represents the Guidehouse evaluation team's impact findings and recommendations.

**Table 2-6: Residential Lighting Program Impact Findings and Recommendations**

Finding	Recommendation	Impact
The HVACe (interactive factor) in the tracking data was different from the value specified in the NJ Coordinated measure list. The tracking data value is from an updated version of the NJ TRM.	Savings algorithms and deemed values must align with the NJ Coordinated measure list which is agreed upon by utilities and the SWE.	Improved accuracy of energy and peak demand savings

A small number of measures were found to have unexplained discrepancies between the evaluated and reported savings. We are working with the implementers to identify the source of these discrepancies.

<p>Some of the implementer's fixture wattage values did not agree with the Energy Star Certified Lighting Reference table.</p>	<p>Efficient fixture wattages must be picked from the most up-to-date reference material from ENERGY STAR.</p>	<p>Improved accuracy of energy and peak demand savings</p>
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<p>A small number of measures had ENERGY STAR IDs that were not present in the ENERGY STAR Certified Lighting Reference Table. We noticed that this was because the IDs were included in an older version of the ENERGY STAR database that was valid at the time of implementation but, were subsequently removed in later versions.</p>	<p>Include the version of the ENERGY STAR database that was used for calculating savings at the time of implementation.</p>	<p>Improved measure data tracking</p>
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<p>Implementers referenced fixture baseline wattages from the NJ Coordinated Measures List, however baseline wattage values were not listed in the tracking data. They were in a separate reference/look up table that was not integrated with the tracking data.</p>	<p>All data required to calculate energy and demand savings must be included in the tracking data.</p>	<p>Improved measure data tracking</p>
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## 2.4 Cost Effectiveness

Guidehouse collected adequate data to support a portfolio-wide cost effectiveness analysis for this program and adhered to the New Jersey Cost Test (NJCT). The NJCT was developed as the primary test to evaluate the benefits and costs of Energy Efficiency and Peak Demand Reduction programs established in the state pursuant to the Clean Energy Act (CEA) during the first three-year program cycle, starting with PY1 on July 1, 2021, and running through the end of program year 3 (PY3) on June 30, 2024.

The program costs available to Guidehouse were for all Efficient Products programs combined as one. We did not have costs disaggregated by sub-program i.e., Residential HVAC, Residential Lighting, etc. Therefore, we calculated cost effectiveness for all Efficient Products programs grouped together as if it were a single program.

Guidehouse calculated six cost tests for ACE’s Efficient Products program, including the New Jersey cost test as defined in New Jersey BPU Order 8A<sup>3</sup>. Administrative costs were not tracked by sub-program in a manner that allowed for sub-program level cost testing. The Lighting sub-program contributed 12.52% of the Efficient Products program’s NJCT benefits. Cost test results presented in Table 2-7 and Table 2-8 were calculated using net ex-post savings. The Efficient Products program achieved a NJCT ratio above 1.0.

**Table 2-7: Net Efficient Products Program Cost Test Results and Comparison with Filings**

Program	Source	NJCT	PCT	PACT	RIMT	TRCT	SCT
Efficient Products	Evaluation	2.49	14.99	0.80	0.22	0.85	1.03
Efficient Products	Filings	4.7	10.2	3.8	1.3	3.6	7.6

**Table 2-8: Efficient Products Program NJCT NPV Benefits and Costs**

Program	NPV Benefits (\$1,000)	NPV Costs (\$1,000)	Net Benefits (\$1,000)
Efficient Products	\$6,866	\$4,820	\$4,110

<sup>3</sup> <https://www.state.nj.us/bpu/pdf/boardorders/2020/20200824/8A%20-%20ORDER%20New%20Jersey%20Cost%20Test.pdf>

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