



Retail Products Impact Evaluation

Rhode Island Energy

Prepared by
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Executive Summary

This report presents the results of Resource Innovations’ impact evaluation of the Retail Products Program, offered by Rhode Island Energy to provide customers with a wide range of residential energy efficiency measures.

As part of this study, our team evaluated the gross and net energy savings, as well as demand reductions, associated with the retail products measures installed in 2023 and 2024. RI Energy will use the results of this evaluation to inform program planning and prospectively apply savings claims beginning in 2026.

1.1 Key Gross Savings Updates

Key measure-specific gross savings updates include:



Variable-Speed Pool Pumps

Variable-speed pool pumps accounted for 52% of total lifetime savings across the Retail Products program. Following a literature review by the evaluation team, the savings for variable-speed pool pumps were updated to be grounded on Weighted Energy Factors rather than Energy Factors, which is a switch in metrics that the DOE mandated in 2021.



Room Air Conditioners

Cooling and dehumidification equipment accounted for 19% of total lifetime savings across the program. As part of this measure group, Room Air Conditioners previously had their measure savings calculated through an outdated federal standard. The evaluation team updated these savings so that they are calculated using a federal standard that initiates in 2026.

1.2 Key Net Savings Results

Our team used both primary (participant surveys) and secondary (literature review) data collection approaches to develop measure-specific NTG ratios.

The team used the responses from 72 participant surveys and a recycling-specific approach (based on the Renewable Energy Laboratory’s Uniform Methods Project), in order to determine a NTG ratio of 0.32 for dehumidifiers recycled through RI Energy’s Retail Products program. This result is slightly lower than the program’s ex ante assumption of 0.41.

For most other measures, our team leaned on a 2021 Residential Products NTG Study completed for the Massachusetts Electric Program Administrators. While completed in 2021, the study thoughtfully projected NTG values through 2024 for prospective application. Our team's research did not identify a more appropriate (products-focused), regionally appropriate (from neighboring Massachusetts) or recent (forecasted NTG values through 2024) source than this study. For this reason, our team used the NTG values recommended for application for 2022, 2023 and 2024 to forecast NTG values for prospective use by RI Energy in 2026. For example, for room air cleaners, the study recommended NTG values of 0.70, 0.68, and 0.66 for application in 2022, 2023, and 2024, respectively. To develop the appropriate value for RI Energy in 2026, our team continued the study's average annual decline (2%) and recommended RI Energy use 0.62 in 2026. Like room air cleaners, most Retail Products measures experienced a decline in NTG relative to the ex ante assumption.

1.3 Recommendations

The team offers the following recommendations based on our team's experience completing this evaluation:

1. **Adopt Evaluated Gross and Net Savings for Prospective Application.** As outlined in this report, our team identified numerous improvements to gross savings algorithms and input values. Collectively, these improvements, which often reflect important updates to appliance standards or efficiency ratings, yield gross savings that better reflect RI Energy's current Retail Products program. We recommend that RI Energy adopt the gross savings algorithms and input updates identified by our team through this impact evaluation for prospective application, starting in 2026. Similarly, we recommend RI Energy apply the updated NTG groups ratios documented in this report.
2. **Collect More Comprehensive Contact Information.** Our team was only able to conduct primary net savings research (i.e., participant surveys) for one measure (dehumidifier recycling) offered through the Retail Products program. This is because the program tracking data did not include sufficient participant contact information to support surveys for other measures. We understand that some Retail Products delivery pathways do not facilitate the collection of participant contact information. However, for the measures and delivery pathways that do, we recommend that Rhode Island Energy place greater emphasis on collecting participant email addresses to support future evaluation efforts.
3. **Add Additional Fields to Program Data.** The team was only able to calculate realization rates for electric savings because the program data included ex ante savings for electricity. To enable calculation of realization rates for other fuel types, the team recommends that RI Energy add gross annual savings for therms and

delivered fuels to program tracking data provided to future evaluators. In addition, incorporating supplemental information (e.g., window size or other building characteristics) would allow for more accurate and representative savings calculations as part of future evaluations.

1.4 Complete Gross and Net Savings

Table ES-1 offers a complete list of this evaluation's measure- and fuel-specific gross annual energy savings, realization rates, summer and winter peak demand reductions, and, when relevant, annual water savings. Table ES-2 succinctly summarizes NTG ratios for prospective application.

Table ES-1 Evaluated Gross Energy Savings, Realization Rates, Demand Reductions, and Water Savings

Measure	Electric (kWh/Year)			Natural Gas (Therms /Year)	Heating Oil & Propane (MMBtu/Year)	Summer Peak Demand Savings (kW)	Winter Peak Demand Savings (kW)	Water Savings (Gallons /Year)
	Ex Ante Savings	Ex Post Savings	Realization Rate					
Plug Load								
Smart Strip	105	105	100%	-	-	0.01	0.02	-
Room Air Cleaner ¹	391	127/154	32%/38%	-	-	0.02	0.01	-
Appliances								
Most Efficient Clothes Washer	29	49	168%	0.18	0.2	0.01	0.01	2,016
Most Efficient Refrigerator	96	57	60%	-	-	0.01	0.01	-
ENERGY STAR Dryer	160	160	100%	-	-	0.02	0.03	-
Most Efficient Dryer	213	213	100%	-	-	0.03	0.04	-
Cooling and Dehumidification Equipment								
Dehumidifier Rebate	82	82	100%	-	-	0.02	0.02	-
Dehumidifier Recycling	407	407	100%	-	-	0.08	0.03	-
Room Air Conditioner	36	23	63%	-	-	0.02	0	-
Hot Water								
Low Flow Showerhead with TSV	247	289	117%	1.1	1.2	0.0	0.1	2,201
Building Envelope²								

¹ As described later in the report, the higher savings value reflects the savings after incorporating the specifications in ENERGY STAR v3.0, effective in October 2025. The lower savings value reflects the specifications found in ENERGY STAR v2.0.

² There were no ex ante savings for the Triple Pane Windows measure.

Triple Pane Windows - Electric Resistance Heating	-	139	-	-	-	0	0	-
Triple Pane Windows - Heat Pump	-	46	-	-	-	0	0	-
Triple Pane Windows - Fossil Fuel Heating	-	14	-	5.68	0.57	0	0	-
Pool Equipment								
Variable Speed Pool Pump	1,284	625	49%	-	-	0.17	0.00	-

Table ES-2. NTG Results: Recommended Values for Prospective Application

Measure	Ex Ante NTG	Ex Post NTG	Difference
Smart Strips	1.00	0.84	-0.16
Room Air Cleaner	0.63	0.58	-0.05
Room Air Conditioner	0.56	0.48	-0.08
Dehumidifier Rebates	0.49	0.41	-0.08
Thermostatic Shut-Off Valve	0.97	0.96	-0.01
Pool Pump (Variable)	0.89	0.78	-0.11
ENERGY STAR® Triple Pane Windows	0.96	0.96	0
ENERGY STAR® Dryer	0.52	0.52	0
Most Efficient Clothes Washer	0.90	0.75	-0.15
Most Efficient Dryer	1.00	0.75	-0.25
Most Efficient Refrigerator	0.75	0.75	0

1 Introduction

Rhode Island Energy (RI Energy) offers several programs that incentivize the installation of energy efficient equipment in customer homes. One of these programs is the Retail Products program, which is a retail-based program that incentivizes energy efficient appliances, such as clothes washers and refrigerators.

To determine the impact of this program, RI Energy contracted Resource Innovations to evaluate the gross and net energy savings and demand reductions associated with incentivized products.

1.1 Study Objectives

The key objectives for this study included:

- Evaluating gross and net energy savings and demand reductions³ for every prescriptive measure
- Providing feedback on data quality and comprehensiveness, as well as recommendations for improvement

1.2 Evaluated Measures

Table 1 outlines the prescriptive measures included as part of this evaluation.

³ The team used measure-specific summer and winter coincident factors and maximum demand values from the most recent TRM to convert evaluated energy savings into demand reductions. The scope of this study did not include a review of the factors themselves, nor the source RI Energy used to derive them.

Table 1. Relevant Measures by Fuel Type

Measure	Electricity	Natural Gas	Heating Oil	Propane
Smart Strips	✓			
Room Air Cleaner	✓			
Room Air Conditioner	✓			
Dehumidifier Rebates	✓			
Dehumidifier Recycling	✓			
Low Flow Showerhead with TSV*	✓	✓	✓	✓
Pool Pump (Variable)	✓			
ENERGY STAR® Triple Pane Windows	✓	✓	✓	✓
ENERGY STAR® Dryer	✓			
Most Efficient Clothes Washer*	✓	✓	✓	✓
Most Efficient Dryer	✓			
Most Efficient Refrigerator	✓			

*The team also calculated water savings (gallons/year)

Continuous Improvement

During this study, RI Energy—simultaneously working on its 2026 Energy Efficiency Annual Plan—determined that the company would not continue to incentivize two measures included in this evaluation scope: dehumidifiers and room air conditioners. In addition, because RI Energy uses the results of evaluations to inform future program offerings, it is possible that the company will use results contained in this report to make further changes to the mix of measures included in the company’s 2026 Retail Products program.

Note that the list above does not include two active Retail Products program measures: refrigerator recycling and freezer recycling. This is because both measures were evaluated as part of a separate recycling-focused evaluation⁴ in 2021 and do not require updating at this time.

⁴ https://eec.ri.gov/wp-content/uploads/2021/12/ng-ri-21-re-appliance-recycling-one-page-summary_draft_20oct2021.pdf

Retail measures are delivered through three separate channels:

- 1. Downstream.** Customers receive incentives through creating accounts online following their purchase.⁵
- 2. Midstream.** Distributors receive incentives to provide instant discounts to utility customers.
- 3. Upstream.** Retailers receive incentives to sell ENERGY STAR® Most Efficient products through a markdown program.

Table 2 shows the incentive channels for each measure.

It is also important to note that because RI Energy's efforts focus on influencing stocking practices for "Most Efficient" measures, the program does not collect contact information for the Most Efficient Clothes Washer, Most Efficient Dryer, and Most Efficient Refrigerator upstream measures.

Table 2. Incentive Channels by Measure

Measure	Incentive Channel
Smart Strips	Downstream, Midstream
Room Air Cleaner	Downstream
Room Air Conditioner	Downstream
Dehumidifier Rebates	Downstream
Dehumidifier Recycling	Downstream
Low Flow Showerhead with TSV	Downstream
Pool Pump (Variable)	Midstream
ENERGY STAR® Triple Pane Windows	Downstream
ENERGY STAR® Dryer	Downstream
Most Efficient Clothes Washer	Upstream
Most Efficient Dryer	Upstream
Most Efficient Refrigerator	Upstream

⁵ The majority of downstream incentives are provided through this website: <https://www.rienergy.com/site/ways-to-save/save-money-with-rebates-and-incentives/appliance-and-electronics-incentives>

1.3 Key Terminology

The evaluation team uses the language defined in Table 3 throughout the report to explain key impact evaluation concepts. The evaluation team uses the language defined in Table 3 throughout the report to explain key impact evaluation concepts.

Table 3. Summary of Key Evaluation Terminology

Term	Definition
Participant	An individual or household (also identified by a unique account number) who receives at least one Retail Products measure (such as Smart Strips, Dehumidifier Recycling, Variable Speed Pool Pumps, etc.).
Ex Ante Savings	Savings assumed by Rhode Island Energy prior to an evaluation, usually based on information in the Rhode Island TRM.
Ex Post Savings	Savings determined through this evaluation.

1.4 Program Summary

To provide context for the evaluation results provided in this report, this section offers readers insight into the key measures and fuel types that drove overall program savings in 2023 and 2024. Our team used this information (i.e., what matters most in each program) to focus and prioritize our evaluation efforts.

In 2023 and 2024, nearly 8,000 customers received a rebate from RI Energy for recycling an older appliance and/or purchasing a new efficient product. Collectively, these customers recycled or purchased over 27,000 individual measures saving ~14,500 kWh (gross lifetime energy savings).

To summarize program activity, the team aggregated all measures into the following six measure groups:

- 1. Plug Load.** Smart Strips, Room Air Cleaner
- 2. Appliances.** ENERGY STAR Dryer, Most Efficient Dryer, Most Efficient Clothes Washer, Most Efficient Refrigerator
- 3. Cooling and Dehumidification Equipment.** Room Air Conditioner, Dehumidifier Rebate, Dehumidifier Recycling
- 4. Hot Water.** Low Flow Showerhead with TSV

5. Building Envelope. Triple Pane Windows**6. Pool Equipment.** Variable Speed Pool Pumps

Using installation counts and per-unit ex ante savings for each measure, we compared the total annual ex ante savings generated by each measure category in 2023-2024.⁶ Table 5 summarizes the number of installations and total savings by measure and year, providing additional detail behind the category-level comparisons discussed below.

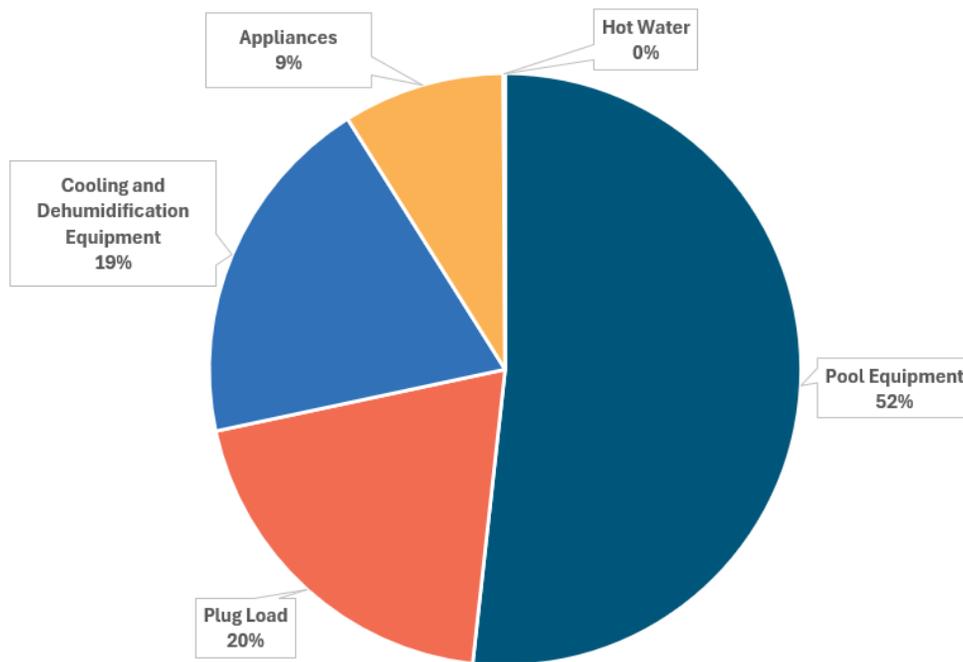
As shown in Figure 1, Pool Equipment measures are responsible for the majority of lifetime electric savings in 2023-2024 (52%), followed by Plug Load (20%) and Cooling and Dehumidification Equipment (19%). Together, these categories account for over 90% of total lifetime savings. Appliance measures contribute a smaller share (9%), while Water Heating represents less than 1%. From a lifetime savings perspective, the dominance of categories with longer-lived equipment, such as pools and cooling systems, becomes evident.⁷ Conversely, categories with shorter expected useful lives, such as plug load devices, play a relatively smaller role in the long-term savings profile.

Figure 2 illustrates these results, showing that Pool Equipment contributes more than 7,500 kWh of lifetime savings, with Plug Load and Cooling and Dehumidification Equipment each contributing just under 3,000 kWh.

⁶ As the program data only contains electric savings, the evaluation team only included electric savings in the lifetime savings calculations. Note that while the program data only contained electric savings, the team still generated per-unit ex post savings values for other fuel types for certain measures, as highlighted in Table 1.

⁷ This impact evaluation focused on annual gross and net energy savings and demand reductions (via application of existing end-use specific load shapes). Consistent with the evaluation work plan (see Appendix A), the scope of this study did not include a critical review of measure life assumptions. Similar to load shapes, the team leveraged the existing values and associated source in the 2025 RI Energy TRM.

Figure 1. Total Lifetime Electric Savings by Measure Category (% in 2023-2024)⁸



⁸ Due to there being no ex ante savings for the Triple Pane Windows measure, these figures do not include the Building Envelope measure group.

Figure 2. Total Lifetime Electric Savings by Measure (kWh in 2023-2024)

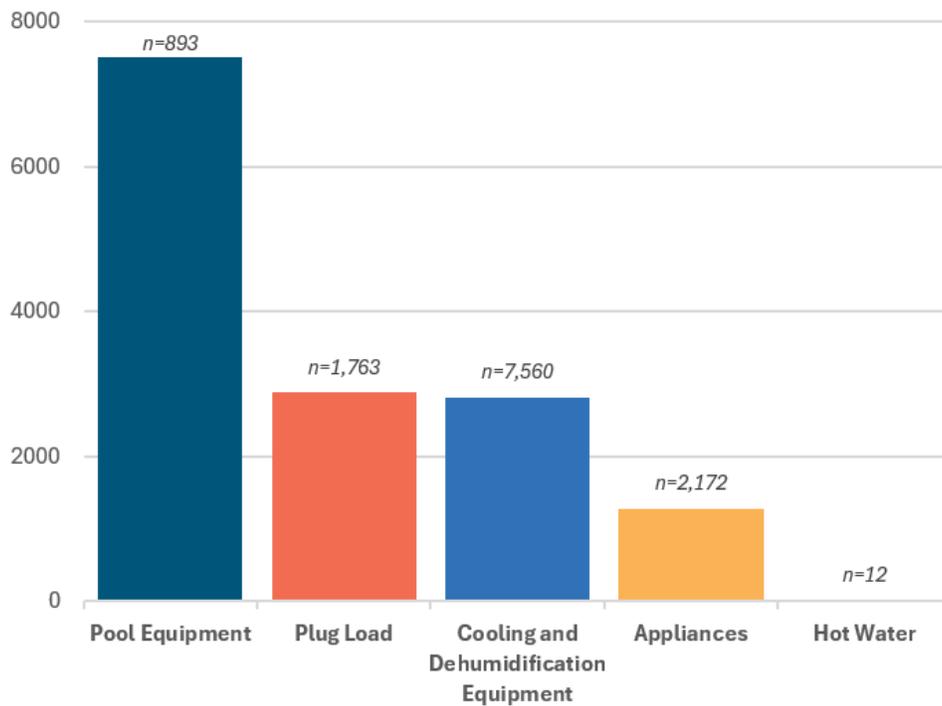


Table 4. Detailed Measure Summary Containing Measure Lives, Sales Quantities, and Lifetime Savings

Measures	Measure Life	2023		2024	
		Quantity	Lifetime Savings (kWh)	Quantity	Lifetime Savings (kWh)
Smart Strips	5	148	708	181	802
Room Air Cleaner	9	873	834	561	544
ENERGY STAR Dryer	16	749	599	524	419
Most Efficient Dryer	16	4	10	13	11
Most Efficient Clothes Washer	14	20	6	475	131
Most Efficient Refrigerator	12	84	30	303	76
Room Air Conditioner	12	938	675	479	345
Dehumidifier Rebate	17	1,790	678	907	309
Dehumidifier Recycling	4	1,472	531	1,974	276
Low Flow Showerhead with TSV	15	1	1	11	14
Variable Speed Pool Pumps	6	569	4,882	324	2,624

1.5 How to Use the Results of this Evaluation

We present the results of this evaluation in three parts: An **Evaluation Summary**, a **Supporting Documentation workbook**, and an **Appendix**.

The **Evaluation Summary**, which this section is part of, summarizes the results of the evaluation and outlines the evaluation methodologies used. For key or unique measures, such as dehumidifier recycling, the Evaluation Summary includes a detailed explanation of how our team calculated ex post net savings. The Evaluation Summary does not, however, include details, such as the engineering algorithms and the specific primary and secondary data used to develop ex post savings for every measures.

For these types of details, users of this evaluation should reference the **Supporting Documentation workbook**. The Supporting Documentation workbook includes a tab for each Retail Products measure included in the scope. Each measure-specific worksheet includes a direct comparison of ex ante and ex post savings and highlights differences in inputs and savings algorithms. Each measure-specific tab links to common set of participant, housing stock, and engineering assumptions, which ensures consistency across measures. Readers interested in accessing the Supporting Documentation workbook should request access from Rhode Island Energy's evaluation staff.

The third and final part of this evaluation is the **Appendix**, which contains all the interim deliverables our team created as part of this evaluation process. The appendix includes:

- A. Evaluation Scope of Work
- B. Participant Survey Instruments
- C. Load Shapes

2 Methodology

2.1 Activities

The team completed two tasks—an engineering analysis and a participant survey—as part of this impact evaluation.

Table 5. Summary of Evaluation Methodologies

Methodology	Details
<p>Engineering Analysis</p>	<ul style="list-style-type: none"> Referenced the 2025 Rhode Island TRM⁹ to compare results from this evaluation to existing deemed savings values and sources, and algorithmic approaches when available. The 2025 TRM often referenced a 2021 TRM review¹⁰ for the measure algorithm and inputs, while other times referring to recent ENERGY STAR data or a 2018 EPA Calculator. Leveraged detailed program data for inputs into the measure calculations for certain measures. Added the savings algorithms from the NY TRM¹¹ and IL TRM¹² to measures that lacked an algorithm-based approach for their savings calculations. Included a literature review of ENERGY STAR data to ensure that the most recent data is included in the ex post calculations.
<p>Participant Surveys</p>	<ul style="list-style-type: none"> Sampled 411 customers that received a rebate for recycling a dehumidifier in 2024 through the Retail Products program. Programmed survey in Qualtrics, sent initial and follow-up survey Completed surveys with 72 participants (17.5% response rate). Provided all participants who completed the survey with a \$25 e-gift card incentive. <p>The survey can be found in Appendix B.</p>

⁹ [24-39-EE Rhode Island Technical Reference Manual - 2025 Program Year.pdf](#)

¹⁰ [MA19R17-B-TRM Final Report 2021-04-12 clean.pdf](#)

¹¹ <https://dps.ny.gov/system/files/documents/2025/03/trm-management-plan-2025.pdf>

¹² [Illinois Statewide Technical Reference Manual - Illinois Energy Efficiency Stakeholder Advisory Group Illinois Energy Efficiency Stakeholder Advisory Group](#)

2.2 Other Data Sources

- **Product Program Tracking Data.** Rhode Island Energy provided the evaluation team program tracking data for the 2023 and 2024 program years. This data included basic customer information (account number, first and last name), measure information (type, quantity, savings, model number¹³, descriptions), and timing (payment date) for 2023-2024 participants.
- **Additional E-mails.** The evaluation team also received additional email addresses from our evaluation partner, NMR Group (NMR). The team used these additional e-mails to bolster participant survey sample for the Dehumidifier Recycling measure. Leveraging residential customer data provided by RI Energy for a concurrent study, NMR matched billing account numbers in the program data to emails and successfully provided our team with additional e-mails that allowed us to move forward with the participant survey task.

¹³ The team researched manufacturer and model numbers in the program data to identify product capacities and efficiencies used in the savings calculations. For example, the team looked up capacity values for the Room Air Conditioner measure and rated hydraulic horsepower for the Variable Speed Pool Pumps measure.

3 Gross Savings

This section presents the evaluated gross energy savings for all measures in the Retail Products program for prospective application in 2026. Our team developed these prospective savings using the most recent RCP program data available (2023 and 2024) at the time of this study.

As shown in Table 4, the evaluation team conducted an engineering analysis to estimate gross energy savings. The team reviewed the existing savings calculations to determine whether alternative algorithms or inputs would provide a more accurate estimate. Based on this review, the team either maintained the original methodology or updated the algorithms and inputs as appropriate. When updates were made, they primarily drew on recent federal standards, ENERGY STAR data, and available program data.

The results presented in this section provide a high-level summary of the evaluated savings for each measure category. As a reminder, this evaluation's Supporting Documentation Workbook, includes detailed documentation of the specific algorithms, input values, data sources, and calculation methodologies used for each measure. Readers seeking comprehensive technical details should reference the measure-specific worksheets in that workbook.

3.1 Plug Load

The Plug Load end-use contains two measures: **Smart Strips** and **Room Air Cleaners**.

Table 5 compares gross ex ante and ex post annual energy savings for both plug load measures. The table also denotes when our team did not use a Rhode Island TRM algorithm, summarizes the updated inputs we used (relative to those in the current Rhode Island TRM), and explains the rationale for and implications of those input updates on evaluated energy savings.

The evaluation team found that the Rhode Island TRM currently references the best available source for Smart Strip savings, while recommending updates to both the savings algorithm and inputs for Room Air Cleaners.

Table 6. Plug Load: Annual Energy Savings Summary

Measure & Fuel	Ex Ante	Ex Post	Updated Savings Algorithm	Updated Inputs	Rationale & Implication on Energy Savings
Smart Strips (Electric, kWh/Year)	105	105	No	No	The TRM continues to reference the best available source for Smart Strip savings.
Room Air Cleaner (Electric, kWh/Year)	391	127/154 ¹⁴	Yes, from 2025 IL TRM.	Baseline/Measure CADR/Watt: Citing more recent ENERGY STAR QPL and updated ENERGY STAR specifications. HOU: Also taken from the ENERGY STAR QPL, whereas the TRM assumed that room air cleaners operate 8,760 hours per year.	As the TRM does not contain a savings algorithm for this measure, the team has adopted the algorithm from the 2025 IL TRM to calculate savings. Furthermore, the TRM uses outdated baseline and efficient performance assumptions ¹⁵ , so the team updated these metrics so that they are in accordance with the ENERGY STAR QPL and updated ENERGY STAR specifications. The drop in savings are primarily caused by the evaluation team updating these performance metrics so that they are aligned with products currently on the market.

3.2 Appliances

Our team evaluated four Appliance end-use measures: **ENERGY STAR Dryers, Most Efficient Dryers, Most Efficient Clothes Washers,** and **Most Efficient Refrigerators.** Table 6 compares ex ante and ex post annual energy savings for these four measures, and highlights when we have made an update to the savings algorithm and/or an algorithm input. Note that because ENERGY STAR Dryers must meet an efficiency level that is

¹⁴ The higher savings number reflects the incorporation of the ENERGY STAR v3.0 specifications effective in October 2025, whereas the lower savings number reflects the ENERGY STAR v2.0 specifications that came into place in July 2020.

¹⁵ While the Rhode Island TRM did not contain a savings algorithm for this measure, it states the baseline and measure-level efficiencies used to determine savings.

significantly higher than the DOE standard (~20% higher), this results in a savings increase between the ENERGY STAR and Most Efficient levels being relatively small.

While the evaluation team does not suggest that RI Energy modify the savings calculations for the dryer measures, the team proposed updates for the Most Efficient Clothes Washer and Most Efficient Refrigerator measures. For both measures, the Rhode Island TRM lacks clarity as to how the savings were calculated. Our team recommends adopting the energy savings algorithm from the New York Technical Reference Manual to provide greater transparency.

Table 7. Appliances: Annual Energy Savings Summary

Measure & Fuel	Ex Ante	Ex Post	Updated Savings Algorithm	Updated Inputs	Rationale & Implication on Energy Savings
ENERGY STAR Dryer (Electric, kWh/Year)	160	160	No	No	The team recommends using the existing methodology in the TRM to calculate savings, as there is no available information that could be used to improve the savings calculations.
Most Efficient Dryer (Electric, kWh/Year)	213	213	No	No	As with the prior measure, the team recommends using the existing methodology in the TRM to calculate savings, as there is no available information that could be used to improve the savings calculations.
Most Efficient Clothes Washer (Electric, kWh/Year)	29	49	Yes, from 2025 NY TRM	Sources of Energy Savings: Differentiated into electric and gas clothes washer savings, as well as the energy savings attributed to water heating.	While the Rhode Island TRM references 2024 ENERGY STAR data for the savings for this measure, it lacks further detail on how savings are calculated. The method proposed by the evaluation team contains further transparency and more information regarding the source of the energy savings.
Most Efficient Clothes Washer (Fossil fuels, MMBtu/Year)	N/A	0.18	N/A	N/A	RI Energy did not previously include fossil fuel savings as part of the Most Efficient Clothes Washer measure.
Most Efficient Refrigerator (Electric, kWh/Year)	96	57	Yes, from 2025 NY TRM.	Baseline/Efficient kWh: Updated to incorporate kWh from a myriad of baseline and efficient refrigerators. Adjustment Factors: The algorithm proposed by the evaluation team contains adjustment factors that account for a building's HVAC system and the number of occupants.	The Rhode Island TRM lacks transparency as to the algorithm and data sources currently being used to calculate savings for this measure. The team employed the savings algorithm from the 2025 NY TRM, incorporated the baseline and efficient electricity consumption values from many different refrigerator types, and added adjustment factors that account for a building's HVAC system and the number of occupants.

3.3 Cooling and Dehumidification Equipment

There are three measures contained in the Cooling and Dehumidification Equipment section: **Room Air Conditioners, Dehumidifier Rebates, and Dehumidifier Recycling.**¹⁶ Similar as above, Table 7 compares ex ante and ex post annual energy savings for these three measures, and denotes when we made an update to the savings algorithm and/or input.

While the evaluation team does not suggest that RI Energy modify the savings calculations for the dehumidifier measures, the team has proposed updates to the Room Air Conditioner measure. For this measure, the Rhode Island TRM references an outdated federal standard (from 2014), and so the team has updated the savings for this measure so that it references the federal standard beginning in 2026.

Table 8. Cooling and Dehumidification Equipment: Annual Energy Savings Summary

Measure & Fuel	Ex Ante	Ex Post	Updated Savings Algorithm	Updated Inputs	Rationale & Implication on Energy Savings
Room Air Conditioner (Electric, kWh/Year)	36	23	Yes, from 2025-2027 MA TRM.	Capacity: Updated to reflect current program data rather than using an assumption. ¹⁷ Baseline/Efficient CEER: Updated to reflect the federal standard from 2026, as the ex ante values referenced the federal standard from 2014. FLH_Room AC: Necessary input for updated algorithm, team applied value from 2023 Phase 7 MA Res Baseline Data.	The savings in the Rhode Island TRM use an outdated federal standard (from 2014) as the baseline efficiency. The team updated the baseline efficiency to reflect the federal standard beginning in 2026 and the capacity to reflect the current program data.
Dehumidifier Rebate (Electric, kWh/Year)	82	82	No	No	The team recommends using the existing methodology in the TRM to calculate savings, as there is no available information that could be used to
Dehumidifier Recycling	407	407	No	No	

¹⁶ Note that during the course of this study, RI Energy determined that they would not continue to incentivize the Room Air Conditioner and Dehumidifier Rebate measures.

¹⁷ The team found capacities for the Room Air Conditioner measure through researching the manufacturer and model number of the top-selling products in the program data.

(Electric, kWh/Year)					improve the savings calculations.
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3.4 Water Heating

Low-Flow Showerheads and **TSVs** are the only Water Heating measures. Table 8 shows the ex ante and ex post savings by fuel type. As noted in the table, the source referenced by the Rhode Island TRM did not contain an algorithm for calculating the savings for this measure. As a result, we recommend an algorithm-based approach for measure savings, with the algorithm inputs divided into three groups, as shown below.

Table 9. Water Heating: Annual Energy Savings Summary

Measure & Fuel	Ex Ante	Ex Post	Updated Savings Algorithm	Updated Inputs	Rationale & Implication on Energy Savings
Low-Flow Showerhead with TSV (Electric, kWh/Year)	247	289	Yes, from the RTF and other sources.	<p>Reduction in Annual Shower Usage: Using information from the RTF and other sources, the updated algorithm clearly highlights the reduction in annual shower usage due to low-flow showerheads.</p> <p>Pre-Shower Waste Time: The team references a workbook published by the RTF for the pre-shower waste time.</p> <p>Shower Temperature: The updated algorithm including information on shower temperature allows the team to translate the decrease in water usage to a decrease in energy.</p>	The source referenced by the Rhode Island TRM does not contain an algorithm for calculating the savings for this measure, necessitating greater transparency to the inputs used for calculating savings.
Low-Flow Showerhead with TSV (Natural Gas, therms/Year)	12	11			
Low-Flow Showerhead with TSV (Delivered Fuels, MMBtu/Year)	1.32	1.17			

3.5 Building Envelope

Triple Pane Windows are the Retail Products program’s only building envelope measure. The Rhode Island TRM does not calculate savings for the Retail Products program for this measure, so the evaluation team has implemented the savings algorithm from the 2025-2027 MA TRM to calculate savings.

As described in Table 9, this algorithm primarily hinges on the window square footage and energy usage by window type, with the latter being calculated through building simulations. In alignment with the MA TRM, the evaluation team has calculated energy savings for homes heated with three different HVAC systems that install triple pane windows.

Table 10. Building Envelope: Annual Energy Savings Summary

Measure & Fuel	Ex Ante	Ex Post	Updated Savings Algorithm	Updated Inputs	Rationale & Implication on Energy Savings
Triple Pane Windows (Electric Resistance, kWh/Year)	N/A	139	The updated savings algorithm is from the 2025 - 2027 MA TRM.	Energy Usage by Window Type: To calculate savings from switching from a single pane to triple pane window, the team employed energy consumption data in the 2025 - 2027 MA TRM based on building simulations. Window Square Footage: From the 2025 - 2027 MA TRM, the team assumed a window square footage of 11.7.	The Rhode Island TRM does not calculate savings for the Retail Products program for this measure. The team turned to the 2025 - 2027 MA TRM, which contains unique savings values by building HVAC system.
Triple Pane Windows (Fossil Fuels, MMBtu/Year)	N/A	0.6			
Triple Pane Windows (Fossil Fuels, kWh/Year)	N/A	14			
Triple Pane Windows (Heat Pumps, gal/Year)	N/A	46			

3.6 Pool Equipment

The Rhode Island TRM references a source for **Variable Speed Pool Pumps** that uses outdated metrics to calculate savings for this measure, as the DOE mandated that pool pumps report Weighted Energy Factors, rather than Energy Factors, in 2021. The evaluation team has thus modified the savings to be calculated through Weighted Energy Factors, in addition to updating certain inputs to reflect more applicable data.

The updated savings, along with descriptions of the updated inputs, are shown in Table 10.

Table 11. Pools and Specialty Equipment: Annual Energy Savings Summary

Measure & Fuel	Ex Ante	Ex Post	Updated Savings Algorithm	Updated Inputs	Rationale & Implication on Energy Savings
Variable Speed Pool Pumps (Electric, kWh/Year)	1,284	625	Yes, from the 2025 NY TRM.	<p>Rated Hydraulic Horsepower: The team used the current program data to calculate the rated hydraulic horsepower to use as an input when calculating the weighted energy factors.</p> <p>Baseline/Efficient Weighted Energy Factor: The team used algorithms in the 2025 NY TRM to translate the rated hydraulic horsepower into baseline and efficient weighted energy factors.</p> <p>Number of Turnovers per Day: The 2025 NY TRM referenced the ENERGY STAR savings calculator for inground pool pumps for generating a value for this variable.</p>	The source referenced by the Rhode Island TRM is based off information that is published in 2017. In 2021, however, pool pump efficiency began to be rated by weighted energy factors, which the team has incorporated into the updated savings algorithm.

4 Net Savings

Net savings are critical for understanding the true impact of a program, such as RI Energy’s Residential Products program. Unlike gross savings, net savings capture the portion of reported savings that would not have occurred without program intervention. To determine these values, the evaluation team estimated a net-to-gross (NTG) ratio for each Retail Products measure.

4.1 Approach

Our team used both primary (participants surveys) and secondary (literature review) data collection approaches to develop measure-specific NTG ratios. However, as evident in Table 11, the team leaned heavily on the literature review approach: we determined NTG ratio for all but one measure (dehumidifier recycling) via literature review.

Table 12. NTG Approach by Measure

Measure	Participant Survey	Literature Review
Smart Strips		✓
Room Air Cleaner		✓
Room Air Conditioner		✓
Dehumidifier Rebates		✓
Dehumidifier Recycling	✓	
Low Flow Showerhead with TSV		✓
Pool Pump (Variable)		✓
ENERGY STAR® Triple Pane Windows		✓
ENERGY STAR® Dryer		✓
Most Efficient Clothes Washer		✓
Most Efficient Dryer		✓
Most Efficient Refrigerator		✓

The following subsections provide more detail regarding both approaches, including why our team used a given approach for each measure.

4.1.1 Participant Survey

The evaluation's original work plan proposed to use participant surveys to determine NTG ratios for three measures: dehumidifier recycling, dehumidifier rebates, and room air conditioners. Our team identified these measures for inclusion in the participant survey for three reasons:

1. They had sufficient participation to produce results with at least 10% precision at the 80% confidence level.
2. Program records included a high proportion of valid email addresses, supporting a web-based survey approach.
3. Together, the measures accounted for 30% of the program's 2024 ex ante savings, making them meaningful targets for evaluation.

After finalizing the scope of work—but before launching the participant survey—RI Energy, in collaboration with program stakeholders, decided not to continue incentivizing two of the measures (dehumidifier rebates and room air conditioners¹⁸) in 2026. As a result, RI Energy instructed our team to drop both measures from the participant survey effort as the results would not be useful prospectively.¹⁹

The team had initially hoped to also survey customers that purchased Smart Strips and Variable Speed Pool Pumps, which represented another 68% of savings. However, the program data provided to our team did not include enough emails or phone numbers to produce reliable results.²⁰

In August 2025, the team completed web surveys with 72 customers that recycled their dehumidifier through the Products program in 2024. Because the lone product included in the survey was a recycling measure, rather than a new measure, our team used a recycling-specific NTG methodology based on the Renewable Energy Laboratory (NREL) Uniform Methods Project (UMP) protocol for recycled refrigerators.^{21,22} The NREL UMP protocol focuses on determining what a participant would have done with the recycled appliance in

¹⁸ While these measures are no longer being incentivized at the current ENERGY STAR level, they are now being supported at the ENERGY STAR Most Efficient level.

¹⁹ The team still assessed NTG for both measures through the literature review approach, a more cost-effective evaluation option.

²⁰ The remaining 7 products collectively represent only 2% of savings so surveys were not a prudent use of evaluation funds.

²¹ The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures (<https://docs.nrel.gov/docs/fy18osti/70472.pdf>)

²² This is the same protocol that NMR Group, as a subcontractor to Cadeo, used as part of the National Grid Rhode Island Appliance Recycling study (completed in 2021)

the absence of the program and, more specifically, whether that counterfactual action would have resulted in the destruction of the appliance or its continued use, by the participant themselves or by someone else.

Please see Appendix C for copies of the survey instruments used.

4.1.2 Literature Review

Our team conducted a search for relevant NTG studies to potentially inform our NTG recommendations for RI Energy's non-dehumidifier recycling measures. Specifically, we sought NTG studies that focused on retail programs, relied on primary data collection and that were recently completed, ideally, in the Northeast.

Our search resulted in two notable outcomes:

- **No “Most Efficient” NTG evaluations.** Our team was unable to identify any existing NTG studies for the program's three “Most Efficient” upstream measures (Most Efficiency Clothes Washers, Dryers, and Refrigerators). Since the TRM did not include a citation for the existing NTG values, which varied by Most Efficient measures, our team asked RI Energy regarding the source(s). RI Energy evaluation staff indicated the source was a Massachusetts study, but, like our team, were unable to locate the source online.
- **The current source remained the best source.** The 2025 TRM cites a 2021 Residential Products NTG Study completed for the Massachusetts Electric Program Administrators as the NTG source for five Retail Products program measures.²³ While completed in 2021, the study thoughtfully projected NTG values through 2024 for prospective application. Our team's research did not identify a more appropriate (products-focused), regionally appropriate (from neighboring Massachusetts) or recent (forecasted NTG values through 2024) source than this study. For this reason, our team used the NTG values recommended for application for 2022, 2023 and 2024 to forecast NTG values for prospective use by RI Energy in 2026. For example, for room air cleaners, the study recommended NTG values of 0.70, 0.68, and 0.66 for application in 2022, 2023, and 2024, respectively. To develop the appropriate value for RI Energy in 2026, our team continued the study's average annual decline (2%) and recommended a RI Energy use 0.62 in 2026.

²³ Residential Products Net-to-Gross Study - MA20X04-E-PRODNTG (https://ma-eeac.org/wp-content/uploads/MA20X04-E-PRODNTG_Res-Products-NTG-Report_FINAL_2021.06.08.pdf)

4.2 Findings

4.2.1 Dehumidifier Recycling

Per UMP, the first step in a recycling-based NTG analysis is to “estimate the distribution of participating units likely to have been kept or discarded absent the program”. As shown in Table 12, our survey with 2024 dehumidifier recycling participants determined that nearly three-quarters of customers self-reported that they would have discarded their dehumidifier absent RI Energy’s program.

Table 13. Dehumidifier Recycling: Self-Report Action in Absence of Program

Response	Count	Percent
Gotten rid of it	43	74%
Kept it	15	26%
Total²⁴	58	100%

The second step specified in UMP is to follow-up on the initial self-report actions.

For those that said they would have gotten rid of their dehumidifier, our team asked them – specifically – how they would have discarded it. The purpose of this follow-up question is to determine whether they would have discarded it in a way that would have resulted in its eventual destruction (e.g., taken it to the dump themselves), which is indicative of freeridership or in a manner that would have resulted in the dehumidifiers continued use in another household (e.g., gave it to a family member or friend, which is not indicative of freeridership).

Our team found that the majority of these respondents (68%) said they would have recycled it themselves through their town or city or took it to dump/put it out with the trash. Both of these responses would result in the destruction of the dehumidifier and are therefore associated with freeridreship (FR=1). While free for some, both options can include a cost to the customer – between \$12 and \$25 depending on the option and the customer’s location in Rhode Island, per our research. For this reason, the survey informed the respondent of the cost associated with their response and asked them again—now that they were notified of the potential cost—how they would have discarded their dehumidifier. A small number of respondents changed their answer, but most confirmed they would have paid the cost necessary to recycle or discard it themselves.

²⁴ The remaining respondents said “I don’t know” and were skipped to other questions.

Table 14. Dehumidifier Recycling: Self-Report Discard Method

Response	Count	Percent	Indicative of Freeridership
Recycled it through my town or city*	16	39%	Yes
Took it to a garbage dump or put it out as trash*	12	29%	Yes
Gave it away for free to a stranger or charity	7	17%	No
Recycled it in some other way, please specify**	3	7%	Yes
Hired a hauler to take it away*	2	5%	Yes
Gave it away for free to someone I know	1	2%	No
Sold it	0	0	No
Had a retail store come and pick it up	0	0	Yes
Total²⁵	43	100%	

*Confirmed they would have paid fee (\$12-\$25) if relevant in their jurisdiction

**The team reviewed these individual responses and found all three would have led to the discontinued use of the dehumidifier

For respondents that said they would have kept their dehumidifier absent the program, we asked if they would have continued to use it or stored it unplugged. One-third said they would have continued to use it while two-thirds said they would have stored it unplugged. The units that would have continued to operate are not freeriders (FR=0). The unplugged units would not have continue use energy in the near term, but it is possible that the respondent would plug them in at a later. For this reason, the team assigned a partial (FR=0.5) score to these respondents' dehumidifiers.

²⁵ Ibid.

Table 15. Dehumidifier Recycling: Self-Report Action if Kept

Response	Count	Percent	Indicative of Freeridership
Continued to use it	5	33%	No
Kept it unplugged	10	67%	Partially
Total	15	100%	

Table 15 summarized the previous tables in this section and, using a weighted average of the responses and their associated freeridership scores, calculates overall freeridership for dehumidifier recycling (68%).

Table 16. Dehumidifier Recycling: Freeridership Summary

Response	Count	Percent	Freeridership Score
Kept and continued to be used	5	9%	0.0
Kept unplugged	10	18%	0.5
Discarded in a manner associated with no further use	33	59%	1.0
Discarded in a manner associated with continued use	8	14%	0.0
Overall	56	100%	0.68

Since the survey did not reveal any dehumidifier recycling specific spillover, the measure-specific NTG - using the standard NTG algorithm (1-FR+SO) - RI Energy's dehumidifier recycling measure is 32%.

Table 17. Dehumidifier Recycling: NTG Summary

Response	Value
Freeridership	0.68
Spillover	0.00
NTG	0.32

4.2.2 All Other Measures

Table 17 summarizes the existing ex ante savings, the team's recommendations for an ex post value (and source), and the rationale behind that recommendation.

Table 18. All Other Measures: NTG Summary

Measure	Ex Ante		Ex Post		Rationale
	NTG	Source	NTG	Source	
Smart Strips	1.00	None	0.84	MA Products NTG Study (2021)	The TRM does not include a source for the current NTG value (100%). For consistency across Retail Program measures and because it is the most recent, relevant, and specific Products NTG study, the team recommends that RI Energy use the 2021 NMR Products NTG study as the source. The NMR report includes NTG values that decrease 2% annually from 2023 (90%) and 2024 (88%) for online and upstream smart strips. (It provides different values for strips left behind during assessments or mailed to customers as part of a kit). The team recommends that RI Energy apply this annual rate of decrease and use a NTG of 84% in 2026.
Room Air Cleaner	0.63	MA Products NTG Study (2021)	0.58	Same	The source cited in the TRM remains the most recent/best source for prospective NTG values. However, RI Energy is currently using the NTG value recommended for 2022 (63%). The report suggests NTG values decrease 1% annually from 2023 (61%) and 2024 (60%). The team recommends that RI Energy prospectively apply this annual decrease and use a NTG of 58% in 2026.
Room Air Conditioner	0.56	MA Products NTG Study (2021)	0.48	Same	The source cited in the TRM remains the most recent/best source for prospective NTG values. However, RI Energy is currently using the NTG value recommended for 2022 (56%). The report suggests NTG values decrease 2% annually from 2022-2024. The team recommends that RI Energy prospectively apply this same annual decrease and use a NTG of 48% for 2026, which is 4% less than the study's recommended value for 2024 (52%).
Dehumidifier Rebates	0.49	MA Products NTG Study (2021)	0.41	Same	The source cited in the TRM remains the most recent/best source for prospective NTG values. However, RI Energy is currently using the NTG value recommended for 2022 (49%). The report suggests NTG values decrease 2% annually from 2022-2024. The team recommends that RI Energy use a NTG of 41% for 2026, which is 4% less than the study's recommended value for 2024 (45%).
Thermostatic Shut-Off Valve	0.97	MA EnergyWise Evaluation (2008)	0.96	MA Products NTG Study (2021)	The TRM likely references the wrong source for this measure (a 2008 EnergyWise study), which - based on the team's review - doesn't include the referenced 97% NTG. That value does match the suggested 2022 NTG for this measure in the 2021 NMR Group Residential Products NTG study, which the TRM cites for many other Retail program measures. The team recommends that RI Energy update the reference and apply the NMR study's value for 2024 (the last year provided) for prospective application. (Unlike other measures, the team does not recommend additional adjustments for prospective application beyond 2024. This is because

					the NMR report suggests consistent values for 2023 and 2024, which does not suggest impending declines.)
Low Flow Showerhead with TSV	1.00	None	0.96	MA Products NTG Study (2021)	The team recommends using the same NTG value recommended for TSVs (96%). See previous row for additional detail TSVs.
Pool Pump (Variable)	0.89	MA Products NTG Study (2021)	0.78	Same	The source cited in the TRM remains the most recent/best source for prospective NTG values. However, RI Energy is currently using the NTG value recommended for 2022 (89%). The report suggests NTG values decrease 3% annually from 2023 (87%) and 2024 (84%). The team recommends that RI Energy prospectively apply this annual decrease and use a NTG of 78% in 2026, which is 6% less than the report's 2024 value.
ENERGY STAR® Triple Pane Windows	0.96	2022-2024 MA TRM (pg. 58)	0.96	2025-2027 MA TRM (pg. 56)	The freeridership assumption (4%, based on low market share) and source (MA) remain the same, but RI Energy should update the NTG citation to reference the more recent MA TRM (i.e., 2025-2027, not 2022-2024)
ENERGY STAR® Dryer	0.52	MA Products NTG Study (2021)	0.52	Same	The source cited in the TRM remains the most recent/best source for prospective NTG values. RI Energy is currently using the appropriate prospective NTG value (52%), which the NMR recommended for application in 2023 and 2024. Unlike other measures, the team does not recommend additional adjustments for prospective applications beyond 2024. This is because the NMR report recommends the same NTG values for 2023 and 2024, which does not suggest impending declines.
Most Efficient Clothes Washer	0.90	None	0.75	NA	The TRM does not include a source for any of the three "Most Efficient" measures included in the Retail Impact Evaluation scope. Per RI Energy, the current NTG assumptions are based on information from MA, although neither RI Energy nor the evaluation team could locate the source. The evaluation team was also unable to identify NTG values for "Most Efficient" measures used in other states to substantiate or replace the current assumptions. The team recommends RI Energy consider primary research to develop a prospective, empirically based NTG value for Most Efficient Cloth Washers, which represented 13% of total Retail program net lifetime savings in 2024. (Collectively, Most Efficient Dryers and Refrigerators were only 2.7%. Unless RI Energy anticipates higher volume for those measures in the future, the current savings are not significant enough to merit the cost of primary data collection.) In the interim, the team recommends using a consistent NTG of 75% for all three Most Efficient appliances.
Most Efficient Dryer	1.00	None	0.75	NA	
Most Efficient Refrigerator	0.75	None	0.75	NA	

5 Recommendations

The team offers the following recommendations based on our team's experience evaluating RI Energy's multifamily programs.

- 1. Adopt Evaluated Gross and Net Savings for Prospective Application.** As outlined in this report, our team identified numerous improvements to gross savings algorithms and input values. Collectively, these improvements, which often reflect important updates to appliance standards or efficiency ratings, yield gross savings that better reflect RI Energy's current Retail Products program. We recommend that RI Energy adopt the gross savings algorithms and input updates identified by our team through this impact evaluation for prospective application, starting in 2026. Similarly, we recommend RI Energy apply the updated NTG groups ratios documented in this report.
- 2. Collect More Comprehensive Contact Information.** Our team was only able to conduct primary net savings research (i.e., participant surveys) for one measure (dehumidifier recycling) offered through the Retail Products program. This is because the program tracking data did not include sufficient participant contact information to support surveys for other measures. We understand that some Retail Products delivery pathways do not facilitate the collection of participant contact information. However, for the measures and delivery pathways that do, we recommend that Rhode Island Energy place greater emphasis on collecting participant email addresses to support future evaluation efforts.
- 3. Add Additional Fields to Program Data.** The team was only able to calculate realization rates for electric savings because the program data included ex ante savings for electricity. To enable calculation of realization rates for other fuel types, the team recommends that RI Energy add gross annual savings for therms and delivered fuels to program tracking data provided to future evaluators. In addition, incorporating supplemental information (e.g., window size or other building characteristics) would allow for more accurate and representative savings calculations as part of future evaluations.

Appendix A Evaluation Scope of Work



Appendix B Participant Survey



Appendix C Load Shapes

The table below contains all the load shapes values from the 2025 Rhode Island Technical Reference Manual (Appendix C), which the team used to calculate the demand savings.

Table 19. Load Shapes By Measure

Measure	Fuel	LS_ID	Max Demand Factor	CF Summer Peak	CF Winter Peak
Smart Strip	Electric	ls_06_Electric	0.0002	0.56	0.77
Dehumidifier Recycling	Electric	ls_79_Electric	0.0002	0.97	0.24
Dehumidifier Rebate	Electric	ls_79_Electric	0.0002	0.97	0.24
Room Air Cleaner	Electric	ls_79_Electric	0.0002	0.97	0.24
Room Air Conditioner	Electric	ls_18_Electric	0.0009	1.19	0
Energy Star Dryer	Electric	ls_75_Electric	0.0003	0.43	0.58
Most Efficient Dryer	Electric	ls_75_Electric	0.0003	0.43	0.58
Most Efficient Clothes Washer	Electric	ls_142_Electric	0.0003	0.89	1
Most Efficient Refrigerator	Electric	ls_07_Electric	0.0002	0.94	0.72
Low Flow Showerhead with TSV	Electric	ls_08_Electric	0.0003	0.33	0.64
Variable Speed Pool Pump	Electric	ls_80_Electric	0.0008	0.82	0
Triple Pane Windows - Electric Resistance Heating	Electric	ls_264_Electric	0	0.33	0.43
Triple Pane Windows - Heat Pump	Electric	ls_265_Electric	0	0.37	0.22
Triple Pane Windows - Fossil Fuel Heating	Gas	ls_266_Electric	0	0.37	0