Multifamily Impact Evaluation

Rhode Island Energy

Prepared by
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Executive Summary

This report details the results of Resource Innovations' impact evaluation of three Rhode Island Energy (RI Energy) retrofit programs targeted at buildings with 5 or more units: **EnergyWise Multifamily (EWMF), Income-Eligible Multifamily (IEMF), and C&I Multifamily Retrofit (C&I MF)**. The programs, which Rhode Island Energy delivers in tandem through a single lead vendor (RISE Engineering), offers multifamily participants similar efficiency measures – albeit under different incentive structures. Given the similarity and coordinated delivery of the programs, this report summarizes impact findings for all three programs, which we collectively refer to as the "multifamily" or "MF" program.

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

This evaluation complements Resource Innovation's recently completed Multifamily Custom Measure Impact Evaluation and replaces the prior prescriptive measure-focused impact study completed in 2020.

1.1 Key Gross Savings Results

Key gross savings results for select measures and fuel types include:

Building Shell

Building shell measures such as insulation, air sealing, and duct insulation accounted for **57% of total lifetime savings (overall MMBtu across all fuels)** across all multifamily programs. A calibrated building simulation analysis showed that in natural gas-heated homes, these measures deliver meaningful annual reductions in energy use—**insulation saved 47 therms per dwelling unit, air sealing saved 53 therms, and duct insulation saved 5 therms.**

Thermostats

Wi-Fi thermostats and programmable thermostats—were the **second largest contributor to total lifetime savings, accounting for 21% across all fuel types.** Notably, they dominated savings in the IEMF program. In natural gas-heated homes, **Wi-Fi thermostats saved 17.9 therms per unit installed, programmable thermostats saved 13 therms, and boiler reset controls delivered the largest impact with 31.8 therms.**

1.2 Key Net Savings Results

To determine the net savings associated with EWMF and C&I MF measures, our team conducted surveys with a sample of participating property owners and managers. We did not collect net-to-gross (NTG)-related data for IEMF, which is deemed at 100% - standard practice for income eligible programs. Unfortunately, sparsely populated contact information in the program tracking data—particularly e-mail addresses—limited our team's outreach to only 97 participants yielding 19 completed surveys. For context, our team estimated approximately 500 unique decision-makers (property owners/managers) participated in the programs over 2023 and 2024, meaning we could only reach about one-fifth of the total participant population.

Despite a strong response rate (20%), the surveys were insufficient to calculate reliable NTG values. To bolster samples size and develop more reliable NTG results for prospective application, our team combined the results of our survey with the previous evaluation.

This combination approach yielded higher NTG results (+0.07) for weatherization and duct sealing. The biggest change, however, was smart strips (+0.30). This change was not due to the combined data but rather a change in methodology. Specifically, our team contends that smart strip NTG should be 1.0 since the building owner or manager makes the decision to participate in the program, which mean the installation decision posed to the tenant was really more of an opportunistic one (i.e., "Do you want a smart power strip as part of your building's participation in this MF program?") than a more traditional NTG question (i.e., "Would they have bought a smart power strip anyway?"). It is highly unlikely that an individual tenant was planning to purchase a smart power strip on their own and avoided the purchase because the program happened to knock on their door and offer them free smart strip first. Following this logic, all smart power strips installed through a multifamily program like RI Energy's (where the building owner makes the participation decision) have a NTG of 1.0. The remaining multifamily measures either saw a modest increase (+0.01) or are unchanged.

1.3 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 MF 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. **Revisit Previous Data Improvement Recommendations.** This study began with a review of the program tracking data that RI Energy provided to our team to enable this evaluation. Specifically, we assessed whether data-related recommendations from the previous multifamily evaluation (2020) had been addressed. Despite the implementation of new data tracking system, our review found that two of the three prior recommendations remain unresolved. We discussed these findings with RI Energy staff during the study, who acknowledged ongoing challenges in capturing comprehensive multifamily data and indicated continued interest in implementing the previous data quality improvements (see Appendix C). As described in this report, these persistent data quality issues continue to impact evaluation capabilities and program analysis. Regarding the prior recommendations, RI Energy should prioritize implementing automated data validation checks and maintaining comprehensive contact information.

3. **Ensure Complete Technical Data Capture in New Tracking System.** RI Energy transitioned to new data tracking software since the previous MF impact evaluation. The data provided to our team for this study, which originated in the new software, was missing critical technical parameters that were available as part of the previous evaluation via the prior software. Specifically, the new tracking data did not include pre- and post-installation R-values and air leakage test results (ACH50)—essential for calculating and validating building envelope savings. RI Energy is aware of this shortcoming and working to address it. Given the importance of this information, we formally recommend that RI Energy work with the implementation and software vendors to ensure key pre- and post-program technical parameters are captured in the software and made available to future evaluators.

4. **Collect Pre-Program Hot Water Data for a Sample of Participants.** RI Energy currently assumes that all retrofitted showerheads and faucet aerators replace existing fixtures that consume the maximum allowable water flow per federal requirements (2.5 and 2.2 gallons/minute, respectively). In practice, it is likely that some participants are already using fixtures with flow rates below the federal maximum - though still meaningfully higher than the program's high-efficiency models - making the replacements worthwhile but less impactful than assumed. Given the lack of empirical data specific to Rhode Island's multifamily housing stock and the significant impact of this assumption on savings estimates, our team recommends that RI Energy collect pre-program hot water flow rates for a representative sample of future participants. Specifically, we recommend RI Energy work with its implementation vendor collect pre-program measurements for a minimum of 20 EWMF and 20 IEMF participants in 2026. To ensure representation

across participating buildings, RI Energy should not collect measures from more than five tenants at any given participating multifamily facility. Once available, RI Energy should use this program-specific, empirical data to update showerhead and faucet aerator gross savings for application in 2027.

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, summer and winter peak demand reductions, and, when relevant, annual water savings. Some of the values in the table are program-specific (i.e., differ between EWMF and IEMF), while others are the same for both programs. Our team used the information in Appendix D (Demand Factors, Coincidence Factors) to calculate demand savings. Lastly, all EWMF savings are also relevant for C&I MF.

The evaluated savings presented in Table ES-1 reflect several important updates. Most notably, building envelope measures (air sealing and insulation)—which account for over half of total program savings—showed realization rates of 113% and 313%, respectively, for gas-heated EWMF participants. Conversely, HVAC measures, which represent approximately one-fifth of program savings, showed modest decreases in gross savings driven primarily by updated building heating and cooling loads that reflect current participant characteristics. Water heating measures also decreased slightly due to improved baseline water heater efficiencies under updated federal standards.

For detailed comparisons of ex ante versus ex post savings by measure, including percent changes and the specific factors driving these differences, please refer to the measure-specific gross savings tables in Section 3.

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

Measure	Measure unit	Multifamily (EWMF & IEMF)			EWMF		IEMF		Water Savings *(Gallons/Year)*
		Electric *(kWh/Year)*	Gas *(therms/year)*	Oil *(MMBtu/Year)*	Summer peak demand savings *(kW)*	Winter peak demand savings *(kW)*	Summer peak demand savings *(kW)*	Winter peak demand savings *(kW)*	
Domestic Hot Water									
Showerhead	Per Showerhead	294	11.4	1.2	0.029	0.056	0.027	0.071	2035
Faucet Aerators	Per Showerhead	47	2	0.2	0.005	0.009	0.004	0.011	450
Pipe Wrap/Insulation (per foot)	Per Linear Foot	7	0.5	0.06	0.001	0.001	0.001	0.001	-
Low Flow Showerhead w TSV	Per Showerhead	341	13.2	1.4	0.034	0.066	0.032	0.083	2368
Boiler Reset Controller	Per Controller	-	303.0	31.8	-	-	-	-	-
HVAC									
Wifi Thermostat									
Heating	Per Thermostat	485	17.9	1.8	-	-	0.144	0.096	-
Cooling (kwh/year)		34	34	34					
Fan/Pump Heating (kwh/year)[1]		-	21	21					
Fan/Pump Cooling (kwh/year)		-	4	4					
Programmable Thermostat									
EWMF Heating	Per Thermostat	432	16.5	1.6	0.132	0.066	-	-	-
EWMF Cooling (kwh/year)		27	27	27					
EWMF Fan/Pump Heating (kwh/year)		-	19	19					
EWMF Fan/Pump Cooling (kwh/year)		-	4	4					
IEMF Heating		362	13	1.3	-	-	0.128	0.096	
IEMF Cooling (kwh/year)		25	25	25					
IEMF Fan/Pump Heating (kwh/year)		-	16	16					
IEMF Fan/Pump Cooling (kwh/year)		-	3	3					

[1] There are no fan or pump savings for electrically heated homes. The electrically heated homes in the program data have electric resistance heating and are cooled with room AC units, neither of which use fans or pumps.

Measure	Measure unit	Multifamily (EWMF & IEMF)			EWMF		IEMF		Water Savings *(Gallons/Year)*
		Electric *(kWh/Year)*	Gas *(therms/year)*	Oil *(MMBtu/Year)*	Summer peak demand savings *(kW)*	Winter peak demand savings *(kW)*	Summer peak demand savings *(kW)*	Winter peak demand savings *(kW)*	
Plug Load									
Smart Strip	Per Strip	105	-	-	0.010	0.020	-	-	-
Lighting - Common Area									
LED EISA EXEMPT (Interior)	Per Lamp	15	-	-	0.001	0.005	0.001	0.005	-
LED Fixture (Exterior)		503	-	-	0.057	0.089	0.057	0.089	-
LED Fixture (Interior)		206	-	-	0.023	0.037	0.023	0.037	-
LED Fixture, Linear (Interior)		206	-	-	0.023	0.085	0.023	0.085	-
Building Envelope									
Duct Insulation									
EWMF Heating	Per Dwelling Unit	-	5.0	0.5					
EWMF Cooling		-	-131	-133	-	-	-	-	-
IEMF Heating		-	4.0	0.4					
IEMF Cooling (kwh/year)		-	-124	-126					
Air Sealing									
EWMF Heating	Per Dwelling Unit	1,059	52.8	5.4	0.279	0.186	-	-	-
EWMF Cooling (kwh/year)		22	-20	-20					
IEMF Heating		886	42.8	4.4					
IEMF Cooling (kwh/year)		21	-19	-19					
Insulation									
EWMF Heating	Per Dwelling Unit	1,106	47.0	4.8	0.310	0.000	-	-	-
EWMF Cooling		53	30	30					-
IEMF Heating		926	38.0	3.9			0.244	0.163	
IEMF Cooling (kwh/year)		50	28	29					

Evaluation Approach	
(blue)	Engineering Algorithm
(orange)	Building Simulation
(green)	Both

Table ES-2 succinctly summarizes NTG ratios for prospective application.

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

#	NTG Group	FR	SO	NTG	Change	Approach	Rationale
1	Hot Water Fixtures	0.07	0.01	**0.94**	+0.01	Combined Survey Result and Existing Value*	Current survey sample was small, but produced generally similar results as the previous evaluation (i.e., minimal freeridership)
2	Hot Water Pipe Wrap	0.07	0.01	**0.94**	+0.01		
3	Boiler Controls	0.14	0.00	**0.86**	-	No change	The current survey did not yield any new data to modify the existing values, which were already based on a secondary source
4	Thermostats	0.47	0.01	**0.54**	+0.01	Combined Survey Result and Existing Value*	Only one response; minimal impact on recommended prospective NTG
5	Common Area Lighting	0.23	0.01	**0.78**	-	No change	The current survey did not yield any new data to modify the existing values, which were already based on a secondary source (MA Res 44 evaluation)
6	Smart Strips	0.00	0.00	**1.00**	+0.30	Deemed Value	Per pre-survey communication, team contends that smart power strips - in the MF program context - are all opportunistically installed by tenants (given the owner/manager-focused nature of the program), would not have occurred without program participation, and therefore have a NTG of 100%.
7	Duct Insulation	0.26	0.01	**0.75**	+0.07	Set Equal to Another NTG Group	Neither the current or previous survey reached any duct insulation respondents. Like previous study, the team recommends tying the duct insulation NTG to the more general weatherization NTG
8	Weatherization	0.26	0.01	**0.75**	+0.07	Combined Survey Result and Existing Value*	The current survey found significantly less freeridership than the previous survey (5% vs. 33%), but the signal in the current sample was consistent (only 1 of 9 respondents indicated any level of FR)

**Weighted average using number of responses associated with each value*

1 Introduction

This report details the results of Resource Innovations' impact evaluation of three Rhode Island Energy (RI Energy) retrofit programs: **EnergyWise Multifamily (EWMF), Income-Eligible Multifamily (IEMF), and C&I Multifamily Retrofit (C&I MF)**.

Our team evaluated the gross and net energy savings and demand reductions associated with prescriptive measures installed in all three programs in 2023 and 2024. RI Energy will use the results of this evaluation to prospectively inform program planning and savings claims in 2026 and beyond.

This evaluation complements Resource Innovation's recently completed Multifamily Custom Measure Impact Evaluation[2] and replaces the prior prescriptive measure-focused impact study completed in 2020.[3]

1.1 Study Objectives

The key objectives for each program are similar and include:

- Evaluating gross and net energy savings and demand reductions[4] for every prescriptive measure
- Providing feedback on data quality and comprehensiveness

1.2 Evaluated Measures

Table 1 lists the prescriptive measures included in this evaluation. As evident in the table below, most measures are relevant for multiple programs.

Please note that this evaluation did not include in-unit lighting measures, as in-unit lighting is no longer part of RI Energy's multifamily programs and therefore updated gross savings are not useful for prospective application. The study did include common area lighting

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[2] https://eec.ri.gov/wp-content/uploads/2025/04/RI-Energy_MF-Custom-Impact-Evaluation_Final-Report.pdf

[3] https://eec.ri.gov/wp-content/uploads/2020/10/ng-ri-mf-impact-and-process-comprehensive-report_final_04sept2020.pdf

[4] 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.

(interior or exterior lighting installed outside dwelling units) as the program continues to offer such lighting.

Table 1. List of Relevant Prescriptive Measures for EWMF, IEMF, and C&I MF Programs

Measure	EWMF	IEMF	C&I MF
Water Heating[5]			
Faucet Aerator	✓	✓	✓
Pipe Wrap	✓	✓	✓
Low Flow Showerhead	✓	✓	✓
Low Flow Showerhead w/ Thermostatic Valve	✓	✓	✓
HVAC[6]			
Boiler Reset Control	✓	✓	✓
WiFi Thermostat[7]	✓	✓	✓
Programmable Thermostat	✓	✓	✓
Lighting (Common Area)			
EISA Exempt Lighting - Common Interior	✓	✓	
LED Fixture - Common Interior	✓	✓	
LED Fixture - Common Exterior	✓	✓	
LED Fixture, Linear - Common Interior	✓	✓	
Plug Load			
Smart Strips	✓	✓	
Building Shell			
Duct Insulation	✓	✓	
Air Sealing	✓	✓	✓
Insulation	✓	✓	✓

[5] Water heater replacements are custom, not prescriptive, measures and therefore not included in this scope. Measures associated with the Water Heating end use (e.g. faucet aerators) are prescriptive.
[6] HVAC equipment replacements are custom, not prescriptive, measures and therefore not included in this scope.
[7] Also known as "Smart Thermostats"

More about Building Envelope Measures

Building envelope measures (air sealing, insulation, and duct insulation) are a different type of prescriptive measure. Unlike measures such as showerheads or thermostats, where RI Energy reports gross savings using deemed, per-unit value, the TRM dedicates that building envelope savings should be "calculated" for each project using algorithms that incorporate site-specific parameters including square footage, insulation R-values, and air leakage rates. While still technically a prescriptive measure, building envelope measures are, in a sense, more "custom" than the other prescriptive multifamily measures our team evaluated through this study.

The implication of this difference is important for understanding how to apply evaluation results. For the non-building envelope measures, RI Energy should replace its existing deemed, per-unit savings value with the results of this evaluation. However, for building envelope measures, RI Energy should adopt and apply the evaluation's measure-specific realization rate, which adjusts the savings calculated via the prescribed TRM approach to align with the evaluated results determined through this study.

1.3 Key Terminology

The evaluation team uses the language defined in Table 2 throughout the report to explain key impact evaluation concepts.

Table 2. Summary of Key Evaluation Terminology

Term	Definition
Participant	An individual or household (also identified by a unique account number) who receives at least one measure through RI Energy Multi-family Retrofit programs.
Ex Ante Savings	Savings assumed by Rhode Island Energy prior to an evaluation, usually based on a prior impact evaluation and/or the Rhode Island TRM.
Ex Post Savings	Savings determined through this evaluation.
Weatherization	A general term used to describe air sealing and/or insulation (one or more of attic, wall, or floor insulation). References to air sealing or insulation in the report are specific to that measure, whereas weatherization refers to one or both measures.

1.4 About the Programs

To provide context for the evaluation results provided in this report, this section offers readers insight into Rhode Island Energy's Multifamily program, as well as 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.

1.4.1 Program Descriptions

Rhode Island Energy's 2025 Energy Efficiency Annual Plan described the company's three complementary multifamily programs as follows[8]:

- **EnergyWise Multifamily (EWMF):** The EWMF program offers comprehensive energy services for market-rate multifamily customers (buildings with 5+ dwelling units), including energy assessments, incentives for heating and domestic hot water systems, cooling equipment, and weatherization. All types of multifamily properties are eligible. A primary point of contact is designated to manage and coordinate services offered through the Company's existing portfolio. This program is offered in conjunction with the Commercial and Industrial (C&I) Multifamily gas program where

[8] Rhode Island Energy 2025 Energy Efficiency Annual Plan (https://ripuc.ri.gov/sites/g/files/xkgbur841/files/2024-10/24-39-EE%20Rhode%20Island%20Energy%27s%202025%20Annual%20Energy%20Efficiency%20Plan%20-%20PUC%2010-01-2024.pdf)

a site may have a commercial meter or office space but also has individual dwelling units. The delivery of the Market-Rate Multifamily Program's services should be virtually indistinguishable to the customer as the Company's single point of contact will handle all program overlap (between Residential and C&I programs) and offer a seamless customer experience.

- **Income-Eligible Multifamily (IEMF):** The IEMF Program offers comprehensive energy services for multifamily customers (buildings with 5+ dwelling units) that also meet the criteria for "income eligible" as defined in Attachment 1 Residential and IES Programs, Section 4. Multifamily. These services include energy assessments, incentives for heating and domestic hot water systems, air source heat pumps, cooling equipment, water savings installations and thermostats. Typically, there are no costs to the customer for these services as most income eligible upgrades are covered at 100 percent.

- **C&I Multifamily Retrofit (C&I MF)**: The C&I MF Program provides comprehensive efficiency services for market rate multifamily customers who reside in residential buildings with 5+ dwelling units. These coordinated services include energy assessments and incentives for weatherization and the replacement of heating and domestic hot water equipment and systems.[9] The program's services are offered for all types of multifamily properties. To streamline the delivery of program services, the Company designates a primary point of contact for the multifamily property who will manage and coordinate the services offered.

1.4.2 Recent Participation Trends

To summarize program activity in 2023 and 2024, the team aggregated measures from all three programs (EWMF, IEMF, C&I-MF) into the following five prescriptive measure groups:

1. **Water Heating.** Faucet Aerator, Pipe Wrap, Low Flow Showerhead, Low Flow Showerhead w/ Thermostatic Valve
2. **HVAC.** Boiler Reset Control, Wi-Fi Thermostat, Programmable Thermostat
3. **Lighting.** EISA Exempt Lighting - Common Interior, LED Fixture - Common Interior, LED Fixture - Common Exterior, LED Fixture, Linear - Common Interior
4. **Plug Load.** Smart Strips

[9] As noted above, space and water heating equipment replacements are custom measures. While part of the program's overall offering (which is why RI Energy mentioned the measures in the 2025 Energy Efficiency Annual Plan), neither measure were not part of this prescriptive measure focused impact evaluation.

5. **Building Shell.** Duct Insulation, Air Sealing, Insulation

Using installation counts, per-unit annual ex ante savings, and measure life assumptions from the program databases, we calculated the total gross lifetime ex ante savings by program and measure category in 2023-2024. To enable comparison savings across fuels, the team converted all fuel-specific savings into MMBtus. As a reminder, the values and figures below do not include any custom measures, since those were previously evaluated in a separate study. In the original dataset, custom measures represented about 53% of total lifetime savings (~98,000 MMBtu), compared to 47% (~87,000 MMBtu) from prescriptive measures.

As shown in Figure 1, the majority of lifetime savings in 2023–2024 were achieved through the EWMF program (64%), with IEMF contributing 27% and C&I MF making up the remaining 9%. When savings are examined by measure category (Figure 2), Building Shell measures dominate the portfolio (57% of total lifetime savings), followed by HVAC (21%), Water Heating (18%), Lighting (2%), and Plug Load (2%).

Figure 1. Total Lifetime Savings by Program (% in 2023-2024)

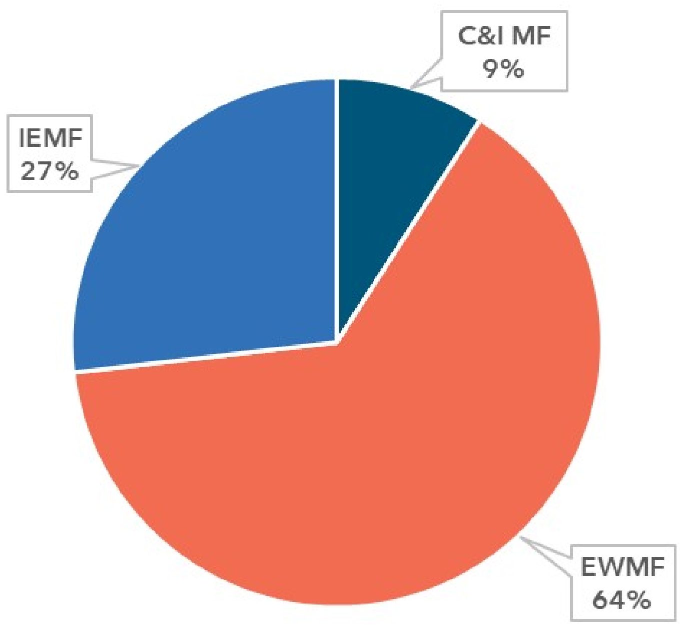


Figure 2. Total Lifetime Savings by Measure Category (% in 2023–2024)

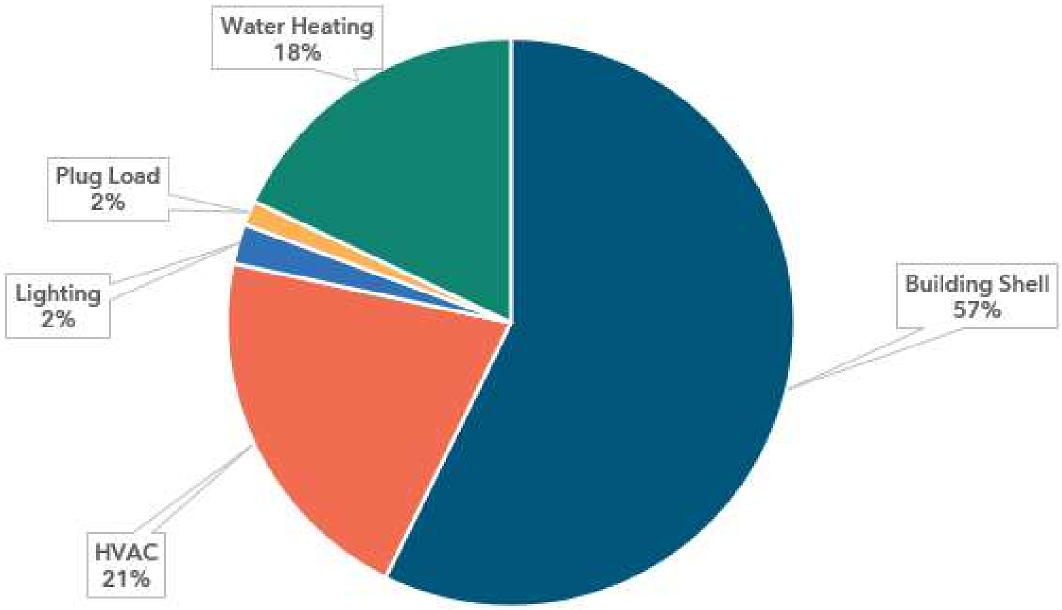


Figure 3 and **Error! Reference source not found.** combine the previous figures by showing lifetime savings by program and measure category. Here we also see that Building Shell measures account for nearly three-quarters of EWMF savings and nearly all C&I MF savings, while HVAC and Water Heating measures make up the majority of IEMF savings.

Figure 3. Total Lifetime Savings by Program and Measure Category (2023-2024, Thousand MMBtu)

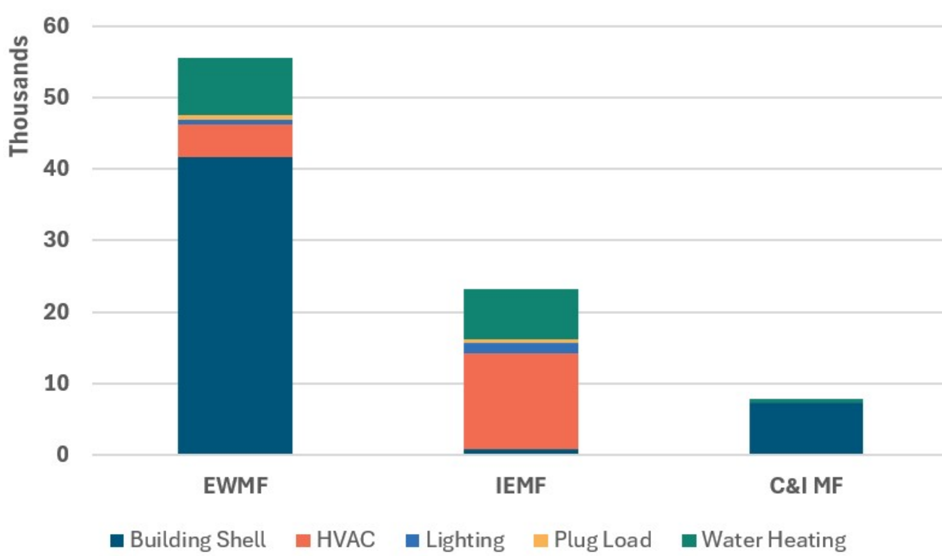
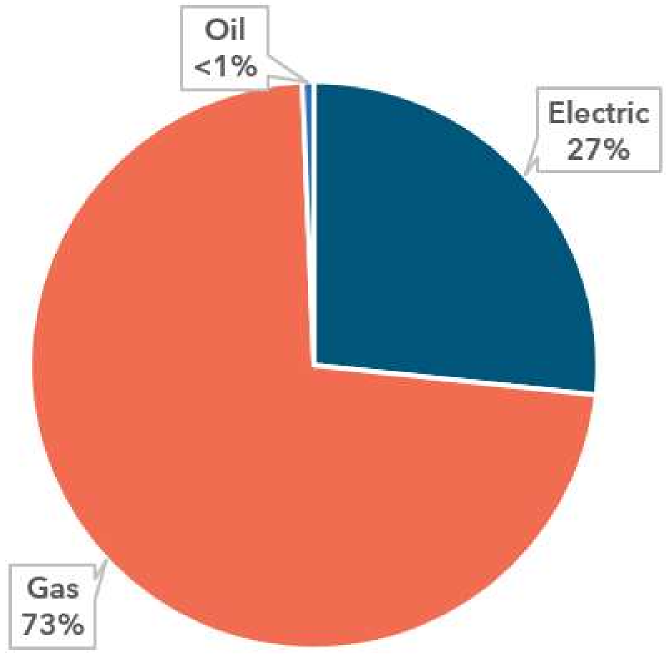


Table 3. Measure Share and Count by Measure and Program (2023-2024)

Measure Category	Measure	EWMF		IEMF		C&I MF		All Programs	
		Savings %	Count	Savings %	Count	Savings %	Count	Savings %	Count
Building Shell	Air Sealing	22%	109	2%	2	20%	3	17%	114
	Duct Insulation	<1%	53	0%	0	0%	0	<1%	53
	Insulation	53%	250	1%	2	71%	10	41%	262
HVAC	Thermostats	8%	161	58%	13	2%	2	21%	176
Lighting	Common Area Lighting - Exterior	1%	23	2%	9	0%	0	1%	32
	Common Area Lighting - Interior	<1%	23	4%	22	0%	0	1%	45
Plug Load	Plug Load	1%	395	2%	8	0%	0	1%	403
Water Heating	Hot Water Fixtures	11%	465	26%	71	7%	9	14%	545
	Hot Water Pipe Wrap	2%	157	3%	3	0%	0	2%	160
	Thermostats	2%	20	2%	5	0%	0	2%	25
Total		**100%**	**1,656**	**100%**	**135**	**100**	**24**	**100%**	**1,815**

The team also investigated how each fuel type contributed to the program's overall savings. We found that natural gas measures accounted for nearly three-quarters (73%) of all savings with electricity making up most of the remaining balance (27%). Heating oil, a significant saver in RI Energy's single family programs, makes up less than 1% of total savings due to its low saturation in the multifamily sector.

Figure 4. Total Lifetime Savings by Fuel (% in 2023-2024)



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 MF measures the Evaluation Summary includes a detailed explanation of how our team calculated ex post savings. The Evaluation Summary does not, however, include details such as the specific engineering algorithms and the exact primary and secondary data that the team used as inputs to develop ex post savings for all 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 MF measure. For measures assessed using an algorithmic approach, the workbook details the Rhode Island TRM engineering algorithm used to evaluate that measure and the values (and sources) for all inputs used in that algorithm. Each measure-specific worksheet also includes a direct comparison of ex ante and ex post savings. Each of these tabs link 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
C. Program Tracking Data Review Presentation

2 Methodology

The team completed five tasks as part of this impact evaluation: a data assessment, engineering analysis, building simulation, bill disaggregation, and a participant survey.

Table 4. Evaluation Methodologies

Methodology	Details
Data Assessment	• Previous multifamily impact evaluation in 2020 encountered significant data issues. These issues included missing program tracking information, inconsistencies in building-level data, and small sample sizes, which prevented the team from completing the billing analysis proposed as part of that effort. • The evaluation team conducted a thorough assessment of the more recent program tracking data to determine the extent to which RI Energy has addressed previously identified multifamily-specific data issues. • Communicated findings of the data assessment with RI Energy (see Appendix C). • Cleaned, organized, joined and filtered the program tracking data producing analysis-ready data sets for subsequent tasks in this study (engineering analysis, building simulation, participant survey).
Engineering Algorithms	• Referenced the 2025 Rhode Island TRM[10] to compare results from this evaluation to existing deemed savings values and sources, and algorithmic approaches when available. • The 2025 TRM typically included deemed savings values based on the previous prescriptive MF impact evaluation (2020). • Leveraged detailed MF program data to calculate baseline and efficient cases for each measure. • Relied on regionally appropriate secondary data sources and other relevant studies when MF tracking data was not collected or unavailable (sources included the most recent MF impact evaluation in Massachusetts, Residential Energy Consumption Survey, ENERGY STAR® standards). • Included a literature review of recent studies, relevant US Department of Energy appliance standards, other state TRMs, and other MF evaluations.

[10] Rhode Island Technical Reference Manual: 2025 Program Year (https://ripuc.ri.gov/sites/g/files/xkgbur841/files/2024-10/24-39-EE%20Rhode%20Island%20Technical%20Reference%20Manual%20%E2%80%93%202025%20Program%20Year.pdf)

Methodology	Details
Building Simulation	• Modeled using BEopt (Building Energy Optimization) software developed by the National Renewable Energy Laboratory. • Constructed baseline building geometry and building characteristics using inputs like square footage, number of floors, and baseline infiltration rates from MF program data. • Created three calibrated building models in BeOpt, reflecting gas and electrically heated homes, with the gas models divided into those with central and room AC systems. • Calibrated each model using MF participant billing data, while running separate calibrations for baseload, heating, and cooling consumption. • Utilized the Residential Building Stock Model (ResStock) to determine consumption differences between market-rate and low-income multifamily units to estimate savings for the IEMF program[11]. • Applied post-modeling adjustments to the results of the different models to calculate separate statewide averages for gas and electrically heated homes, for both the EWMF and IEMF programs.
Bill Disaggregation	• Translated the heating and cooling consumption for participants across the state into individual, weather-normalized values that could be used for the building simulation task. • Used where billing data was available for natural gas and electricity (not used for delivered fuels). • Combined customer billing records with weather and measure installation data to get a complete perspective of each customer's energy consumption drivers. • Conducted a structured screening process to ensure that the model uses only those customers with sufficient billing data and without spurious billing records. • Performed variable based degree day (VBDD) analysis to model weather dependent consumption for each account. Modeled pre and post installation periods independently for each account.

[11] ResStock is a U.S. Department of Energy and NREL modeling tool that uses detailed housing stock data and EnergyPlus simulations to estimate residential energy use and savings potential.

Methodology	Details
Participant Surveys	• The survey, which can be found in Appendix B, focused on Net-to-Gross (NTG) questions. • Given the predominantly NTG-focused nature of the survey - and the fact that IEMF is not subject to NTG - IEMF participants were excluded from the survey outreach • Reached out to 97 MF participants (survey focused on property owners and managers) that had measures installed in their buildings (regardless of heating fuel type) between 2023-2024. • Programmed survey in Qualtrics, sent initial e-mail, and up to three reminder emails to nonrespondents. • Conducted phone surveys to reach participants for whom only contact phone numbers were available. • Completed surveys with 19 participants (20% response rate). • Provided all participants who completed the survey with a $200 e-gift card incentive. •

What about billing analysis?

While our team disaggregated participants' electric and natural gas consumption records (into baseload, heating load, and – for electricity - cooling load) for calibrating our building simulation models, we did not use a regression-based billing analysis approach to evaluate savings for any MF measures.

This is because, as part of the prior impact evaluation (2020), our team found billing analysis was not viable due to data inconsistencies, missing tracking information, and the complexity of aggregating energy use in multifamily buildings. Small sample sizes and cross-program participation effects further limited its reliability.

However, billing data remains a valuable resource for informing broader energy consumption patterns and supporting other impact tasks, such calibrating our building simulation models. Doing so ensured our building simulation models reflected actual pre-program energy use for multifamily buildings in general while avoiding the potential pitfalls of analyzing specific building via a standalone billing analysis.

2.1 Other Data Sources

In addition to the evaluation data generated by the activities described in Table 4, our team used the following datasets as part of our evaluation.

- **Program Tracking Data**. This data included basic customer (account number, address, ZIP code), measure (type, quantity, savings, pre/post measure conditions[12\]), and timing (assessment and installation dates) information for 2023-2024 participants.
- **Billing Data.** Rhode Island Energy provided monthly natural gas and electric consumption data ranging from 2012 to 2025 participants. The team did not attempt to gather any information regarding delivered fuels (i.e., heating oil and propane).[13]
- **Weather Data**. Our team also acquired contemporaneous, hourly weather data from NOAA for three weather stations in Rhode Island (Block Island, Newport, & T.F. Green Airport). We used these data to calculate weather normalized consumption for program participants, which we then used to calibrate building simulations and to determine weatherization energy savings.

[12] Such as the R values before and after the implementation of the Insulation measure, in addition to the ACH50 before and after the implementation of the Air Sealing measure.
[13] It is common for evaluations of programs like this to not have access to delivered fuel records. The team does not suggest RI Energy attempt to collect such records as part of future evaluations because the process can be costly (metering) or inaccurate (using delivery records given the irregularity of tank refills).

3 Gross Savings

This section presents the evaluated gross energy savings for all EWMF, IEMF, and C&I MF prescriptive measures for prospective application in 2026. Our team developed these prospective savings using the most recent MF program data available (2023 and 2024) at the time of this study.

All annual gross savings are reported using the following fuel-specific units:

Electricity *(kWh/Year)*

Natural Gas *(Therms/Year)*

Heating Oil *(MMBtus/Year)*

As shown in Table 4 the evaluation team employed multiple complementary methodologies to estimate gross energy savings, including engineering algorithms for water heating, HVAC, plug load, and lighting measures, building simulation modeling for envelope measures, and billing data disaggregation to calibrate the building simulation results.

For all non-envelope energy measures—water heating, HVAC, plug load, and common area lighting measures—the evaluated savings are identical across all three multifamily programs (EWMF, IEMF, and C&I MF). This consistency reflects the fact that these measures have the same technical pre- and post-program specifications and operating characteristics regardless of which program delivered them. In other words, there are no differences in the gross savings calculations (algorithm or inputs) across programs. For these measures, a single, deemed savings value for all three programs is appropriate.

However, or envelope measures (air sealing, insulation, and duct insulation), the team used program-specific abuilding simulations that accounted for the specific building characteristics and participant mix within each program.

3.1 Water Heating

The team used engineering algorithms–sourced from the most recent Rhode Island TRM when viable–to evaluate savings for all MF water heating measures. The team populated the algorithms with the best available and applicable data. Specifically, the team relied on program tracking when possible and secondary data when it was not.

Table 5 compares ex ante and ex post annual energy savings for all four water heating measures: showerheads, faucet aerators, pipe wrap, and low flow showerheads with TSV. The table also denotes when our team did not use a Rhode Island TRM algorithm, summarizes the updated inputs we used (relative to the prior MF evaluation), and explains the rationale for and implications of those input updates on evaluated energy savings.

The program tracking data provided to our team did not indicate that the program retrofitted hot water measures in a building served by a central hot water system. Consequently, our team focused the evaluation on showerheads, faucet aerators, pipe wrap, and low flow showerheads with TSV associated with dwelling unit-level water heaters (i.e., each tenant has their own water heater). This approach is consistent with the measure framing in the most recent RI Energy TRM.

As evident below, the team generally found lower annual savings for most water heating measures. While the exact reason for the decrease varies by measure and fuel type, the primary drivers were the updated uniform energy factor (UEF) of boilers and changes in some inputs like household members.

Table 5. Water Heating: Annual Energy Savings Summary

Measure & Fuel	Ex Ante	Ex Post	% Change	Updated Algorithm	Updated Inputs	Rationale & Implication on Energy Savings
Showerheads (per unit)						
Electric (kWh)	246	294	19.5%	No	**Household members:** citing more recent value from the RECS 2020 report. **Shower length:** The REU2016 value has been used due to its more up-to-date and closer proximity to the RI climate.	Some input values and assumptions in the RI TRM are outdated; replaced with more recent values.
Natural Gas (Therm)	13	11.4	-12.3%			
Heating Oil (MMBtu)	1.4	1.2	-14.3%			
Faucet Aerators (per unit)						
Electric (kWh)	38	47	23.7%	No	**Household members:** citing more recent value from the RECS 2020 report. **Total Daily faucet use per capita per day:** more recent value from the Regional Technical Forum. **Cold water temperature:** The updated value was obtained from the USGS website.	Some input values and assumptions in the RI TRM; replaced with more recent values.
Natural Gas (Therm)	2	1.9	-5%			
Heating Oil (MMBtu)	0.2	0.2	-			
Pipe Wrape DHW (per linear foot)						
Electric (kWh)	8.3	7.4	-10.8%	Yes, from 2025-2027 MA TRM.	**Hot Water Temperature:** Based on the available resources, the average hot water temperature is slightly higher than the previously assumed value **Uniform Energy Factor:** Updated UEF from federal regulations; higher than the previous UEF.	Some input values and assumptions in the MA TRM are outdated; replaced with more recent values.
Natural Gas (Therm)	0.5	0.5	-			
Heating Oil (MMBtu)	0.05	0.06	20%			
Low Flow Showerhead w TSV (per unit)						
Electric (kWh)	315	341	8.2%	No	**Household members:** citing more recent value from the RECS 2020 report. **Shower length:** The REU2016 value has been used due to its more up-to-date and closer proximity to the RI climate. **Uniform Energy Factor:** The updated uniform energy factors are taken from federal regulations, which are a bit higher than the previous numbers.	Some input values and assumptions in the RI TRM are outdated; replaced with more recent values. Since gas and oil water heater efficiencies have increased, the RR is slightly below 100% for oil and NG fuels.
Natural Gas (Therm)	14.1	13.2	-6.4%			
Heating Oil (MMBtu)	1.6	1.4	-12.5%			

Table 6 provides demand reductions (for measures associated with an electric water heater only) and water savings (relevant regardless of water heater fuel) for the same measures. Our team used the information in Appendix D (Demand Factors, Coincidence Factors) to calculate demand savings.

Table 6. Water Heating: Demand Reduction & Annual Water Savings Summary

	EWMF		IEMF		EWMF & IEMF
Measure	Summer Peak Demand Reduction (kW)	Winter Peak Demand Reduction (kW)	Summer Peak Demand Reduction (kW)	Winter Peak Demand Reduction (kW)	Water Savings (gallons/year)
Showerhead	0.029	0.056	0.027	0.071	2,035
Faucet Aerators	0.005	0.009	0.004	0.011	450
Pipe Wrap (per foot)	0.001	0.001	0.001	0.001	-
Low Flow Showerhead w/ TSV	0.034	0.066	0.032	0.083	2,368

3.2 HVAC

As shown in Table 7, the team generally observed lower annual savings for most HVAC measures. The primary drivers were updated building heating and cooling loads, which are lower than the ex-ante assumptions. In addition, the team calculated heating, cooling, and fan/pump savings separately, which differs from the aggregated approach used in the TRM.

The program tracking data provided to our team indicated that the program exclusively retrofitted HVAC measures in buildings served by space heating or cooling systems serving individual dwelling units (i.e., not central, building-wide systems). Consequently, our team's approach to evaluating savings for WiFi thermostats and programmable thermostats focused on scenarios with dwelling unit-level heating and cooling systems (i.e., each tenant has their own thermostat controlling their unit's temperature). This approach is consistent with the measure framing in the most recent RI Energy TRM.

Table 7. HVAC: Annual Energy Savings Summary

Measure & Fuel	Ex Ante	Ex Post		% Change	Updated Algorithm	Updated Inputs	Rationale & Implication on Energy Savings
		EWMF	IEMF				
Wifi Thermostat (per thermostat)							
Electric (kWh)	-	485	485	-	No	**Building heating load:** Updated based on building simulations completed for this study.	The updated building heating load reflects the most recent cohort of program participants and savings.
Natural Gas (Therm)	27.9	17.9	17.9	-36%			
Heating Oil (MMBtu)	2.8	1.8	1.8	-36%			
Electric cooling (kWh)	64	33.8	33.8	-47%			
Electric Fan/Pump (kWh)[14]	-	25	25	-			
Programmable Thermostat (per thermostat)							
Electric (kWh)	249	432	362	73%; 45%	No	**Building heating load:** Updated based on building simulations completed for this study.	The updated building heating load reflects the most recent cohort of program participants and savings.
Natural Gas (Therm)	15	16.5	13	10%; -13%			
Heating Oil (MMBtu)	1.6	1.6	1.3	- ; -19%			
Electric cooling (kWh)	15	26.6	25.2	77%; 68%			
Electric Fan/Pump (kWh)	14	23.1	18.7	65%; 34%			
Boiler Reset Control (per controller)							
Natural Gas (Therm)	-	303	303	-	No	**Heating EFLH:** While this value was previously sourced from a 2012 MA report, this value has been updated to reflect what is in the	Swapping the Heating EFLH value uses more recent data that is more specific to Rhode Island. The input heating EFLH value is lower
Heating Oil (MMBtu)	37.3	31.8	31.8	-15%			

[14] The fan/pump savings for both of the thermostat measures are derived from the breakout of cooling systems in the program data - out of participants with cooling, 69% of them had central AC and 31% had room AC. In the final version of this report, the fan/pump savings will be reported separately by cooling system.

						current Rhode Island TRM.	than what was used previously.

Table 8 provides demand reductions for HVAC measures.

Table 8. HVAC: Demand Reduction

	EWMF		IEMF	
Measure	Summer Peak Demand Reduction (kW)	Winter Peak Demand Reduction (kW)	Summer Peak Demand Reduction (kW)	Winter Peak Demand Reduction (kW)
Wifi Thermostat	-	-	0.144	0.096
Programmable Thermostat	0.132	0.066	0.128	0.096
Boiler Reset Controls	-	-	-	-

3.3 Plug Load

The team didn't propose any changes to the savings or sourcing for power strips. The TRM continues to cite the best available source for power strips savings (NMR's 2019 metering study in neighboring Massachusetts). Table 9 shows energy saving summary for smart strips.

Table 9. Plug Load: Annual Energy Savings Summary

Measure & Fuel	Ex Ante	Ex Post	Updated Savings Algorithm	Updated Inputs	Rationale & Implications on Energy Savings
Smart Strips (Electric, kWh/Year)	105	105	No	No	None

Table 10 provides demand reductions for smart strips.

Table 10. Plug Load: Demand Reduction

Measure	Summer Peak Demand Reduction (kW)	Winter Peak Demand Reduction (kW)	Summer Peak Demand Reduction (kW)	Winter Peak Demand Reduction (kW)	Water Savings (gallons/year)
Smart Strips	0.029	0.056	0.027	0.071	2,035

3.4 Lighting (Common Areas)

The team does not propose any changes to the lighting savings or their sources for two reasons. First, the current program data lacks the necessary information to update the existing delta wattage and hours of use, which limited our team's ability to conduct analysis. Second, the current sources - a mix of data from the previous MF evaluation (2020) and a metering study in MA (2019) remain relevant and sufficiently recent sources. Table 11 shows energy saving summary for the lighting measures.

Table 11 Lighting: Annual Energy Savings Summary

Measure & Fuel	Ex Ante	Ex Post	Updated Savings Algorithm	Updated Inputs	Rationale & Implication on Energy Savings
LED EISA EXEMPT (Interior) (Electric, kWh/Year)	185.9	15	No	No	The Rhode Island TRM savings values were referenced from the 2020 Impact Evaluation Study, which is also the reference source used in our report. It appears that the RI TRM contains an incorrect savings value, where 185.9 kWh was reported instead of 15 kWh. Therefore, the primary cause of the low realization rate is the erroneous value reported in the RI TRM initially.
LED Fixture (Exterior) (Electric, kWh/Year)	503	503	No	No	None
LED Fixture (Interior) (Electric, kWh/Year)	206	206	No	No	None
LED Fixture, Linear (Interior) (Electric, kWh/Year)	206	206	No	No	None

Table 12 provides demand reductions for common area lighting measures.

Table 12. Lighting: Demand Reduction

	EWMF		IEMF	
Measure	Summer Peak Demand Reduction (kW)	Winter Peak Demand Reduction (kW)	Summer Peak Demand Reduction (kW)	Winter Peak Demand Reduction (kW)
LED EISA EXEMPT (Interior)	0.001	0.005	0.001	0.005
LED Fixture (Exterior)	0.057	0.089	0.057	0.089
LED Fixture (Interior)	0.023	0.037	0.023	0.037
LED Fixture, Linear (Interior)	0.023	0.085	0.023	0.085

3.5 Building Envelope

As mentioned earlier, the team used a different approach—building simulation modeling—to evaluate savings for three building envelope measures: air sealing, insulation, and duct insulation. To ensure that the building simulations were representative of participants' energy usage, the evaluation team calibrated pre-program baseline models using natural gas and electric billing data provided by RI Energy for EWMF participants.

3.5.1 EWMF Segmentation

To reflect the energy consumption profiles associated with the different types of multifamily buildings in the EWMF program, the team initially planned to segment by four customer characteristics:

- Program (EWMF and IEMF)
- Heating Fuel (natural gas and electricity)
- Cooling (yes and no)
- Building Type (high-rise and low-rise)

After reviewing the data, however, we determined that two of these segments were unnecessary or could not be informed by the provided data:

- **Program.** In the previous segmentation plan, we proposed creating calibrated models for the IEMF program. Our team found that there was limited billing data for the IEMF program[15], however, and so creating calibrated models for the IEMF program would not be possible. Instead, as described later in this section, the team leveraged ResStock to apply post-modeling adjustments to the EWMF results to calculate weatherization savings for the IEMF program.

- **Building Type.** In the work plan, our team proposed segmenting by building type (i.e., low- and high-rise multifamily buildings).[16] However, when we analyzed the provided billing data, we found that the per-unit energy consumption between low-

[15] Following the process to remove outliers in the billing data, there were no remaining gas-heated IEMF facilities containing a year's worth of data.

[16] The team defined low-rise and high-rise buildings using a 20-unit threshold (i.e., buildings containing 20 or more units classified as high-rise). These two building types can differ in several ways that influence energy consumption, including average unit size, envelope characteristics, and internal loads.

rise and high-rise buildings was not statistically different and therefore segmenting by building type was unnecessary.[17]

Upon seeing that there was a large proportion of both central AC and room AC systems in the program data, the team revisited the cooling segment to differentiate between homes with central AC, room AC, and no cooling.[18] In addition, data limitations required our team to adjust how we assigned heating and cooling consumption within some segments:

- **Natural gas heating consumption**. Due to the inability to distinguish natural gas accounts by presence of cooling[19], a single heating consumption value was applied to both gas-heated segments.

- **Electric heating with cooling.** As shown in the table below, program data indicated that only a handful of electrically heated participants had cooling. Therefore, the team applied the average electric heating consumption across all electrically heated units (regardless of the presence of cooling) for this segment. Similarly, we based cooling consumption on the average across all units with cooling[20], regardless of heating fuel type.

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[17] This decision was made following the results of a two-sample t-test.

[18] Most electrically heated homes in the program data had no cooling (131 or 95%). Of the seven homes in the program data with cooling, six had room ACs, and one had a heat pump. The team applied post-modeling adjustments to the savings for electrically heated homes with cooling to incorporate savings from the single heat pump into the aggregated savings for electrically heated homes.

[19] Gas heating consumption can vary by as much as 10% depending on whether a home has cooling. Since our annual gas heating consumption value is based on a mix of homes both with and without cooling, this variation is already reflected in the number. Even though we cannot distinguish which individual natural gas accounts belong to homes with cooling, the impact is inherently captured in the calibrated annual consumption value we are using.

[20] The team calibrated to the same cooling consumption for both central and room AC systems but calculated distinct savings values for each system.

Table 13. EWMF Building Simulation Segments

Space Heating Fuel	Cooling	Unique Facilities
Natural Gas	Yes, Central AC	130
	Yes, Room AC	59
	No	348
Electric	Yes, Room AC[21]	6
	No	131

3.5.2 EWMF Segment Characteristics

Part of the model development and calibration process included defining the geometry of the multifamily building that participated in the program. Using the provided tracking data, the team determined the average number of units and stories per building, as well as the average dwelling unit square footage for each segment (Table 14).

It is worth noting that BeOpt[22], the modeling tool in this analysis, can model multifamily buildings with a maximum of 12 units. This limitation, however, is not a barrier for accurately estimating average unit-level consumption throughout a multifamily building. Empirical research and guidance from the Department of Energy's Better Buildings Challenge[23] states that modeling a representative sample of 10–15 units—especially when diversified by orientation, floor level, and layout—is sufficient to capture the main drivers of energy variability in multifamily buildings. As such, the team's 12-unit sample for each segment reflects a statistically meaningful cross-section of the full participating building and an accurate method for modeling unit-level energy impacts.

Table 14. General Unit and Building Characteristics

Heating Fuel	Cooling	Unique Facilities	Unit-Level Square Footage	Average Units per Building	Average Stories per Building
Gas	Yes	191	1,209	58	2
	No	348	1,359	65	2
Electric	Yes	6	953	8	3
	No	131	1,309	92	2

[21] To estimate savings for the single heat pump included in the program data, the team applied coefficient of performance (COP) adjustments to the savings associated with electrically heated homes equipped with room AC systems.
[22] BeOpt is a validated and widely used building energy simulation tool developed by the U.S. Department of Energy and the National Renewable Energy Laboratory. It is designed specifically for residential energy analysis and supports detailed modeling of multifamily configurations.
[23] https://files.hudexchange.info/resources/documents/Better-Buildings-Challenge-Data-Tracking-Manual-Multifamily-Sampling-Protocol.pdf

To prepare each segment-specific building simulation model for calculating measure savings, the team calculated pre- and post-program values for participating building envelopes from the program data.[24] This information was calculated entirely from the 2023 program dataset, as the 2024 program dataset, which was created using RI Energy's updated tracking system, did not contain information on pre- and post-program measure values. RI Energy is working with their vendors to have these values available to support future evaluations.

This data is shown in Table 15 along with the N values used to calculate this information.

Table 15. Pre- and Post- Program Measure Values

Measure	N	Pre-Program Value	Post-Program Value
Wall Insulation (R)	22	3.4	11.3
Floor Insulation (R)	11	4.4	19.6
Attic Insulation (R)	109	13.3	39.3
Air Sealing (ACH50)	69	10.0	8.0
Duct Insulation (R)[25]	N/A	0.05	4

3.5.3 EWMF-Specific Savings Calculations

Following the pre- and post-program modeling of segment-level measure savings, the team performed two additional calculations necessary to evaluate savings for the EWMF program:

1. **Normalize savings for insulation measures by the amount of installed insulation.** This step incorporates the actual amount of insulation installed for each measure; for instance, if participants, on average, upgraded their insulation on 75% of the surface area of their walls, then the final savings for the wall insulation measure will be multiplied by 0.75. This adjustment is necessary because building energy simulation tools (including BeOpt) do not allow for partial insulation of individual surfaces (e.g., walls, roofs, and floors must be modeled as either fully insulated or not insulated at all). By applying this normalization step, we more accurately reflect the partial installation patterns observed in the program data (e.g., when a participant does not insulate every exterior wall).

[24] This information was calculated entirely from the 2023 program dataset, as the 2024 program dataset does not contain information on pre- and post-program measure values.
[25] There are no duct insulation values provided in the program data, so the team applied the values used in last year's MA MF Impact Evaluation here. For the remainder of the measures, the team calculated the pre- and post- measure values from the participant program data.

2. **Weight the savings by segment to find final savings by program.** Using the total number of units that installed each measure, the team weighted the savings values by segment to find unique savings values for the EWMF program. This ensured that segments in which there was greater participation have a larger influence on the program-level savings than the segments with lesser participation.

3.5.4 IEMF-Specific Savings Calculations

As mentioned earlier, there was insufficient billing data available to develop calibrated models for the IEMF program. In lieu of calculating savings using calibrated building simulations, our team used ResStock consumption data to adjust the savings generated for the EWMF program to be appropriate for IEMF.

This adjustment approach involved the following steps:

1. Filter the ResStock database to multifamily homes in Rhode Island and separate the dataset into low-income and high-income populations.[26]
2. Calculate the average gas heating, electric heating, and cooling consumption per square foot for both the low-income and market-rate groups.
3. Generate ratios between the low-income and high-income consumption values for gas heating, electric heating, and cooling.
4. Apply these ratios to the EWMF savings per square foot—previously calculated using calibrated simulations—to estimate corresponding savings per square foot for the IEMF population.
5. Multiply the estimated IEMF savings per square foot by the average unit-level square footage[27] for IEMF program participants to calculate total estimated savings.

Table 16 shows the per-square-foot gas heating, electric heating, and cooling consumption values derived from ResStock. Notably, income eligible units tend to have slightly higher energy intensity, which likely reflects generally less efficient pre-program building and mechanical equipment conditions (e.g., building envelopes and HVAC systems). The

[26] Households with annual incomes at or below $60,000 were designated as low-income for the purposes of this analysis. This threshold approximates 60% of the area median income (AMI) for a typical Rhode Island household and is consistent with income eligibility limits used in state and federal energy assistance programs.
[27] While the team lacked sufficient consumption data to calibrate a dedicated IEMF building simulation model, there was enough IEMF program data to accurately define unit-level square footage.

consumption ratios from ResStock were applied to the EWMF per-square-foot savings to estimate the IEMF per-square-foot savings.

Table 16. Income Eligible and Market Rate Estimates for Consumption Values by Square Foot

Program	N[28]	Gas Heating (therms/sf)	Electric Heating (kWh/sf)	Cooling (kWh/sf)
Income Eligible (IE)	495	0.55	7.56	0.63
Market Rate (MR)	202	0.49	6.52	0.48
IE:MR Ratio	**N/A**	**1.12**	**1.16**	**1.32**

3.5.5 Results

As part of the billing data disaggregation, the evaluation team found that weatherized EWMF participants (i.e., those who received air sealing and/or insulation) used an average of 514 therms annually to heat their units prior to program participation. Using this information to calibrate our models, we modeled energy savings of 53 therms/year from air sealing and 47 therms/year from insulation. This translates to average reductions of 10% and 9%, respectively, of participants' pre-program, weather-normalized heating consumption.

For the IEMF program, the team estimated pre-program heating consumption by applying the consumption ratios in Table 17 and adjusting for the differences in square footage between EWMF and IEMF units, which tended to be smaller. This analysis indicated that IEMF participants consumed an average of 417 therms annually for space heating before participation and yielded savings of 43 therms/year from air sealing and 38 therms/year from insulation. These represented average reductions of 10% and 9%, respectively – same as the EWMF measures.

Based on 2023 and 2024 program data, participants receiving insulation installed an average of 1.06 different insulation types. Across both the EWMF and IEMF programs (due to limited IEMF-specific data), 87% of installations were attic insulation, 5% were basement/floor insulation, and 14% were wall insulation. The team modeled these insulation

[28] Reflects the total number of ResStock models for the low-income and high-income groups.

types separately and weighed the results by reported installation shares to calculate initiative-level savings.

Table 17 presents savings estimates for these insulation measures, along with duct insulation and air sealing.

Table 17. Dwelling Unit Level Envelope Heating Savings for Gas-Heated Homes

Measure	EWMF Savings (therms)	IEMF Savings (therms)
Duct Insulation	5	4
Air Sealing	53	43
Floor Insulation	5	4
Attic Insulation	34	27
Wall Insulation	124	101
Insulation, Total	**47**	**38**

For electrically heated homes, the billing data disaggregation found EWMF participants used an average of 10,546 kWh annually to heat their units before any weatherization measures were installed. Our models found average savings of 1,059 kWh from air sealing and 1,106 kWh from insulation, which equates to about 10% reductions in pre-program, weather-normalized heating use for each measure.

To estimate heating consumption for IEMF participants, the evaluation team again scaled EWMF pre-program consumption by the ratios in Table 18 and adjusted for the smaller average home size in IEMF. This resulted in an estimated pre-program consumption of 8,826 kWh per year. Air sealing and insulation savings for these homes were 886 kWh and 926 kWh, respectively—again representing savings of roughly 10% of baseline heating use, consistent with the EWMF findings.

Table 18 summarizes the envelope savings for electrically heated homes for air sealing and insulation, along with duct insulation.

Table 18. Envelope Savings for Electrically Heated Homes

Measure	EWMF Savings (kWh)	IEMF Savings (kWh)
Duct Insulation	0	0
Air Sealing	1,059	886
Floor Insulation	105	88

Attic Insulation	772	646
Wall Insulation	3,071	2,570
Insulation, Total	1,106	926

Table 19 shows demand reduction for envelope measures.

Table 19. Envelope: Demand Reduction for Electrically Heated Homes

Measure	Summer Peak Demand Reduction (kW)	Winter Peak Demand Reduction (kW)
Duct Insulation	-	-
Air Sealing - EWMF	0.279	0.186
Air Sealing - IEMF	0.234	0.156
Insulation - EWMF	0.310	0
Insulation - IEMF	0.244	0.163

What about delivered fuels?

Our team did not develop a delivered fuel (heating oil or propane) building simulation model like we did for natural gas and electrically heated buildings for two reasons:

1. Limited delivered fuel-heated multifamily buildings
2. Lack of delivered fuel consumption data to inform calibration

To provide RI Energy with air sealing, insulation, and duct insulation savings appropriate for delivered fuel-heated multifamily buildings, our team made engineering adjustments to the natural gas building simulation results. Specifically, we adjusted the natural gas results to reflect differences in heating system efficiencies and the average size of dwelling units by fuel type.

The following table summarizes building envelope measures results for all fuel types.

Table 20. Building Envelope: Annual Savings Summary

Measure & Fuel	Ex Post	
	EWMF	IEMF
Duct Insulation		
Natural Gas (heat, Therms/Year)	5	4
Heating Oil (heat, MMBTU/Year)	0.5	0.4
Air Sealing		
Electric, (kWh/Year)	1,059	886
Natural Gas (heat, Therms/Year)	53	42.8
Heating Oil (heat, MMBTU/Year)	5	4.4
Insulation		
Electric, (kWh/Year)	1,106	926
Natural Gas (heat, Therms/Year)	47	38
Heating Oil (heat, MMBTU/Year)	4.8	3.9

The team only had sufficient program data to calculate realization rates for the Insulation and Air Sealing measures among EWMF participants with gas-heated homes.[29] These realization rates are presented in the table below. According to the Rhode Island TRM, ex ante savings for both measures are based on a formula that accounts for the building's pre- and post-installation conditions, as well as the quantity of the measure installed. As shown in The significant difference between ex ante and ex post savings for the insulation measure suggests that the TRM formula may not fully capture key drivers of performance. Specifically, the current formula does not account for variations in savings based on where insulation is installed (e.g., floor, wall, or attic) or on the home's baseline energy consumption prior to installation. These factors can be represented more accurately through calibrated energy modeling, making building simulation a more robust and reliable approach for estimating savings from insulation measures.

Given the **difference in ex post and ex ante savings for the insulation measure, the team suggests that RI Energy proactively employ the realization rate determined through this study to improve the accuracy of reported savings for as long as RI Energy uses the current ex ante estimation approach. If RI Energy changes**

[29] All other combinations of measure, program, and heating fuel included fewer than ten facilities each, resulting in an insufficient sample size to reliably calculate realization rates.

the approach, such as through using algorithms that are specific to each insulation location, then an evaluator should revisit and update the realization rates shown below as needed.

Table 21, the realization rates calculated through building simulation for Insulation and Air Sealing are 313% and 113%, respectively, for gas-heated EWMF participants.

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Table 21. Realization Rates for Building Envelope Measures

Measure	Ex Ante Savings	Ex Post Savings	Realization Rate
Insulation	15	47	313%
Air Sealing	45	53	113%

3.5.6 Benchmarking

To corroborate and provide context for our building simulation results, we benchmarked our building envelope findings against last year's Massachusetts Multifamily Impact Evaluation, which evaluated similar market-rate and income-eligible programs.[30] Table 22 and Table 23 compares insulation and air sealing savings across the respective studies, alongside pre-program NAC (normalized annual consumption) values and savings expressed as a percentage of pre-program usage.

[30] Guidehouse, Cadeo. Massachusetts Income Eligible and Residential Coordinated Delivery Multifamily Impact Evaluation (MA23R59-B-MFI) (https://ma-eeac.org/wp-content/uploads/MA23R59-MF-Impact-Report_FINAL_18SEPT2024.pdf)

As shown in the tables, RI Energy's insulation and air sealing savings are similar, but somewhat lower than those observed in Massachusetts.

An important distinction between the states is the difference in pre-program consumption levels. Rhode Island customers in both EWMF and IEMF programs had higher pre-program NACs than their Massachusetts counterparts. This difference is driven by commensurate differences in the average size of participating dwelling units in each state, as the NACs per square foot are very similar between MA and RI residents for the market-rate programs.

While the difference in pre-program NAC is explained by the difference in average square footage, the larger pre-program NAC for RI Energy's program means similar absolute savings translate into a smaller percentage reduction in usage. For example, insulation measures in Rhode Island IEMF account for 6% of pre-program consumption, compared to 9% for Massachusetts IE. This effect is also seen in the EWMF versus RCD comparison, where Rhode Island lags in percentage savings for both insulation and air sealing results. For insulation, this is due to Massachusetts customers installing, on average, more types of insulation than Rhode Island customers.[31] For air sealing, this is caused by Massachusetts homes having much higher pre-measure infiltration values than Rhode Island homes.[32]

Table 22. EWMF Envelope Savings Benchmarked Against Massachusetts RCD Savings

Characteristic	Rhode Island Multifamily, EWMF	Massachusetts Multifamily, RCD
Average Pre-Program NAC (therms/year)	748	545
Average Dwelling Size (square feet)	1,306	975
Energy Intensity (NAC/square feet)	0.57	0.56
Evaluated Insulation Savings (therms/year)	**47**	**50**
Insulation Savings as % of Pre-Program NAC	6%	9%
Evaluated Air Sealing Savings (therms/year)	**53**	**61**

[31] Massachusetts RCD weatherization participants installed 1.39 different types of insulation, whereas this number is only 1.06 for Rhode Island EWMF weatherization participants.
[32] The pre-measure ACH50 was 20.3 for Massachusetts RCD weatherization participants, whereas this value was only 10.0 for Rhode Island EWMF weatherization participants.

Air Sealing Savings as % of Pre-Program NAC[33]	7%	11%

Table 23. IEMF Envelope Savings Benchmarked Against Massachusetts IE Savings

Characteristic	Rhode Island Multifamily, IEMF	Massachusetts Multifamily, IE
Average Pre-Program NAC (therms/year)	606	478
Average Dwelling Size (square feet)	936	837
Energy Intensity (NAC/square feet)	0.65	0.57
Evaluated Insulation Savings (therms/year)	**38**	**42**
Insulation Savings as % of Pre-Program NAC	6%	9%
Evaluated Air Sealing Savings (therms/year)	**43**	**62**
Air Sealing Savings as % of Pre-Program NAC	7%	13%

[33] The values in this table are expressed as a percentage of total gas consumption (as in, heating load plus baseload), while the values in the results section are expressed as a percentage of heating consumption.

4 Net Savings

Net savings are essential for understanding the underlying impact of programs like RI Energy's EWMF and C&I MF offerings.[34] This is because net savings focuses on the percentage of reported gross savings that would not have occurred without programmatic intervention.

4.1 Approach

To determine the net savings associated with EWMF and C&I MF measures, our team conducted surveys with a sample of participating property owners and managers.[35]

4.1.1 Participant Surveys

The team leveraged the provided program tracking databases to build the survey sample. Unfortunately, the contact information fields in the tracking data were sparsely populated, which significantly limited the size of our sample frame. The team took several steps to bolster the sample frame:

- **Joined with Other Customer Records**. Using the account numbers in the tracking data, we worked with RI Energy to join any contact information available in their Customer Information System (CIS). This effort resulted in more contact information, although the team recognizes that the customer billing contact and the person responsible for participating in the program may not be the same person.
- **Requested Additional Contact information from RISE**. We undertook a similar exercise with RISE, the program implementer.

Because of these efforts, the team was able to build a sample frame consisting of 97 multifamily participants (i.e., the program's point-of-contract for a given participating multifamily facility) that installed measures installed in their buildings in either 2023 or 2024. Our team estimates the resulting sample of 97 participants represented approximately one-fifth of total EWMF and C&I MF participation during this timeframe.

Given the relatively small sample, our team knew we needed an excellent response rate. We also knew—based on past evaluations, including the prior MF prescriptive study and more recent MF Custom Impact Evaluation—that it is difficult to get multifamily participants to

[34] We did not collect NTG-related data for IEMF, which is deemed at 100% (standard practice for income eligible programs).
[35] The team used screener questions at the outset of the survey to identify/confirm the appropriate respondent.

reply to evaluation outreach. In response, our team took two deliberate actions to maximize our response rate:

- **Offer Large Incentives.** For challenging outreach efforts, our team has found it more cost-effective to offer per complete larger incentives than to offer lower amounts and spend more labor time on recruitment. Consequently, we offered participants a $200 incentive, paid (in the form of an e-gift card) immediately upon completion of the survey.
- **Implementer-led Outreach.** Our team has also consistently found meaningfully higher response rates to survey invitations are sent by the implementer vendor (versus a third-party evaluation contractor like Resource Innovations) because participants recognize the name and already associate it with their participation experience. As such, our team coordinated with RISE to send the initial outreach e-mail, as well as multiple follow-ups.

In total, these efforts resulted in 19 completed surveys – a 20% response rate. While the response rate outpaced our planning assumption (15%), the limited sample size (97) meant the team fell well short of our planning code of 45 total completes.

What about surveying tenants?

The team recognizes that some measures may be installed at the tenants' discretion and that the surveyed property owners and managers cannot speak direct to this installation decision. However, we do not believe these instances warrant the significant cost associated with a separate tenant-focused survey effort. This is especially true from a NTG perspective because the property owner and manager made the decision for the building to participate in the program, which is the only reason tenant faced an installation decision.

4.1.2 NTG Measure Groups

Given the variety of measures installed through the programs, it was impractical to ask respondents a battery of NTG questions for each MF measure. Consequently, the team organized the prescriptive measures included in this study into eight different "NTG Measure Groups" and asked each respondent NTG questions about up to two groups. Our team collaborated with RI Energy on these groups, which were organized into similar measures likely to be subject to the same decision-making process by participating building owners or property managers.

Table 24. NTG Measure Groups

#	NTG Group	End Use	Relevant Measure(s)
1	Hot Water Fixtures	Water Heating	Faucet Aerator, Low Flow Showerhead, Low Flow Showerhead w/ Thermostatic Valve
2	Hot Water Pipe Wrap		Pipe Wrap
3	Boiler Controls	HVAC	Boiler Reset Control
4	Thermostats		WiFi Thermostat; Programmable Thermostat
5	Common Area Lighting	Lighting (Common Area)	EISA Exempt Lighting - Common Interior, LED Fixture - Common Interior LED Fixture, Linear - Common Interior, LED Fixture - Common Exterior
6	Smart Strips	Plug Load	Smart power strips
7	Duct Insulation	Building Shell	Duct Insulation
8	Weatherization		Air Sealing; Insulation

4.2 Findings

Table 25 summarizes the freeridership (FR), spillover (SO), and NTG (i.e., 1-FR+SO) values determined through this evaluation's survey effort. Two takeaways are immediately evident in the table: 1) respondents indicated relatively low levels of freeridership across measure groups, and 2) the sample sizes are far too small for the results to deliver reliable and definitive NTG results.

Table 25, NTG Results: Current Survey

#	NTG Group	Sample Size	FR	SO	NTG
1	Hot Water Fixtures	3	0.00	0.00	**1.00**
2	Hot Water Pipe Wrap	2	0.00	0.00	**1.00**
3	Boiler Controls	0	-	-	**-**
4	Thermostats	1	0.25	0.00	**0.75**
5	Common Area Lighting	0	-	-	**-**
6	Smart Strips	N/A	N/A	N/A	**N/A**
7	Duct Insulation	0	-	-	**-**
8	Weatherization	9	0.05	0.00	**0.95**

Because of the small sample sizes, the team revisited the NTG results of the previous MF impact study completed in 2020, which are shown below.[36] It is important to note that the previous study leveraged secondary sources for four measures so the NTG results come from another study.

[36] RI Energy confirmed that program had not undergone any major changes to its design, delivery, or incentive structure since 2020 that would make combining results across studies inappropriate.

Table 26, NTG Results: Previous MF Study

#	NTG Group	Sample Size	FR	SO	NTG
1	Hot Water Fixtures	25	0.08	0.01	**0.93**
2	Hot Water Pipe Wrap	25	0.08	0.01	**0.93**
3	Boiler Controls	N/A[37]	0.14	0.00	**0.86**
4	Thermostats	19	0.48	0.01	**0.53**
5	Common Area Lighting	72[38]	0.23	0.01	**0.78**
6	Smart Strips	163[39]	0.31	0.01	**0.70**
7	Duct Insulation	N/A[40]	0.33	0.01	**0.68**
8	Weatherization	28	0.33	0.01	**0.68**

To bolster samples size and provide RI Energy with more reliable NTG results for prospective application, our team decided to combine the results of our survey with the previous evaluation. Table 27 summarizes the combined FR, SO, and NTG values, how the NTG differs from RI Energy current NTG assumption, the approach we used to combine the studies and why we choose that approach.

As evident in the table, smart strips experienced the largest increase (+0.30) due to a change in approach, followed by weatherization and duct sealing (+0.07), which saw consistently lower freeridership amongst the small number (n=9) response collected as part of this study. The remaining measures either saw a modest increase (+0.01) or are unchanged.

[37] Based on Guidehouse (2021). MA Residential Programs Net-to-Gross Research of RCD and Selected Products Measures (MA20R28-B-RCD). https://ma-eeac.org/wp-content/uploads/MA20R28-B-NTGRCDP_Final-Report_08Oct2021.pdf

[38] Based on Guidehouse (2017) Multi-Family Program Impact and Net-to-Gross Evaluation (RES 44). https://ma-eeac.org/wp-content/uploads/RES-44_Multi-family-Program-Impact-Evaluation_FINAL_SO-Rates-Updated.pdf

[39] Based on Cadeo (20202). EnergyWise Single Family Program Impact & Process Evaluation. https://eec.ri.gov/wp-content/uploads/2020/10/ng-ri-ewsf-impact-and-process-comprehensive-report_final_04sept2020.pdf

[40] Like the current evaluation team, the previous one created a separate NTG group for Duct Insulation, but failed to get any responses. As such, the NTG values were set to the Weatherization NTG.

Table 27. NTG Results: Recommended Values for Prospective Application

#	NTG Group	FR	SO	NTG	Change	Approach	Rationale
1	Hot Water Fixtures	0.07	0.01	**0.94**	+0.01	Combined Survey Result and Existing Value*	Current survey sample was small, but produced generally similar results as the previous evaluation (i.e., minimal freeridership)
2	Hot Water Pipe Wrap	0.07	0.01	**0.94**	+0.01		
3	Boiler Controls	0.14	0.00	**0.86**	-	No change	The current survey did not yield any new data to modify the existing values, which were already based on a secondary source
4	Thermostats	0.47	0.01	**0.54**	+0.01	Combined Survey Result and Existing Value*	Only one response; minimal impact on recommended prospective NTG
5	Common Area Lighting	0.23	0.01	**0.78**	-	No change	The current survey did not yield any new data to modify the existing values, which were already based on a secondary source (MA Res 44 evaluation)
6	Smart Strips	0.00	0.00	**1.00**	+0.30	Deemed Value	Per pre-survey communication, team contents that smart power strips - in the MF program context - are all opportunistically installed by tenants (given the owner/manager-focused nature of the program), would not have occurred without program participation, and therefore have a NTG of 100%.
7	Duct Insulation	0.26	0.01	**0.75**	+0.07	Set Equal to Another NTG Group	Neither the current or previous survey reached any duct insulation respondents. Like previous study, the team recommends tying the duct insulation NTG to the more general weatherization NTG
8	Weatherization	0.26	0.01	**0.75**	+0.07	Combined Survey Result and Existing Value*	The current survey found significantly less freeridership than the previous survey (5% vs. 33%), but the signal in the current sample was consistent (only 1 of 9 respondents indicated any level of FR)

**Weighted average using number of responses associated with each value*

More about Smart Strips.

As mentioned briefly above, our team used a different approach to assessing NTG for smart strips than the previous evaluation. We decided that, since the building owner/manager made the fundamental decision to participate in the program that means the installation decision posed to the tenant was really more of an opportunistic one (i.e., "Do you want a smart power strip as part of your building's participation in this MF program?") versus a more traditional NTG question (i.e., "Would they have bought a smart power strip anyway?").

It seems highly unlikely that an individual tenant was planning to purchase a smart power strip on their own and avoided this (and therefore became a freerider) because the program happened to knock on their door and offered them one for free first.

Following this logic, all smart power strip installed through the program were not otherwise going to be installed and the FR = 0. This is different than the approach used in the previous MF impact evaluation, which attempted to ask tenants about smart power strips. However, that study only reached two tenants that received power strips so the results were not viable. As a result, the previous MF NTG analysis leveraged the results from a concurrent EWSF evaluation. The team considered continuing to use this value as a proxy, but feels the proposed approach is more logical since the EWSF participation decision is almost always owner/occupant-driven and fundamentally different than the EWMF scenario where most tenants are reacting to the building owner or managers participation decision.

Because of this logic, our team excluded smart power strips from the survey and focused NTG questions on the remaining, more permanent "infrastructure" energy improvements made by the program at the building owner/manager's request. This includes weatherization measures, as well as hot water fixtures (e.g., faucet aerators and showerheads) that typically remain in a dwelling unit when it turns over.

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 MF 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. **Revisit Previous Data Improvement Recommendations.** This study began with a review of the program tracking data that RI Energy provided to our team to enable this evaluation. Specifically, we assessed whether data-related recommendations from the previous multifamily evaluation (2020) had been addressed. Our review found that two of the three prior recommendations remain unresolved, while one was only partially resolved. The status of prior recommendations is as follows:

- **Recommendation 1 (Automate Data Checks): Not Resolved** - 18% of facilities continue to have extreme or missing square footage values despite new data tracking software.
- **Recommendation 2 (Track Unit-Level Participation): Not Resolved** - Data still lacks participation status tracking at the individual unit level.
- **Recommendation 3 (Collect Contact Information): Partially Resolved** - 56% of projects now include customer email addresses, an improvement from the previous evaluation.

3. **Ensure Complete Technical Data Capture in New Tracking System.** RI Energy transitioned to new data tracking software since the previous MF impact evaluation. The data provided to our team for this study, which originated in the new software, was missing critical technical parameters that were available as part of the previous evaluation via the prior software. Specifically, the new tracking data did not include pre- and post-installation R-values and air leakage test results (ACH50)—essential for calculating and validating building envelope savings. RI Energy is aware of this shortcoming and working to address it. Given the importance of this information, we formally recommend that RI Energy work with the implementation and software

vendors to ensure key pre- and post-program technical parameters are captured in the software and made available to future evaluators.

4. **Collect Pre-Program Hot Water Data for a Sample of Participants.** RI Energy currently assumes that all retrofitted showerheads and faucet aerators replace existing fixtures that consume the maximum allowable water flow per federal requirements (2.5 and 2.2 gallons/minute, respectively). In practice, it is likely that some participants are already using fixtures with flow rates below the federal maximum - though still meaningfully higher than the program's high-efficiency models - making the replacements worthwhile but less impactful than assumed. Given the lack of empirical data specific to Rhode Island's multifamily housing stock and the significant impact of this assumption on savings estimates, our team recommends that RI Energy collect pre-program hot water flow rates for a representative sample of future participants. Specifically, we recommend RI Energy work with its implementation vendor collect pre-program measurements for a minimum of 20 EWMF and 20 IEMF participants in 2026. To ensure representation across participating buildings, RI Energy should not collect measures from more than five tenants at any given participating multifamily facility. Once available, RI Energy should use this program-specific, empirical data to update showerhead and faucet aerator gross savings for application in 2027.

As described in this report, these persistent data quality issues continue to impact evaluation capabilities and program analysis. Regarding the prior recommendations, RI Energy should prioritize implementing automated data validation checks and maintaining comprehensive contact information. Additional details on specific data issues and their evaluation implications are provided in the Program Tracking Data Review presentation in Appendix C.

Appendix A Evaluation Scope of Work

RI Energy - MF
Impact Evaluation W

Appendix B Participant Survey

RI Energy - MF
Impact Participant S

Appendix C Program Tracking Data Review Presentation

RI Energy -
Revisiting Prior MF

Appendix D 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.

Measure Group	Measure	Section	Fuel	LS_ID	Max Demand Factor	CF Summer Peak	CF Winter Peak
Domestic Hot Water	Showerhead	EWMF Electric	Electric	ls_08_Electric	0.0003	0.33	0.64
Domestic Hot Water	Showerhead	EWMF Oil & other	Oil	ls_00_Electric	0	0	0
Domestic Hot Water	Showerhead	IEMF Electric	Electric	ls_246_Electric	-	0.31	0.81
Domestic Hot Water	Showerhead	IEMF, EWMF and C&I	Gas	ls_00_Gas	0	0	0
Domestic Hot Water	Faucet Aerators	EWMF Electric	Electric	ls_08_Electric	0.0003	0.33	0.64
Domestic Hot Water	Faucet Aerators	IEMF Electric	Electric	ls_246_Electric	-	0.31	0.81
	Faucet Aerators	IEMF, EWMF and C&I	Gas	ls_00_Gas	0	0	0
Domestic Hot Water	Pipe Wrap/Insulation (per foot)	EWMF and IEMF Electric	Electric	ls_08_Electric	0.0003	0.33	0.64
Domestic Hot Water	Pipe Wrap/Insulation (per foot)	EWMF oil	Oil	ls_00_Electric	-	0	0
Domestic Hot Water	Pipe Wrap/Insulation (per foot)	IEMF, EWMF and C&I	Electric	ls_08_Electric	0.0003	0.33	0.64

Domestic Hot Water	Low Flow Showerhead w TSV	EWMF Electric and Oil	Electric and oil	ls_08_Electric	0.0003	0.33	0.64
Domestic Hot Water	Low Flow Showerhead w TSV	IEMF Electric	Electric	ls_246_Electric	-	0.31	0.81
Domestic Hot Water	Low Flow Showerhead w TSV	IEMF, EWMF and C&I	Gas	ls_00_Gas	0	0	0
HVAC	Boiler Reset Controls	EWMF and IEMF Oil	Oil	ls_08_Electric	0.0003	0.33	0.64
HVAC	Wifi Thermostat	IEMF Electric	Electric	ls_183_Electric	-	0.33	0.22
HVAC	Wifi Thermostat	IEMF Gas	Gas	ls_11_Gas	0.0016	0.35	0
HVAC	Wifi Thermostat	IEMF Oil	Oil	ls_207_Electric	-	0.35	0
HVAC	Programmable Thermostat	EWMF Electric	Electric	ls_187_Electric	0.0009	0.34	0.17
HVAC	Programmable Thermostat	EWMF Oil	Oil	ls_85_Electric	0.0005	1.12	0.38
HVAC	Programmable Thermostat	EWMF and IEMF Gas	Gas	ls_11_Gas	0.0016	0.35	0
HVAC	Programmable Thermostat	IEMF Electric	Electric	ls_247_Electric	-	0.33	0.22
HVAC	Programmable Thermostat	C&I Gas	Gas	ls_138_Electric	-	0.77	0.64
Plug Load	Smart Strip	EWMF Electric	Electric	ls_08_Electric	0.0003	0.33	0.64
Lighting - Common Area	LED EISA EXEMPT (Interior)	IEMF Electric	Electric	ls_178_Electric	0.0003	0.17	1

Lighting - Common Area	LED Fixture (Exterior)	IEMF Electric	Electric	ls_04_Electric	0.0002	0.57	0.89
Lighting - Common Area	LED Fixture (Interior)	IEMF Electric	Electric	ls_04_Electric	0.0002	0.57	0.89
Lighting - Common Area	LED Fixture, Linear (Interior)	IEMF Electric	Electric	ls_171_Electric	-	0.55	0.85
Envelope	Duct Insulation		Electric	-	-	-	-
Envelope	Air Sealing	EWMF Electric	Electric	ls_208_Electric	0.0008	0.33	0.22
Envelope	Insulation	EWMF Electric	Electric	ls_238_Electric	-	0.35	0
Envelope	Insulation	IEMF Electric	Electric	ls_247_Electric	-	0.33	0.22