Residential Energy Efficiency Portfolio:
Volume 1

Submitted to: Ameren Missouri

Submitted on: 6/10/2025

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1 Executive Summary

Under contract with Ameren Missouri, ADM Associates, Inc., (ADM) performed evaluation, measurement, and verification (EM&V) activities to confirm the energy savings (kWh) and demand reduction (kW) realized through its energy efficiency programs.

This report is divided into two volumes providing information on the impact, process, and cost-effectiveness evaluation of the Ameren Missouri portfolio of residential programs implemented during the 2024 program year (PY2024). Volume I presents chapters describing the evaluation approach and findings.

Volume I is organized as follows:

- Chapter 2: Evaluation Approach
- Chapter 3: Efficient Products
- Chapter 4: Multifamily Market Rate
- Chapter 5: HVAC (Midstream and Downstream)
- Chapter 6: Pay As You Save®(“PAYS®)
- Chapter 7: Multifamily Income Eligible
- Chapter 8: Single Family Income Eligible
- Chapter 9: General Population Survey Key Findings

Report Volume II contains chapters presenting detailed information regarding evaluation methodologies, data collection instruments, and evaluation results.

1.1 Impact Evaluation Findings

Table 1-1 summarizes the energy savings for the Ameren Missouri portfolio of residential energy efficiency programs. Table 1-2 summarizes the peak demand impacts of the residential energy efficiency programs.

Table 1-1 Summary of Energy Savings

Program Name	Annual Net MWh Savings Goal	Percent Achievement of Annual Net MWh Savings Goal	Ex Ante Annual MWh Savings	Ex Post Annual Gross MWh Savings	Gross Realization Rate	Ex Post Annual Net MWh Savings	Net-to-Gross Ratio	Lifetime Net Ex Post MWh Savings
Residential Efficient Products Program	3,367	104%	5,637	5,412	96%	3,518	65%	35,313
Multifamily Market Rate Program	2,717	65%	2,857	2,720	95%	1,768	65%	18,463
Residential HVAC Program	23,031	110%	36,200	38,894	107%	25,281	65%	280,605
Pay As You Save® Program	5,013	8%	497	605	122%	393	65%	5,591
Multifamily Income Eligible Program	8,048	108%	9,452	8,674	92%	8,674	100%	115,241
Single Family Income Eligible Program	1,087	59%	752	639	85%	639	100%	6,159
Residential Portfolio Totals	43,263	93%	55,396	56,944	103%	40,273	71%	461,373

Table 1-2 Summary of Peak Demand Impacts

Program Name	Annual Net MW Savings Goal	Percent Achievement of Annual Net MW Savings Goal	Ex Ante Gross MW Savings	Ex Post Gross MW Savings	Gross Realization Rate	Ex Post Net MW Savings	Net-to-Gross Ratio
Residential Efficient Products Program	1.17	110%	2.15	1.98	92%	1.29	65%
Multifamily Market Rate Program	1.48	61%	1.45	1.39	96%	0.90	65%
Residential HVAC Program	13.53	117%	20.93	24.26	116%	15.77	65%
Pay As You Save® Program	2.34	5%	0.17	0.18	103%	0.12	65%
Multifamily Income Eligible Program	2.21	106%	2.61	2.34	90%	2.34	100%
Single Family Income Eligible Program	0.46	96%	0.54	0.44	82%	0.44	100%
Residential Portfolio Totals	21.19	98%	27.86	30.59	110%	20.86	68%

1.2 Key Evaluation Findings

Overall, the portfolio's success in exceeding its target was driven by strong performance in HVAC, efficient products, and multifamily income-eligible programs. However, underperformance in the PAYS and single-family income-eligible categories highlights areas for potential program design improvements.

The portfolio performed well in achieving its net energy savings goal, reaching 103% of the overall target. However, performance varied by program category:

- HVAC (110%), Efficient Products (104%), and Multifamily Income Eligible (108%) exceeded their net goals, driven by strong participation and good gross realization rates, such as the 107% gross realization rate for HVAC.
- The Multifamily Market Rate offering achieved 65% of its savings goal. It had a 95% gross realization rate, indicating alignment between expected and realized savings.
- PAYS (8%) significantly underperformed against its net goal, despite a high 122% gross realization rate. One factor is that a relatively small share of participants completed Tier 4 projects during the program year. While the program's net MWh performance would have improved with more customers completing Tier 4 projects, it is unlikely that increasing Tier 4 projects alone would have achieved the net savings goal. If all participants had completed Tier 4 projects in addition to the Tier 1 measures, assuming the average savings per Tier 4 project (2,187 kWh), the program would have reached approximately 82% of its savings goal. Therefore, in addition to increasing the conversion rate from Tier 1 to Tier 4 projects, enrollment would also need to be increased for the program to reach goal.
- Single Family Income Eligible (59%) fell short of its goal, achieving 639 MWh of net savings against a target of 1,087 MWh. While the 85% gross realization rate was reasonable, the lower savings indicate potential issues with participation levels.

Realization rates across programs were influenced by several common factors, leading to both under- and over-performance relative to 100%. The key drivers of these differences included:

- Baseline Assumptions – Variations in ex ante and ex post savings often stemmed from differences in assumed baseline conditions. In some cases, ex ante savings applied higher or lower baseline efficiency levels than those specified in the TRM, leading to discrepancies in calculated savings.
- Installation and In-Service Rates – PAYS measures that transitioned from participant installation to direct installation generally saw higher realization rates due to increased confidence in actual installations. Conversely, measures with assumed in-service rates that differed from TRM-specified values saw lower realization rates.
- Energy Modeling vs. TRM-Based Methods – For PAYS measures relying on energy modeling for ex ante savings frequently showed differences from TRM-consistent ex post analyses. In cases where ex ante modeling used generalized assumptions rather than site-specific characteristics, adjustments in the ex post analysis led to realization rates diverging from 100%.
- Early Replacement and Equipment Assumptions – Some measures experienced lower realization rates when ex ante estimates included early replacement savings that were not validated in ex post analysis, which instead applied time-of-sale baselines. Similarly, assumptions about SEER ratings and equipment efficiency affected realization rates, particularly for HVAC-related measures.

- Household and Site-Specific Characteristics – Measures where savings depended on household size, operational hours, or specific equipment conditions often saw realization rate adjustments when ex post calculations incorporated actual site data rather than assumed values.

The individual program chapters provide additional details on impact evaluation findings as well as findings from the assessment of program processes.

1.3 Cost Effectiveness Results

The following table summarizes the cost effectiveness results of each of the programs.

Table 1-3 Cost Effectiveness Results

Program Name	TRC	UCT	RIM	PCT	SCT
Residential Efficient Products Program	1.12	1.21	0.42	5.64	1.33
Multifamily Market Rate Program	1.04	0.93	0.38	8.19	1.29
Residential HVAC Program	1.61	1.96	0.50	5.41	1.95
Pay As You Save® Program	0.13	0.13	0.11	2.99	0.15
Multifamily Income Eligible Program	1.58	0.79	0.31	10.72	1.58
Single Family Income Eligible Program	0.38	0.24	0.18	5.95	0.38

2 Evaluation Approach

This chapter presents a summary of the evaluation approach and data collection activities that the ADM Team used to evaluate the Ameren Missouri programs.

2.1 Ex Post Gross Savings Approach

In conducting the Ex Post Gross kWh Savings analysis, the ADM Team referenced the Ameren Missouri TRM for measures that are documented within the TRM. The specific equations and input sources are presented in Volume II.

ADM followed the equations in the TRM and relied on one of these sources for measure parameters, listed in order of preference:

- Measure-specific and building-specific information from program tracking data or other program documentation.
- Assumptions provided in the Ameren Missouri TRM for known measure and building characteristics (e.g., baseline efficiencies applicable to the known efficient measure type).
- Estimates developed from participant surveys, if the data is not tracked. For example, if water heating type is not tracked for low-income measures, this data will be collected through a survey of participants.
- Ameren Missouri TRM parameter values for "unknown" measure characteristics.

The ADM Team used the kWh to kW end-use factors to calculate the kW savings for the program measures.

2.2 Ex Post Net Savings Approach

To calculate ex post gross savings, ADM multiplied the gross savings by the net-to-gross ratios employed in the calculation of throughput disincentives. These ratios are set at 65% for non-low-income programs and 100% for low-income programs.

2.3 Process Evaluation Approach

The process evaluation focused on addressing the five process evaluation questions required by Missouri Code of State Regulations section 20 CSR 4240-22.070(8). As stated,

> *Each demand-side program and demand-side rate that is part of the utility's preferred resource plan shall be subjected to an ongoing evaluation process which addresses at least the following questions about program design.*

1. *What are the primary market imperfections that are common to the target market segment?*
2. *Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?*
3. *Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?*

4. *Are the communication channels and delivery mechanisms appropriate for the target market segment?*

5. *What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation for select end-uses/measure groups included in the Program?*

In addition to addressing the five process evaluation questions, the process evaluation provides findings and recommendations, as applicable, based on the findings from the evaluation research activities.

2.4 Cost Effectiveness Analysis

ADM analyzed the final, post-implementation cost-effectiveness of each measure, program, and the overall portfolio. ADM coordinated with Ameren Missouri to obtain the economic and financial assumptions for developing the model, including discount rate, line losses, summer peak date/time, avoided electric transmission and distribution costs, and escalation rates. Additionally, program spending data costs for implementation, incentives, and administration were provided by Ameren Missouri. ADM provided measure-level data by program with model inputs for the number of units, measure life, gross energy savings, net energy savings, demand savings, end use, and incremental costs.

The approaches for calculating gross and net energy and demand savings were characterized in the program sector chapters below. The sources of data for EULs and incremental costs were, stated in order of preference:

- The Ameren Missouri TRM
- Project-specific information
- Another source, such as the Illinois TRM, Mid-Atlantic TRM, or Pennsylvania TRM.

The ADM Team calculated cost-effectiveness using the five most widely accepted tests conducted in evaluations of energy efficiency programs across North America. These tests are summarized below:

- Utility Cost Test (UCT): Comparison of program administrator costs to resource supply costs.
- Total Resource Cost Test (TRC): Comparison of program administrator and customer costs to utility resource savings.
- Ratepayer Impact Measure Test (RIM): Impact of the program on all ratepayers, including non-participants.
- Societal Cost Test (SCT): Comparison of total societal costs to resource savings and non-monetized benefits.
- Participant Cost Test (PCT): Comparison of costs and benefits from the perspective of the customer implementing the measures.

2.5 Summary of Data Collection

The ADM Team engaged in several forms of data collection in the process of completing the evaluation of the Ameren Missouri programs. We present a brief overview of the data collection activities here.

2.5.1 Interviews with Program Staff

The ADM Team completed interviews with program staff from Ameren Missouri and its implementation partners. The purpose of the interview was to review our understanding of the program's design and operations, gather additional information about its marketing and target markets, and learn more about its delivery strategies, quality control processes, and data management practices. The interviews were completed in March and April of 2024.

2.5.2 Online and Telephone Surveys

Online and telephone surveys and interviews of program participants, market actors, and nonparticipants were the primary data collection activity. The populations for these surveys were developed using data from program participation records and the database of Ameren Missouri. Table 2-1 summarizes the survey data collection.

Table 2-1 Summary of Data Collection

Program Name	Data Collection Activity	Mode	Number of Contacts	Completed Surveys / Interviews	Response Rate
Efficient Products	Participant survey	Email	2,856	53	1.9%
Heating and Cooling	Distributor interviews	Telephone	13	5	38.5%
	Trade ally survey	Email	392	25	6.4%
	Midstream end-user survey	Email	421	25	5.9%
	Downstream participant survey	Email	3,513	134	3.8%
Cross-cutting	General population survey	Email	31,940	287	0.9%

2.5.3 Onsite Visits

A limited number of onsite visits were completed for some of the Ameren Missouri programs. The purpose of the onsite visits was primarily to provide qualitative feedback to the program on the measure installation practices and to identify opportunities for program improvement.

Table 2-2 Summary of Site Visits

Program Name	Number of Site Visits Completed
Multifamily Mass Market	2 Properties / 5 Units
Multifamily Income Eligible	3 Properties / 36 Units
Single Family Income Eligible	10

2.5.4 Review of Program Documents

The ADM Team reviewed several types of documents to obtain information about the programs and their operations. The types of documents included:

- Program database queries and extracts.
- Application forms and participation agreements.
- Program procedure manuals.
- Customer journey maps.
- Program websites.
- Marketing materials.

3 Efficient Products

Ameren Missouri's Efficient Products Program aims to increase customer awareness about the benefits of high-efficiency products. It educates residential customers on energy usage in their homes and offers information, products, and services for cost-effective energy savings. The target market for this program includes all residential customers within the Ameren Missouri service territory.

The Efficient Products Program serves as an umbrella program, incorporating various partners, products, and delivery strategies. Its design is flexible, allowing for evolution based on program performance evaluations.

3.1 Program Activity Summary

Table 3-1 summarizes the Efficient Products Program activity during PY2024.

Table 3-1 Summary of Program Activity – Efficient Products

Measure	Number of Accounts	Percent of Accounts*	Ex Ante Savings (MWh)	Percent of Ex Ante Savings
Smart Thermostat	9,907	99.6%	5,561	98.6%
Heat Pump Hot Water Heater	17	0.2%	66	1.2%
Advanced Power Strip (Tier 2)	40	0.4%	10	0.2%
Total	9,948		5,637	100.0%

* The summed percentage of accounts exceeds 100% because some accounts purchased multiple measure types.

3.2 Data Collection Activities

The ADM Team administered the survey to a census of unique contacts with contact information available at the time the surveys were fielded.

Table 3-2 Summary of Data Collection – Efficient Products

Data Collection Activity	Mode	Time Frame	Number of Contacts	Completed Surveys / Interviews	Response Rate
Participant survey	Email	September 2024	2,856	53	1.9%

3.3 Estimation of Ex Post Savings

The analysis of the ex post gross savings involved two steps. First, the ADM Team reviewed the program tracking data to identify any missing data or duplicate entries in the program tracking data. Second, the ADM Team applied the Ameren Missouri TRM to calculate kWh savings and applied the kWh to kW end-use factors to calculate the kW savings. The specific calculations and assumptions used for each measure are presented in report Volume II.

The ADM Team multiplied the gross savings by the net-to-gross ratio (65%) employed in the calculation of throughput disincentives to calculate the program net savings.

Table 3-3 summarizes the ex ante and ex post program savings.

Table 3-3 Program Summary of Ex Post Gross and Net Savings – Efficient Products

Metric	Ex Ante Gross Savings	Ex Post Gross Savings	Gross Real-ization Rate	Ex Post Net Savings	Net-to-Gross Ratio	Net Goal	% of Goal
Energy Savings (MWh)	5,637	5,412	96%	3,518	65%	3,367	104%
Demand Savings (MW)	2.15	1.98	92%	1.29	65%	1.17	110%

Table 3-4 and Table 3-5 summarize the ex post gross kWh and kW savings of the Efficient Products program by measure and program component.

Table 3-4 Summary of Ex Post Gross Energy Savings – Efficient Products

Measure	Quantity of Measures Reported	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
Smart Thermostat	11,908	5,561	5,333	96%
Heat Pump Hot Water Heater	29	66	69	104%
Advanced Power Strip (Tier 2)	67	10	10	100%
Total	12,004	5,637	5,412	96%

Table 3-5 Summary of Ex Post Gross Peak Demand Impacts – Efficient Products

Measure	Ex Ante Gross kW Savings	Ex Post Gross kW Savings	Gross Realization Rate (kW)
Smart Thermostat	2.15	1.98	92%
Heat Pump Hot Water Heater	0.01	0.01	104%
Advanced Power Strip (Tier 2)	0.00	0.00	100%
Total	2.15	1.98	92%

The following discusses factors affecting realization rates that differed from 100%.

- **Smart Thermostat (96%).** Ex ante savings of 467 kWh are based on Appendix F measure 250450_2021_12_, assuming 100% of homes with installed thermostats have central air conditioning. Ex post assumptions adjust this to 91%, per Ameren Missouri TRM V7.0 Vol. 3, p. 59.

- **Heat Pump Hot Water Heater (104%).** Ex ante per-unit savings of 2,276 kWh were estimated referencing a UEF of 3.44 (Appendix F measure 250050_2019_12_). Actual units installed showed higher efficiency, with 27 units at a UEF of 3.88 and 2 units at a UEF of 4.07.

3.4 Process Evaluation Findings

3.4.1 Required Process Evaluation Questions

This section presents findings related to addressing the five process evaluation questions required by Missouri Code of State Regulations section 20 CSR 4240-22.070(8).

3.4.1.1 What are the primary market imperfections that are common to the target market segment?

The primary market imperfections that the Efficient Products program seeks to address to encourage the adoption of energy-efficient products included the following:

- **Limited Customer Interest**: There is a notable lack of customer interest in specific products such as advanced power strips and heat pump water heaters. This disinterest is a significant barrier to market adoption of these products.
- **Installation Logistics**: Customers face logistical challenges related to the installation of certain products. This includes the need for additional electrical work, which incurs extra costs. These logistical issues contribute to customer hesitancy.
- **High Product Prices**: The relatively high prices of some energy-efficient products remain a significant barrier. This price sensitivity affects customer willingness to invest in these technologies.

3.4.1.2 Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?

The target market segment for the Efficient Products Program is defined broadly as residential customers. Two of the three program measures, smart thermostats and heat pump water heaters, are suitable for homeowners while smart power strips are suitable for owners and renters.

The market for heat pump water heaters can be divided into two groups: customers who face minimal installation challenges (e.g., those with adequate electrical systems and space who can handle self-installation) and customers who require extensive work, such as electrical upgrades, relocating the water heater, or contractor assistance. Those two groups have different needs and face different barriers to adopting the measure.

The program has faced challenges with slower sales of heat pump water heaters and advanced power strips. This further indicates that there may be potential benefits in further segmenting the market to better target specific customer groups with tailored marketing strategies and product offerings.

3.4.1.3 Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?

The Efficient Products Program offers advanced thermostats, advanced power strips, and heat pump water heaters. While these measures do not cover all end-use measures suitable for residential customers, Ameren Missouri offers additional programs that add to the diversity of measures in the portfolio.

Future versions of the program could consider other appliance and plug-load measures such as room air conditioners, dehumidifiers, and air purifiers that may prove to be cost effective. Additionally, selling low-flow aerators and shower heads would expand the offerings to address hot water end-uses, although Ameren Missouri currently offers these measures through PAYS, income eligible programs, and multifamily market rate.

3.4.1.4 Are the communication channels and delivery mechanisms appropriate for the target market segment?

The communication channels and delivery mechanisms for the Efficient Products Program are designed to maximize customer awareness and engagement through a combination of digital, traditional, and event-based approaches. The marketing strategy includes social media engagement, direct email campaigns, TV ads, and participation in events like Earth Day celebrations. Additionally, banners on Ameren's website serve as a gateway for customers visiting the site. Special promotions, particularly those offering limited-time discounts on thermostats, receive significant marketing attention. Internally managed website content highlights manufacturer discounts and rebate offers prominently, often featuring banners showcasing reduced pricing or special rebates. Postcards, Facebook marketing, and remarketing efforts are also utilized to maintain customer engagement and awareness. Collaborations with local corporations involve providing energy efficiency brochures and sponsoring giveaways to increase program visibility. Additionally, the program includes information about the online marketplace in quarterly newsletters from Ameren.

The delivery mechanisms involve an online marketplace managed by TechniArt, with options for product fulfillment and shipping. Customers are required to sign in using Ameren's single sign-on portal to verify their status as customers. TechniArt then checks if the customer has exceeded their purchase limits for specific measures, such as advanced power strips, thermostats, and heat pump water heaters. After making the purchase with the discount applied, customers receive an email confirmation, and TechniArt proceeds to pack and ship the product within approximately five days. Customer service options on the marketplace include live chat and phone support, with inquiries handled by TechniArt's customer service team or directed to ICF's customer service if necessary. Returns are accepted for power strips at any time, while thermostats can only be returned if the box is unopened to maintain the manufacturer warranty. For heat pump water heaters, customers are advised to consult a contractor for installation guidance, though TechniArt can assist with basic inquiries.

The online purchasing process for heat pump water heaters provides additional informational support through use of a series of guided questions to determine suitability, and installation logistics that may pose additional challenges.

Overall, the communication channels and delivery mechanisms are appropriate for the target market segment, as they utilize a variety of strategies to reach and engage customers while providing convenient options for product fulfillment and support. For heat pump water heaters, the program could provide additional support by providing information for contractors that could install the units for customers not interested in self-installing.

Survey responses—predominantly from customers who purchased thermostats—further support the conclusion that the communication channels are effective and appropriate for the target market segment for thermostat purchasers. Key findings include:

- **Use of Ameren Missouri website**: 42% of respondents indicated that they obtained information from the Ameren Missouri website that influenced their decision to purchase a

product. Among these, 85% rated the information as either very influential (rated 5) or somewhat influential (rated 4).

- **Ease of navigation and clarity**: Approximately 80% of participants rated the website as easy to navigate for finding products, and they rated the discount information as clear. Detailed metrics are summarized below:

Table 3-6 Ease of Finding Product and Clarity of Discount Information

Metric	Percent of Respondents
Rated ease of finding product on website as a 5 (very easy) or 4 (n = 47)	79%
Rated clarity of information on product discount as a 5 (very clear) or 4 (n = 46)	80%

- **Delivery times**: 34% of respondents reported receiving their product within one week, while 40% received their product within two to three weeks. These responses suggest that delivery times are generally reasonable.

3.4.1.5 What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation for select end-uses/measure groups included in the Program?

To more effectively address market imperfections and increase customer acceptance and implementation of select end-uses and measure groups in the Efficient Products Program, several strategies can be implemented:

- **Enhancing Marketing Efforts:** Focused promotional campaigns and educational initiatives can raise awareness about the benefits and incentives tied to energy-efficient products, particularly for items with slower sales. For example, the program could replicate successful strategies, such as offering significant discounts and educational marketing that highlights energy savings potential, to drive adoption of lower-volume measures like advanced power strips.
- **Providing Installation Support for Heat Pump Water Heaters (HPWHs):** Many households prefer professional installation over self-installation for HPWHs. To address this:
    - Partner with local contractors to develop a vetted list of installers familiar with HPWHs and offer discounted installation services.
    - Create an online "contractor matching tool" to help customers connect with certified installers in their area.
    - Include comprehensive installation guides or instructional videos on the utility store website to assist customers who choose to self-install.

These strategies can help reduce barriers to adoption and improve program performance for targeted measure should they be offered in the future.

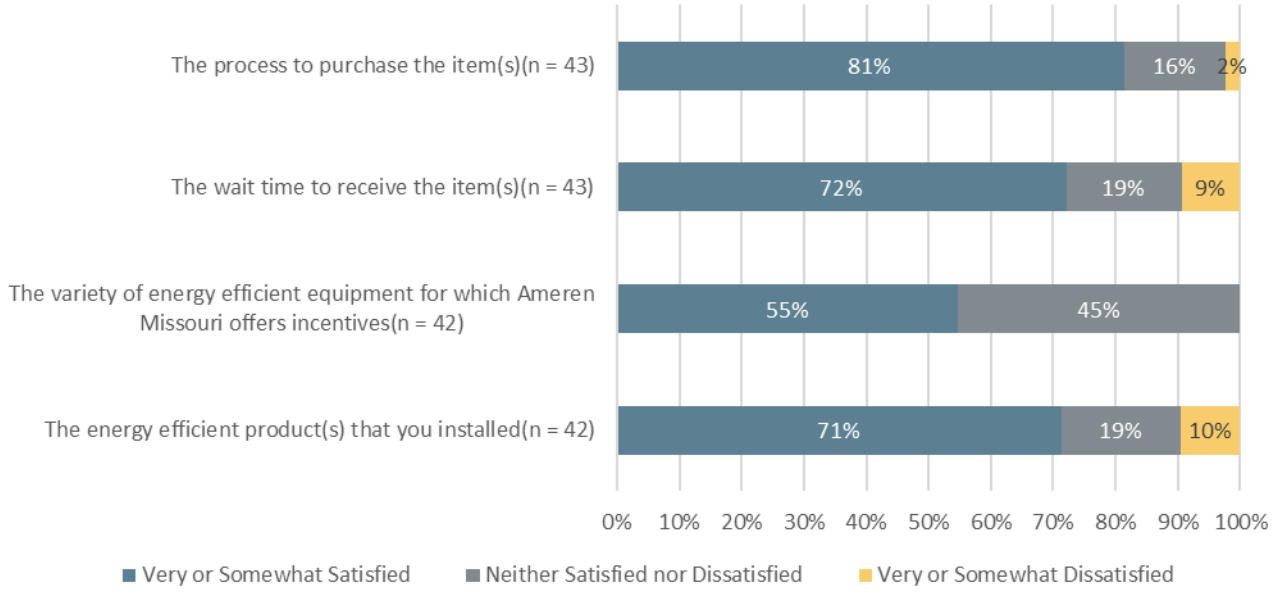
3.4.2 Additional Process Evaluation Findings

The majority of respondents are satisfied with key aspects of their experience with Ameren Missouri's energy-efficient products and services (see Figure 3-1). Specifically:

- **Satisfaction with products:** 71% of respondents were very or somewhat satisfied with the energy-efficient products they installed, while 19% were neutral and 10% were dissatisfied.
- **Variety of offerings:** 55% of respondents were satisfied with the variety of energy-efficient equipment for which Ameren Missouri offers incentives, with no reported dissatisfaction, though 45% were neutral.
- **Delivery wait time:** 72% expressed satisfaction with the wait time to receive their items, 19% were neutral, and 9% were dissatisfied.
- **Purchase process:** The highest satisfaction was with the purchasing process, where 81% were very or somewhat satisfied, 16% were neutral, and only 2% were dissatisfied.

Dissatisfied respondents noted issues with shipping, lack of information on thermostat installation or system compatibility, and a thermostat that broke.

Figure 3-1 Participant Satisfaction with Efficient Products



3.5 Key Findings and Recommendations

The following are the main findings and recommendations from the evaluation of the program.

- **Smart thermostats accounted for the largest share of total program energy savings and, as a result, had the greatest influence on the overall realization rate.** Whereas ex ante savings for this measure were based on Appendix F measure 250450_2021_12_, assuming 100% of homes with installed thermostats have central air conditioning, ex post assumptions adjust this to 91%, per Ameren Missouri TRM V7.0 Vol. 3, p. 59.
- **The communication channels and delivery mechanisms for the Efficient Products Program are well-designed to effectively reach and engage the target market segment for smart**

thermostats and advanced power strips. A combination of digital, traditional, and event-based marketing strategies ensures broad customer awareness, while the online marketplace provides convenient options for purchasing and fulfillment. Key strengths include a user-friendly website with clear discount information, reasonable delivery times, and effective promotional campaigns, particularly for thermostats. Survey responses support these conclusions, with 42% of respondents indicating that the website influenced their purchase decision and over 80% rating the website as easy to navigate and the discount information as clear. Enhancements, such as providing contractor resources for heat pump water heaters, could further improve customer support and adoption.

- **Thermostats comprised the vast majority of measures purchased with advanced power strips and heat pump water heaters purchased in much lower volumes.**

Recommendation 1: Enhance support for heat pump water heater adoption by addressing installation barriers should the measure be offered in future years. While the program's communication channels and delivery mechanisms are effective overall, providing additional resources for heat pump water heaters could increase customer acceptance of this measure. Specifically, the program could partner with local contractors to create a vetted list of installers and offer a contractor-matching tool on the utility's website. This approach would address the challenge of self-installation for many customers and could lead to higher adoption rates for heat pump water heaters. Additionally, promoting these resources through targeted marketing efforts, similar to those used for thermostats, could further boost customer awareness and engagement.

4 Multifamily Market Rate

The Multifamily Market Rate (MFMR) Program is designed to provide long-term energy savings and bill reductions to customers residing in multifamily properties of four or more units. This program is directed at multifamily property managers and owners, offering a one-stop-shop approach to aid in overcoming challenges associated with comprehensive retrofits. The eligible measures encompass lighting, refrigerators, advanced thermostats, advanced power strips, domestic hot water, building shell, and HVAC equipment.

The program's one-stop-shop approach includes a variety of concierge-style services to assist participants in identifying and executing energy efficiency projects. The primary implementer oversees customer recruitment, application process assistance, project scope recommendations, incentive estimations, and coordination of installations. Customers have the option to contract the installation work to a program-approved Trade Ally, or they may choose to install measures themselves. Post-installation Quality Assurance/Quality Control (QA/QC) activities are conducted by the primary implementer's staff, who also submit final project data for invoicing, and deliver rebates to customers upon project conclusion.

4.1 Program Activity Summary

Table 4-1 summarizes the Multifamily Market Rate Program activity during PY2024.

Table 4-1 Summary of Program Activity – Multifamily Market Rate

Measure	Number of Accounts	Percent of Accounts*	Ex Ante Savings (MWh)	Percent of Ex Ante Savings
Air Source Heat Pump	1	0%	46	2%
Central Air Conditioner Tune-up	407	20%	103	4%
Smart Thermostat	929	46%	619	22%
Setback Thermostat	24	1%	6	0%
Dirty Filter Alarm	125	6%	10	0%
ECM Motor Fan	277	14%	165	6%
Showerhead	74	4%	30	1%
Faucet Aerator	148	7%	13	0%
Standard LED	132	7%	48	2%
LED Bulbs and Fixtures	55	3%	739	26%
Central Air Conditioner	287	14%	699	24%
Ductless Heat Pump	4	0%	26	1%
Variable Frequency Drives for Pumps and Fans on Hydronic HVAC Systems	2	0%	293	10%
Single-Package and Split System Unitary Air Conditioner	2	0%	42	1%
LED Specialty Lamp	31	2%	16	1%
Total	2,025		2,857	100%

* The summed percentage of accounts exceeds 100% because some accounts received multiple measure types.

4.2 Data Collection Activities

The ADM Team conducted site visits at two properties and inspected five units. No issues were identified with the measure installations.

4.3 Estimation of Ex Post Savings

The analysis of the ex post gross savings involved two steps. First, the ADM Team reviewed the program tracking data to identify missing data or duplicate entries in the program tracking data. Second, the ADM Team applied the Ameren Missouri TRM to calculate the kWh savings and applied the kWh to kW end-use factors to calculate the kW savings. The specific calculations and assumptions used for each measure are presented in report Volume II.

The ADM Team multiplied the gross savings by the net-to-gross ratio (65%) employed in the calculation of throughput disincentives to calculate the program net savings.

Table 4-2 summarizes the ex ante and ex post program savings.

Table 4-2 Program Summary of Ex Post Gross and Net Savings – Multifamily Market Rate

Metric	Ex Ante Gross Savings	Ex Post Gross Savings	Gross Realization Rate	Ex Post Net Savings	Net-to-Gross Ratio	Net Goal	% of Goal
Energy Savings (MWh)	2,857	2,720	95%	1,768	65%	2,717	65%
Demand Savings (MW)	1.45	1.39	96%	0.90	65%	1.48	61%

Table 4-3 and Table 4-4 summarize the ex post gross kWh and kW savings of the Multifamily Market Rate program by measure and program component.

Table 4-3 Summary of Ex Post Gross Energy Savings – Multifamily Market Rate

Measure	Quantity of Measures Incented	Ex Ante Gross MWh Savings	Ex Post Gross MWh Savings	Gross Realization Rate
Air Source Heat Pump	6	46	44	94%
Central Air Conditioner Tune-up	431	103	103	100%
Smart Thermostat	1,031	619	598	97%
Setback Thermostat	24	6	6	103%
Dirty Filter Alarm	129	10	13	130%
ECM Motor Fan	284	165	170	103%
Showerhead	74	30	30	100%
Faucet Aerator	148	13	16	119%
Standard LED	887	48	12	25%
LED Bulbs and Fixtures	900	739	730	99%

Measure	Quantity of Measures Incented	Ex Ante Gross MWh Savings	Ex Post Gross MWh Savings	Gross Realization Rate
Central Air Conditioner	292	699	667	95%
Ductless Heat Pump	4	26	25	96%
Variable Frequency Drives for Pumps and Fans on Hydronic HVAC Systems	6	293	293	100%
Single-Package and Split System Unitary Air Conditioner	3	42	9	21%
LED Specialty Lamp	230	16	5	32%
Total	4,449	2,857	2,720	95%

Table 4-4 Summary of Ex Post Gross Peak Demand Impacts – Multifamily Market Rate

Measure	Ex Ante Gross MW Savings	Ex Post Gross MW Savings	Gross Realization Rate
Air Source Heat Pump	0.01	0.01	104%
Central Air Conditioner Tune-up	0.10	0.10	100%
Smart Thermostat	0.16	0.18	108%
Setback Thermostat	0.00	0.00	80%
Dirty Filter Alarm	0.00	0.01	130%
ECM Motor Fan	0.08	0.08	103%
Showerhead	0.00	0.00	100%
Faucet Aerator	0.00	0.00	119%
Standard LED	0.01	0.00	21%
LED Bulbs and Fixtures	0.14	0.11	77%
Central Air Conditioner	0.66	0.63	95%
Ductless Heat Pump	0.01	0.01	104%
Variable Frequency Drives for Pumps and Fans on Hydronic HVAC Systems	0.26	0.26	100%
Single-Package and Split System Unitary Air Conditioner	0.01	0.01	65%
LED Specialty Lamp	0.00	0.00	27%
Total	1.45	1.39	96%

The following discusses factors affecting realization rates that differed substantially from 100%.

- **LED Specialty Lamp (32%).** In the calculation of ex ante savings, baseline wattages differed from those specified in the Ameren Missouri TRM—sometimes more efficient and sometimes less efficient—and lower hours of operation were generally used instead of the TRM-specified values.

- **Single-Package and Split System Unitary Air Conditioner (21%).** Ex ante savings included incremental early replacement savings, while ex post savings were based on a time of sale baseline.
- **Smart Thermostat (97%).** Ex post analysis references applicable HVAC equipment characteristics to calculate TRM-consistent savings.
- **Air Source Heat Pump (94%).** Ex post savings reflect applicable R-values, HVAC equipment characteristics, and home attributes in the estimation of TRM-consistent savings.
- **Standard LED (25%).** In the calculation of ex ante savings, a baseline with lower efficiency was sometimes used instead of the TRM-specified baseline.
- **Dirty Filter Alarm (130%).** While ex ante savings are based on an Appendix F measure associated with a 47% in-service rate, there is no citation for the in-service rate. Instead, ex post analysis in-service rate of 58% is based on Ameren Missouri Community Savers Evaluation PY2018, https://www.efis.psc.mo.gov/Document/Display/36053, page 27.
- **Faucet Aerator (119%).** Household size and L_base variables for the Appendix F measures were not substantiated through an included citation. Ex post savings were based on the Ameren Missouri TRM.

4.4 Process Evaluation Findings

4.4.1 Required Process Evaluation Questions

This section presents findings related to addressing the five process evaluation questions required by Missouri Code of State Regulations section 20 CSR 4240-22.070(8). The findings presented below are based on interviews with program staff and review of program documentation.

4.4.1.1 What are the primary market imperfections that are common to the target market segment?

The target market segment for the Market Rate Multifamily program faces several primary market imperfections. These imperfections highlight the need for targeted interventions to improve access to incentives, reduce the financial burden on property owners, and bridge information gaps to enhance program participation and effectiveness. These include:

- **Equipment Costs:** The cost of more extensive equipment replacements such as HVAC systems can be a significant barrier since property owners may not have access to funds to improve the building's energy efficiency.
- **Split Incentives:** One form of split incentives in multifamily occurs when the tenant pays the cost of the electricity use, but the owner is responsible for choices that affect how efficiently the equipment and building utilizes electricity. This issue is most likely to occur for equipment and building characteristics that affect tenant energy use.
- **Lack of Staff to Plan and Make Improvements:** Multifamily property operators may not have staff available to implement efficiency measures.
- **Lack of Knowledge:** Property management may not have enough information to decide upon and prioritize efficiency improvements to reduce building operations and tenant electricity costs.

4.4.1.2 Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?

The target market segment for the Market Rate Multifamily program is appropriately defined. The program targets multifamily properties with four or more units that receive Ameren Missouri electric

service. These properties must offer leases of at least six months, which qualifies them as long-term residential rentals. The segment also includes independent senior living apartments, provided they do not offer on-site medical services such as rehabilitation, memory care, assisted living, or pharmacy services. Additionally, facilities with individual residential meters serving housing units are included, even if common areas are on commercial meters.

The current definition of the target market segment is comprehensive and well-targeted. It focuses on properties that can significantly benefit from energy-efficient upgrades and incentives. The inclusion criteria ensure that the program reaches a diverse range of multifamily properties, from standard residential units to senior living apartments. This approach maximizes the potential impact of the program by addressing the needs of various property types within the multifamily sector.

Considerations for further subdivision of the market segment are:

- **Segmenting by property size.** Energy efficiency opportunities may vary for larger multifamily properties from smaller ones. For example, larger properties may have more opportunities for common area equipment and are more likely to have centralized heating and cooling systems and building management systems. Additionally, St. Louis has an energy benchmarking ordinance for larger properties greater than 50,000 square feet, which may affect interest in the program.
- **Segment by unit ownership.** The Multifamily Market Rate Program targets renter-occupied buildings, but individually owned units have a different mix of incentives when considering energy efficiency improvements. Working with this type of property may be more complex due to the involvement of multiple decision-makers and the diversity of equipment in the units. However, owners may show greater interest in improving their living spaces.

4.4.1.3 Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?

The mix of end-use measures included in the Market Rate Multifamily Program appropriately reflects the diversity of end-use energy service needs and existing end-use technologies within the target market segment. The program offers a comprehensive range of incentives for various energy-efficient equipment and upgrades, ensuring that the diverse needs of the target market are met.

Incentives are provided for common and residential areas of properties. The incentives cover a wide range of end-uses, and custom incentives are available to handle opportunities not covered by prescriptive incentives.

The program includes incentives for HVAC systems, including learning thermostats, HVAC tune-ups, air source heat pumps, and central air conditioners with various SEER ratings. These measures cater to different types of heating and cooling needs within multifamily properties, ensuring that property owners can choose the most suitable options for their specific requirements. Additionally, the program offers incentives for water heating solutions, including heat pump water heaters. This addresses the need for efficient water heating technologies, which is an important aspect of energy consumption in multifamily properties. The program also offers incentives for building shell improvements, such as ceiling insulation. Custom incentives cover all major end-uses including “miscellaneous” end-uses.

4.4.1.4 Are the communication channels and delivery mechanisms appropriate for the target market segment?

The communication channels and delivery mechanisms for the Market Rate Multifamily program are appropriate for the target market segment. The program employs a variety of communication channels to ensure that property owners and managers are well-informed about the available incentives and energy-efficient upgrades. These channels include the program's website, digital marketing information, and direct mail. The website serves as a central hub for all program-related information, making it convenient for property owners to find the resources they need.

The program also benefits from word-of-mouth referrals and attending events where property owners are likely to be present. This approach helps in meeting property owners where they already are and providing tailored packages that have a low out-of-pocket cost.

4.4.1.5 What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation for select end-uses/measure groups included in the Program?

To more effectively overcome the identified market imperfections and increase the rate of customer acceptance and implementation for select end-uses/measure groups included in the Multifamily Market Rate program, several strategies can be employed:

- **Comprehensive Information Campaigns:** Addressing information gaps through targeted marketing and outreach efforts can help property owners understand the benefits of the program and the specific measures available. Developing approaches tailored to different segments of the multifamily market could assist with conveying the value of the program to property owners and managers.
- **Collaboration with Trade Allies:** Engaging and recruiting a network of trade allies who can promote the program and assist with installations can enhance the program's reach and effectiveness. Trade allies can serve as trusted advisors to property owners, providing expert guidance on the most suitable energy-efficient measures.

4.5 Key Findings and Recommendations

The following are the main findings and recommendations from the evaluation of the program.

- **The program's overall energy savings realization rate was 95%.** The realization rates for these measures varied due to differences in baseline assumptions, in-service rates, and calculation methodologies between ex ante and ex post analyses. Measures such as LED specialty lamps and standard LEDs had lower realization rates because the ex ante analysis used different baseline wattages—sometimes more efficient and sometimes less efficient—along with lower operational hours than those specified in the Ameren Missouri TRM. Similarly, the single-package and split system unitary air conditioners had a lower realization rate because ex ante savings included incremental early replacement savings, whereas ex post savings applied a time-of-sale baseline, consistent with the approach specified in the Ameren Missouri TRM. For the dirty filter alarm and faucet aerators, realization rates were influenced by differences in assumed in-service rates and baseline household size variables.

- **The Market Rate Multifamily program's target market segment is well-defined and effectively structured.** It inclusively targets multifamily properties that can derive substantial benefits from energy efficiency upgrades while excluding properties that fall outside the scope of residential energy efficiency (e.g., facilities with on-site medical services). The criteria ensure a diverse reach within the multifamily sector, maximizing program impact.

  Recommendation 1: Should the program be offered in the future, opportunities for refinement include segmenting properties based on size or ownership structure. This would allow for tailored strategies to address distinct energy efficiency opportunities and barriers within these subcategories.

- **The program offers a comprehensive and flexible mix of end-use measures that appropriately address the varied energy service needs and technologies within the target market.** Prescriptive incentives for common areas and residential units, alongside custom incentives, ensure adaptability to a wide range of energy efficiency improvements, from HVAC upgrades to building shell enhancements. This diversity reflects the multifaceted needs of the market and promotes broader adoption of energy-efficient solutions.

5 HVAC (Midstream and Downstream)

The Ameren Missouri Residential HVAC Program is designed to realize energy and demand savings through incentivizing the installation of energy efficient central air conditioning, heat pump, and advanced thermostat measures. The targeted market encompasses both single-family and multifamily residential homeowners within the Ameren Missouri service territory.

The HVAC Program operates through two channels: Downstream and Midstream, each significantly relying on a network of trade allies for promoting the installation of high-efficiency HVAC equipment and managing the rebate application process on behalf of customers.

In the Downstream channel, customers have the option to either receive the rebate directly or get it applied as an instant incentive on their invoice. In the latter scenario, the contractor advances the cost of the incentive, receiving the rebate from the program upon processing.

The Midstream channel primarily targets equipment with a rated Seasonal Energy Efficiency Ratio (SEER2) of 18 or higher, aiming to strategically incentivize these super-efficient units. The channel's goal is to alter distributor stocking and sales patterns, concentrating on the supply side (i.e., distributors) in addition to the demand side (i.e., contractors or customers). This is envisaged to increase the availability of super-efficient units, thereby accelerating market transformation.

Contractors play a pivotal role in the execution and success of both program channels. They have a significant influence on customer decision-making, capable of recommending, and elucidating the benefits of energy efficient or super-efficient HVAC equipment to customers. Besides, contractors are responsible for obtaining and installing the HVAC equipment, positioning them ideally for assisting in marketing and promoting the program.

5.1 Program Activity Summary

Table 5-1 summarizes the HVAC (Midstream and Downstream) Program activity during PY2024.

Table 5-1 Summary of Program Activity – HVAC (Midstream and Downstream)

Measure	Number of Accounts	Percent of Accounts*	Ex Ante Savings (MWh)
Downstream			
Central Air Conditioner	10,056	79%	14,683
Air Source Heat Pump	1,659	13%	10,183
Ductless Heat Pump	1	0%	0
Ground Source Heat Pump	119	1%	1,103
Smart Thermostat	5,858	46%	2,500
Total	**12,745**		**28,470**
Midstream			
Central Air Conditioner	670	37%	1,407
Air Source Heat Pump	670	37%	4,245
Ductless Heat Pump	456	25%	1,388
Ground Source Heat Pump	1	0%	0
Smart Thermostat	1,177	66%	689
Total	**1,790**		**7,730**

* The summed percentage of accounts exceeds 100% because some accounts purchased multiple measure types.

5.2 Data Collection Activities

The ADM Team administered the survey to a census of unique contacts with contact information available at the time the surveys were fielded.

Table 5-2 Summary of Data Collection – HVAC (Midstream and Downstream)

Data Collection Activity	Mode	Time Frame	Number of Contacts	Completed Surveys / Interviews	Response Rate
Distributor interviews	Telephone	October 2024	13	5	38.5%
Trade ally survey	Email	September 2024	392	25	6.4%
Midstream end-user survey	Email	September/ October 2024	421	25	5.9%
Downstream participant survey	Email	September/ October 2024	3,513	134	3.8%

5.3 Estimation of Ex Post Savings

The analysis of the ex post gross savings involved two steps. First, the ADM Team reviewed the program tracking data to identify missing data or duplicate entries in the program tracking data. Second, the ADM Team applied the Ameren Missouri TRM to calculate the kWh savings and applied the kWh to kW end-use factors to calculate the kW savings. The specific calculations and assumptions used for each measure are presented in report Volume II.

For measures involving early replacement and replace-on-burnout (time-of-sale) installations, baseline classification was based on participant-reported information about the condition and operability of existing HVAC units. Units reported as still functioning—regardless of cooling performance—were classified as early replacements. Units reported as non-operational, or with missing or unclear operability information, were classified as replace-on-burnout. For new construction projects, a time-of-sale baseline was also uniformly applied.

The ADM Team multiplied the gross savings by the net-to-gross ratio (65%) employed in the calculation of throughput disincentives to calculate the program net savings.

Table 5-3 summarizes the ex ante and ex post program savings.

Table 5-3 Program Summary of Ex Post Gross and Net Savings – HVAC (Midstream and Downstream)

Metric	Ex Ante Gross Savings	Ex Post Gross Savings	Gross Real-ization Rate	Ex Post Net Savings	Net-to-Gross Ratio	Net Goal	% of Goal
Energy Savings (MWh)	36,200	38,894	107%	25,281	65%	23,031	110%

Demand Savings (MW)	20.93	24.26	116%	15.77	65%	13.53	117%

Table 5-4 and Table 5-5 summarize the ex post gross kWh and kW savings of the HVAC (Midstream and Downstream) program by measure and program component.

Table 5-4 Summary of Ex Post Gross Energy Savings – HVAC (Midstream and Downstream)

Measure	Quantity of Measures Reported	Ex Ante Gross MWh Savings	Ex Post Gross MWh Savings	Gross Realization Rate (MWh)
Downstream				
Central Air Conditioner	10,668	14,683	16,628	113%
Air Source Heat Pump	1,770	10,183	11,677	115%
Ground Source Heat Pump	168	1,103	891	81%
Smart Thermostat	6,364	2,500	1,836	73%
Total	**18,970**	**28,470**	**31,033**	**109%**
Midstream				
Central Air Conditioner	731	1,407	1,765	125%
Air Source Heat Pump	720	4,245	4,947	117%
Ductless Heat Pump	583	1,388	761	55%
Smart Thermostat	1,284	689	387	56%
Total	**3,318**	**7,730**	**7,861**	**102%**
Midstream and Downstream				
Central Air Conditioner	11,399	16,091	18,393	114%
Air Source Heat Pump	2,490	14,429	16,625	115%
Ductless Heat Pump	583	1,388	761	55%
Ground Source Heat Pump	168	1,103	891	81%
Smart Thermostat	7,648	3,189	2,224	70%
Total	**22,288**	**36,200**	**38,894**	**107%**

Table 5-5 Summary of Ex Post Gross Peak Demand Impacts – HVAC (Midstream and Downstream)

Measure	Ex Ante Gross MW Savings	Ex Post Gross MW Savings	Gross Realization Rate (MW)
Downstream			
Central Air Conditioner	13.91	15.75	113%
Air Source Heat Pump	2.28	3.42	150%
Ground Source Heat Pump	0.45	0.33	74%
Smart Thermostat	1.15	0.88	76%
Total	**17.79**	**20.39**	**115%**
Midstream			
Central Air Conditioner	1.33	1.67	125%
Air Source Heat Pump	1.19	1.86	156%
Ductless Heat Pump	0.39	0.18	47%
Smart Thermostat	0.23	0.16	68%
Total	3.14	3.87	123%
Midstream and Downstream			
Central Air Conditioner	15.24	17.43	114%
Air Source Heat Pump	3.47	5.28	152%
Ductless Heat Pump	0.39	0.18	47%
Ground Source Heat Pump	0.45	0.33	74%
Smart Thermostat	1.38	1.03	75%
Total	**20.93**	**24.26**	**116%**

The following discusses factors affecting realization rates that differed substantially from 100%.

- **Central Air Conditioner (114%).** Ex ante savings calculations were based on a weighted average of Appendix F measures for an applicable efficiency bin (CAC-SEER15 to CAC-SEER21+), with 60% weight for a measure with an early replacement baseline and 40% weight for a measure with a replace-on-burnout baseline. Notably, 84% of units were assessed as early replacements, significantly higher than the expected 60%, contributing to the discrepancy between ex ante and ex post savings. Additionally, the ex ante savings calculations referenced SEER1 standards (14.0) as opposed to SEER2 (13.4). Typically, the SEER2 efficiency of the new units met or surpassed the SEER1 efficiency thresholds for their assigned bins (e.g., units in the CAC-SEER15 bin had an average SEER2 efficiency exceeding 15.0). Consequently, the actual incremental efficiency improvement relative to the federal baseline was greater than indicated by the Appendix F measures.
- **Air Source Heat Pump (115%).** Ex ante savings calculations were based on a weighted average of Appendix F measures for an applicable efficiency bin (ASHP-SEER15 to ASHP-SEER21), with 60% weight for a measure with an early replacement baseline and 40% weight

for a measure with a replace-on-burnout baseline.[1] Notably, 76% of units were assessed as early replacements, significantly higher than the expected 60%, contributing to the discrepancy between ex ante and ex post savings. Additionally, the ex ante savings calculations referenced SEER1 standards (14.0 and 15.0, depending on existing unit type) as opposed to SEER2 (13.4 and 14.3, depending on existing unit type), and HSPF1 standards (8.6) rather than HSPF2 standards (7.5). Typically, the SEER2 efficiency of the new units met or surpassed the SEER1 efficiency thresholds for their assigned bins (e.g., units in the CAC-SEER15 bin had an average SEER2 efficiency exceeding 15.0). Therefore, the actual incremental cooling efficiency improvement relative to the federal baseline was greater than indicated by the Appendix F measures.

- **Smart Thermostat (70%).** 87% of smart thermostats were installed alongside new, high-efficiency HVAC units, exceeding the efficiency assumptions in Appendix F used for calculating ex ante savings. Specifically, 4,991 central air conditioners had an average SEER of 17.2, and 1,638 air source heat pumps had an average SEER of 18.1 and an HSPF of 8.4. The Appendix F estimates were based on a SEER of 13 and heating consumption ranging from 0 kWh to 14,201 kWh, depending on the type of HVAC system. Additionally, 5% of the smart thermostat installations were replacements of existing smart thermostats, which did not contribute to additional energy savings.
- **Ductless Heat Pump (55%).** Average ex post gross energy savings for this measure are 969 kWh. 83% of units had ex ante savings of 2,227 kWh, based on the weighted average of an early replacement Appendix F measure (841 kWh, 60% weight) and a replace-on-burnout Appendix F measure (3,169 kWh, 40% weight). Because the majority of measures (91%) were subject to a replace-on-burnout baseline—thus misaligned with the assumptions associated with ex ante savings—there was a low realization rate for this measure.
- **Ground Source Heat Pump (81%).** The discrepancy between ex ante and ex post savings is related to actual unit capacity varying from the unit capacity associated with the ex ante savings estimates. While the Appendix F measures on which ex ante savings are based were premised on a unit heating and cooling capacity of 46,438 btu/h, the actual average unit cooling capacity is 38,688 btu/h and the actual average unit heating capacity is 30,330 btu/h.

Table 5-6 provides additional detail on MWh savings due to early replacement for the downstream and midstream components combined.

[1] Per the Ameren Missouri TRM, replace-on-burnout baselines vary by existing equipment type. For ASHPs: (1) 15 SEER (14.3 SEER2) and 8.6 HSPF (7.5 HSPF2) when replacing an existing ASHP; (2) 14 SEER (13.4 SEER2) and 3.41 HSPF when replacing a central AC with electric resistance heating; and (3) 14 SEER (13.4 SEER2) when replacing a central AC with non-electric or no heating. The same values apply to DHPs. No heating savings are claimed in cases of fuel-switching from non-electric heat, regardless of whether the measure is classified as early replacement or replace-on-burnout.

Table 5-6 Summary of Early Replacement (Midstream and Downstream)

Measure	Ex Post Gross MWh Savings	Ex Post Gross MWh Savings: Incremental Early Replacement	Incremental Early Replacement Savings As Percent of Ex Post Gross kWh Savings	Quantity of Measures Incented with Incremental Early Replacement Savings	Percent of Measures with Incremental Early Replacement Savings
Central Air Conditioner	18,393	14,123	77%	9,551	84%
Air Source Heat Pump	16,625	6,456	39%	1,896	76%
Ductless Heat Pump	761	63	8%	53	9%
Ground Source Heat Pump	891	275	31%	52	31%
Smart Thermostat	2,224	0	0%	n/a	n/a
Total	38,894	20,918	54%	n/a	n/a

5.4 Process Evaluation Findings

5.4.1 Required Process Evaluation Questions

This section presents findings related to addressing the five process evaluation questions required by Missouri Code of State Regulations section 20 CSR 4240-22.070(8).

5.4.1.1 What are the primary market imperfections that are common to the target market segment?

The primary market imperfections common to the target market segment include several factors.

High Initial Costs: The higher upfront cost of energy-efficient HVAC equipment can discourage adoption, even though long-term savings are favorable. Homeowners may be unable or unwilling to pay the incremental cost of a more efficient unit. All surveyed contractors reported that this was a barrier (see Table 5-7) and the interviewed distributors also noted that this was a key barrier to the adoption of high efficiency equipment.

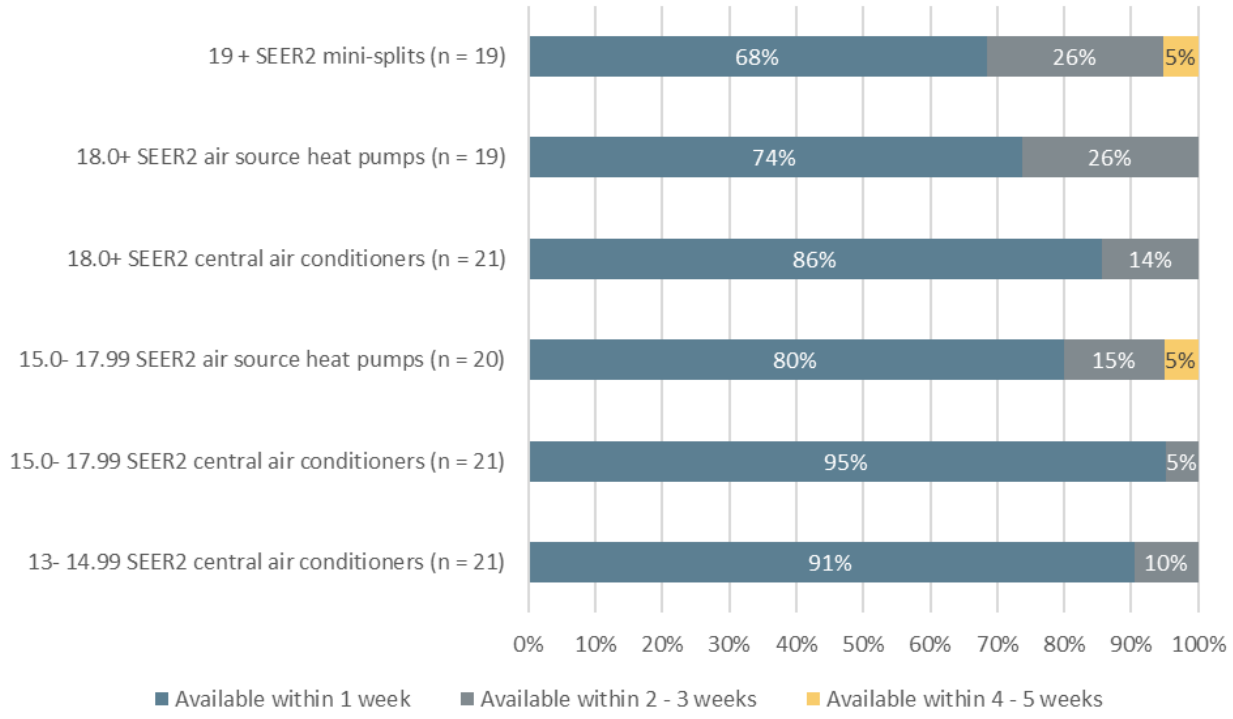
Information Asymmetry: Homeowners often lack sufficient knowledge about the energy efficiency and long-term cost savings of high-efficiency HVAC systems compared to standard equipment. For instance, many homeowners focus on upfront costs, with limited awareness of the longer-term costs associated with owning and operating such systems, an issue that was noted by the distributors the ADM Team interviewed. Interviewed distributors also noted that contractors have cited concerns about equipment breakdowns and the availability of replacement parts and that distributors can play a role in educating them to alleviate these concerns.

Surveyed contractors highlighted several informational barriers hindering the adoption of high-efficiency equipment:

- 35% reported customer skepticism about energy savings.
- 17% cited system complexity.
- 9% noted concerns about reliability.
- 9% highlighted a general lack of information.

Limited Availability or Accessibility: Efficient HVAC systems might not be readily available through local suppliers or installers. High efficiency units may not be stocked because of limited demand for the units and homeowners may prioritize a quick replacement over waiting for fulfillment of an order. Contractor survey responses indicated that low and moderate efficiency air conditioners were generally available within one week. Heat pumps were somewhat less likely to be available within a week, and the highest efficiency air conditioners and heat pumps were even less frequently available within that time frame. For mini-splits, about two-thirds reported that these units were typically available within a week. However, only four percent of contractors said that longer delivery times were a barrier to high efficiency equipment.

Figure 5-1 Equipment Availability as Reported by Contractors



Contractor Influence and Practices: Contractors often heavily influence customer decisions, and they may not promote high-efficiency options due to unfamiliarity, bias, or perceived customer preferences. Contractor behavior was an issue identified by the interviewed program distributors as hindering adoption of high efficiency equipment. The respondents expressed that many contractors often prioritize entry-level, less efficient options because they believe homeowners are unlikely to choose more expensive systems. Overcoming this mindset requires education on the advantages of higher-efficiency systems, both in terms of rebates and long-term savings for the homeowner, as well as the potential for increased profit margins for the contractor.

Fifty-three percent of Downstream survey respondents and 35% of Midstream respondents reported being unaware of the differences between high-efficiency HVAC systems and standard systems before speaking with their contractor. Furthermore, 59% of Downstream respondents and 60% of Midstream respondents looked to their contractors for information about the equipment they installed. This underscores the important educational role contractors play in conveying the benefits of high-efficiency equipment to customers.

Table 5-7 Prevalence of Barriers Reported by Contractors

Barrier to Installing High Efficiency Units	Percent of Respondents (n = 23)
Higher initial cost	100%
Plan to move soon	74%
Doubts about savings	35%
System complexity	17%
Reliability concerns	9%
Lack of information	9%
Longer delivery times	4%
Comfort concerns	0%

5.4.1.2 Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?

The target market segment for the HVAC program appears to be appropriately defined. The program is available to residential customers who live in single and multifamily buildings.

The program currently operates through two channels: the Downstream channel, which is contractor-driven and has been in place for over eight years, and the Midstream channel, which involves distributors and targets higher SEER units.

The Downstream channel relies heavily on contractors to engage with customers and manage the rebate application process. This approach has been successful, but there are some challenges, such as the need for contractor training and the potential for inconsistencies in rebate processing.

The Midstream channel involves distributors who validate rebate applications and ensure the legitimacy of the process. This channel targets a smaller demographic due to affordability constraints for higher SEER units. Seasonal fluctuations and external factors like COVID also impact the volume of HVAC equipment sales.

5.4.1.3 Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?

The mix of end-use measures included in the program does reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment. Incentives are provided for the following types of equipment:

- Central air conditioners

- Air source heat pumps, including central and mini-split systems
- Geothermal heat pumps
- Smart thermostats

As is frequently the case for HVAC system programs, incentives are not offered for services such as HVAC tune-ups and duct testing and repair. Incentives are offered for these end-use measures through the Multifamily, PAYS, and Single Family Income Eligible.

5.4.1.4 Are the communication channels and delivery mechanisms appropriate for the target market segment?

The communication channels and delivery mechanisms for the HVAC program appear to be well-suited for the target market segment. The program utilizes a combination of contractor-driven and distributor-driven approaches to engage with customers and facilitate rebate applications.

In the Downstream channel, contractors play an important role in engaging with customers, offering rebates for higher SEER units, and managing the rebate application process. Using contractors to deliver Heating and Cooling measures is logical because they have direct access to customers during equipment installation, possess the expertise to explain the benefits of high-efficiency equipment, serve as the primary point of purchase for HVAC systems, and can simplify the paperwork process for customers. Contractors are provided with tools such as the Ameren Missouri rebate chart, case studies, and printed collateral to educate staff and customers about the program's benefits.

Survey responses indicate that contractors are the primary source of program awareness for Downstream participants, with 65% of respondents indicating they learned about the program through their contractor.

It is also noteworthy that only a minority of customers—12% of Downstream respondents and 9% of Midstream respondents—found their contractor through the Ameren Missouri website. This highlights the importance of maintaining a broad and engaged contractor network to effectively deliver the program and reach customers through multiple touchpoints.

One significant issue is the reliance on contractors to facilitate customer interactions and manage the rebate application process. This contractor-driven approach can lead to inconsistencies and inefficiencies in how rebates are offered and processed. Additionally, the affordability constraints for some customers, particularly in the Midstream channel targeting higher SEER units, create a smaller demographic that can access these incentives. Seasonal fluctuations and the impact of external factors like the COVID pandemic also contribute to market imperfections, affecting the volume of HVAC equipment sales.

In the Midstream channel, contractors initiate the process for installing high-SEER units with rebates processed through distributors. These units typically have higher upfront costs and lower market demand. They often incorporate advanced technologies such as variable-speed compressors and sophisticated control systems. By working directly with distributors, the program helps ensure that installing contractors receive the necessary training and technical support. Two of the five distributors interviewed by the ADM Team indicated that the program supported their efforts to hold workshops for dealers, including installing contractors. One distributor also reported using program-developed marketing and educational materials.

Midstream incentives can also encourage stocking of the highest efficiency HVAC units. These units often have lower demand compared to other models due to their higher costs. By providing Midstream incentives to distributors, the program encourages them to stock and promote these premium units. Without this support, distributors may hesitate to carry expensive inventory, which can limit availability

and delay market adoption. Consistent with this, three of the five distributors the ADM Team interviewed reported that the incentives did encourage them to purchase the program-qualified units.

Midstream incentives streamline the rebate process by shifting much of the administrative burden from consumers to a smaller group of distributors. While the program still validates each rebate application individually, rebate payments are issued at the distributor level, reducing some administrative complexity.

A majority of contractors (76%) believed that the program has been effective at encouraging adoption of the lower efficiency tier units, while a smaller share (52%) thought that it was more effective at encouraging SEER 18+ units. It is important to note that incentives for lower-tier units are paid directly to contractors, while incentives for higher-tier units are paid to distributors. This distinction may influence contractors' perceptions of the program's effectiveness. Two-thirds of contractors reported that the program was effective at encouraging early replacements.

Table 5-8 Contractors Ratings of Program Effectiveness

Program is Effective at Encouraging Installation of…*	Percent of Contractors (n = 21)
SEER2 15 - 17.99 Equipment	76%
SEER2 18+ Equipment	52%
Early Replacement of Functioning Units with Efficient Units	67%

* Effective includes ratings of 4 or 5 on a scale ranging from 1 (Not at all effective) to 5 (Very effective).

Program marketing efforts directly target Ameren Missouri customers and help support contractors in their marketing efforts. ICF leads the marketing efforts for the program, which include email campaigns, social media, direct mail, video content, streaming radio ads, paid search advertising, commercials, and billboards. Ameren provides supplemental marketing support. Additionally, contractors participate in co-marketing, with the program matching a portion of their marketing costs.

The Ameren Missouri website, mailings, and email communications were all sources of awareness for Downstream program participants, collectively accounting for how 18% of respondents learned about the program. Additionally, 8% of Downstream program participants and 12% of Midstream participants reported that they referenced the Ameren Missouri website for information about the equipment they installed.

This two-pronged approach aims to raise customer awareness of the program through general outreach, guiding them toward selecting Ameren Missouri-qualified options and increasing interest in higher-efficiency units. Simultaneously, it equips participating contractors with the resources needed to encourage customers to enhance the efficiency of their HVAC systems.

5.4.1.5 What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation for select end-uses/measure groups included in the Program?

To more effectively overcome the identified market imperfections and increase the rate of customer acceptance and implementation for select end-uses/measure groups included in the program, several strategies can be employed:

- **Enhancing Contractor and Distributor Engagement:** The program can focus on recruiting and training more contractors, especially in rural areas where engagement may be lower but where customers are more likely to have electric heating (see the general population survey findings in Chapter 9). This includes providing ongoing training and support to ensure contractors serving rural communities are well-equipped to promote the program and assist customers with the rebate application process. Additionally, maintaining strong relationships with distributors and holding regular meetings to review trends and address any challenges can help ensure consistent participation and support.
- **Improving Marketing and Outreach:** Interviewed distributors noted increased customer outreach as a way to enhance the program. Utilizing targeted marketing efforts, such as email campaigns, social media initiatives, direct mail, and video content, can help raise awareness about the program and its benefits.
- **Encourage and Support Distributor Education Efforts.** Distributors noted that contractors may not be well informed on high efficiency systems and two of the five did not believe that the program supported them in holding contractor workshops, indicating that there may be an opportunity to expand on this.

5.4.2 Additional Process Evaluation Findings

Ameren Missouri incentives and other incentives were influential in participants' decisions to install the high efficiency HVAC equipment. Approximately half of Downstream respondents and two-thirds of Midstream respondents cited Ameren Missouri incentives as a reason for selecting high-efficiency units. Federal tax credits and state or federal rebates were also influential considerations. It is important to note that respondents reported motivations for their equipment choices rather than incentives received.

Participants generally cited multiple reasons for installing high-efficiency equipment. Energy cost savings and recommendations from HVAC professionals were the most frequently mentioned factors, with equipment performance also being a key consideration.

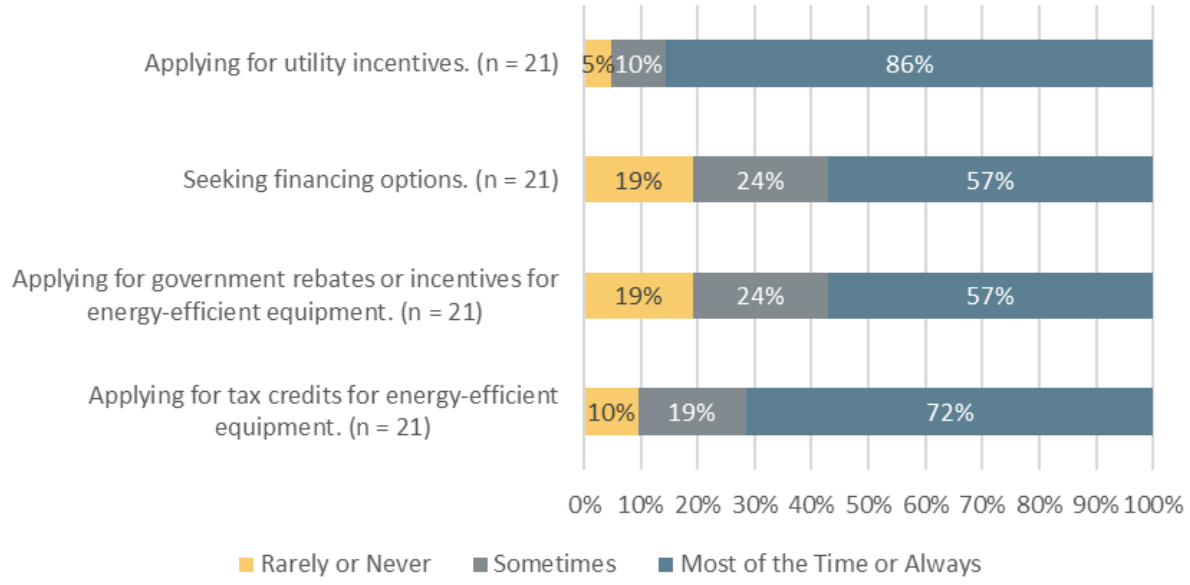
Table 5-9 Reasons for Selecting High Efficiency Equipment

Reasons for Selecting High Efficiency HVAC Equipment	Downstream (n = 133)	Midstream (n = 25)
Energy Cost Savings	65%	72%
Recommendation from HVAC Professional	61%	48%
Incentives, Rebates, or Tax Credits	53%	68%
Ameren Missouri incentives/discount	47%	64%
Federal tax credit	21%	56%
State or federal rebates	11%	40%
Equipment Performance	48%	64%
Home Value Improvement	24%	36%
Environmental Concerns	21%	36%
Other	5%	0%

* Respondents were allowed to select multiple options, resulting in total percentages exceeding 100%.

While most contractors frequently recommend utility incentives, tax credits, and government rebates, relatively few customers use formal financing options, with many opting to pay upfront or rely on credit cards instead. Sixty-eight percent of contractors reported offering financing to customers, and most indicated they always or often recommend applying for utility incentives (see Figure 5-2). About half of contractors frequently suggest financing options or government rebates, while nearly three-quarters regularly recommend tax credits.

Figure 5-2 Frequency of Recommending Financing Options

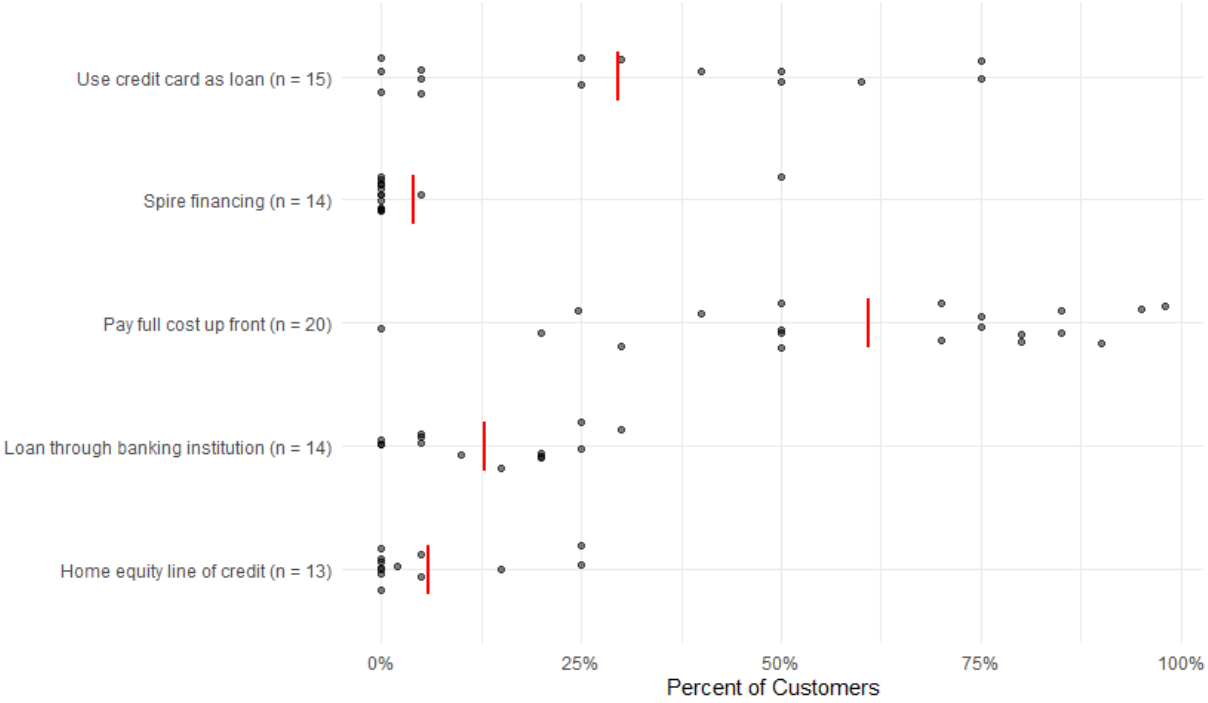


Contractors reported that relatively few customers use spire financing, home equity lines of credit, or loans through banking institutions. The average share of customers using these, indicated by the red

lines in Figure 5-3, was less than 25%. Credit cards were more commonly used and a sizable share of contractors reported that a majority of customers paid the full cost up front without financing.

Figure 5-3 Contractor Estimates of the Percentage of Customers Using Different Financing Options

(Red Line Represents the Average)

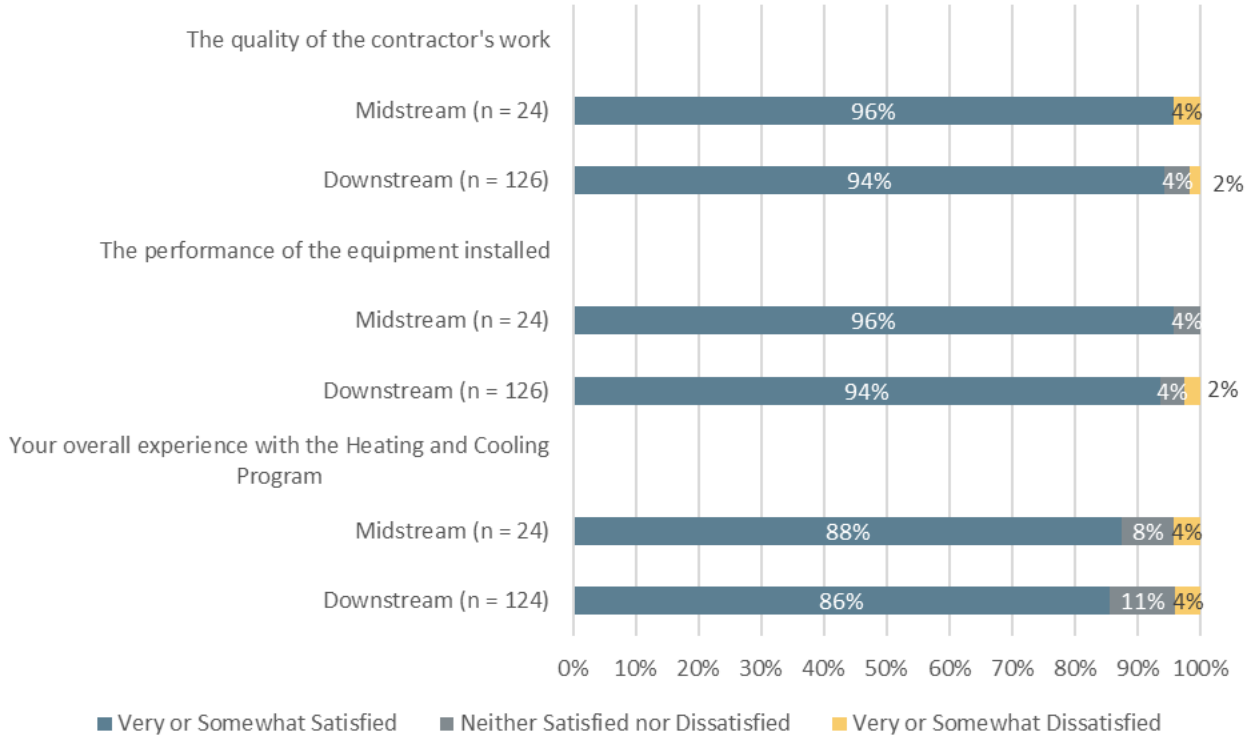


Most participants were satisfied with their contractor, the equipment installed, and the program overall. Participants in both the Downstream and Midstream channels reported high levels of satisfaction with the Heating and Cooling Program. For overall program experience, 86% of Downstream participants and 88% of Midstream participants were very or somewhat satisfied. Only a small proportion of respondents—four percent in both channels—expressed dissatisfaction, with the remainder reporting neutral opinions.

When it came to the performance of the equipment installed, satisfaction levels were also high. Nearly 94% of Downstream participants and 96% of Midstream participants were very or somewhat satisfied, reflecting the effectiveness of the high-efficiency HVAC systems promoted through the program. Dissatisfaction rates in this category were minimal, with two percent of Downstream respondents and none of the Midstream respondents reporting dissatisfaction.

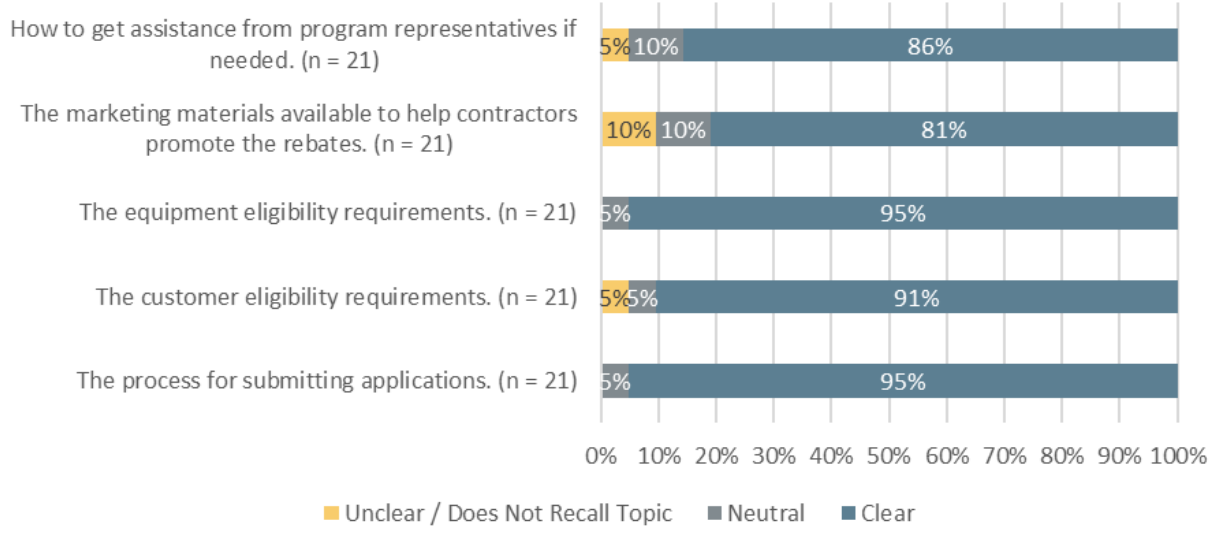
Similarly, the quality of contractors' work received strong endorsements. Among Downstream participants, 94% were very or somewhat satisfied, while Midstream participants expressed slightly higher satisfaction at nearly 96%. Dissatisfaction with contractors was rare, with only two percent of Downstream and four percent of Midstream participants reporting negative experiences.

Figure 5-4 Participant Satisfaction



Contractors found the program training to be clear. For each of the rated aspects of the training, 80% or more of the contractors rated the clarity as a 4 or a 5 on a scale ranging from 1 (Not at all clear) to 5 (Completely clear). Information on marketing materials was the aspect of the training that was least clear for contractors.

Figure 5-5 Clarity of Contractor Training



Overall, the majority of contractors expressed high levels of satisfaction with various aspects of the program, with most satisfaction ratings exceeding 80%. Specifically, 89% of contractors were satisfied with the program overall. Contractors reported high levels of satisfaction with program communications and support, with 95% indicating they were very or somewhat satisfied with their interactions with program account managers and the timeliness of responses to their inquiries. Similarly, 89% of contractors were very or somewhat satisfied with the timeliness of payment for program incentives and the program overall.

The marketing support provided by the program (86%) and the training or information on program procedures and requirements (84%) also received high satisfaction ratings. However, satisfaction with the application process was notably lower, with only 65% of contractors expressing satisfaction, while 25% were neutral and 10% were dissatisfied. Despite this, dissatisfaction across all other program aspects was minimal, with no more than five percent of contractors expressing dissatisfaction in any category. The feedback provided by the dissatisfied contractors was:

> *I think some of the process is hard to get through and the updates are just not there. We truly would like to know when our customers have been approved and when their checks are mailed out so we can keep them updated. We have them call often asking. Maybe devise a system where the updates are a little better.*
>
> *Too much repetition in the application process. Some information has to be inputted three times.*
>
> *Application reviewers flag applications for no reason.*

Overall, distributors found the training to be clear, effective, and beneficial for filing claims and supporting contractors. Training options included in-person sessions, webinars, and conference calls. Generally, participants found the training helpful for understanding the program and its requirements. For experienced staff, it reviewed minor updates, while newer contractors gained significant insights. Some distributors also found ICF to be responsive to questions they may have had. Some distributors reported that they received no formal training but had ICF support, while others used interactive videos and contractor sessions to gain understanding of the program.

Suggestions provided by respondents for improving training included providing initial training for new participants, offering more visual or online resources, and hosting in-person meetings to facilitate direct interactions. One participant emphasized the need for better homeowner education about available rebates to drive demand for higher-efficiency products.

Distributors suggested ways to improve the program through training, outreach, and education. The ideas suggested by distributors are summarized below:

- **Enhancing Customer Awareness**: Direct outreach and marketing efforts to educate end-use customers about the benefits of high-efficiency HVAC systems and the rebates available. This could involve informational campaigns through digital channels, in-person events, and promotional materials.
- **Expanding Training for Dealers:** Providing more comprehensive training sessions for contractors to help them become more comfortable with promoting and installing high-

efficiency systems. This could include offering case studies, success stories, and testimonials from previous projects to illustrate the benefits of these systems.

- **Clarifying Product Classifications:** Streamlining the process for understanding which products qualify for rebates, possibly through clearer guidelines or an online resource center for dealers.
- **Developing Tools for Sales:** Distributors suggested creating tools to assist in explaining the benefits of high-efficiency systems to consumers. For example, offering cost-benefit calculators, comparison tools for energy savings, and calculators for rebate calculations directly on websites could help both dealers and customers make more informed decisions.

5.5 Key Findings and Recommendations

The following are the main findings and recommendations from the evaluation of the program.

- **The program's energy savings realization rate was 107%.** Key factors influencing this rate included differences between assumed and actual early replacement rates, the use of baseline energy consumption based on SEER1 standards, and the assignment of efficient units to bins with lower SEER values than the actual units. Smart thermostat savings were based on Appendix F values, which generally reflected lower-efficiency units than those paired with smart thermostats in the program. This discrepancy arose because the smart thermostats were installed on new, high-efficiency equipment.
- **The communication channels and delivery mechanisms for the HVAC program appear to be well-suited for the target market segment.** Contractors are driving participant awareness and influencing customer decisions to install efficient HVAC systems. The program supported contractors by providing them with tools such as the Ameren Missouri rebate chart, case studies, and printed collateral to educate staff and customers about the program's benefits. Additionally, the Midstream component focuses on the highest efficiency units and three of the five distributors reported that the incentives encouraged them to purchase these units.
- **Findings from the general population survey indicate that customers in rural areas were less likely to be aware of the program and more likely to have electric resistance heating.** These factors indicate that focusing on these customers would be advantageous if the program is offered in the future.

  Recommendation 1: Focus on customer and contractor outreach in rural communities to increase awareness and help convert more prevalent electric resistance heating systems with efficient ducted or ductless heat pump systems.

- **Customers and contractors were generally satisfied with the program.** Customers reported high rates of satisfaction (between 86% and 96% satisfied) with the contractors' work, the performance of the equipment, and their overall experience with the program. Contractors were also generally satisfied with 89% reporting satisfaction with the program overall and 95% satisfied with their interactions with program account managers. Satisfaction with the application process was lower with 65% reporting satisfaction with this component and 10% reporting dissatisfaction.

6 Pay As You Save

The PAYS Program provides participating residential customers with on-bill financing for various energy efficiency measures such as LED lighting, domestic hot water, insulation, air sealing, and HVAC equipment. During an initial home assessment, program staff deliver some smaller equipment at no cost to customers, while installations of other items for qualifying customers are part of more extensive retrofit projects. The program design allows participating customers to repay the cost of energy efficiency projects incrementally through a tariff charge on their utility bill. This design ensures that the cost of the project and the payback remains with the premise, not the individual customer. Should a customer vacate the treated home before the project cost is fully repaid, the new occupant will assume the remaining balance through their utility bill.

The program operates on an 80/20 rule, structuring monthly loan payments to ensure that the expected energy savings outweigh the project cost. This results in a lower net monthly utility bill for participants. To qualify for a PAYS project, the cost of a measure cannot exceed 80% of the estimated post-upgrade savings over 80% of its expected lifecycle, with the remaining 20% of savings directed to the participant.

The PAYS Program is tailored towards residential customers exhibiting higher than expected energy usage based on specific housing characteristics, irrespective of income levels. Targeted customers receive custom marketing materials, with an option for enrollment online. The program delineates participation into four tiers:

- Tier 1: Upon enrollment, an in-person appointment is scheduled at the customer's home where an energy advisor conducts a visual inspection, provides further program information, and may deliver direct install measures.
- Tier 2: Provided the home is devoid of health and safety issues, and the participant wishes to proceed, a comprehensive home assessment is conducted, analyzing building characteristics and HVAC system specifications, possibly including direct-air and duct leakage tests.
- Tier 3: Data from the home assessment is input into a customized version of the proprietary OptiMiser® modeling software to estimate potential savings from upgrading measures. Participants receive an Easy Plan detailing recommended upgrades. Should the project not comply with the program's 80/20 rule independently, participants are quoted the copay required to proceed under program stipulations.
- Tier 4: Participants accepting the plan move to the installation phase, with the program team collaborating with a network of registered Trade Allies for the implementation of measures. A tariff charge is then placed on the participant's bill, with quality control conducted remotely for all projects and on-site for 10% of Tier 4 projects.

Additionally, the installed measures qualify for other energy efficiency program incentives offered by Ameren Missouri, which are automatically applied to the project cost without necessitating additional action from the participant.

6.1 Program Activity Summary

Table 6-1 summarizes the Pay As You Save Program activity during PY2024.

Table 6-1 Summary of Program Activity – Pay As You Save

Tier	Measure	Number of Accounts	Percent of Accounts*	Ex Ante Savings (MWh)	Percent of Ex Ante Savings
Tier 1 Direct Install	Advanced Power Strip	1,698	92%	45	9%
	Standard LED	953	52%	58	12%
	Faucet Aerator	182	10%	15	3%
	Showerhead	77	4%	14	3%
	Hot Water Pipe Insulation	283	15%	13	3%
Tier 4 Retrofit	Central Air Conditioner	38	2%	77	15%
	Air Source Heat Pump	31	2%	185	37%
	Smart Thermostat	61	3%	31	6%
	Ceiling Insulation	80	4%	36	7%
	Specialty LED	16	1%	1	0%
	Air Sealing	54	3%	20	4%
	Duct Sealing	3	0%	3	1%
	Total	1,849		497	100%

* The summed percentage of accounts exceeds 100% because some accounts purchased multiple measure types.

6.2 Data Collection Activities

The ADM Team did not complete any primary data collection for the PAYS Program.

6.3 Estimation of Ex Post Savings

The analysis of the ex post gross savings involved two steps. First, the ADM Team reviewed the program tracking data to identify missing data or duplicate entries in the program tracking data. Second, the ADM Team applied the Ameren Missouri TRM to calculate kWh savings and applied the kWh to kW end-use factors to calculate the kW savings. The specific calculations and assumptions used for each measure are presented in report Volume II.

The ADM Team multiplied the gross savings by the net-to-gross ratio (65%) employed in the calculation of throughput disincentives to calculate the program net savings.

Table 6-2 summarizes the ex ante and ex post program savings.

Table 6-2 Program Summary of Ex Post Gross and Net Savings – Pay As You Save

Metric	Ex Ante Gross Savings	Ex Post Gross Savings	Gross Real-ization Rate	Ex Post Net Savings	Net-to-Gross Ratio	Net Goal	% of Goal
Energy Savings (MWh)	497	605	122%	393	65%	5,013	8%
Demand Savings (MW)	0.17	0.18	103%	0.12	65%	2.34	5%

Table 6-3 and Table 6-4 summarize the ex post gross kWh and kW savings of the Pay As You Save program by measure and program component.

Table 6-3 Summary of Ex Post Gross Energy Savings – Pay As You Save

Tier	Measure	Quantity of Measures Incented	Ex Ante Gross MWh Savings	Ex Post Gross MWh Savings	Gross Realization Rate
Tier 1 Direct Install	Advanced Power Strip	1,862	45	55	121%
	Standard LED	6,758	58	67	116%
	Faucet Aerator	337	15	27	184%
	Showerhead	98	14	21	155%
	Hot Water Pipe Insulation	299	13	8	57%
	Tier 1 Subtotal	9,354	145	178	123%
Tier 4 Retrofit	Central Air Conditioner	40	77	88	114%
	Air Source Heat Pump	31	185	272	147%
	Smart Thermostat	65	31	24	78%
	Ceiling Insulation	80	36	18	50%
	Specialty LED	168	1	0	88%
	Air Sealing	54	20	23	116%
	Duct Sealing	3	3	2	65%
	Tier 4 Subtotal	9,795	353	427	121%
	Total	10,094	497	605	122%

Table 6-4 Summary of Ex Post Gross Peak Demand Impacts – Pay As You Save

Tier	Measure	Quantity of Measures Incented	Ex Ante Gross MW Savings	Ex Post Gross MW Savings	Gross Realization Rate
Tier 1 Direct Install	Advanced Power Strip	1,862	0.01	0.01	125%
	Standard LED	6,758	0.01	0.01	116%
	Faucet Aerator	337	0.00	0.00	194%
	Showerhead	98	0.00	0.00	160%
	Hot Water Pipe Insulation	299	0.00	0.00	57%
	Tier 1 Subtotal	9,354	0.02	0.02	123%
Tier 4 Retrofit	Central Air Conditioner	40	0.07	0.08	114%
	Air Source Heat Pump	31	0.05	0.04	85%
	Smart Thermostat	65	0.01	0.01	171%
	Ceiling Insulation	80	0.02	0.01	50%
	Specialty LED	168	0.00	0.00	88%
	Air Sealing	54	0.01	0.01	116%

Tier	Measure	Quantity of Measures Incented	Ex Ante Gross MW Savings	Ex Post Gross MW Savings	Gross Realization Rate
	Duct Sealing	3	0.00	0.00	65%
	Tier 4 Subtotal	441	0.15	0.16	101%
	Total	9,795	0.17	0.18	103%

The following discusses factors affecting realization rates that differed substantially from 100%.

- **Standard LED (116%).** While ex post savings were based on the Ameren Missouri TRM, ex ante savings for Tier 4 participants were determined through energy modeling.
- **Advanced Power Strip (121%).** Ex ante savings reference Appendix F measures with a 74% in-service rate. In 2024, the program shifted from participant installation to direct installation. Accordingly, in the ex post analysis, the TRM-specified 95% in-service rate for income direct install measures is applied.
- **Faucet Aerator (184%).** Ex ante savings reference Appendix F measures with a 82% in-service rate. In 2024, the program shifted from participant installation to direct installation. Accordingly, in the ex post analysis, the TRM-specified 95% in-service rate for income eligible and MFMR direct install measures is applied. Additionally, where available, ex post calculations incorporate the actual number of household occupants, which, on average, resulted in higher calculated savings.
- **Hot Water Pipe Insulation (57%).** For a single residence, ex ante energy savings totaled 3,948 kWh, contributing significantly to the difference between ex ante and ex post savings. In several other cases, ex ante savings exceeded 200 kWh—considerably higher than Appendix F values, which served as the basis for most ex ante savings.
- **Showerhead (155%).** Ex ante savings reference Appendix F measures with a 65% in-service rate. In 2024, the program shifted from participant installation to direct installation. Accordingly, in the ex post analysis, the TRM-specified 94% in-service rate for single family direct install measures is applied. Additionally, where available, ex post calculations incorporate the actual number of household occupants, which, on average, resulted in higher calculated savings.
- **Specialty LED (88%).** While ex post savings were based on the Ameren Missouri TRM, ex ante savings for Tier 4 participants were determined through energy modeling.
- **Ceiling Insulation (50%).** Ex post analysis references applicable pre and post R-values, area insulated, and HVAC equipment characteristics to calculate TRM-consistent savings. Ex ante savings are based on energy usage modeling.
- **Smart Thermostat (78%).** Ex post analysis references applicable HVAC equipment characteristics to calculate TRM-consistent savings. Ex ante savings are based on energy usage modeling.
- **Air Sealing (116%).** Ex post analysis references applicable pre and post CFM50 values and HVAC equipment characteristics to calculate TRM-consistent savings. Ex ante savings are based on energy usage modeling.
- **Central Air Conditioner (114%).** Ex post analysis references applicable HVAC equipment characteristics to calculate TRM-consistent savings. Ex ante savings are based on energy usage modeling.

- **Air Source Heat Pump (147%).** Ex post analysis references applicable HVAC equipment characteristics to calculate TRM-consistent savings. Ex ante savings are based on energy usage modeling.
- **Duct Sealing (65%).** Ex post analysis references applicable pre and post CFM25 values and HVAC equipment characteristics to calculate TRM-consistent savings. Ex ante savings are based on energy usage modeling.

6.3.1 Supplementary Whole-Building Analysis

The ADM Team conducted a supplementary whole-building analysis to assess the alignment between TRM-consistent ex post savings estimates and observed post-installation energy consumption patterns.

For the analysis, 65 customers with Tier 4 measure installations during PY2024 were evaluated using pre- and post-installation AMI interval data. The pre- and post-installation periods covered the same calendar days, but a full year of post-installation data was not available for any customer. On average, 207 days of post-installation data was available.

The approach involved selecting site-specific optimal heating and cooling degree hour (HDH/CDH) base temperatures, determined by identifying the HDH-CDH combination that maximized model fit (highest R^2). These base temperatures were used to construct HDH and CDH variables which were included in the following regression model among with annual ex post gross kWh savings (ex_post_kwh):

$$kWh = \beta0 + \beta1ex\_post\_kwh + \beta2HDH + \beta3CDH + e$$

Findings for the ex post savings coefficient (β1):

- 37 cases had a statistically significant negative coefficient (t-statistic < -2.0), indicating a strong correlation between ex post savings and observed reductions in energy use, controlling for weather.
- 19 cases had a statistically significant positive coefficient (t-statistic > 2.0), which may indicate non-weather-related increases in household energy consumption.
- 9 cases had non-significant results (t-statistic between -2.0 and 2.0).

The results indicate that additional post-installation data or further refinement of the modeling approach—such as identifying non-project-related and non-weather-related factors—may enhance future analyses.

6.4 Process Evaluation Findings

6.4.1 Required Process Evaluation Questions

This section presents findings related to addressing the five process evaluation questions required by Missouri Code of State Regulations section 20 CSR 4240-22.070(8).

6.4.1.1 What are the primary market imperfections that are common to the target market segment?

The PAYS Program targets residential customers, including homeowners and renters (with the owner's permission). The program facilitates energy efficiency improvements that reduce occupants' energy costs, ensuring that the monthly financing cost is less than the resulting energy cost savings.

The primary market imperfections common to the target segment include:

- **First-Cost Barrier to Energy Efficiency Improvements:** The high upfront costs of energy efficiency upgrades can deter participants, especially if they are required to cover the full initial cost or secure financing on their own. The PAYS Program addresses this by eliminating these upfront costs and providing financing options tied to energy savings.
- **Barriers to Financing/Prohibitively Expensive Financing Options:** Customers interested in financing home improvements may not know how to identify and apply for that financing. Furthermore, obtaining financing may require passing hurdles such as passing a credit check or verifying income. Lastly, available financing options may include expensive rates that undermine the cost savings resulting from efficiency upgrades.
- **Information Asymmetry:** Participants often lack sufficient knowledge about energy efficiency opportunities and the potential for long-term cost savings. They may not know which improvements to pursue or the extent to which these improvements will reduce their energy costs.
- **Contractor Influence and Practices:** Contractors play a significant role in shaping customer decisions. However, they may fail to promote high-efficiency options due to unfamiliarity with the technologies, personal biases, or assumptions about customer preferences. This can limit the adoption of more efficient measures.

6.4.1.2 Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?

The target market is broadly defined as all eligible customers. Segmenting the market into owner-occupied and rental units may enhance outreach and communication strategies, as the concerns and objectives of these customer types often differ.

Program staff noted that the program has historically been most effective for high-energy consumers residing in homes aged 15 to 30 years. These households, often families with higher energy consumption, find the program's financial incentives particularly compelling. The economic benefits are especially significant for these participants due to the higher cost of energy.

However, homes constructed before the 1950s present challenges. These older properties are more likely to have health and safety concerns, such as asbestos, mold, or foundational issues, which often prevent them from progressing beyond Tier 1 of the program.

Given these insights, further segmentation based on energy consumption and property age may be beneficial. Such segmentation could help address specific barriers to participation and tailor program efforts more effectively to the needs of different subgroups.

6.4.1.3 Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?

The program provides no-cost installation or financing of measures that are tailored to the home based on the energy assessment and energy modeling. The measures cover lighting, water heating, building shell, and heating and cooling end-uses.

6.4.1.4 Are the communication channels and delivery mechanisms appropriate for the target market segment?

The program employs a multifaceted marketing strategy, utilizing direct mail, Facebook ads, Google ads, and email campaigns to reach potential participants. In response to fluctuations in project lead times, there has historically been a strategic reduction in marketing activities to manage the flow of incoming projects effectively.

Efforts to refine marketing approaches through targeted strategies have been undertaken, focusing on specific neighborhoods, zip codes with varying income levels or home ages, and customers categorized by their energy bills. However, these targeted marketing experiments have not yielded definitive improvements in program participation rates.

The program provides a walk-through assessment to identify and recommend energy efficiency improvements to the resident. Additionally, for customers that progress to Tier 3 and 4, the program performs energy modeling and an “Easy Plan.”. The Easy Plan outlines what measures the program recommends be implemented and financed through the on-bill payment. The plan is explained by an “educator” to the customer.

6.4.1.5 What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation for select end-uses/measure groups included in the Program?

Targeting the highest energy-using homes could enhance the program's effectiveness in advancing projects through Tier 4. Program staff have noted that these homes align best with the program's goals, as they maximize energy savings and fit within the maximum copay range that program staff report most customers are willing to pay—typically between $2,000 and $2,500. By leveraging historical data, the program could establish a metric, such as energy cost per square foot, as a participation criterion. This approach could help reduce the costs associated with audits and direct installations that do not ultimately lead to Tier 4 project implementation.

Extending the financing terms is another potential strategy to reduce the customer copay. However, the current loan term is tied to the lifetime of the improvements, capped at 80% of the estimated lifespan of the shortest-lived measure implemented in the project. Extending the term could impact financing costs, and a longer-term loan would ultimately increase the total cost of the project.

Additionally, health and safety issues—such as asbestos in homes—were identified as significant barriers to moving beyond Tier 1. Addressing these barriers can be costly, and educating applicants during the enrollment process about potential mitigation expenses could help set realistic expectations for progressing to more comprehensive home improvements.

6.4.2 Additional Process Evaluation Findings

6.4.2.1 Detailed Description of Program

6.4.2.1.1 Program Objectives and Market

The program's goals are based on spending and energy-saving targets. To align with these overall objectives, specific participation targets have been set for each Tier. These targets are determined by applying historical throughput rates to estimate transitions between the tiers, ensuring consistency with the program's overarching goals.

Historically, the program has worked best for high energy consumers residing in homes aged between 15 to 30 years. A significant portion of participating households, often families with higher energy consumption, find the financial incentives of the program particularly compelling. Moreover, the economic benefits are more pronounced for these participants due to the higher cost of energy. It is important to note that older homes, particularly those constructed before the 1950s, are more susceptible to health and safety concerns, such as asbestos, mold, or foundational issues. These concerns frequently preclude these homes from advancing beyond Tier 1 of the program.

6.4.2.1.2 Program Marketing

The program employs a multifaceted marketing strategy, utilizing direct mail, Facebook ads, Google ads, and email campaigns to reach potential participants. In response to fluctuations in project lead times, there has historically been a strategic reduction in marketing activities to manage the flow of incoming projects effectively.

Efforts to refine marketing approaches through targeted strategies have been undertaken, focusing on specific neighborhoods, zip codes with varying income levels or home ages, and customers categorized by their energy bills. However, these targeted marketing experiments have not yielded definitive improvements in program participation rates. This indicates a need for further analysis and potential adjustment of targeting criteria or marketing tactics to enhance program outreach and uptake.

6.4.2.1.3 Program Barriers and Challenges and PY2024 Program Changes to Address Them

For Program Year (PY) 2024, program staff have implemented several strategic changes aimed at enhancing the effectiveness and accessibility of the program.

A significant barrier to Tier 4 participation is the amount of the Copay required by the customer. EEtility staff commented that once the copay gets above $2,000 to $2,500, participants are less likely to move forward with a project. Two changes have been made in PY2024 to address this issue:

- **Negotiated Lower HVAC Pricing:** Collaborations with contractors to reduce the cost of HVAC systems, making them more affordable for participants.
- **Financing Arrangements by HVAC Contractors:** Now requiring all HVAC contractors to possess the capability to arrange financing for the customer's co-pay, thereby facilitating smoother project execution and financial management.

Another issue identified by program staff was that some projects were prevented from moving beyond Tier 1 because safety issues were identified. Two approaches were developed to address this barrier:

- **Tier 1 Project Approval by Off-Site Staff:** Instituted a new requirement for off-site staff to authorize the conclusion of a project at Tier 1, ensuring thorough consideration and oversight. This ensures thorough oversight and consideration, preventing field staff from prematurely concluding projects when opportunities for further development at the site may exist.
- **Flexibility for Single Measure Projects:** Introduction of the option to undertake projects focusing on a single measure, such as HVAC system replacement or insulation upgrade. This flexibility helps navigate potential safety concerns that may arise from comprehensive tests like blower door assessments.

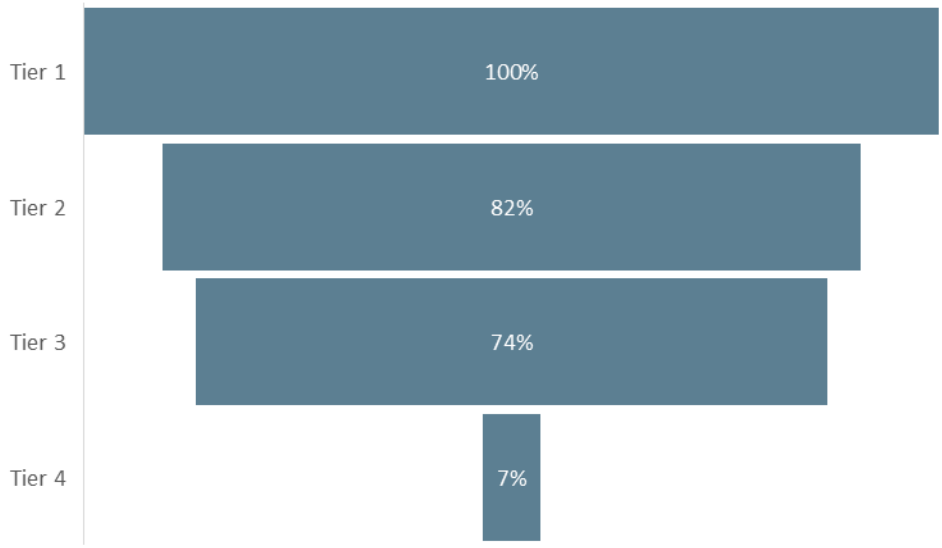
Additionally, the program made the following changes to enhance the program process:

- **Self-Scheduling for Home Visits:** Participants now have the capability to self-schedule their home visits upon enrolling in the program, streamlining the initial engagement process.

- **Video Requirement for HVAC Systems:** Introduced a mandate for a video showcasing the HVAC system with a measuring tape to verify the unit's accessibility and ensure the surrounding area meets the requirements for new installations.
- **Easy Plan Review Meeting Post-Tier 2 Assessment:** Requirement to schedule the Easy Plan review meeting immediately following the Tier 2 assessment, enhancing customer engagement and project momentum.
- **Tier 1 Measures are Installed by Program Representatives:** Before 2024, direct install measures were left for customers to install on their own. Now, program representatives install these measures during home visits and document the installations with photos.

In PY2024, most participants progressed through the initial stages of the PAYS Program, but only a small percentage reached the final installation phase (see Figure 6-1), a factor that contributed to the program reaching its net savings goal. All enrolled participants (100%) completed Tier 1, which involves an in-person appointment and initial inspection. A majority (82%) proceeded to Tier 2, where a comprehensive home assessment was conducted. Participation declined further in Tier 3, with 74% receiving an Easy Plan outlining recommended upgrades. However, only 7% advanced to Tier 4, where upgrades were installed and a tariff charge was applied. The sharp drop-off at Tier 4 suggests that cost-sharing requirements or other barriers may have influenced participant decisions.

Figure 6-1 Progress Through Program Tiers (N = 1,849)



While the program's net MWh performance would have improved with more customers completing Tier 4 projects, it is unlikely that increasing Tier 4 projects alone would have achieved the net savings goal. If all participants had completed Tier 4 projects in addition to the Tier 1 measures, assuming the average savings per Tier 4 project (2,187 kWh), the program would have reached approximately 82% of its savings goal. Therefore, in addition to increasing the conversion rate from Tier 1 to Tier 4 projects, enrollment would also need to be increased for the program to reach goal.

6.4.2.1.4 Incentives and Financing Mechanisms

The program treats the Tier 1 measures, as well as the Tier 2 and Tier 3 data collection and modeling efforts, as incentive costs. On the other hand, the Tier 4 measures and associated program delivery costs are included in the financed project costs.

Importantly, the program does not require a credit check or income verification, and the financing is not considered debt. Additionally, the cost of the project is tied to the property meter rather than the owner, meaning it does not follow the homeowner if they move. Importantly, PAYS does not place a lien on the property, reducing the risk for homeowners related to sales or refinancing.

The financing is structured such that the monthly charge for the project is 80% of the expected energy savings, leaving a 20% margin to account for potential errors in estimating the energy cost savings.

The financing loan term can extend up to 12 years, but it cannot exceed 80% of the estimated life of the shortest-lived measure implemented through the project. A notable requirement of the program is that for HVAC system replacements, an annual service agreement is mandated. While the cost of the first 3 years of this agreement is included in the project cost, the subsequent 9 years are the responsibility of the customer.

6.4.2.1.5 Participation Process

6.4.2.1.5.1 Application and Initiation

Customers can enroll in the program through Ameren's website, where they have the opportunity to self-schedule a home visit. During the enrollment process, customers can either name a preferred contractor or opt to have the program assign the lowest-cost contractor.

The program automatically sends the customer a reminder 3 days prior to the scheduled home visit to confirm, reschedule, or cancel the appointment. On the day of the visit, if the EEtility data collectors are expected to be more than 15 minutes late, they will notify the customer.

6.4.2.1.5.2 Tier 1 Home Visit

The home visit begins with an interview to understand the customer's motivations for participating and any issues they have with the home. This helps focus the home inspection and identify the customer's key concerns. The data collector also explains any testing that will be performed. The direct install measures are installed during this visit as well.

The data collector will inspect the home for health and safety issues. If they believe the home should be limited to Tier 1 measures due to identified issues, they must communicate this to the non-field staff, who will make the final determination. Similarly, if a direct install measure cannot be installed, the field staff must obtain approval from the non-field staff before leaving the site.

6.4.2.1.5.3 Tier 2 In-depth Audit and Data Collection

The Tier 2 audit involves blower door testing, duct pressure testing, and a comprehensive HVAC system inspection. The audit cost of $189 reported by EEtility is split between the gas and electric utility for combined gas and electric projects.

As part of the air sealing assessment, the data collector will use techniques to simulate the weatherization work and measure the resulting leakage reduction. The goal is to identify the most cost-effective leakage fixes to achieve the 25% leakage reduction target.

At the end of Tier 2, a remote meeting is scheduled with the customer to review the results and provide them with their "Easy Plan."

6.4.2.1.5.4 Tier 3 Energy Modeling

The Tier 3 process involves modeling the energy savings and creating a scope of work for the project. The data collected during Tier 2 is uploaded and a BPI certified energy analyst combines the data collected on site through the app along with the energy usage history (electricity, natural gas, and/or propane). The energy analyst uses a proprietary version of the Energy Optimizer software to model and calibrate the project, taking into account the age and efficiency degradation of the HVAC system. The modeling process is also used to size the HVAC system optimally, though customers may have concerns about installing smaller units suggested by the model.

6.4.2.1.5.5 Tier 4 Easy Plan Delivery and Measure Implementation

The Easy Plan is reviewed with the customer by an "educator" in a non-sales meeting. A customer can choose to proceed with the Tier 4 measure installation during that meeting or, if they prefer to think about it, the program follows up with them in about two weeks. Regardless, the pricing for the project is firm for 90 days.

Once the customer agrees to move forward, the work is scheduled to be completed within 3 weeks. If there are any delays due to contractor availability or supply chain issues, the program communicates these to the customer.

To proceed with the project, the customer signs a customer agreement with EEtility, and a work order is prepared for each contractor. Contractors are provided with the photos and data collected during the site visits and are obligated to review these. Having reviewed them, the contractors can request an additional site visit if needed.

Weatherization contractors re-test the home for air leakage, and any deviations from the original estimate beyond 10% must be approved. Additionally, if a contractor identifies additional work needed during the installation, a change order process is initiated to document and approve the necessary work. For example, the contractor may discover an open electrical junction box beneath the existing insulation in the home.

Once the work is complete, the contractors photograph the results and submit them to the program. EEtility staff then review the closeout documentation, aiming to complete this process within 2-4 days. If any documentation is missing, the program may revisit the home, and the contractor may face a financial penalty for failing to obtain all the needed documentation. After the closeout is complete, the contractor's net 15-day payment period begins.

Weatherization contractors re-test the home for air leakage. If the leakage value falls outside of 10% of the original estimate, they can photograph the revised meeting and get approval to use the new reading.

6.4.2.1.5.6 Project Close Out

Once the work is complete, the contractors photograph the results and submit them to the program. EEtility staff then review the closeout documentation, aiming to complete this process within 2-4 days. If any documentation is missing, the program may revisit the home, and the contractor may face a financial penalty for failing to obtain all the needed documentation. After the closeout is complete, the contractor's net 15-day payment period begins. Additionally, EEtility will follow up with the customer by telephone to see if the program addressed their issues and if there are any opportunities to improve the program.

6.4.2.1.6 Data Collection and Management

Data and photographic evidence collected during site visits are systematically gathered using a designated app. This app not only timestamps and geocodes the photos but also enables field staff to

annotate directly onto the images to underscore specific details, such as the gallon per minute rating of existing equipment. For the year 2024, a new requirement has been introduced mandating a video capture of the baseline HVAC system, accompanied by a measuring tape to indicate the distance from surrounding objects.

All project-related data and documentation, including annotated photos and videos, are securely stored in Smartsheet. Furthermore, data is systematically transferred to the Sightline database managed by ICF through an XML file. ICF undertakes a detailed review of the submitted documentation and reported values to ensure accuracy and consistency across the information provided.

6.5 Key Findings and Recommendations

The following are the main findings and recommendations from the evaluation of the program.

- **The program's energy savings realization rate was 122%.** The program's realization rates varied across measures due to differences in baseline assumptions, installation methods, and site-specific factors. Measures that transitioned from participant installation to direct installation, such as advanced power strips, faucet aerators, and showerheads, saw increased realization rates due to higher in-service rates specified in the TRM. Similarly, faucet aerators and showerheads showed higher ex post savings when incorporating actual household occupancy data. Conversely, measures such as hot water pipe insulation and duct sealing had lower realization rates due to discrepancies between ex ante estimates and TRM-based calculations. Measures relying on energy modeling for ex ante savings, including smart thermostats, ceiling insulation, and air sealing, often showed differences when compared to TRM-consistent ex post analyses that accounted for specific HVAC characteristics.
- **The PAYS Program provides comprehensive services for addressing home energy efficiency.** By combining detailed energy assessments and audits with no-cost measures and financing options for larger home improvements, the program equips homeowners with the information and resources necessary to improve their home's efficiency.
- **Program staff made process changes to increase program throughput.** Program staff implemented several process changes to enhance program throughput. These changes include:
    - Requiring a second level of approval to halt progress beyond Tier 1 due to health and safety issues.
    - Scheduling the Easy Plan review meeting immediately after the Tier 2 assessment.
    - Allowing single-measure projects so improvements can proceed without costly remediation of identified safety issues.

  While these changes are a positive step, additional considerations to further improve throughput are outlined below.

  Recommendation 1: Leverage Inflation Reduction Act incentives. Blend Inflation Reduction Act incentives into the program to reduce overall project costs and lower customer copays. This could make projects more financially accessible to participants and encourage greater program engagement.

Recommendation 2: Screen homes based on energy cost per square foot. At the time of application, consider screening homes using energy cost per square foot, based on customer estimates of home size and utility-provided energy use data. While this approach may reduce the total number of customers served, it could increase the proportion of participants progressing to Tier 4 by focusing on homes with higher energy-saving potential.

Recommendation 3: Incorporate safety assessments into the application process
Include a safety assessment as part of the application process and provide applicants with clear information about potential risks of disqualification for project financing due to health and safety issues. For example, educating customers about risks such as asbestos and other hazards in older homes may allow those unlikely to qualify to self-select out, improving efficiency in processing applications.

7 Multifamily Income Eligible

The Multifamily Income Eligible (MFIE) Program, promoted to customers as the CommunitySavers® Multifamily Program, is designed to provide long-term energy savings and bill-reduction opportunities to income-eligible customers of Ameren Missouri residing in multifamily properties. The program specifically targets income-eligible multifamily property managers and owners, offering a one-stop-shop approach to aid in navigating the challenges associated with comprehensive retrofits. The range of eligible measures includes lighting, advanced thermostats, advanced power strips, domestic hot water, building shell, and HVAC upgrades.

The program's target market encompasses owners and managers of multifamily properties with four or more units and a high percentage of low-income residents. To qualify, participants must meet one of the specified income prerequisites:

- Residing in a federally, state, or locally subsidized housing property and aligning with the income guidelines of that program.
- Residing in nonsubsidized housing with proof of income levels at or below 80% of area median income (AMI).
- Residing in a census tract where at least 85% of customers have income levels at or below 80% of AMI.
- Properties with a mix of qualifying and non-qualifying tenants can be deemed eligible if at least 50% of the tenants fulfill the income eligibility stipulations.

7.1 Program Activity Summary

Table 7-1 summarizes the – Multifamily Income Eligible Program activity during PY2024.

Table 7-1 Summary of Program Activity – Multifamily Income Eligible

Measure	Number of Accounts	Percent of Accounts*	Ex Ante Savings (MWh)	Percent of Ex Ante Savings
Air Source Heat Pump	575	18%	4,752	50%
Central Air Conditioner Tune-up	920	28%	225	2%
Smart Thermostat	1,759	54%	1,032	11%
Dirty Filter Alarm	1,031	32%	88	1%
ECM Motor Fan	766	24%	430	5%
Showerhead	279	9%	66	1%
Faucet Aerator	340	10%	44	0%
Refrigerator	53	2%	33	0%
Standard LED	885	27%	379	4%
LED Bulbs and Fixtures	158	5%	1,294	14%
LED Exit Sign	4	0%	69	1%
Central Air Conditioner	163	5%	287	3%
Variable Frequency Drives for Pumps and Fans on Hydronic HVAC Systems	1	0%	93	1%
Commercial Heat Pump System	1	0%	150	2%

Measure	Number of Accounts	Percent of Accounts*	Ex Ante Savings (MWh)	Percent of Ex Ante Savings
Packaged Terminal Air Conditioner (PTAC) and Packaged Terminal Heat Pump (PTHP)	107	3%	421	4%
Ceiling Insulation	5	0%	61	1%
Ceiling Fan	84	3%	10	0%
LED Specialty Lamp	296	9%	19	0%
Total	3,258	100%	9,452	100%

7.2 Data Collection Activities

The ADM Team completed site visits at three properties and 36 units for qualitative feedback purposes. No issues were identified with the measure installations.

7.3 Estimation of Ex Post Savings

The analysis of the ex post gross savings involved two steps. First, the ADM Team reviewed the program tracking data to identify missing data or duplicate entries in the program tracking data. Second, the ADM Team applied the Ameren Missouri TRM to calculate kWh savings and applied the kWh to kW end-use factors to calculate the kW savings. The specific calculations and assumptions used for each measure are presented in report Volume II.

The ADM Team multiplied the gross savings by the net-to-gross ratio (100%) employed in the calculation of throughput disincentives to calculate the program net savings.

Table 7-2 summarizes the ex ante and ex post program savings.

Table 7-2 Program Summary of Ex Post Gross and Net Savings – Multifamily Income Eligible

Metric	Ex Ante Gross Savings	Ex Post Gross Savings	Gross Realization Rate	Ex Post Net Savings	Net-to-Gross Ratio	Net Goal	% of Goal
Energy Savings (MWh)	9,452	8,674	92%	8,674	100%	8,048	108%
Demand Savings (MW)	2.61	2.34	90%	2.34	100%	2.21	106%

Table 7-3 and Table 7-4 summarize the ex post gross kWh and kW savings of the Multifamily Income Eligible program by measure and program component.

Table 7-3 Summary of Ex Post Gross Energy Savings – Multifamily Income Eligible

Measure	Quantity of Measures Incented	Ex Ante Gross MWh Savings	Ex Post Gross MWh Savings	Gross Realization Rate
Air Source Heat Pump	551	4,752	4,642	98%
Central Air Conditioner Tune-up	937	225	225	100%
Smart Thermostat	1,702	1,032	878	85%
Dirty Filter Alarm	861	88	88	100%
ECM Motor Fan	739	430	374	87%
Showerhead	284	66	66	100%
Faucet Aerator	608	44	44	100%
Refrigerator	58	33	4	12%
Standard LED	9,012	379	212	56%
LED Bulbs and Fixtures	3,693	1,294	1,292	100%
LED Exit Sign	190	69	70	102%
Central Air Conditioner	164	287	287	100%
Variable Frequency Drives for Pumps and Fans on Hydronic HVAC Systems	3	93	93	100%
Commercial Heat Pump System	2	150	16	11%
Packaged Terminal Air Conditioner (PTAC) and Packaged Terminal Heat Pump (PTHP)	107	421	299	71%
Ceiling Insulation	5	61	61	100%
Ceiling Fan	170	10	4	44%
LED Specialty Lamp	1,701	19	19	100%
Total	20,787	9,452	8,674	92%

Table 7-4 Summary of Ex Post Gross Peak Demand Impacts – Multifamily Income Eligible

Measure	Ex Ante Gross MW Savings	Ex Post Gross MW Savings	Gross Realization Rate
Air Source Heat Pump	0.95	0.97	102%
Central Air Conditioner Tune-up	0.21	0.21	100%
Smart Thermostat	0.31	0.27	89%
Dirty Filter Alarm	0.04	0.04	100%
ECM Motor Fan	0.20	0.17	87%
Showerhead	0.01	0.01	100%
Faucet Aerator	0.00	0.00	100%
Refrigerator	0.00	0.00	12%
Standard LED	0.07	0.03	46%
LED Bulbs and Fixtures	0.24	0.19	79%
LED Exit Sign	0.01	0.01	102%
Central Air Conditioner	0.27	0.27	100%
Variable Frequency Drives for Pumps and Fans on Hydronic HVAC Systems	0.08	0.08	100%
Commercial Heat Pump System	0.14	0.01	11%
Packaged Terminal Air Conditioner (PTAC) and Packaged Terminal Heat Pump (PTHP)	0.03	0.02	55%
Ceiling Insulation	0.03	0.03	100%
Ceiling Fan	0.00	0.00	44%
LED Specialty Lamp	0.00	0.00	99%
Total	2.61	2.34	90%

The following discusses factors affecting realization rates that differed substantially from 100%.

- **Smart Thermostat (85%).** Ex post analysis references applicable HVAC equipment characteristics to calculate TRM-consistent savings.
- **Air Source Heat Pump (98%).** For 10 units involving fuel switching, the ex ante savings included heating savings relative to a standard efficiency baseline. However, the ex post savings did not incorporate heating savings.
- **ECM Motor Fan (87%).** Ex post savings reflect installed HVAC type using the TRM-specified algorithm.
- **Refrigerator (12%).** Ex post savings referenced TRM-specified values instead of those in Appendix F.
- **Standard LED (56%).** In the calculation of ex ante savings, a halogen lamp baseline was sometimes applied instead of the TRM-specified baseline, and higher hours of operation were occasionally used instead of the income-eligible hours of operation specified in the Ameren Missouri TRM.
- **LED Exit Sign (102%).** Waste heat factors differed between the ex ante and ex post savings estimates, with the ex post estimate based on the Ameren Missouri TRM.

- **Ceiling Fan (44%).** Ex post savings for ceiling fan operation were calculated using Illinois TRM V12.0, while savings for the integrated fan lighting were determined based on the Ameren Missouri TRM. In contrast, ex ante savings assumed a 9-watt LED lamp within the ceiling fan replacing a 120-watt baseline, contributing to the difference in realization rate.
- **Commercial Heat Pump System (11%).** Ex ante savings included incremental early replacement savings, while ex post savings were based on a time of sale baseline.
- **Packaged Terminal Air Conditioner (PTAC) and Packaged Terminal Heat Pump (PTHP) (71%).** Ex ante savings were based on higher heating and cooling full load hours than those reflected in the Ameren Missouri TRM, which was used to calculate ex post savings.[2]

7.4 Process Evaluation Findings

7.4.1 Required Process Evaluation Questions

This section presents findings related to addressing the five process evaluation questions required by Missouri Code of State Regulations section 20 CSR 4240-22.070(8).

7.4.1.1 What are the primary market imperfections that are common to the target market segment?

The primary market imperfections common to the target market segment for the Multifamily Income Eligible program include:

- **Equipment Costs:** The cost of more extensive equipment replacements such as HVAC systems can be a significant barrier since property owners may not have access to funds to improve the building's energy efficiency.
- **Spit Incentives:** One form of split incentives in multifamily occurs when the tenant pays the cost of the electricity use, but the owner is responsible for choices that affect how efficiently the equipment and building utilizes electricity. This issue is most likely to occur for equipment and building characteristics that affect tenant energy use.
- **Lack of Staff to Plan and Make Improvements:** Multifamily property operators may not have staff available to implement efficiency measures.
- **Lack of Knowledge:** Property management may not have enough information to decide upon and prioritize efficiency improvements to reduce building operations and tenant electricity costs.

7.4.1.2 Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?

The target market segment for the Multifamily Income Qualified program is well-defined. It aims to serve multifamily (MF) properties with four or more units, where tenants meet specific eligibility criteria, such as participating in federal or state programs, living in low-income communities, or having an income at 80% of the median income. This segment is well-targeted as it addresses the primary issue of income-qualified residents, which is to reduce energy usage and thereby lower their energy costs and burden.

[2] For this measure installed in tenant units, ex post savings were calculated using the Ameren Missouri TRM V7.0, Volume 3, Section 3.4.10, which specifies full load hours (FLH) of 1,040 for heating and 617 for cooling. The ex ante savings, however, were based on higher values—1,433 for heating and 1,171 for cooling—sourced from page 63 of Ameren Missouri TRM V7.0, Volume 2 (Commercial and Industrial Measures), which presents FLH values for the "Midrise Apartment – Building" type. The discrepancy appears to result from the ex ante analysis applying commercial assumptions, whereas the TRM specifies lower residential values for multifamily tenant installations.

The program's flexibility in addressing both small and large properties, ranging from four-unit flats to complexes with up to 700 units, ensures that diverse energy service needs are met.

However, there might be potential advantages in further subdividing the target market segment to address specific needs more effectively. For example, properties could be categorized based on the size of the complex, ownership structure, or geographic location. This subdivision could enable more tailored marketing and outreach strategies, ensuring that the distinct needs of different sub-segments are met more efficiently.

7.4.1.3 Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?

The mix of end-use measures included in the Income Qualified MF program appropriately reflects the diversity of end-use energy service needs and existing end-use technologies within the target market segment. The program offers a variety of measures for both in-unit and common area needs, and the measures cover the following end-uses:

- HVAC systems (Replacements, tune-ups, thermostats)
- Lighting
- Water heating (Low flow)
- Building shell
- Plug-loads
- Refrigerators and Freezers
- Compressed air, cooking, motors, and pool pumps.

The program's design includes a mix of deemed and custom incentives that cover between 65% and 85% of the cost to upgrade to more efficient equipment. This approach encourages a broader uptake of holistic energy-saving measures, such as water heating (faucet aerators, shower heads) and lighting, by providing slightly more than the cost to upgrade these items. This strategy anticipates that customers will leverage these funds to invest in more expensive upgrades like HVAC systems or motors.

7.4.1.4 Are the communication channels and delivery mechanisms appropriate for the target market segment?

The communication channels and delivery mechanisms for the Income Qualified MF program appear to be appropriate for the target market segment. The program primarily relies on direct outreach by the outreach team, who contact property owners and present the benefits of the program. This direct approach ensures that the information reaches the decision-makers who have the authority to participate in the program.

Additionally, the program utilizes a website to provide information and updates to eligible participants. This online presence is useful for maintaining accessibility and providing a central location for program details, application forms, and other relevant resources.

The program also benefits from word-of-mouth referrals and repeat customers, which indicates a strong network of satisfied participants who help bring in new projects each year. This organic growth through referrals is a testament to the program's effectiveness and the trust it has built within the community.

Participation begins with a tailored energy audit of the property, followed by the development of a package of efficiency improvements based on the results of the audit. This delivery mechanism facilitates

comprehensive retrofits and addresses market information related to participants' lack of knowledge on efficiency improvements.

7.4.1.5 What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation for select end-uses/measure groups included in the Program?

While the program's current target market is well-defined, further segmentation of properties (e.g., by size, ownership structure, or geographic location) could improve the effectiveness of outreach and implementation. For instance:

- **Small vs. Large Properties**: Smaller properties may require more hands-on assistance, while larger properties may benefit from streamlined processes for bulk upgrades. Tailoring incentives and messaging accordingly could increase participation across all property types.
- **Geographic Location**: Adapting outreach to reflect regional variations in building types or tenant needs could enhance the program's relevance to property owners and managers. For example, urban areas are likely to include older buildings with unique retrofit challenges from those in more rural areas.

7.5 Key Findings and Recommendations

The following are the main findings and recommendations from the evaluation of the program.

- **The program's energy savings realization rate was 122%.** The program's energy savings realization rate was 122%. The realization rates for these measures varied due to differences in baseline assumptions, calculation methodologies, and data sources used in ex ante and ex post analyses. Measures such as standard LEDs and ceiling fans had lower realization rates due to discrepancies in baseline assumptions, including the use of higher wattage baselines and operational hours in the ex ante estimates compared to TRM-specified values. Similarly, the commercial heat pump system had a significantly lower realization rate because ex ante savings included incremental early replacement savings, whereas ex post savings were based on a time-of-sale baseline. For measures like air source heat pumps and packaged terminal air conditioners/heat pumps, realization rates were influenced by differences in assumed heating and cooling full load hours. In the case of air source heat pumps, heating savings were included in ex ante estimates but excluded in ex post calculations. Conversely, measures such as LED exit signs and refrigerators had realization rates close to 100% due to alignment with TRM specifications in the ex post analysis. Smart thermostats, ECM motor fans, and other HVAC-related measures had moderate realization rates, reflecting refinements in HVAC-specific assumptions and TRM-aligned calculations.
- **The Multifamily I program's target market segment is well-defined and effectively structured.** It inclusively targets multifamily properties that can derive substantial benefits from energy efficiency upgrades while excluding properties that fall outside the scope of residential energy efficiency (e.g., facilities with on-site medical services). The criteria ensure a diverse reach within the multifamily sector, maximizing program impact.

Recommendation 1: Should the program be offered in the future, opportunities for refinement include segmenting by property size or geographic areas to better address distinct energy efficiency opportunities and barriers in these subcategories.

- **The program offers a comprehensive and flexible mix of end-use measures that appropriately address the varied energy service needs and technologies within the target market.** Prescriptive incentives for common areas and residential units, alongside custom incentives, ensure adaptability to a wide range of energy efficiency improvements, from HVAC upgrades to building shell enhancements. This diversity reflects the multifaceted needs of the market and promotes broader adoption of energy-efficient solutions.

8 Single Family Income Eligible

The Single Family Income Eligible (SFIE) Program, marketed as CommunitySavers® Single Family Program, is aimed at delivering whole-home energy efficiency upgrades to income-qualified Ameren Missouri customers residing in single-family homes, mobile homes, and triplexes and duplexes. The program's primary objective is to provide income-eligible customers with a comprehensive walkthrough home energy assessment, direct installation of low-cost energy efficiency measures, and home weatherization measures (including minor repairs necessary for these installations). Additionally, the program offers information on behavioral improvements and other Ameren Missouri programs, all at no cost to the customer. The implementation team chiefly engages participants through alliances with large housing organizations and reputable community groups.

8.1 Program Activity Summary

Table 8-1 summarizes the Single Family Income Eligible Program activity during PY2024.

Table 8-1 Summary of Program Activity – Single Family Income Eligible

Measure	Number of Accounts	Percent of Accounts	Ex Ante Savings (MWh)	Percent of Ex Ante Savings
Central Air Conditioner	159	47%	255	40%
Air Source Heat Pump	10	3%	69	11%
Central Air Conditioner Tune-up	16	5%	6	1%
Smart Thermostat	243	72%	72	11%
Room Air Conditioner	53	16%	66	10%
ECM Motor Fan	212	63%	130	20%
Dirty Filter Alarm	18	5%	2	0%
Air Sealing	54	16%	3	1%
Ceiling Insulation	56	17%	16	3%
Standard LED	157	46%	8	1%
Specialty LED	72	21%	2	0%
Faucet Aerator	3	1%	0	0%
Showerhead	2	1%	1	0%
Hot Water Pipe Insulation	2	1%	0	0%
Refrigerator	19	6%	10	2%
Advanced Power Strip (Tier 2)	1	0%	0	0%
Duct Sealing	1	0%	0	0%
Total	338		639	100%

* The summed percentage of accounts exceeds 100% because some accounts received multiple measure types.

8.2 Data Collection Activities

The ADM Team completed site visits at 10 participating homes to collect qualitative feedback on the program.

8.3 Estimation of Ex Post Savings

The analysis of the ex post gross savings involved two steps. First, the ADM Team reviewed the program tracking data to identify missing data or duplicate entries in the program tracking data. Second, the ADM Team applied the Ameren Missouri TRM to calculate kWh savings and applied the kWh to kW end-use factors to calculate the kW savings. The specific calculations and assumptions used for each measure are presented in report Volume II.

The ADM Team multiplied the gross savings by the net-to-gross ratio (100%) employed in the calculation of throughput disincentives to calculate the program net savings.

Table 8-2 summarizes the ex ante and ex post program savings.

Table 8-2 Program Summary of Ex Post Gross and Net Savings – Single Family Income Eligible

Metric	Ex Ante Gross Savings	Ex Post Gross Savings	Gross Real-ization Rate	Ex Post Net Savings	Net-to-Gross Ratio	Net Goal	% of Goal
Energy Savings (MWh)	752	639	85%	639	100%	1,087	59%
Demand Savings (MW)	0.54	0.44	82%	0.44	100%	0.46	96%

Table 8-3 and Table 8-4 summarize the ex post gross kWh and kW savings of the Single Family Income Eligible program by measure and program component.

Table 8-3 Summary of Ex Post Gross Energy Savings – Single Family Income Eligible

Measure	Quantity of Measures Incented	Ex Ante Gross MWh Savings	Ex Post Gross MWh Savings	Gross Realization Rate
Central Air Conditioner	160	330	255	77%
Air Source Heat Pump	10	86	69	80%
Central Air Conditioner Tune-up	16	9	6	66%
Smart Thermostat	346	86	72	83%
Room Air Conditioner	874	66	66	99%
ECM Motor Fan	216	126	130	103%
Dirty Filter Alarm	18	2	2	100%
Air Sealing	54	5	3	72%
Ceiling Insulation	56	20	16	82%

Measure	Quantity of Measures Incented	Ex Ante Gross MWh Savings	Ex Post Gross MWh Savings	Gross Realization Rate
Standard LED	1,007	8	8	102%
Specialty LED	416	1	2	140%
Faucet Aerator	3	0	0	100%
Showerhead	3	1	1	100%
Hot Water Pipe Insulation	3	0	0	102%
Refrigerator	20	11	10	87%
Advanced Power Strip (Tier 2)	1	0	0	100%
Duct Sealing	1	0	0	70%
Total	3,204	752	639	85%

Table 8-4 Summary of Ex Post Gross Peak Demand Impacts – Single Family Income Eligible

Measure	Ex Ante Gross MW Savings	Ex Post Gross MW Savings	Gross Realization Rate
Central Air Conditioner	0.31	0.24	77%
Air Source Heat Pump	0.02	0.01	39%
Central Air Conditioner Tune-up	0.01	0.01	66%
Smart Thermostat	0.06	0.05	85%
Room Air Conditioner	0.06	0.06	99%
ECM Motor Fan	0.06	0.06	103%
Dirty Filter Alarm	0.00	0.00	100%
Air Sealing	0.00	0.00	72%
Ceiling Insulation	0.01	0.01	82%
Standard LED	0.00	0.00	102%
Specialty LED	0.00	0.00	141%
Faucet Aerator	0.00	0.00	100%
Showerhead	0.00	0.00	100%
Hot Water Pipe Insulation	0.00	0.00	102%
Refrigerator	0.00	0.00	87%
Advanced Power Strip (Tier 2)	0.00	0.00	100%
Duct Sealing	0.00	0.00	70%
Total	0.54	0.44	82%

The following discusses factors affecting realization rates that differed from 100%.

- **Smart Thermostat (83%).** Ex post savings reflect installed HVAC characteristics. Using TRM-specified full load hours, ex post estimated energy use was lower than that of Appendix F reference measures.
- **ECM Motor Fan (103%).** Ex post savings reflect installed HVAC type using the TRM-specified algorithm.
- **Air Sealing (72%).** Ex post analysis references applicable pre and post CFM50 values and HVAC equipment characteristics to calculate TRM-consistent savings.
- **Ceiling Insulation (82%).** Ex post savings reflect applicable R-values, HVAC equipment characteristics, and home attributes in the estimation of TRM-consistent savings. Ex ante savings referenced total home square footage as a savings input, overestimating attic area, particularly in multi-story homes.
- **Specialty LED (140%).** Ex post savings applied TRM base wattages and assumed PAR38 lamps were installed outdoors, using different operating hours than the Appendix F reference measure.
- **Refrigerator (87%).** Ex post savings referenced TRM-specified values instead of those in Appendix F.
- **Central Air Conditioner Tune-up (77%).** Ex ante assumed unit capacity (36,666 BTU/h) was significantly higher than actual installed capacity.
- **Hot Water Pipe Insulation (102%).** Applied TRM delta-temp of 60.0°F vs. 58.9°F in Appendix F.
- **Duct Sealing (70%).** Simplified TRM deemed savings method applied to calculate ex post savings.

8.4 Process Evaluation Findings

8.4.1 Required Process Evaluation Questions

This section presents findings related to addressing the five process evaluation questions required by Missouri Code of State Regulations section 20 CSR 4240-22.070(8).

8.4.1.1 What are the primary market imperfections that are common to the target market segment?

The primary market imperfections common to the target market segment include several key challenges:

- **Financial Constraints:** Limited access to upfront capital for energy efficiency improvements can be a significant barrier, especially since low-income households may lack savings or face difficulties obtaining financing due to low credit scores or lack of credit history.
- **Information Gaps:** Many households in this segment are unaware of energy efficiency programs or their potential benefits, leading to underutilization of available resources. Additionally, there is often a limited understanding of how energy efficiency improvements can reduce energy bills.
- **Split Incentives:** In rental properties, landlords may be reluctant to invest in energy-efficient upgrades because they do not directly benefit from reduced energy bills, while tenants, who bear the energy costs, are unable to make changes to the property. Additionally, property owners may be reluctant to provide program staff with access to the property.
- **Energy Burden:** A large portion of income spent on energy bills leaves little financial flexibility for investing in efficiency improvements, perpetuating a cycle of high energy costs and inefficiency.

- **Housing Stock Challenges:** Older, less efficient homes in this segment often have structural issues, such as inadequate insulation, outdated HVAC systems, or unsafe wiring, which can require costly repairs before energy efficiency upgrades can be installed.

8.4.1.2 Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?

The program's target market segment is defined as low-income residents who lack the financial means to invest in energy efficiency upgrades for their homes. The program is available to both homeowners and renters, provided renters have the property owner's permission. Eligibility criteria include participation in a federal, state, or local subsidized housing program, income at or below 80% of the area median income (AMI) or 200% of the federal poverty level, or residence within a census tract on Ameren Missouri's list of eligible low-income census tracts. This ensures the program serves low-income households, particularly in high-need areas.

The program explicitly segments the market into site-built and manufactured homes. It also accounts for rural and urban differences, with a designated budget allocation to serve rural areas and a focus on addressing contractor availability challenges. Additionally, the program includes bilingual staff to support non-English-speaking households.

Given this broad and inclusive definition, the target market segment appears to be appropriately defined. It effectively encompasses a wide range of eligible participants, ensuring accessibility for diverse low-income households and communities. Further subdivision or merging with other market segments does not seem necessary at this time. The current definition is comprehensive and well-aligned with the program's objectives.

8.4.1.3 Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?

The program addresses the diverse energy needs and technologies in the target market by offering comprehensive upgrades for income-eligible households. It includes energy-saving measures for single-family and manufactured homes, covering lighting, appliances, HVAC systems, insulation, and air sealing. Health and safety concerns are also prioritized on a case-by-case basis.

8.4.1.4 Are the communication channels and delivery mechanisms appropriate for the target market segment?

The program's communication channels are designed to reach the target market of low-income residents. These channels include collaboration with community-based organizations like nonprofits, advocacy groups, and community centers to help find and reach low-income customers.

Marketing focuses on distributing printed materials and online resources, with the program website providing detailed information on eligibility, services, and enrollment. Community events and outreach efforts also raise awareness and engage potential participants.

Efforts to reach non-English speaking communities are currently limited, but the implementation contractor does employ bilingual staff.

8.4.1.5 What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation for select end-uses/measure groups included in the Program?

The Single Family Income-Eligible Program has consistently met its goals over the past several years, despite budget constraints. The program serves both rural and urban areas and addresses differences between site-built and manufactured homes.

Future enhancements could include developing non-English materials. However, given the relatively small share of households in the region with limited English proficiency, this has not been prioritized.

8.4.2 Additional Process Evaluation Findings

The following summarizes key findings and recommendations based on observations from site visits. Due to the limited number of site visits conducted to gather qualitative feedback, these findings should not be generalized to the program as a whole.

- **Customer-Installed Measures:** Two instances were observed where a subset of measures was left for the customer to install, rather than being installed by program representatives. Recommendation: Program staff should review and update protocols to ensure all measures are installed by program representatives, improving consistency and customer experience.
- **Sensi Smart Thermostat App Usage:** Some participants had not installed the app necessary to fully utilize the Sensi smart thermostat, which lacks local programming functionality. Recommendation: Program staff should revise training protocols to emphasize the importance of the app and ensure this is effectively communicated to participants during installation.
- **HVAC Tune-Up Cleaning Protocol:** During the HVAC tune-up at one site, debris buildup on the outdoor coil was not adequately addressed. The technician indicated that a garden hose was used for cleaning, which was insufficient for the level of debris present. Recommendation: Program staff should review and enhance technician training protocols to ensure thorough cleaning of HVAC components during tune-ups.

8.5 Key Findings and Recommendations

The following are the main findings and recommendations from the evaluation of the program.

- **The program's energy savings realization rate was 91%.** Realization rates varied due to differences between ex ante assumptions and ex post findings, largely stemming from discrepancies in calculation methodologies, equipment characteristics, and baseline conditions. In several cases, the assumptions used in Appendix F differed from those in the TRM, leading to adjustments in ex post savings. For example, smart thermostats had lower realization rates because ex post estimates applied TRM-specified full load hours, resulting in lower energy use than the Appendix F reference measure. Similarly, specialty LEDs saw higher realization rates because the TRM assumed outdoor PAR38 installations with different operating hours. Other measures, such as refrigerators and hot water pipe insulation, had realization rate differences due to TRM-based adjustments to assumed baseline wattages and temperature differences. In other cases, the actual installed equipment or site conditions differed from ex ante assumptions, leading to deviations in realization rates. Air

sealing and central air conditioner tune-ups had lower realization rates because ex ante savings were based on assumed airflow reductions and unit capacities that did not align with actual field conditions. Additionally, one case, errors in ex ante inputs contributed to realization rate differences. Ceiling insulation savings were overestimated in ex ante calculations because they assumed total home square footage as an input, overestimating the attic area, particularly in multi-story homes.

- **The program effectively addresses key market imperfections such as financial constraints, information gaps, split incentives, and housing stock challenges by offering comprehensive energy efficiency upgrades and targeting low-income households through well-defined eligibility criteria.** However, challenges like limited outreach to non-English speaking communities and contractor availability in rural areas remain areas for potential improvement.

  Recommendation 1: Consider development of non-English language marketing materials in future years to more effectively communicate with limited English households.

- **The program's target market segment is inclusive and well-defined, effectively encompassing low-income residents in both rural and urban areas, including homeowners and renters.** The mix of end-use measures reflects the diverse needs of the segment, and communication channels leverage community-based organizations and outreach events effectively.
- **Quality assurance and control.** During a small sample of site visits, the ADM team observed opportunities to improve quality assurance and control. These included instances where measures were left for the customer to install and a case where debris remained on an external unit coil following an HVAC tune-up.

  Recommendation 2: Strengthen program protocols to ensure proper measure implementation. Potential steps include follow-up verification visits or requiring photographic evidence of completed installations to confirm adherence to standards.

- **Participant understanding of Sensi smart thermostat features.** Some participants were not fully aware of how the Sensi app could help them maximize the smart thermostat's features, leading to limited functionality.

  Recommendation 3: Update program materials and installer guidance to emphasize the importance of the app. Installers should assist participants with app setup during installation and provide clear, user-friendly instructions to ensure participants can fully utilize the thermostat’s capabilities.

9 General Population Survey Key Findings

This chapter summarizes findings from a survey of Ameren Missouri customers. The ADM Team developed the sample frame by cross-referencing the participant list with customer records to identify customers who had participated in a program since 2021. A random sample was then selected for the survey, comprising two groups: customers who had participated in at least one program since 2021, and those whose records indicated no participation in any program during the same period. To ensure representativeness, the ADM Team also stratified the sample based on the urbanity of the customers' locations, as defined by the U.S. Department of Agriculture's 2010 Rural-Urban Commuting Area Codes.

The ADM Team administered an email survey to the sampled Ameren Missouri customers. The survey was conducted in two rounds, with each sampled contact receiving up to three emails per round: an initial invitation to complete the survey, followed by two reminder emails.

Table 9-1 summarizes the data collection for the nonparticipant spillover research. Table 9-2 summarizes the number of surveys obtained from nonparticipants and participants.

Table 9-1 Summary of Data Collection

Mode	Time Frame	Number of Contacts	Completed Surveys	Response Rate
Email	August/September 2024	31,940	287	0.9%

Table 9-2 Number of Participant and Nonparticipant Surveys

Contact Type	Number of Surveys Started
Nonparticipant	230
Participant	57

Table 9-3 summarizes the representation of accounts and responses for each sample stratum, as well as the weights applied.

Table 9-3 Weighting Summary

Stratum	Share of Accounts	Share of Responses	Weight
Nonparticipant Urban	82.6%	72.5%	1.14
Participant Urban	9.5%	17.8%	0.54
Nonparticipant Rural/small town	7.5%	7.7%	0.97
Participant Rural/small town	0.4%	2.1%	0.19

The next sections summarize the main findings.

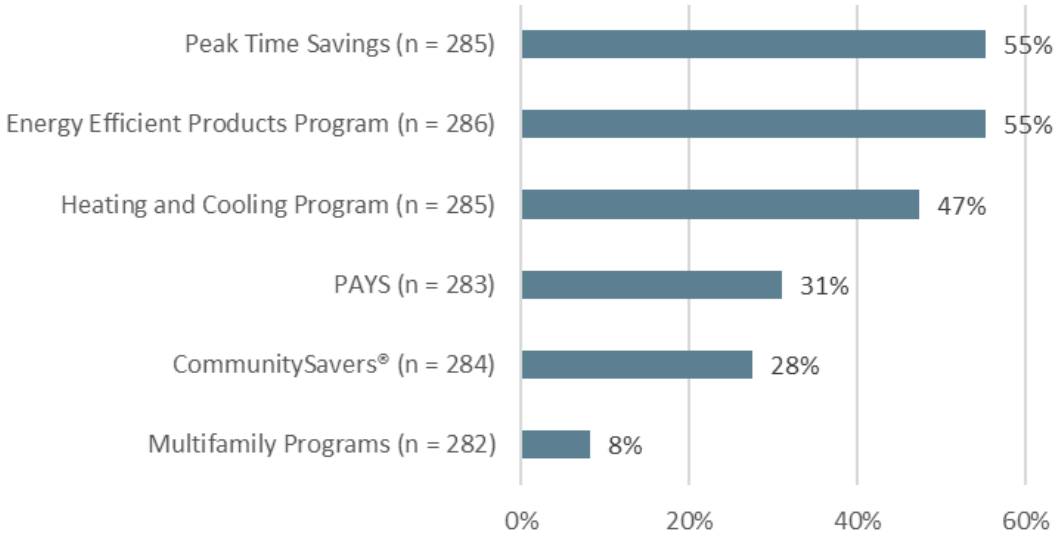
9.1 Program Awareness

Awareness of the Peak Time Savings, Energy Efficient Products, and Heating and Cooling programs was higher than for other programs offered by Ameren Missouri. Approximately half of customers reported having heard of these programs (see Figure 9-1). As expected, program participants reported higher levels of awareness compared to nonparticipants.

Among nonparticipants, awareness of the Efficient Products and Heating and Cooling programs was higher among customers in urban locations than among those in small towns or rural areas (see Figure 9-2 and Figure 9-3).

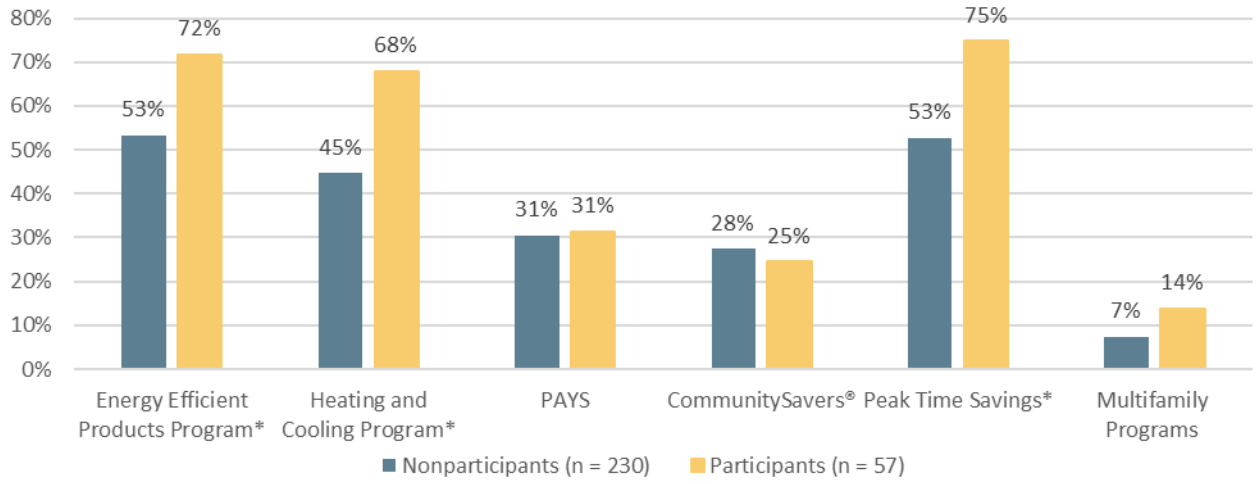
Participants most commonly reported learning about the programs through an Ameren Missouri email (47%), a bill insert or utility mailer (40%), and the Ameren Missouri website (30%) Table 9-4).

Figure 9-1 Summary of Program Awareness – All Respondents



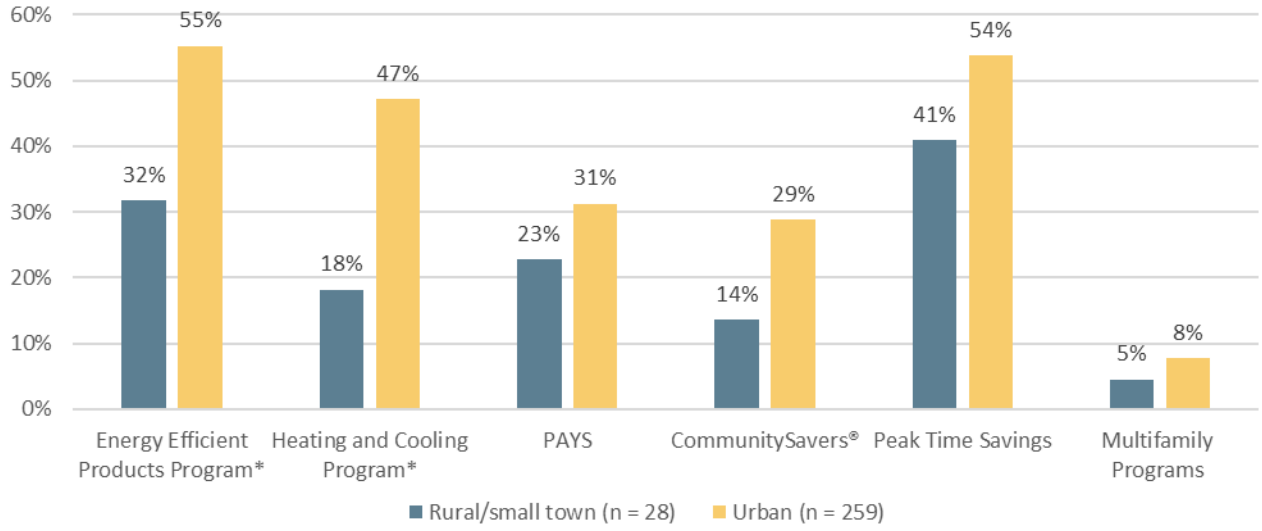
Percentages are weighted; unweighted response counts shown in parentheses.

Figure 9-2 Summary of Program Awareness – Nonparticipants vs. Participants



Percentages are weighted; unweighted response counts shown in parentheses.

Figure 9-3 Summary of Program Awareness – Nonparticipant Rural/Small Town vs. Urban Customers



Percentages are weighted; unweighted response counts shown in parentheses.

Table 9-4 Top 5 Sources of Program Awareness

Contact Type	Percent of Respondents (n = 209)
Email from Ameren Missouri	47%
Bill inserts or utility mailer	40%
Ameren Missouri's website	30%
Print advertisement	11%
Friend, family member, or colleague	11%
Percentages are weighted; unweighted response counts shown in parentheses.	

9.2 Marketing and Media Preferences

The findings indicate that the most common form of receiving information about Ameren Missouri's energy efficiency programs is through email or postal mail, with 50% of respondents reporting they received such information in the past year. Additionally, 43% of respondents noted they had heard or seen advertisements for these programs within the same timeframe. By contrast, 22% of respondents reported visiting the Ameren Missouri website in the last year.

There were no differences in exposure to marketing materials between urban customers and those in rural or small towns, nor between participants and non-participants.

Table 9-5 Ameren Missouri Marketing Awareness

Communication Type	Percent of Respondents
Received email or postal mail energy efficiency program information from Ameren Missouri in the last year (n = 267)	50%
Heard or seen Ameren Missouri energy efficiency program advertisement in the last year (n = 268)	43%
Visited Ameren Missouri website in last year (n = 273)	22%
Percentages are weighted; unweighted response counts shown in parentheses.	

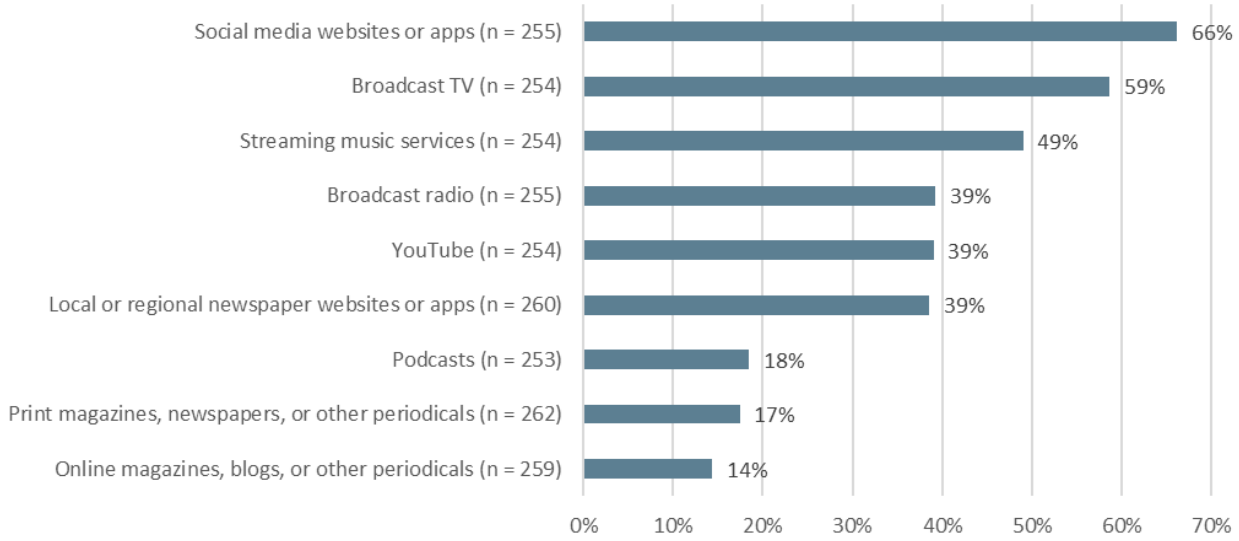
Social media and broadcast television were the media types most frequently engaged with by respondents. Figure 9-4 illustrates the share of customers who frequently engage with various media, defined as engaging at least a few times per week. While social media and broadcast television were the most heavily engaged, patterns of engagement varied by age group.

Younger respondents were more likely to frequently engage with social media, with 91% of 18–34-year-olds, 74% of 45–64-year-olds, and 53% of those 65 and older reporting high engagement. Similarly, younger respondents showed higher levels of frequent engagement with streaming music services, with 71% of both 18–34-year-olds and 45–64-year-olds, compared to 35% of those 65 and older.

Older participants, on the other hand, were more likely to regularly watch broadcast television, with 71% of those 65 and older, 61% of 45–64-year-olds, and only 13% of 18–34-year-olds reporting high engagement.

No significant differences in media engagement were observed between urban and rural/small-town customers or between program participants and non-participants.

Figure 9-4 Percent of Respondents with High Media Engagement



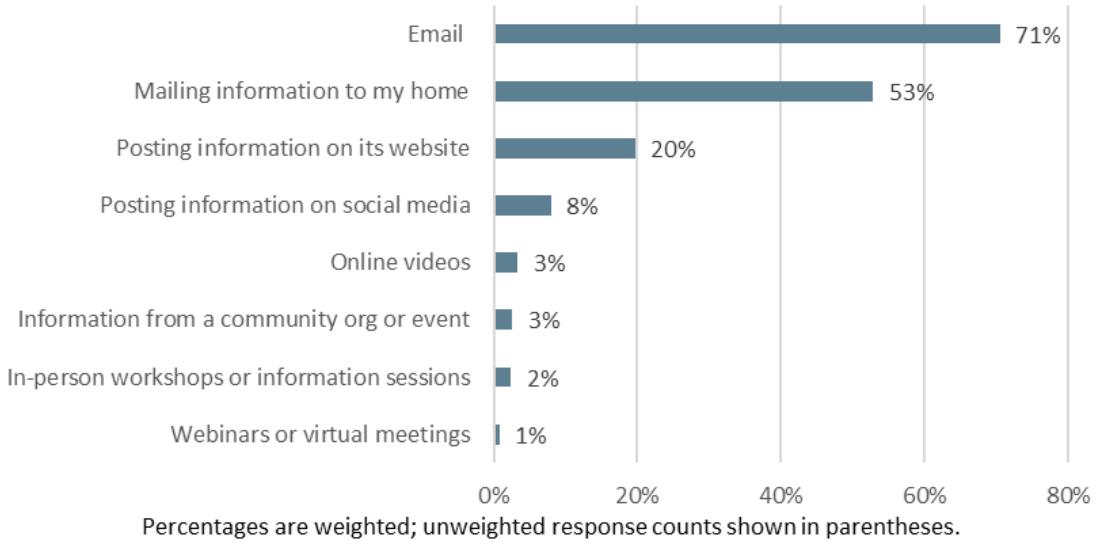
Percentages are weighted; unweighted response counts shown in parentheses.

Customers prefer to receive information on Ameren Missouri efficiency programs by email and postal mail. Email is the most preferred method for receiving information, with 71% of respondents selecting it. This is followed by mailing information to homes, which was chosen by 53% of respondents.

Other methods, such as posting information on websites (20%) and social media (8%), were far less favored. Additionally, methods involving more interactive or visual formats, such as online videos (3%), community events (3%), in-person workshops (2%), and webinars (1%), received notably low preference.

Overall, the data indicates a clear preference for direct and accessible formats like email and mailed materials, while methods requiring active participation or engagement have limited appeal.

Figure 9-5 Preferred Ways for Ameren Missouri to Share Program Information (n = 287)



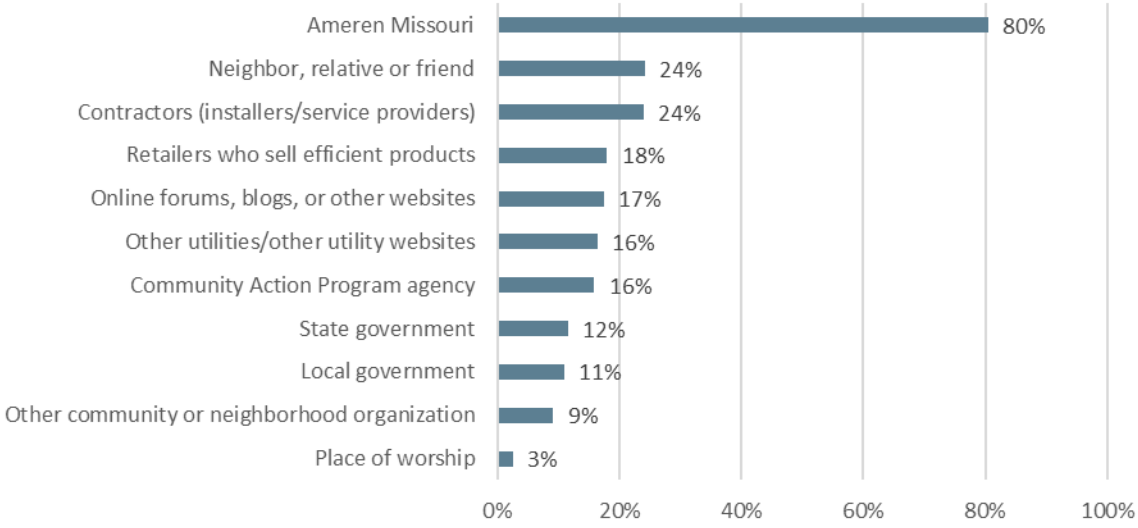
Percentages are weighted; unweighted response counts shown in parentheses.

The results indicate that Ameren Missouri is viewed as the most trustworthy source of information on saving energy, with 80% of respondents selecting it. The high level of trust in Ameren Missouri may be because respondents are familiar with the utility company and its efficiency programs. However, we also note that the low response rate to the survey may be a factor in this response. Respondents who trust Ameren Missouri generally may have been more willing to take the survey than those with lower trust in the utility.

Neighbors, relatives, or friends (24%) and contractors providing equipment installation or home improvement services (24%) are the next most trusted sources. Additional sources, such as retailers (18%), online forums or websites (17%), and other utilities (16%), were chosen by a smaller share of respondents.

Trust in government sources is relatively low, with state government (12%) and local government (11%) receiving limited selections. Community-based organizations, including Community Action Program agencies (16%) and neighborhood organizations (9%), were also rated lower. Finally, places of worship (3%) were the least trusted source for information on saving energy.

Figure 9-6 Most Trusted Information Sources for Saving Energy (n = 277)



Percentages are weighted; unweighted response counts shown in parentheses.

9.3 Equipment Saturations

9.3.1 Thermostat Type

The findings show that manual thermostats are the most prevalent type, with 40% of respondents who have a central heating and/or cooling system reporting this type of thermostat. Programmable thermostats account for 32%, while Wi-Fi smart thermostats make up 27%. A small percentage of respondents (2%) were unsure of their thermostat type.

The analysis found no significant difference in the distribution of smart thermostat installations between rural and urban areas, indicating similar adoption rates across these geographic settings.

Table 9-6 Prevalence of Smart Thermostats

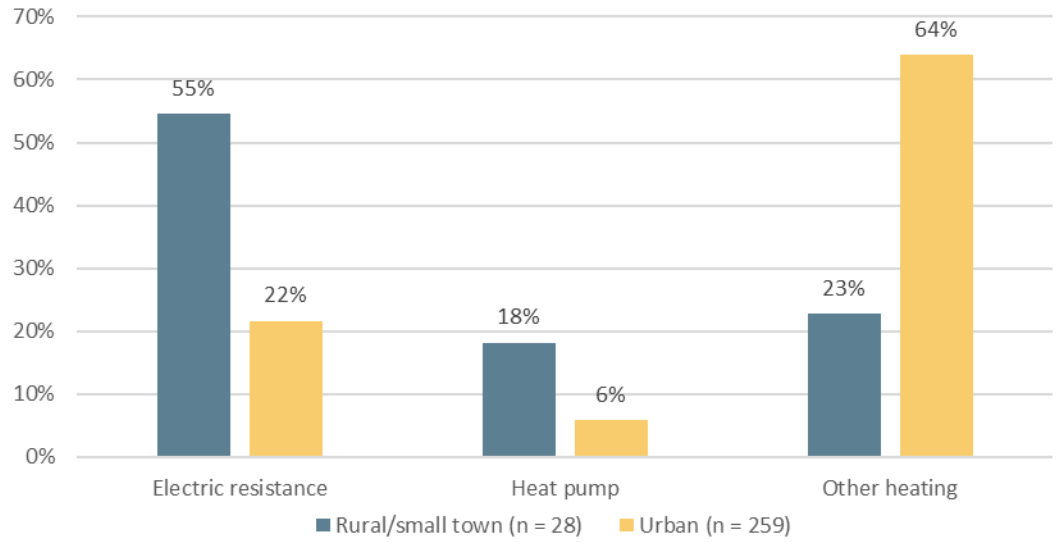
Thermostat Type	Percent of Data (n = 270)
A programmable thermostat	32%
A manual thermostat	39%
A Wi-Fi smart thermostat	27%
Not sure	2 %
Percentages are weighted; unweighted response counts shown in parentheses.	

9.3.2 Heating and Cooling Systems

Rural and small-town non-participants were more likely to use electricity for space and water heating than urban customers. Seventy-three percent of non-participants located in rural areas reported that they had electric resistance heating or a heat pump, in contrast to 27% of urban non-participants (see Figure 9-7). Similarly, 77% of rural customers reported heating water with an electric resistance heater as

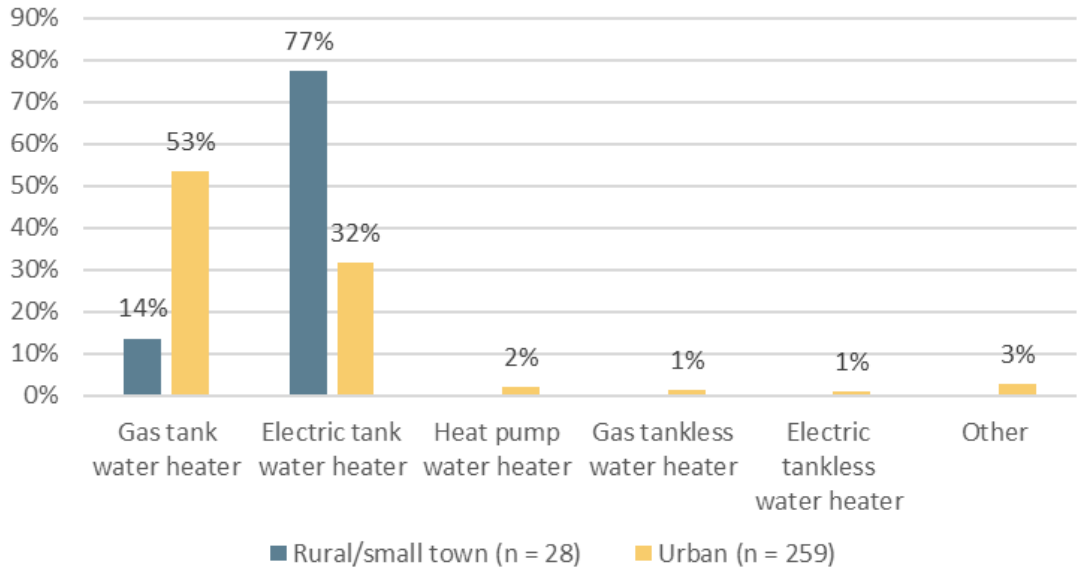
opposed to 32% of urban customers. Heat pump water heaters were uncommon across all non-participants.

Figure 9-7 Space Heating Type by Urban / Rural Locations



Percentages are weighted; unweighted response counts shown in parentheses.

Figure 9-8 Water Heating Type by Urban / Rural Locations



Percentages are weighted; unweighted response counts shown in parentheses.