MEEIA Cycle III PY2: Residential & Demand Response

Measurement and Verification Report

Missouri Metro and Missouri West: Appendices

Prepared for:

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Appendix A NTG Approaches by Program

A.1 Net-to-Gross: Heating, Cooling, and Home Comfort

This section provides a summary of the method to score the responses from the survey of participants and trade allies and a general population survey for the measure-level free ridership score, project-level free ridership score, and overall spillover score. Questions relating to the assessment of net-to-gross (NTG) address both free ridership and spillover (participant and non-participant). The methodologies, survey questions, and calculations are outlined in the sections below.

A.1.1 Ability to Purchase the Measure Without the Rebate

The participant free ridership (PFR) questions addressed the following criteria to determine the likelihood that a customer is a free rider:

- Financial ability to install the energy efficiency measures without program support
- Prior plans regarding installation of the energy efficiency measures
- Likelihood of implementing the measures in the absence of the program
- The program's impact on the timing of measure implementation

The first criterion was based on the response to a question regarding if a participant would have still purchased the efficient measure if they would not have received the program rebate. This was assessed with the following question:

> PFR1: Would you have still purchased the following without the Evergy discount/rebate?

Respondents who indicated that they would have not still purchased the efficient measure without the program rebate were deemed to not be free riders. For all others, a plans score was assigned based on a combination of their reported prior plans to implement the measure, whether a more efficient measure was purchased due to the rebate, and the reported effect of the program on the likely timing of the installation (as described in following subsections).

A.1.2 Prior Plans/Measure Efficiency

The presence of plans prior to involvement with the program was assessed through the following questions:

> PFR2: Did you plan to purchase the following energy-efficient equipment/upgrades before learning about the discounts/rebates offered by Evergy?

PFR3: Did you purchase and install [a more efficient/more] [MEASURE] because of the EVERGY rebate/discount?

Respondents who answered “Yes” to PFR2 and “No” to PFR3 were assigned a plans score of 1. All other respondents were assigned a plans score of 0.

A.1.3 Program Impact on Timing

Program impact on timing is used to account for deferred free ridership. Conceptually, if a participant would have implemented the same measures but did so earlier than they would have without the program, it can be said that the program affected the timing of the savings by causing them to happen earlier than they would have otherwise happened. Here, the approach of using the timing score in the free-ridership calculation is to adjust the net first year savings.

The program effect on the timing was assessed with the following question:

PFR8: If you had not received the Evergy discount/rebate, when might you have completed the following energy-efficient equipment/upgrades?

The information provided in the response to this question was used to assign a timing score based on when a participant would have installed the same measure. This is dependent on when the participant had the original measure installed (either the first 6 months of the program year or the last 6 months of the program year). This is consistent with the definition of a free rider as someone who would have implemented a program measure within the same year of when it was installed through a program. Timing scores were assigned using the following logic:

- If the respondent stated that they would have installed the measure at the same time (no impact on timing), the preliminary free ridership score was multiplied by 1 if the participant had the measure installed in January through June and was multiplied by 0.5 if the participant had the measure installed in July - December.
- If the respondent stated that they would have installed the measure within 6 months, the preliminary free ridership score was multiplied by 0.5 if the participant had the measure installed in January through June and was multiplied by 0.25 if the participant had the measure installed in July - December.
- If the respondent stated that they would have installed the measure in 6 months to one year, the preliminary free ridership score was multiplied by 0.25 if the participant had the measure installed in January through June and was multiplied by 0 if the participant had the measure installed in July - December.
- If the respondent stated that they would have installed the measure in more than one year, the preliminary free ridership score was multiplied by 0 for all participants.

A.1.4 Likelihood of Implementing the Measure in the Absence of the Program

The respondents' stated likelihood of implementing the measure in the absence of the program rebate was assessed through the following question:

> PFR5: How likely is it that you would have purchased the following energy-efficient equipment/upgrades without the Evergy discount/rebate?

The respondents' stated likelihood of implementing the measure based on the recommendation from the service provider was assessed through the following questions:

> PFR6: Were any of the energy-efficient equipment/upgrades recommended by your contractor/energy auditor during an initial visit to your home?
>
> PFR7: [IF YES TO PFR6] How likely is it that you would have purchased the following energy-efficient equipment and/or upgrades if your contractor/energy auditor had not recommended them?

Based on the responses to the likelihood questions, the following point values were assigned to each of the responses:

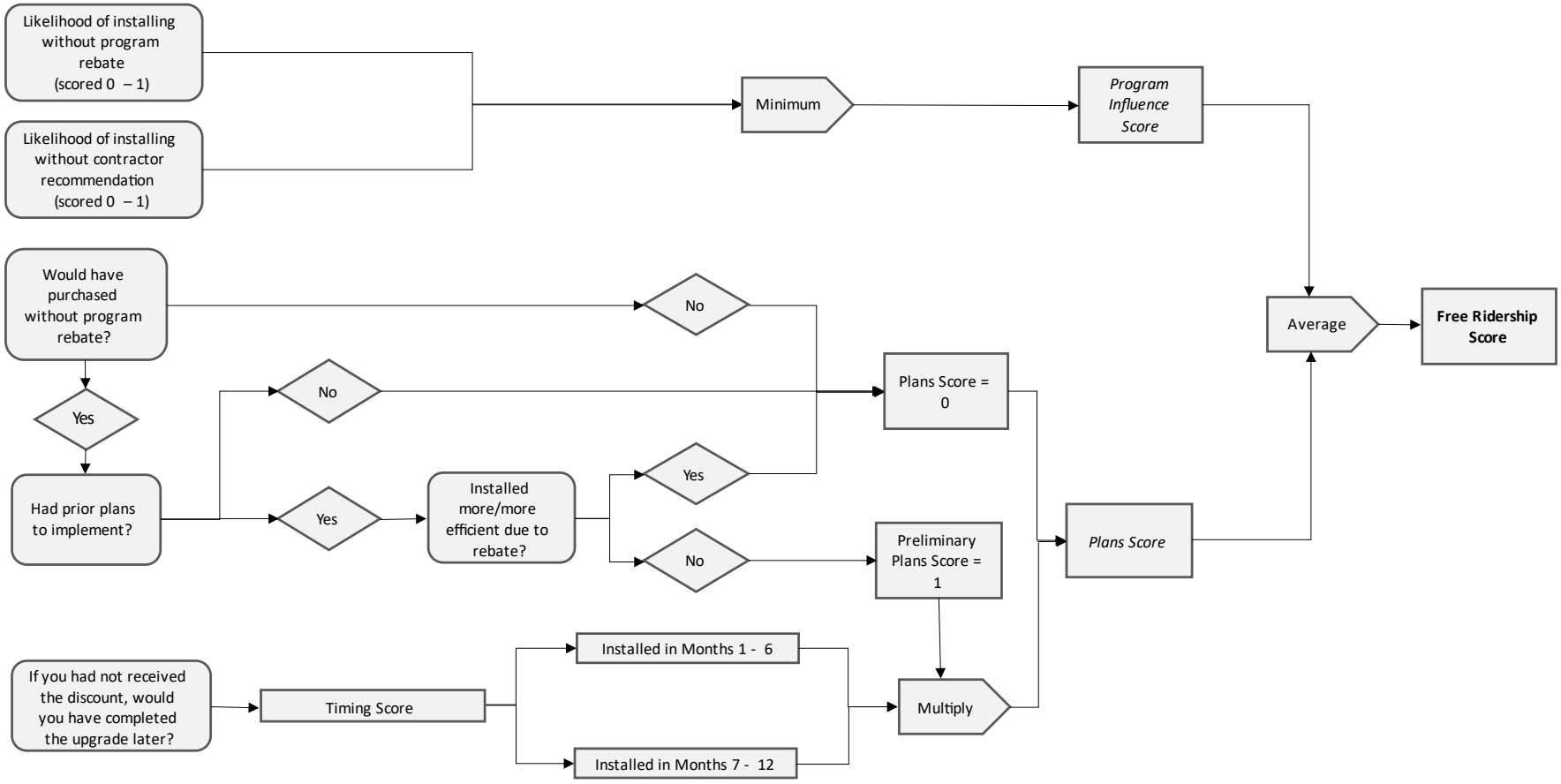
> 1 (Not at all likely) = 0
>
> 2 = 0.25
>
> 3 = 0.5
>
> 4 = 0.75
>
> 5 (Very likely) = 1

The likelihood score was based on the lowest rating provided on questions PFR5 and PFR7.

For any free-ridership survey question that was answered with a "Don't know" response, the calculations allowed for one "Don't know" response per survey participant. If a survey participant answered one free-ridership survey question with a "Don't know" response, the average Program Influence Score and Plans Score was taken. This way the survey question that was answered with a "Don't know" response did not have a significant influence on the overall free-ridership score. If a survey participant answered more than one free-ridership survey question with a "Don't know" response, that participant was dropped from the overall free-ridership calculations. For all program participants, the free-ridership score was based on the average of the plans score and the lowest likelihood of installing the measure without the program rebate or contractor recommendation.

Figure A-1 illustrates the above process for generating the final free ridership score.

Figure A-1: Free Ridership Scoring



A.1.5 Project-Level Free Ridership

ADM calculated the measure-level free ridership scores by taking the average free ridership score per measure for each survey participant. The measure-level free ridership scores were then weighted by the month the measure was installed. The measure-level free ridership scores for each respondent were weighted by the measure installation month and the kWh savings by measure using the following approach: 1) for each respondent, first multiplied the measure level free-ridership score (as noted above, a number from 0 to 1) for each installed measure by the kWh savings that measure represents; 2) sum the total measure level free-ridership kWh over the incentivized measures; 3) divided that sum by the total project kWh savings. The result is a value from 0 to 1, representing the respondent's project level free ridership score. This means that if a respondent indicated free ridership for a low kWh impact measure, but no free ridership for a high kWh impact measure, the overall free ridership score is low, as it was more heavily weighted by the free ridership score for the high kWh impact measure. The savings-weighted measure-level score was then extrapolated to each program participant by the month their measure was installed.

A.1.6 Participant Spillover Scoring

Participant spillover (PSO) is defined as energy efficiency measures that respondents report installing in their home without receiving additional incentives but that were installed based on program influence. Potential participant spillover respondents were identified using the question below:

- PSO1: Have you installed any additional energy-efficient equipment or home improvements in 2021, with or without receiving a discount or rebate?

Participants indicating that they purchased and installed one or more energy efficiency projects since participating in the Heating, Cooling, and Home Comfort Program were then asked two questions to determine whether the energy savings resulting from those measures attributed to the program:

- PSO2: How would you rate the importance of the discount/rebate and/or Energy Saving Kit from Evergy in your decision to install those additional energy-efficient equipment or home improvements?
- PSO3: How likely would you have been to install those additional energy-efficient equipment or home improvements if you had not received a discount/rebate and/or Energy Saving Kit from Evergy?

The responses to PSO2 were scored as following (on a scale of 0 to 10, where higher values indicated higher spillover):

0 (Not at all important) = 1

1 = 0.9

2 = 0.8

3 = 0.7

4 = 0.6

5 = 0.5

6 = 0.4

7 = 0.3

8 = 0.2

9 = 0.1

10 (Very important) = 0

The responses to PSO3 were scored as following (on a scale of 1 to 5, where higher values indicated higher spillover):

1 (Not at all likely) = 0

2 = 0.25

3 = 0.5

4 = 0.75

5 (Very likely) = 1

Participants responding to question PSO3 with a rating of 7 or higher and responding to question PSO3 with a rating of 3 or lower were considered to have been motivated by the program to make these additional purchases, and the energy savings from these items were attributed to the participant spillover. Savings for both like and non-like measures[1] were calculated using the algorithms and default assumptions in the IL TRM . Self-reported measure quantities for LED lightbulbs, faucet aerators, low flow showerheads, and smart power strips were collected as part of the survey. Savings from all qualifying participant spillover measures were calculated against the program savings for all survey respondents and then extrapolated to the overall program savings.

[1] Like spillover refers to program-induced actions participants make outside the program that are of the same type as those made through the program, while non-like spillover refers to program-induced actions participants make outside the program that are of a different type as those made through the program.

A.1.7 Non-Participant Spillover Scoring

Non-participant spillover (NPSO) is defined as the additional energy savings achieved when a non-participant implements energy-efficiency measures and/or practices due to the program's influence through exposure to the program (for example, from a contractor/trade ally/energy auditor or some other source), but is not accounted for in program savings. Potential non-participant spillover respondents were identified using the question below:

- NPSO1: Do you purchase any energy-efficient equipment/upgrades in 2021?
- NPSO2: Did you receive a discount or rebate from Evergy for any of the energy-efficient equipment/upgrades that you purchased?

Non-participants indicating that they purchased and installed one or more energy efficiency projects without receiving a rebate or discount in 2021 were then asked the following question to determine whether they were aware that the Evergy offers rebates or discounts for the energy efficient equipment they purchased:

- NPSO3: What is the main reason you did not receive an Evergy incentive, rebate, or discount for the energy efficient equipment/upgrades you purchased?

Non-participants chose from the following answer options:

"Was not aware there was a rebate available"

"Did not have the time to complete rebate application"

"Found out about rebate too late"

"Contractor I worked with did not offer Evergy rebates/discounts"

"Submitted a rebate application that was rejected"

Non-participants responding to question NPSO3 with anything other than "Was not aware there was a rebate available" were considered to have been aware of the program and/or Evergy discounts/rebates, and the energy savings from these measures were attributed to non-participant spillover. An additional screening question was asked to any respondent who installed LED lightbulbs:

- NPSO4: How important were the LED lighting discounts from Evergy in your decision to purchase the additional non-rebated LED bulbs?

Non-participants responding to question NPSO4 with a rating of 5 or higher were considered to have been motivated by the Evergy discounts to make the additional purchase, and the energy savings from the LED lightbulbs were attributed to the non-participant spillover.

Savings for any measure included in the Heating, Cooling, and Home Comfort Program that were attributed to non-participant spillover using the methodology above were

calculated using the algorithms and default assumptions in the IL TRM. Self-reported measure quantities for LED lightbulbs, faucet aerators, low flow showerheads, and smart power strips were collected as part of the survey. Savings from all qualifying non-participant spillover measures were calculated per-measure for all survey respondents, calculated against the total program savings, and then extrapolated to the overall program savings.

A.1.1 Determination of Program-Level NTG Ratio

The project level free ridership scores for each respondent were weighted by the ex-post kWh savings per project to determine the final weighted average free ridership estimate per customer in the sample. This estimate, along with the spillover estimate, was used to calculate the final net savings (see Equation A-1).

Equation A-1: Net-to-Gross Calculation

$$NTG=(1-Freeridership)+Spillover$$

A.2 Net-to-Gross: Energy Savings Products

The following section details the free ridership, participant spillover, and leakage estimates used to determine net savings for the PY2 Energy Saving Products Program in 2021. Net savings were based on Free Ridership, Participant Spillover, and program leakage. Each effect is discussed in detail below.

A.2.1 Survey Determined Free Ridership

ADM conducted a General Population survey to stratified sample of randomly selected residential customers. Two survey efforts were conducted to broaden the scope of the analysis and receive survey responses closer to the customer's purchase date. The survey was conducted using email invitations to an online survey platform, and small gift card incentive to those who completed the questionnaire.

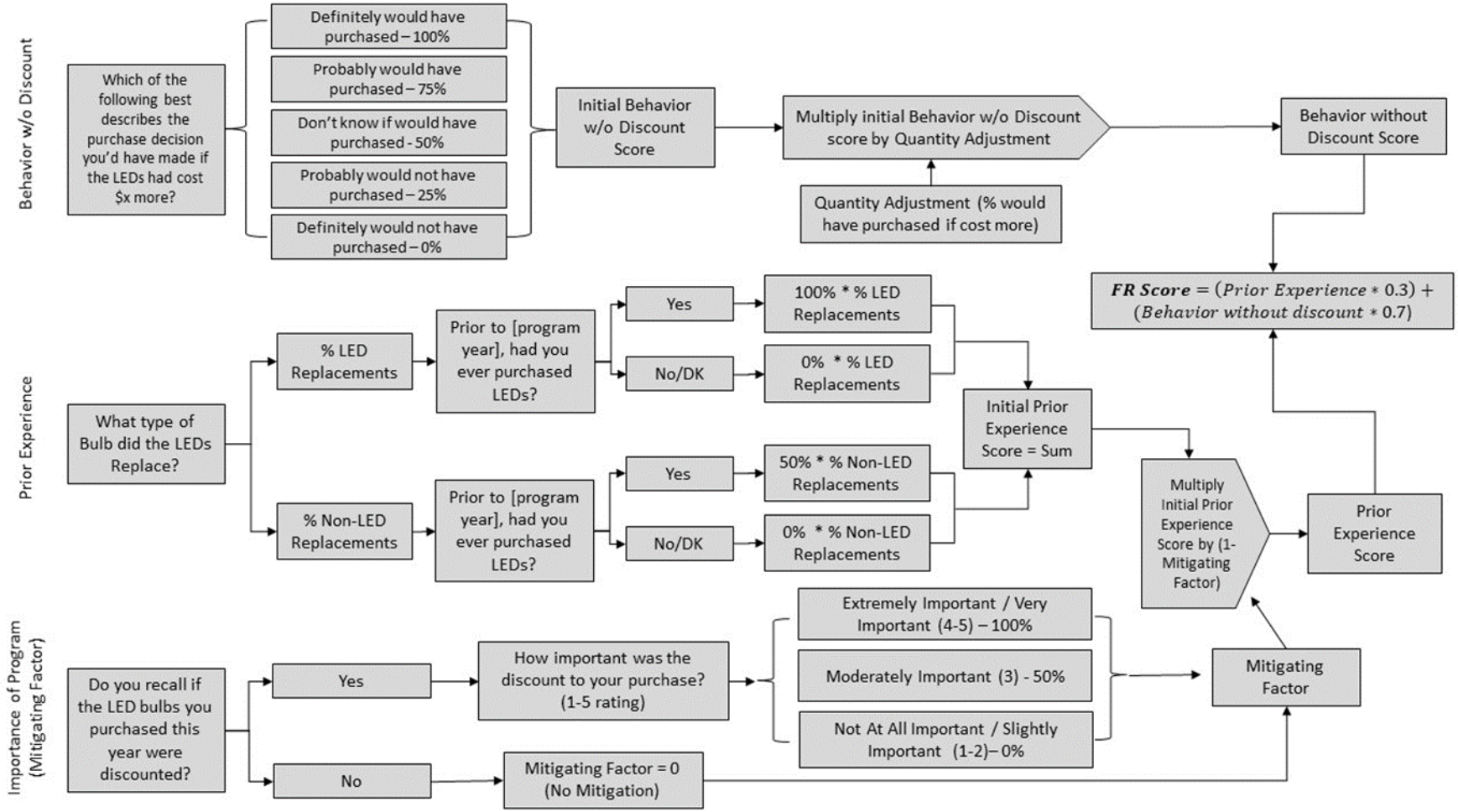
The first survey wave was released in July 2021 to approximately 7,000 customers and received 385 responses. The second survey was released in January 2022 to approximately 12,000 customers and received 609 responses.

The strength of a survey-based approach is the ability to obtain a large, random sample size cost-effectively. It also allows for further questioning regarding the quantity and location of installed bulbs and the motivation behind bulb purchases. In addition, it allows the evaluator to contact customers at a time when many retailers are restricting third parties from entering their premises and surveying customers in person. The biggest drawback to the approach is the potential for respondent recall bias. For example, it may be difficult to get accurate responses to questions about the number of bulbs the

respondent recently purchased and whether they were discounted through the program. This problem is particularly prominent in upstream programs where the respondents may not be aware that the bulbs they purchased were discounted.

Survey respondents were asked a series of questions to elicit feedback regarding influences on their light bulb purchasing decisions. Each respondent was then assigned a free ridership score based on a consistent free ridership scoring algorithm. The free ridership scoring algorithm developed for the survey instruments is shown on the following page on Figure A-2.

Figure A-2: Free Ridership Scoring for LEDs



The free ridership score is determined as the combination of two scores, the “behavior without discount” score based on the participants reported behavior, and the “prior experience” score based on the participants experience with LEDs.

The “behavior without discount” scoring section is the primary determinant of respondents’ free ridership scores, accounting for 70 percent of the total score. This section asked whether the respondent would have purchased the same light bulbs at the regular retail price. As this question is particularly prone to social desirability bias (the tendency to respond in a manner that might be viewed favorably by others), each respondent was asked what the most important characteristic was when purchasing bulbs. As a consistency check, if a respondent lists “price” as the most important characteristic, but then goes on to indicate that they would have still purchased efficient options at full retail price, their response was eliminated from the data population.

The “prior experience” score accounts for the remaining 30 percent of the Free Ridership score. The prior experience score is based on the participants previous experience with LED bulbs (customers who had previously purchased LEDs are more likely to be free riders), and the reported importance of the discount on the customer’s purchasing decisions.

ADM evaluators analyzed survey responses from 994 Evergy customers. Of these, 471 verified responses were used to calculate free ridership for standard LEDs, and 190 verified responses were used to calculate free ridership for specialty LEDs. Verified responses are fewer than total responses as some customers were eliminated if they did not answer relevant questions, failed the consistency check outlined above, or did not purchase bulbs at participating retailers. For program LEDs distributed through budget-retailers Dollar Tree, True Value, Habitat ReStore, and Goodwill, ADM applied an assumed Net-To-Gross Ratio of 1.0 as these retailers would likely not stock ENERGY STAR® LEDs in the absence of the program.

Finally, ADM estimated the average free-ridership score for each participating retailer. Overall Free Ridership scores for Standard and Specialty bulbs in the Missouri West and Missouri Metro jurisdictions were calculated based on the proportion of gross verified savings from bulb sales at the relevant retailer.

Final Free Ridership scores by bulb category are shown in Table A-1.

Table A-1: General Population Survey Free Ridership Estimate

Bulb Type	Jurisdiction	Responses	2021 Free Ridership Estimate	2020 Free Ridership Estimate[2]
Standard LED	MO West	249	47%	51%
	MO Metro	222	47%	
Specialty LED	MO West	97	44%	45%
	MO Metro	93	49%	
Budget Locations		-	0%	0%

A.2.1 Participant Spillover

Spillover refers to sales of energy efficient equipment that occur because of program influences on customers but for which an incentive or rebate is not given. For example, in the context of a program for LED price markdowns, participant spillover may result from a customer who purchases program discounted bulbs and is influenced to install additional (non-rebated) energy efficiency measures or change their energy usage behavior because of their program experience.

ADM conducted a benchmarking study of 8 recent evaluations[3] of upstream lighting programs to determine a participant spillover rate. The average participant spillover across the benchmarked studies was 7 percent, with a range from 2 percent to 11 percent. ADM used the average participant spillover from this benchmarking study for the evaluation of the Energy Saving Products program.

A.2.2 Leakage Adjustments

ADM conducted an analysis of leakage out of territory for the Energy Savings Products (ESP) Program in PY2. Cross-territory sales, or "leakage," occurs when program-incented

[2] Survey participants were unknown in the 2020 program survey. As such it was not possible to determine if a respondent was in the MO West or MO Metro service territory, so a single score was calculated for each bulb type. Survey respondents in 2021 received a personalized survey link that allowed ADM to track details for respondents, including the service territory in which they were located.

[3] Entergy Arkansas Evaluation Report - Program Year 2017, April 20., Table 4-30, p 229

ComEd Programs NTG Approach for CY2019, October 1., p 3

Ameren Missouri Program Year 2019 Annual EM&V Report, June 18., Table 3-20, p 62

efficient products are installed outside of the Evergy Missouri (MO) service territory. When this occurs, the energy and demand savings from the incentivized product are not realized within the territory that paid for, and is claiming savings for, the unit. Upstream programs are vulnerable to leakage as the rebate recipient is unknown and sales are not restricted based on utility.

Estimates of leakage were assessed using an approach that combined responses from the general population survey with a geo-mapping analysis using the following methodology:

- First, ADM developed a mapping of concentric circles (drive times) surrounding each participating retailer. The initial modeling assumed the "reach" of a retailer is a 60-minute drive, which is then modified by the presence of an alternative sponsoring retailer (i.e., if a customer is within a 60-minute drive of two sponsoring retailers, it is assumed they purchased from the closest one). Non-participating retailers are also included as directly competing alternative retailers with the construction of the drive times.
- Second, ADM used 2010 Census block data from Environmental System Research Institute (ESRI) to determine the proportion of the population that falls within each drive time circle (from Step 1), as well as the proportion of the population that falls within the Evergy service territory and within the state of Missouri. Thus, for each drive time circle for each retail location, the Evaluators determined the proportion of the population within the Evergy Missouri service territory, outside of Evergy Missouri service territory, and outside of the state of Missouri.
- Third, a general population survey was used assess the shopping habits of customers within the radius of participating retailers. This was used to assess the total and maximum drive time that Evergy consumers would accept when shopping for products incentivized by the program. This was used in modifying the initial 60-minute drive assumption established in the first step. This approach uses a log transformation of the drive times to smooth the survey data and estimates the cumulative percent via a second order polynomial regression.
- Fourth, for each drive time, the propensity to drive is calculated based on the predicted cumulative percent. The propensity to drive is equal to 1 minus the predicted cumulative percent, such that customers with shorter drive times have a high propensity to drive (because cumulative percent from the survey is lower for shorter drive times), while customers with longer drive times have lower propensity to drive (because predicted cumulative percent is higher for longer drive times). Customers with a propensity to drive represent the estimated population for a given drive time (i.e., estimated population willing to drive = propensity to drive(%)*total population).

- Lastly, the percentage of bulbs that leaked out of the Evergy service territory (but still within Missouri) and the percent that leaked out of state were calculated.

For PY2, ADM updated steps three through five using the drive times reported in the 2021 general population survey.

Leakage was estimated for Mass Merchants (Big Box retailers), DIY stores, and Member channels (e.g., Costco). Together, these three program channels represented more than 90% of program savings. A savings-weighted leakage rate was applied to the remaining retailer types. ADM found that Evergy's overall leakage rate in 2021 was 1.35 percent, compared to the leakage rate of 1.60 percent found in 2020. Given the large and contiguous size of Evergy's service territory, the low leakage rate is to be expected.

A.2.3 Market Effects and Non-Participant Spillover

Market effects refer to the non-incentivized adoption of energy efficiency measures due to the influence of the program on the market structure or market actor behavior. Non-participant spillover refers to program spillover which occurs in customers who were not program participants.

It is likely that some combination of these effects increases the savings attributable to the ESP lighting portion of the program. However, there is also reason to believe these effects may be small overall. Non-participant spillover typically occurs through customer education. The ESP Program component includes regular in-store promotional/educational events, but the number of customers reached relative to overall program sales is likely small. Additionally, the promotional events usually provide information designed to encourage customers to participate in one of Evergy's other energy efficiency programs, which would not constitute spillover if these customers ultimately did participate and receive a rebate. The implementor's field team educates customers regarding the incentives provided in the ESP Program; however, these are not explicitly quantified and therefore cannot provide reliable estimates of spillover. In addition, many retailers have restricted implementer's educational efforts due to the health implications associated with the Coronavirus pandemic.

Market effects may exist to some extent but disaggregating other Evergy Program influences from influences such as technological advances and other lighting discount programs across the country is difficult. The current ESP Program component covers a substantial share of the bulbs sold in the Missouri service territory, with no immediate plans for discontinuing the price markdowns.

Therefore, due to the difficulty of accurately estimating market effects and non-participant spillover, and the small savings expected to be attributable to these influences, neither effect was included in the Net-to-Gross ratio estimated for the 2021 ESP Program. The

net-to-gross estimate developed in this evaluation should be considered with these omitted effects in mind.

A.2.4 Final Net-to-Gross Ratio

The measure level net-to-gross ratio for discounted LEDs were calculated using the following equation:

Equation A-2: Net-to-Gross Ratio

$$NTGR = 1 - Free\ Ridership + Participant\ Spillover.$$

Using this formula, ADM calculated final net-to-gross ratios for each LED type in the 2021 program, as well as for the program overall. The results are shown in Table A-2 below.

Table A-2 Verified Gross and Net Impacts - ESP Program

Measure	Free Ridership Score	Participant Spillover	Net-to-Gross Ratio	Program Leakage
LED - Standard	47%	7%	60%	1.35%
LED - Specialty	46%	7%	61%	1.35%
Budget Locations*	-		100%	1.35%
Total	**43%**	**7%**	**64%**	**1.35%**

***** For program LEDs distributed through budget-retailers Dollar Tree, True Value, Habitat Restores, and Goodwill, ADM applied an assumed a NTGR of 100%.

A.3 Income Eligible Multifamily

The Net-To-Gross Ratio (NTGR) for the Income-Eligible Multi-Family Program is stipulated at 1.00, due to (1) the specific targeting of the low-income sector; and (2) the small contributions of the program to the overall portfolio saving, which do not justify the cost of conducting primary research needed to adjust the NTGR from stipulated values.

A.4 Home Energy Report & Online Energy Audit

Home Energy Reports directly estimates net impacts through a billing analysis that utilizes controls. No savings were claimed for Home Energy Audit.

A.5 Demand Response: Custom Business & Smart Thermostats

These programs directly estimate net impacts through a billing analysis that utilizes controls.

A.6 Pay As You Save

For PY2, ADM applied a designated NTG ratio of 1.0. Though the late launch of the program significantly limited customer surveying activities, this deemed value is supported by staff interviews and program design. For example, during conversations with program staff as a part of the program's process evaluation, staff reported that many of the customers who initially expressed interest in the program were ultimately not eligible to participate, as they had already installed cost-effective measures. This finding supports the program design strategy, which seeks to enroll customers who have a financial barrier to energy efficient product adoption and are therefore not typical early adopters (i.e., free riders). This design strategy coupled with the challenge of finding eligible customers supports a low level of free ridership in the program during PY2, therefore ADM chose to use a free ridership score of 0 (and correspondingly a NTG ratio of 1.0).

Appendix B Missouri Requirements for Impact Evaluation

In accordance with the Missouri Energy Efficiency Investment Act (MEEIA) Rules and the Stipulation and Agreement, Evergy Services, Inc. (ESI) (hereafter referred to as Evergy) on behalf of its affiliates Evergy MO West and Evergy Metro, has contracted with ADM Associates to evaluate, measure, and verify the information tracked by Evergy MO West and Evergy Metro for its portfolio of five residential programs, three demand response programs, and four products and services incubator programs for the 3-year program cycle beginning January 1, 2020 through December 31, 2022. Specific Evergy programs covered by this evaluation include:

Residential Programs:

- Heating Cooling & Home Comfort
- Energy Savings Products
- Income-Eligible Multi-Family
- Home Energy Report
    - Income-Eligible Home Energy Report: Metro Only
- Online Home Energy Audit

Demand Response Programs:

- Business Demand Response
- Residential Demand Response
- Business Smart Thermostats

Products & Services Incubator Programs:

- Pay As You Save
- Energy-Saving Trees
- Energy Efficiency Nonprofits
- HVAC Quality Install

In accordance with the Missouri Code of State Regulations 20 CSR 4240-22.070 (8) (Missouri regulations), Evergy is required to complete an impact evaluation for each program using one or both methods detailed below.

Impact evaluation methods 1: *At a minimum, comparisons of one (1) or both of the following types shall be used to measure program and rate impacts in a manner that is based on sound statistical principles:*

- Comparisons of pre-adoption and post-adoption loads of program or demand-side rate participants, corrected for the effects of weather and other inter-temporal differences; and
- Comparisons between program and demand-side rate participants' loads and those of an appropriate control group over the same period.

Load impact measurement protocols 2: *The evaluator shall develop load-impact measurement protocols that are designed to make the most cost-effective use of the following types of measurements, either individually or in combination:*

- Monthly billing data, hourly load data, load research data, end-use load metered data, building and equipment simulation models, and survey responses; or
- Audit and survey data on appliance and equipment type, size and efficiency levels, household characteristics, or energy-related building characteristics.

Table B-1 presents ADM's methods and protocols for the impact evaluation with the associated Missouri requirement.

Table B-1: Missouri Regulations Impact Evaluation Methods and Protocols

Sector	Program	Impact Evaluation Method	Impact Evaluation Protocol
Residential	Heating Cooling & Home Comfort	1A	2B
	Energy Saving Products	1A	2B
	Income-Eligible Multi-Family	1A	2B
	Home Energy Report	1B	2A
	Online Home Energy Audit	-	-
Demand Response	Business Demand Response	1A	2A
	Residential Demand Response	1B	2A
	Business Smart Thermostats	1B	2A
Products & Services Incubator	Pay As You Save	1A	2A
	Energy-Saving Trees	1A	2A
	Energy Efficiency Nonprofits	1A	2A
	HVAC Quality Install	1A	2A

Appendix C Heating, Cooling, and Home Comfort Program-Specific Methodologies

C.1 Program Overview

The Heating, Cooling, and Home Comfort Program provides educational and financial incentives to residential customers by increasing awareness and incorporation of energy efficiency into their homes, while also generating cost-effective energy and demand savings for Evergy. The program encourages home improvements that increase operational energy efficiency and home comfort. It consists of three primary components: 1) Energy Savings Kit, 2) Insulation and Air Sealing, and 3) HVAC as show in Table C-1.

The program seeks to provide financial incentives on a variety of categorically applicable measures and drive market adoption of energy efficient measures and practices through the education of customers and the community of local contractors. This program is eligible to customers that own or rent a residence or are building a new residence. HVAC contractors are also eligible for participation as trade allies for the program. In PY2, customers could receive the following eligible equipment upgrades:

Table C-1: Program Equipment Offered

Program Component	Measure
Energy Savings Kit*	LED Lightbulbs
	Faucet Aerators
	Low Flow Showerheads
	Pipe Insulation
	Advanced Power Strips
Insulation and Air Sealing	Attic/Ceiling Insulation
	Air Sealing
HVAC	Central AC
	Air Source Heat Pump
	Ground Source Heat Pump
	Ductless Mini-Split Heat Pump

*There were a small number of furnace filter alarms included in the Energy Savings Kit Program in 2021.

PY2 performance metrics are summarized in Table C-2. Overall, gross verified energy savings were close to the targeted value, while the gross verified peak demand savings exceeded the targeted value.

Table C-2: Performance Metrics - Heating, Cooling, and Home Comfort Program

Metric	PY2 Total	MO West	MO Metro
Number of Participants*	5,415		
Energy Savings (kWh)			
Targeted Energy Savings	12,582,480	7,767,640	4,814,841
Reported Energy Savings	10,591,013	6,796,548	3,794,464
Gross Verified Energy Savings	9,699,732	6,140,260	3,559,472
Net Verified Energy Savings	7,412,935	4,612,617	2,800,318
Peak Demand Reduction (kW)			
Targeted Peak Demand Reduction	5,617.19	3,392.19	2,225.00
Reported Peak Demand Reduction	7,022.35	4,361.07	2,661.28
Gross Verified Peak Demand Reduction	6,833.51	4,193.47	2,640.05
Net Verified Peak Demand Reduction	4,915.19	3,000.57	1,914.62
Benefit / Cost Ratios			
Total Resource Cost Test Ratio	1.03	1.02	1.04

*Represents the number of unique account numbers in the program

C.2 EM&V Methodology

This section provides an overview of the gross and net impact evaluation of the Heating, Cooling, and Home Comfort Program. Data collection included participant surveys, trade ally surveys, and in-depth interviews with program staff. Additional sources of data to inform the impact evaluation were a census of program tracking data from the program implementor's tracking and reporting system, along with requested project documentation. Program tracking data included customer contact information and descriptions of the measures installed.

C.2.1 Sampling Plan

Table C-3 summarizes the sample size for each primary data collection activity performed in 2021.

Table C-3: Sample Sizes for Data Collection Efforts

Data Collection Activity	Achieved Sample Size
Participant Surveys Completed	546
Trade Ally Surveys Completed	43
In-Depth Interviews with Program Staff	4

C.2.2 Data Collection

Participant Survey

Contact information from all PY2 program participants was pulled from the tracking data and included in the survey sample list. Starting in May 2021, any participant with a valid email address was sent the online participant survey. The online survey was then administered in monthly "waves" at the beginning of each month to the previous month's program participants. The last wave of the online survey was sent to participants in January 2022. A total of 1,932 participants were sent the online survey, which resulted in a total of 515 completed online participant surveys. A phone survey was administered in October 2021 to supplement the participant survey. A total of 263 participants were contacted via phone call to complete the survey, which resulted in a total of 31 completed phone participant surveys. There were a total of 546 completed participant surveys from both the online survey and phone survey.

Trade Ally Survey

An online survey consisting of a small sample of highly active trade allies was administered to assess program impacts on recommendations made to customers and collect additional feedback on the program. Contact information from all trade allies was pulled from the tracking data and included in the survey sample list. Any trade ally with a valid email address was sent the online trade ally survey in October 2021. A total of 173 trade allies were sent the online survey, which resulted in 43 survey completes.

Program Staff Interviews

In February 2022, program staff members from Evergy and the implementation contractor (ICF) were interviewed to obtain the program administrator's perspective on program processes and operations for the Heating, Cooling, and Home Comfort Program in PY2.

C.2.3 Gross Impact Methodologies

The method used to calculate and verify energy savings (kWh) and demand reduction (kW) consisted of:

- Program tracking data census. The tracking data was reviewed for a census of homes and measures. The data was verified for duplicate participation within the program and to ensure there were no discrepancies within the tracking data.
- Measure installation verification. In-service rates (ISR) were calculated by measure for a sample of program participants using data from the participant survey.
- HVAC efficiency verification. The AHRI data from a sample of approximately 150 HVAC units (70 central ACs, 40 air source heat pumps, 20 ground source heat pumps, and 20 ductless mini-split heat pumps) and from the program were pulled. The efficient SEER and EER values reported in the tracking data were then verified using the AHRI database for each unit.
- Reported savings review. Reported savings calculations were reviewed for all measures to determine the cause of savings discrepancies.
- Standard for verification of savings. The calculation of gross energy savings and demand impacts primarily relied on energy savings values and algorithms from the Evergy TRM. The data collected from the participant survey, along with program tracking data were used as inputs to the savings algorithms as listed in the Illinois Technical Reference Manual (IL TRM) as outlined in the Evergy TRM.

The gross energy savings and demand impacts algorithms as listed in the IL TRM are outlined in Appendix N.

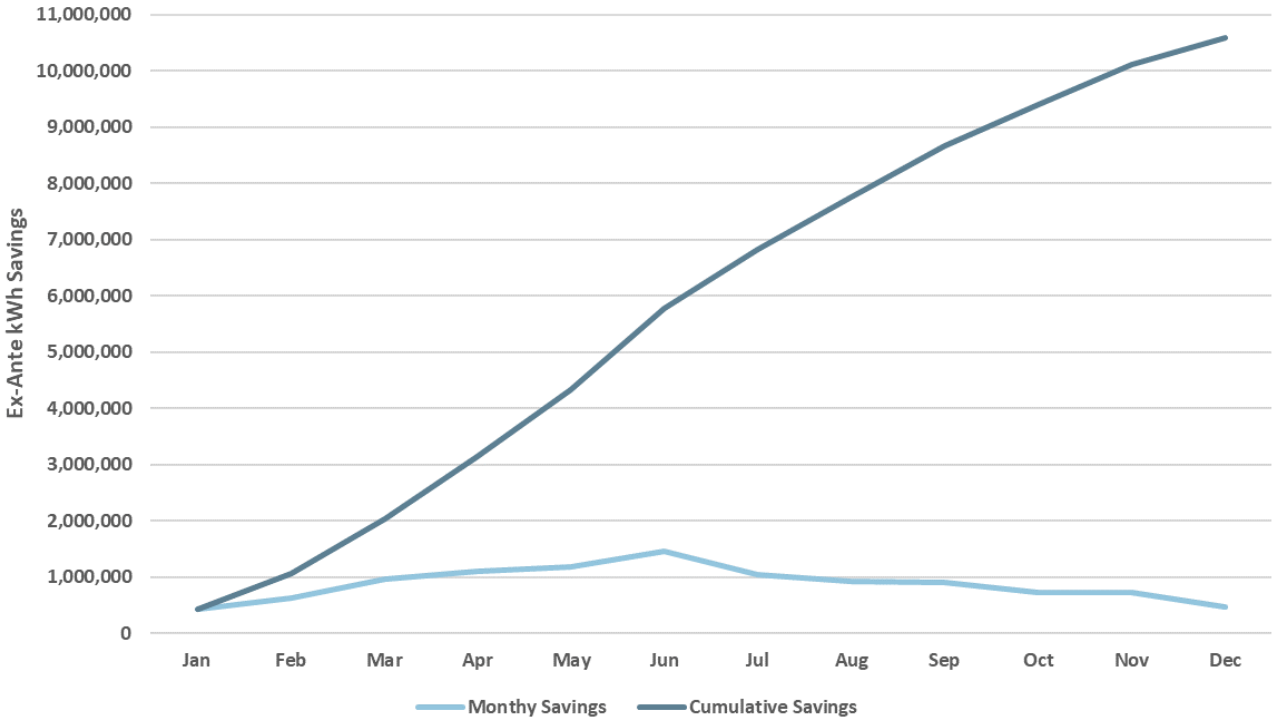
C.3 Gross Impact Evaluation Findings

This section details the level of program activity for PY2, the reported and verified gross savings that resulted from that activity Appendix N.

C.3.1 Program Activity

The Heating, Cooling, and Home Comfort Program in 2021 had 7,364 total projects installed as part of the program. Final energy savings were based on a total of 15,609 energy savings measures. Figure C-1 below details the savings accumulated over the program year.

Figure C-1: Cumulative Reported Energy Savings During the Program Year



C.3.2 Gross Energy Saving and Demand Reduction

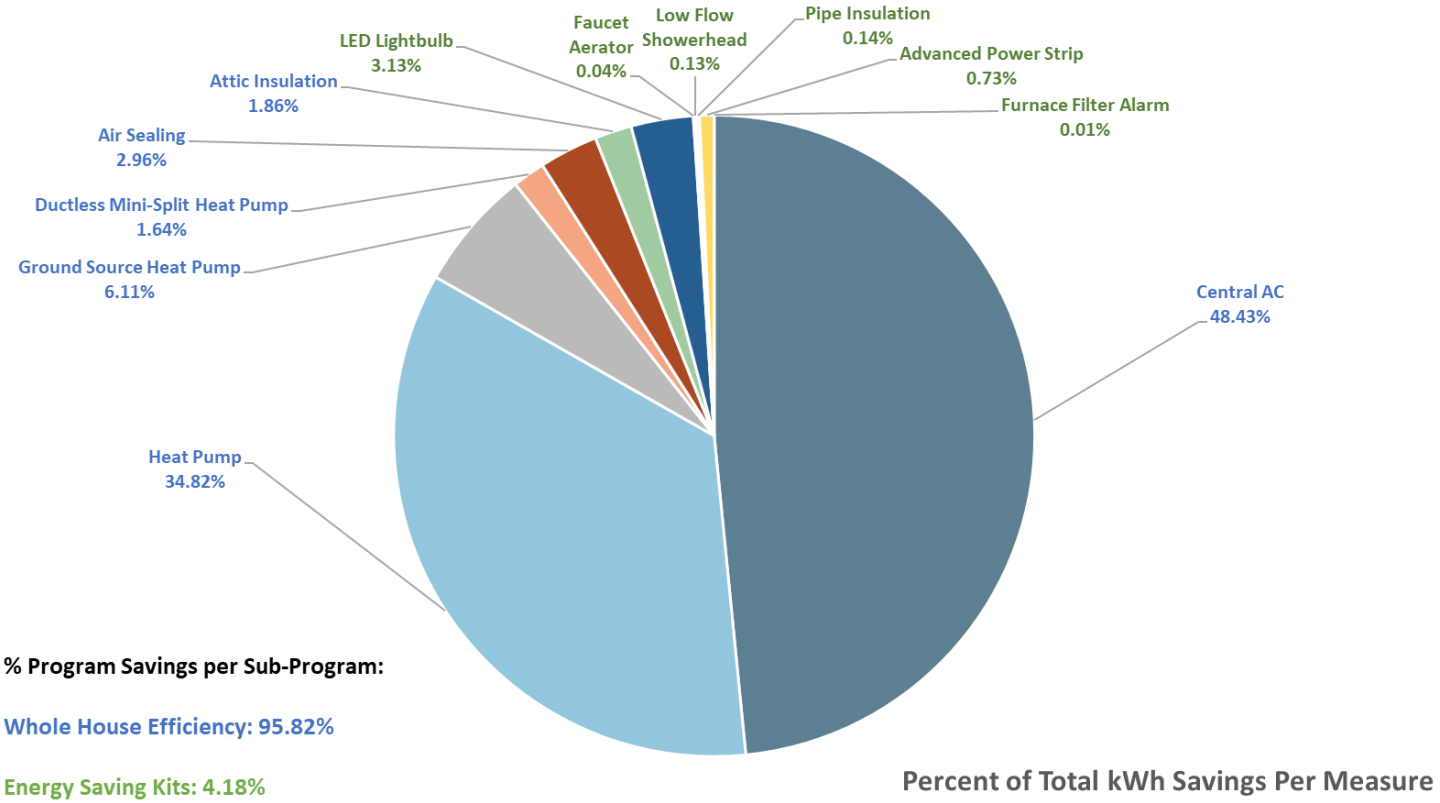
Based on the impact evaluation results, the total verified gross savings for the Heating, Cooling, and Home Comfort Program are 9,699,732 kWh, which resulted in a realization rate of 92 percent and 6,833.51 kW, which resulted in a realization rate of 97 percent. Table C-4 presents the gross verified energy and Demand Reduction and realization rates by measure.

Table C-4: Reported and Verified Gross Energy Savings & Demand Reduction

Measure	Reported Energy (kWh)	Gross Verified Energy (kWh)	Reported Demand (kW)	Gross Verified Demand (kW)	RR_{kWh}	RR_{kW}
Air Sealing	313,953	249,175	55.97	77.44	79%	138%
Attic Insulation	197,422	196,566	33.00	60.14	100%	182%
Central AC	5,128,759	5,060,419	5,667.55	5,593.05	99%	99%
Heat Pump	3,687,359	3,145,616	979.92	835.89	85%	85%
Ground Source Heat Pump	647,121	439,092	223.85	147.39	68%	66%
Ductless Mini-Split Heat Pump	173,806	173,339	6.88	68.30	100%	993%
LED Lightbulb	331,998	336,452	40.44	39.70	101%	98%
Faucet Aerator	4,147	2,458	2.72	0.63	59%	23%
Low Flow Showerhead	13,898	10,345	1.51	1.15	74%	76%
Pipe Insulation	14,903	14,017	1.71	1.60	94%	94%
Advanced Power Strip	77,044	71,651	8.60	8.04	93%	93%
Furnace Filter Alarm	601	601	0.18	0.18	100%	100%
Total	**10,591,013**	**9,699,732**	**7,022.35**	**6,833.51**	**92%**	**97%**

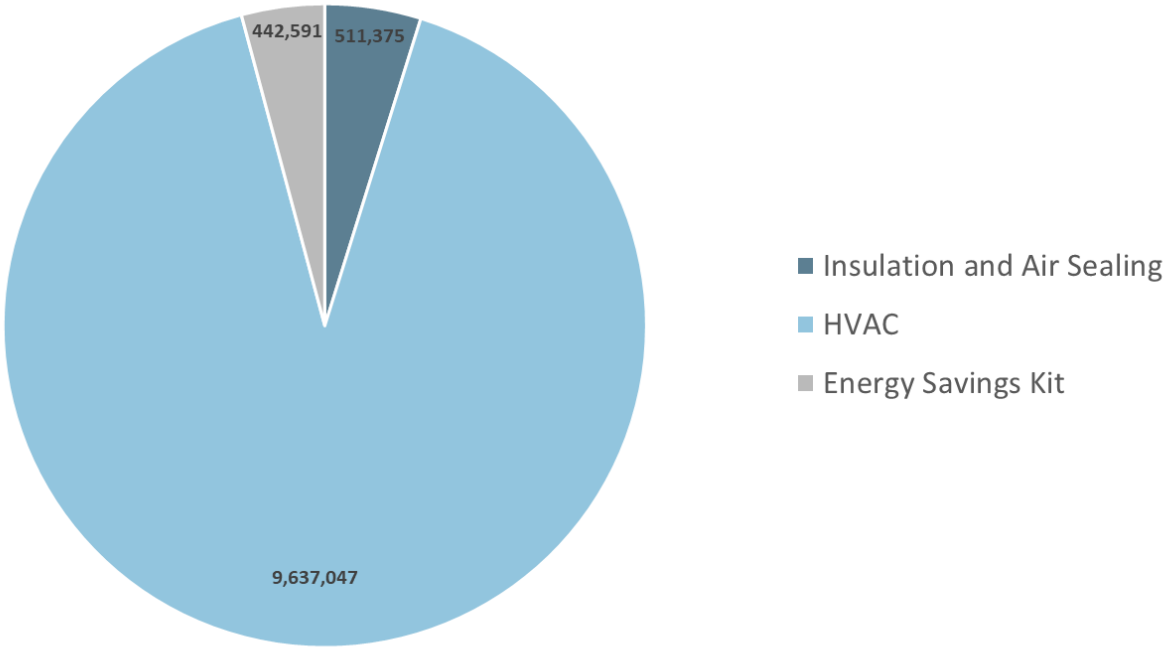
Figure C-2 shows the percentage of energy savings each measure contributed.

Figure C-2: Percent of kWh Savings Per Measure



A breakdown of the verified energy savings for the Insulation and Air Sealing, HVAC, and Energy Savings Kit sub-programs is show Figure C-3.

Figure C-3: Verified Energy Savings per Sub-Program



The gross impact analysis consisted of verifying measure installation and checking the program tracking data to ensure that savings algorithms were appropriately applied. ISRs for each measure type were developed based on the findings from the participant survey. The quantities and ISRs per measure are summarized in Table C-5.

Table C-5: Measure Quantities and ISRs

Measure Type	Quantity of Measures Reported	In-service Rate	Quantity of Measures Verified
Air Sealing	283	100%	283
Attic Insulation	369	100%	369
Central AC	3,866	100%	3,866
Heat Pump	655	100%	655
Ground Source Heat Pump	51	100%	51
Ductless Mini-Split Heat Pump	105	100%	105
LED Lightbulb	9,189	96%	8,824
Faucet Aerator	145	91%	132
Low Flow Showerhead	67	85%	57
Pipe Insulation	121	94%	114
Advanced Power Strip	748	93%	696
Furnace Filter Alarm	8	100%	8

For each measure in the program, total gross energy savings and demand reduction were determined as a product of the number of measures installed as part of the program and the gross savings per measure. A description of verified gross findings for each measure type is included below.

***LED Lightbulb*:** The energy savings for LED lightbulbs have a realization rate of 101 percent and the demand savings had a realization rate of 98 percent. The difference in kWh and kW savings between the reported savings calculations and verified savings calculations is a result of the reported savings calculations using 9W for the efficient wattages and 43W for all baseline wattages for all lightbulbs in the program, as well as the same hours of use. The verified calculations matched the reported calculations for all 9W bulbs, but are using different baseline wattages, efficient wattages, and hours of use for the 5W, 6W, and 8W specialty bulbs as per the IL TRM. An ISR of 96 percent was applied to the overall energy and demand savings.

Faucet Aerator: The energy savings for faucet aerators have a realization rate of 59 percent and the demand savings have a realization rate of 23 percent. The difference in kWh and kW savings between the reported savings calculations and verified savings calculations is a result of the reported savings calculations using a value of 2.56 for the number of persons per household for all faucet aerators in the program and a value of 2.83 for faucets per household for all bathroom faucet aerators in the program. The

verified savings calculations used a value of 2.56 persons per household and 2.83 faucets per household for single-family and 2.1 persons per household and 1.5 faucets per household for multi-family as per the IL TRM. Another difference in savings is due to the reported savings calculations using a value of 1 gallon per minute (GPM) for all bathroom faucet aerators in the program. The verified savings calculations used the actual faucet efficiency reported in the tracking data, which is 1.5 GPM. An ISR of 91 percent was applied to the overall energy and demand savings.

***Low Flow Showerhead*:** The energy savings for low flow showerheads have a realization rate of 74 percent and the demand savings have a realization rate of 76 percent. The difference in kWh and kW savings between the reported savings calculations and verified savings calculations is a result of the reported savings calculations using a value of 2.56 for the number of persons per household and a value of 1.79 for showerheads per household for all low flow showerheads in the program. The verified savings calculations used a value of 2.56 persons per household and 1.79 showerheads per household for single-family and 2.1 persons per household and 1.3 showerheads per household for multi-family as per the IL TRM. An ISR of 85 percent was applied to the overall energy and demand savings.

Pipe Insulation: The energy savings for hot water pipe insulation have a realization rate of 94 percent and the demand savings have a realization rate of 94 percent. The adjustment to the energy and demand savings realization rates was strictly based on the in-service rate (ISR), which was determined from self-reported data collected from the participant survey. An ISR of 94 percent was applied to the overall energy and demand savings.

***Advanced Power Strip*:** The energy savings for advanced power strips have a realization rate of 93 percent and the demand savings have a realization rate of 93 percent. The adjustment to the energy and demand savings realization rates was strictly based on the in-service rate (ISR), which was determined from self-reported data collected from the participant survey. An ISR of 93 percent was applied to the overall energy and demand savings.

***Furnace Filter Alarm*:** The energy savings for advanced power strips have a realization rate of 100 percent and the demand savings have a realization rate of 100 percent. An ISR of 100 percent was applied to the overall energy and demand savings.

Air Sealing: The energy savings for air sealing have a realization rate of 79 percent and the demand savings have a realization rate of 138 percent. The difference in kWh savings between the reported savings calculations and verified savings calculations is a result of the reported savings calculations using a default of electric heating system type for all air sealing projects in the program. As per the IL TRM, heating kWh savings are calculated differently based on the home's heating system fuel type (gas or electric). The verified savings calculations use the actual heating system fuel type to calculate heating kWh

savings per project. Another difference in savings is due to the reported savings calculations using a default nCool (cooling coefficient) of 13,000 (assumes a 13 SEER unit), while the verified savings calculations use the unit SEER based on the existing cooling system (14 SEER for heat pumps and 13 SEER for central ACs) as per the IL TRM. Also, the reported savings calculations use an average CDD and HDD based on data from all major cities in Missouri, while the verified calculations are using the CDD and HDD based on the closet major city. The difference in kW savings is a result of the reported savings calculations using a CF of 70 percent, which assumes a mixture of heat pumps and central ACs (as stipulated in the Evergy TRM), while the verified savings calculations use a CF based on the baseline cooling system (68 percent for central AC and 72 percent for heat pumps) as per the IL TRM. An ISR of 100 percent was applied to the overall energy and demand savings.

Attic/Ceiling Insulation: The energy savings for attic/ceiling insulation have a realization rate of 100 percent and the demand savings have a realization rate of 182 percent. The difference in kW savings is a result of the reported savings calculations using a CF of 70 percent, which assumes a mixture of heat pumps and central ACs (as stipulated in the Evergy TRM), while the verified savings calculations use a CF based on the baseline cooling system (68 percent for central AC and 72 percent for heat pumps) as per the IL TRM. An ISR of 100 percent was applied to the overall energy and demand savings.

Central Air Conditioner: The energy savings for central air conditioners have a realization rate of 99 percent and the demand savings have a realization rate of 99 percent. The slight difference in kWh and kW savings between the reported savings calculations and verified savings calculations is a result of the verified savings calculations using default assumptions for any missing inputs in the program tracking data, including existing cooling/heating system type, home heating fuel type, efficient unit measurements (including SEER, EER, and capacity), which is affecting the overall savings by approximately 1 percent. An ISR of 100 percent was applied to the overall energy and demand savings.

Air Source Heat Pump: The energy savings for air source heat pumps have a realization rate of 85 percent and the demand savings have a realization rate of 85 percent. The difference in kWh savings between the reported savings calculations and verified savings calculations is a result of the reported savings calculations using a HSPF baseline of 5.54 for all units in the program (as stipulated by the Evergy TRM), while the verified savings calculations use an HSPF baseline of 8.2 for all units in the program as per the IL TRM. Another difference in kWh savings is due to the reported savings calculations including cooling savings for any unit in the program (early replacement or time of sale) that does not have an existing cooling system. The verified savings calculations only include heating savings for any unit in the program (early replacement or time of sale) that does not have an existing cooling system. The difference in kW savings is a result of the

reported savings calculations using a CF of 72 percent, which assumes a mixture of heat pumps and central ACs (as stipulated in the Evergy TRM), while the verified savings calculations use a CF based on the house type (72 percent for single-family and 67 percent for multi-family) as per the IL TRM. It is important to note that the verified savings calculations use default assumptions for any missing inputs in the program tracking data, including existing cooling/heating system type, home heating fuel type, efficient unit measurements (including SEER, EER, and capacity), which is affecting the overall kWh and kW savings. An ISR of 100 percent was applied to the overall energy and demand savings.

Ground Source Heat Pump: The energy savings for ground source heat pumps have a realization rate of 68 percent and the demand savings have a realization rate of 66 percent. The difference in kWh savings between the reported savings calculations and verified savings calculations is a result of the reported savings calculations including cooling savings for any unit in the program (early replacement or time of sale) that does not have an existing cooling system. The verified savings calculations only include heating savings for any unit in the program (early replacement or time of sale) that does not have an existing cooling system. Differences in both kWh and kW savings are a result of the reported savings calculations using a value of 11.8 for the baseline EER for all units in the program. The verified savings calculations use a baseline EER value based on the existing cooling system type as per the IL TRM (11.8 EER for air source or ground source heat pumps and 11 EER for central ACs). It is important to note that the verified savings calculations use default assumptions for any missing inputs in the program tracking data, including existing cooling/heating system type, home heating fuel type, efficient unit measurements (including SEER, EER, and capacity), which is affecting the overall kWh and kW savings. An ISR of 100 percent was applied to the overall energy and demand savings.

Ductless Mini-Split Heat Pump: The realization rate for ductless mini-split heat pumps was 100 percent for energy savings and 993 percent for demand savings. The difference between the reported savings calculations and verified savings calculations are the reported calculations use default energy and demand savings values for all units in the program, which are directly from the Evergy TRM and not based on the size/efficiency of the unit. The verified savings calculations use savings algorithms from the IL TRM and are based on the size/efficiency per unit. The verified savings calculations do not include cooling savings (only heating savings) for any unit in the program (early replacement or time of sale) that does not have an existing cooling system as stipulated by the IL TRM.[4] It is also important to note that the verified savings calculations use default assumptions

[4] The IL TRM v7, Page 138 states “Note that in order to claim cooling savings, there must be an existing air conditioning system.”

for any missing inputs in the program tracking data, including existing cooling/heating system type, home heating fuel type, efficient unit measurements (including SEER, EER, and capacity). An ISR of 100 percent was applied to the overall energy and demand savings.

C.4 Net Savings Evaluation Findings

Survey data from a total of 546 survey participants were used to determine the NTG ratio for this program. The data collection methodology for the participant survey is outlined in Section C.2.2. A census of participants from the program were surveyed in order to ensure the maximum number of survey complete for each measure type could be achieved. Table C-6 below shows the number of survey completes per measure compared to the measure quantity in the total population.

Table C-6: Completed Survey Measure Totals Compared to Population

Measure Type	Number of Survey Completes	Quantity of Measures (Population)	Percent of Population
Air Sealing	7	283	2.47%
Attic Insulation	15	369	4.07%
Central AC	229	3,866	5.92%
Heat Pump	57	655	8.70%
Ground Source Heat Pump	5	51	9.80%
Ductless Mini-Split Heat Pump	2	105	1.90%
LED Lightbulb	138	9,189	1.50%
Faucet Aerator	64	145	44.14%
Low Flow Showerhead	60	67	89.55%
Pipe Insulation	116	121	95.87%
Advanced Power Strip	121	748	16.18%
Furnace Filter Alarm	0	8	0.00%

Survey respondents were asked a series of questions aimed at determining the program influence on the purchase and installation decisions for each installed measure. The measure-level free ridership of each participant was weighted by the measure energy savings and the measure installation month to determine the project-level free ridership score. This score was applied to the other measures where a survey response was not obtained.

The survey also included questions related to their retail purchase or contractor installation of similar products offered by the program to determine participant and nonparticipant spillover. A total of 38 program participants and 229 non-participants claimed to have installed energy-efficient equipment/upgrades without receiving additional rebates or incentives but were installed based on program influence. Spillover savings for both like and non-like measures were calculated and then extrapolated to the population of respondents, which resulted in overall spillover of 2 percent for participants and 14 percent for non-participants.

For the Energy Savings Kit sub-program all LED lightbulbs, faucet aerator, low flow showerhead, pipe insulation, and advanced power strip measures were assigned a free ridership score of 0 to any project in the program within a low-income zip code. For the attic/ceiling insulation, air sealing, ground source heat pump, and ductless mini-split heat pump measures, a free ridership score of 0 was assigned to all projects in the program due to the participant survey counts being too low for those measures to validate using the calculated free ridership numbers. All central AC, heat pump, and Energy Savings Kit (non-low income) measures were assigned a free ridership score based on the actual survey responses and calculated according to NTG Approaches by Program.

The overall free ridership score was 40%. The measure score was weighted and rolled up into the project level score and applied to the verified gross savings for the projects without a survey response. The sum of the verified net project savings over the total verified gross savings resulted in an overall NTG ratio of 76%.

C.5 Impact Evaluation - Final Savings Tables

Based on the impact evaluation results, the total verified gross savings for the Heating, Cooling, and Home Comfort Program are 9,699,732 kWh and 6,833.51 kW and the total verified net savings are 7,412,935 kWh and 4,915.19 kW. A summary of gross and net verified energy savings and demand reduction is shown in Table C-7, Table C-8 and Table C-9. The Heating, Cooling, and Home Comfort Program had an overall realization rate of 92 percent for energy savings and 97 percent for peak demand savings.

Table C-7: Program Gross Energy Savings (kWh) and Peak Demand Reduction (kW)

Jurisdiction	Reported Energy Savings (kWh)	Reported Demand Reduction (kW)	Gross Verified Energy Savings (kWh)	Gross Verified Demand Reduction (kW)	RR_{kWh}	RR_{kW}
MO West	6,796,548	4,361.07	6,140,260	4,193.47	90%	96%
MO Metro	3,794,464	2,661.28	3,559,472	2,640.05	94%	99%
Total	**10,591,013**	**7,022.35**	**9,699,732**	**6,833.51**	**92%**	**97%**

Table C-8: Verified Gross and Net Energy Savings (kWh)

Jurisdiction	Spillover (Participant)	Spillover (Non-Participant)	Free Ridership	NTG Ratio	Gross Verified Energy Savings (kWh)	Net Energy Savings (kWh)
MO West	2%	14%	41%	75%	6,140,260	4,612,617
MO Metro	2%	14%	37%	79%	3,559,472	2,800,318
Total			**40%**	**76%**	**9,699,732**	**7,412,935**

Table C-9: Verified Gross and Net Peak Demand Reduction (kW)

Jurisdiction	Spillover (Participant)	Spillover (Non-Participant)	Free Ridership	NTG Ratio	Gross Verified Demand Reduction (kW)	Net Energy Savings (kW)
MO West	2%	14%	44%	72%	4,193.47	3,000.57
MO Metro	2%	14%	43%	73%	2,640.05	1,914.62
Total			**44%**	**72%**	**6,833.51**	**4,915.19**

A breakdown of energy savings and demand by measure is included in Table C-10.

Table C-10: Gross and Net Verified Energy Savings & Demand Reduction Per Measure

Measure	Gross Verified Energy Savings (kWh)	Gross Verified Demand Reduction (kW)	Net Verified Energy Savings (kWh)	Net Verified Demand Reduction (kW)	NTG_{kWh}	NTG_{kW}
Air Sealing	249,175	77.44	289,392	89.93	116%	116%
Attic Insulation	196,566	60.14	228,291	69.85	116%	116%
Central AC	5,060,419	5,593.05	3,478,052	3,844.47	69%	69%
Heat Pump	3,145,616	835.89	2,305,772	613.33	73%	73%
Ground Source Heat Pump	439,092	147.39	509,961	171.18	116%	116%
Ductless Mini-Split Heat Pump	173,339	68.30	201,316	79.32	116%	116%
LED Lightbulb	336,452	39.70	297,622	35.08	88%	88%
Faucet Aerator	2,458	0.63	2,653	0.68	108%	107%
Low Flow Showerhead	10,345	1.15	10,630	1.18	103%	102%
Pipe Insulation	14,017	1.60	14,571	1.66	104%	104%
Advanced Power Strip	71,651	8.04	73,977	8.30	103%	103%
Furnace Filter Alarm	601	0.18	698	0.21	116%	116%
Total	**9,699,732**	**6,833.51**	**7,412,935**	**4,915.19**	**76%**	**72%**

C.6 Process Evaluation

C.6.1 Program Operations

ADM conducted in-depth interviews with the program managers and EM&V manager from Evergy and the residential program manager from ICF. The purpose of the in-depth interviews is to understand better the Heating, Cooling, and Home Comfort program design, operations, challenges, and future opportunities.

Roles and Responsibilities

The role and responsibilities of each program staff member are listed below:

- The Evergy program managers manage the energy-efficient DSM team and work directly with ICF to support the Energy Savings Kits and the HVAC and insulation, and air sealing portions of the Heating, Cooling, and Home Comfort Program.
- The Evergy M&V manager ensures the evaluation is done following Missouri rules and achieving set DSM goals.
- The ICF residential program manager is responsible for managing the day-to-day operations of the Heating, Cooling, and Home Comfort Program, which includes

monitoring the HVAC and insulation, and air sealing portions of the program while working together with the Evergy program staff who manages the Energy Savings Kit portion of the program.

Program Design

Due to pandemic restrictions, the Energy Savings Kit sub-program and home energy assessments went virtual in 2020. The option to have in-home assessments opened up early in 2021. About 70 percent of assessments were performed in person in 2021. A form is filled out during an energy assessment on the software, Read. The form helps ICF collect data on the customer's house and make recommendations to improve their energy efficiency. ICF emails the customer the report from the reading before the assessment is complete to confirm they received it. At the end of the assessment, ICF discusses which items the customer would like for their energy savings kit. Such items include showerheads and different types of LEDs. If the assessment is done virtually, the kits are dropped off at the customer's home by ICF to install themselves. A small number of customers live outside a reasonable driving distance, so they are mailed their kits. A card with a 1-800 number is included with these kits if the customer has any general or installation questions.

Test-in and test-out assessments are required for the air sealing measure as part of the program. ICF's trade ally, the energy auditor, performs these assessments. ICF could not be present during assessments in 2020 due to pandemic restrictions, but they were able to return to being present during these assessments after the first quarter in 2021. Assessments are sent in a report after the improvements are made. The report provides energy savings to the energy auditor's customers. The energy auditors use one of three software to develop these savings: Snugpro, RemDesign, or Compass/Surveyor.

The rebates checks are usually (about 75 percent of projects) sent directly to the homeowners and are delivered within four to six weeks. The rebate can also be reassigned to the trade ally. In this case, a form is filled out and signed by the homeowner or accounting group, and the rebated amount is used as an instant discount off the customer’s invoice.

Along with kWh and kW savings goals, the program also has non-energy, non-peak reduction goals. These goals add stakeholder value through additional earning opportunity metrics in place and agreed on with the Public Service Commission: carbon emission reductions, customer satisfaction, customer equity, and a focus on low-income customers. According to Evergy, the program is well structured to meet those goals.

Program Performance

Communication between program staff remains effective due to conducting regular weekly, monthly, and quarterly meetings with program updates. The program has

consistent structures in place with rebate distribution, a well-developed internal marketing team, and continued trade ally support with ICF's outreach team.

The ICF outreach team oversees a group of about 250 HVAC trade allies and 9 insulation and air sealing trade allies (Energy Auditors).

Program Participation and Marketing

Evergy has an internal marketing staff that develops all customer-facing advertising and marketing. This marketing is done digitally through social media, email campaigns, and the Evergy website with pop-up ads and banners. ICF manages and provides support for the trade ally outreach with quarterly contacts.

Evergy provides LEDs as an added value to both community events and at their Evergy Connect Center, located in the urban core downtown of Kansas City. Evergy participated in five community events in various, low-income locations throughout Kansas City and Missouri in 2021. These events focused on educating the public on energy efficiency and allowing them an opportunity to sign up for energy-efficient programs. Evergy provided the event with bags containing two to four LEDs each for community members to take home with them. The Evergy Connect Center is an in-person billing center where customers can come if they have questions about billing or their usage. Customers can take home two LEDs per person at this center.

Communication

Weekly action items and 4 DX meetings (four disciplines of execution to track success rates) are held by ICF staff. ICF then communicates with the program manager at Evergy, who in turn relays information upward to the senior director of the division. Evergy also conducts quarterly meetings with external stakeholders.

Data Tracking and Quality Assurances and Controls (QA/QC)

Trade Allies use the online intake tool (OIT) to apply for rebates. The OIT uploads the basic information of what was done at the project site into SightLine. The processor at ICF checks the SightLine data, and if there are no flaws to the application, the application is rechecked by an automated process before a rebate is assigned.

Each sub-program has different requirements that have been negotiated with ICF and Evergy about the level of QA/QC. ICF has a goal to complete 45 project verifications during the summer and 25 in winter.

HVAC Equipment QA/QC: ICF sends emails to participants with completed projects to solicit volunteers to inspect their units. These verification visits are primarily completed virtually. HVAC customers are asked to send photographs of their model numbers to confirm that the unit installed is the unit that their system says was installed.

Air sealing and Insulation QA/QC: ICF randomly visits sites while the trade ally is present to ensure that the level of customer service is correct with the client. Pictures of the insulation installed are taken next to an R ruler to compare with paperwork and confirm accuracy.

Energy Savings Kit QA/QC: The kits are delivered to participants directly by ICF (and, in some cases, mailed to the customers[5]).

Challenges for Program

The greatest challenge for all aspects of the program has been the adaptation of having to conduct virtual interactions as opposed to in-person. The in-person installations and energy assessments are more effective than virtual because installation rates can be assured. After the first quarter of 2021, ICF was able to continue in-person assessments and installs, although some customers are still weary of allowing them into their homes. Trying to engage trade allies virtually can be much more challenging than in-person meetings where the focus of the trade ally is undivided. The outreach teams are planning on coordinating more in-person meetings with trade allies in 2022.

C.6.2 Participant Survey

Participants were surveyed to verify the measures they had installed as part of the program. Participants were also surveyed on decision making, installation of additional measures, experience with the program, program satisfaction, and household demographics.

Program Experience

The majority of participants (54 percent) first learned about the rebates/discounts offered by Evergy through their contractor/Energy Auditor. A breakdown of all program awareness sources is shown in Table C-11.

Table C-11: Program Awareness

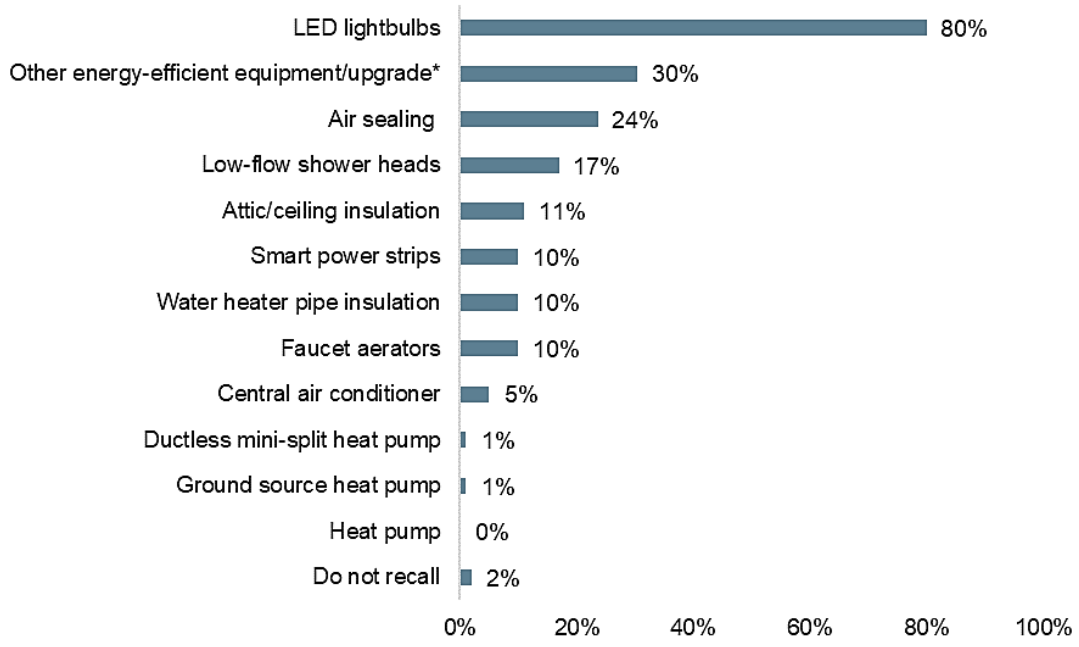
Response	Percent of Responses (n = 531)
Contractor/Energy Auditor	54%
Evergy website	13%
Bill inserts	7%

[5] When customers live outside a reasonable driving distance or if the home assessment is conducted virtually.

Email	5%
Social media or other online ads	5%
Family, friend, or neighbor (word-of-mouth)	4%
Flyer in the mail	2%
Community event	2%
General online search	2%
Evergy call center referral	2%
Connect center referral	1%
Television/radio/media coverage	1%
Spire website	0%
Other sources (Groupon, previously participated)	1%
Don't know	2%

Participants were surveyed regarding installing additional energy-efficient equipment/upgrades. Two hundred and fifty participants claimed to purchase additional equipment or improvements. LED lightbulbs (80 percent) were the most commonly installed additional energy-efficient equipment. A breakdown of all the reported installed additional energy-efficient equipment/upgrades is shown in Figure C-4.

Figure C-4: Installation of Additional Energy-Efficient Equipment/Upgrades

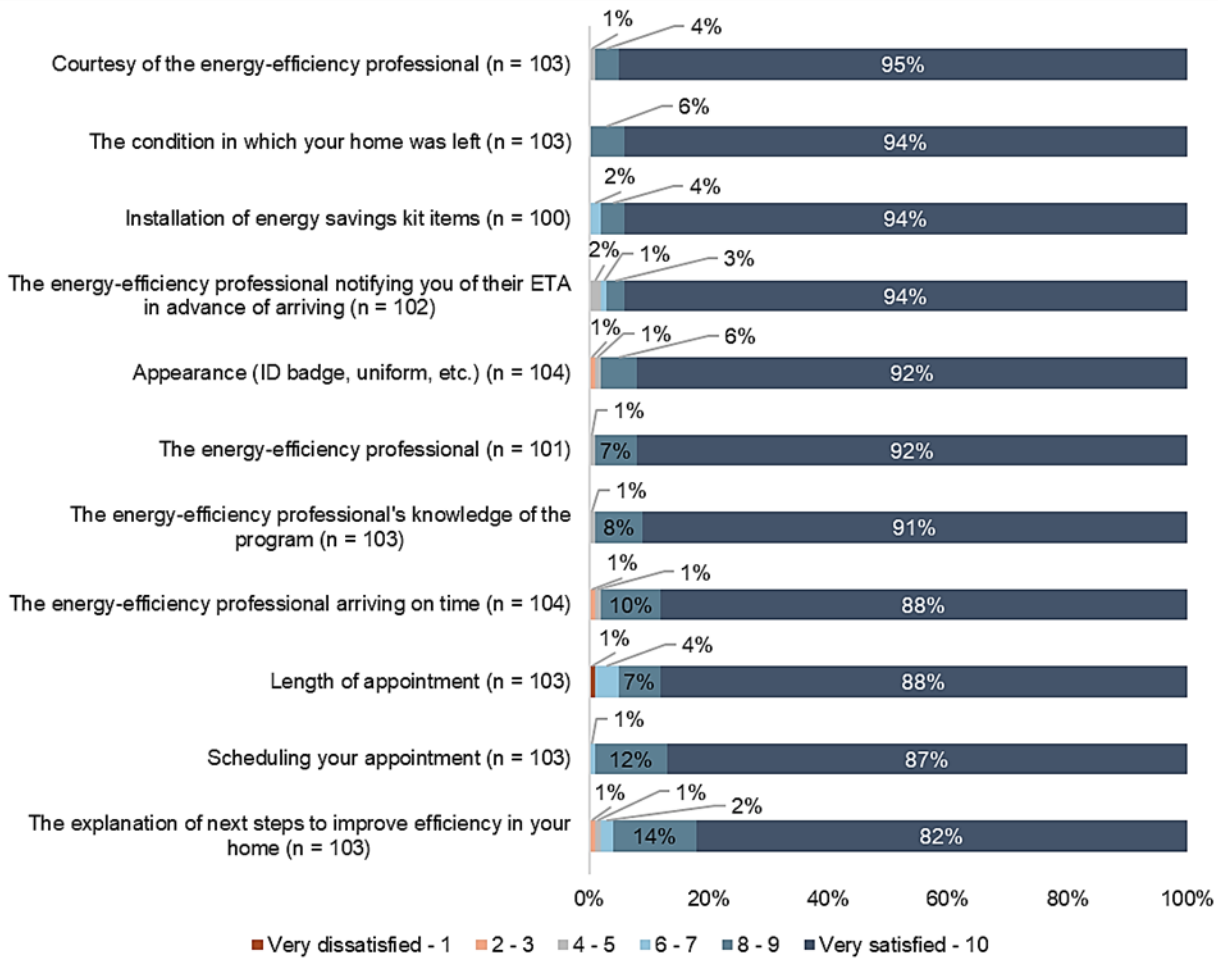


**Other energy-efficient equipment included water heaters, furnaces, kitchen appliances, insulation, windows/doors, solar, lights, and filters.*

Program Satisfaction

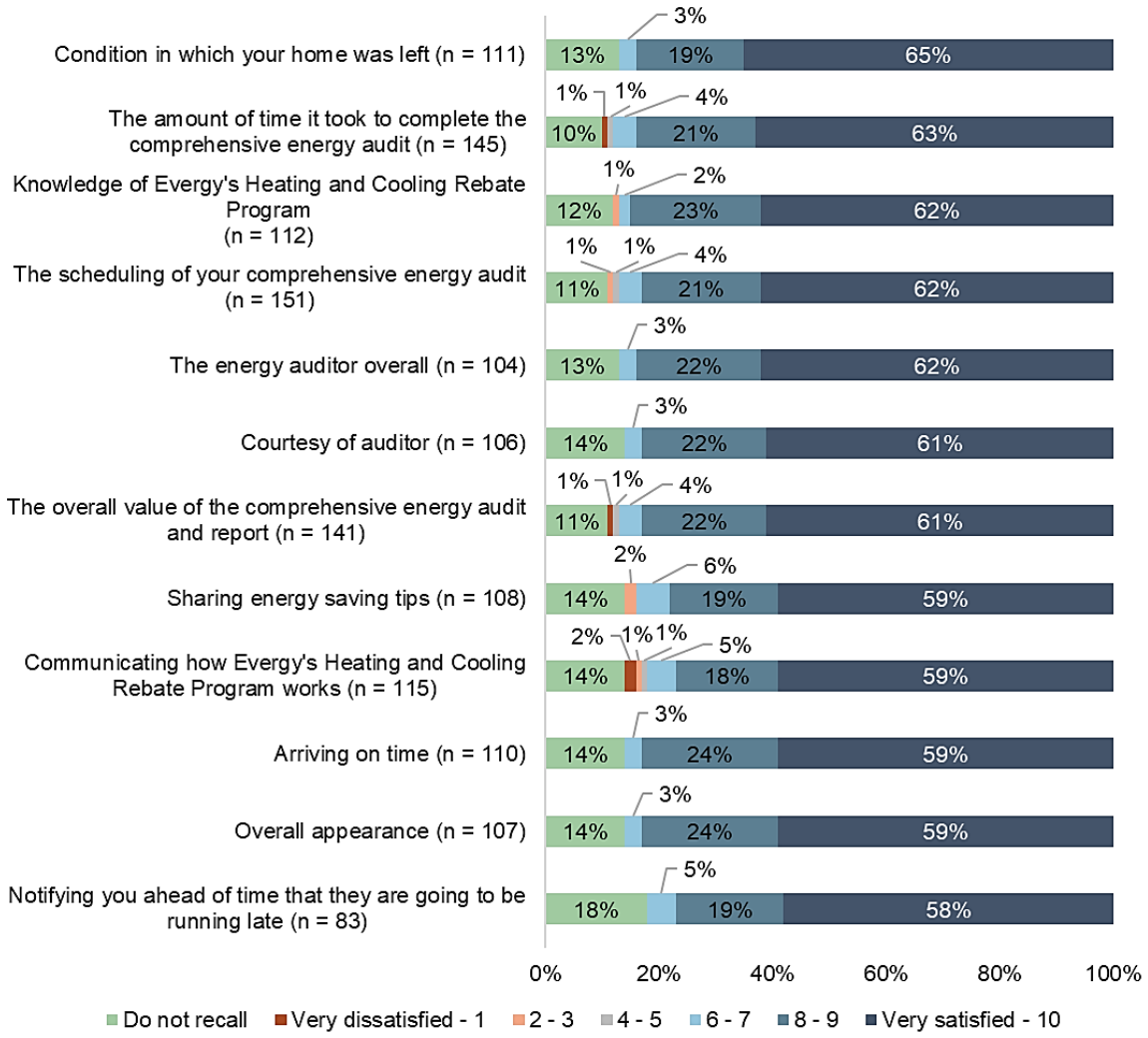
Participants were surveyed on their satisfaction with different aspects of receiving their Energy Savings Kit (Figure C-5). The highest reported satisfaction ratings came from interactions with the energy-efficiency professional once the appointment had started (95 percent) and the condition in which the participant's home was left (94 percent). The lowest rated aspects came from explaining the participant's next steps to improve efficiency in their home (82 percent), scheduling the appointment (87 percent), and the appointment length (88 percent). Finally, participants were asked to rate the usefulness of the post-appointment report. Most (99 percent) participants stated they were helpful.

Figure C-5: Participant Satisfaction with Receiving the Energy Savings Kit



Participants were also surveyed on their satisfaction of their comprehensive energy audit and their energy auditor (see Figure C-6). The highest reported satisfaction ratings came from the condition in which the participant's home was left (65 percent). The lowest rated aspect came from communicating how the program worked. All participants who communicated with Evergy or ICF staff reported being satisfied with their interactions.

Figure C-6: Participant Satisfaction with Receiving the Energy Savings Kit



When asked about their satisfaction with the rebate, 92 percent of participants were satisfied with the timeliness in receiving their rebate, and 89 percent of participants were satisfied with the rebate amount. The Heating, Cooling, and Home Comfort Program was well-received by participants with the overall satisfaction of 97 percent.

Home Demographics

Program participants provided feedback regarding their homes' characteristics, starting with the type of home they live. Most survey respondents (92 percent) owned their homes and 89 percent reported living in a detached single-family home. The survey data suggests participants' income ranged mainly between $50,000 to less than $150,000. Table C-12 and Table C-13 summarize all the household demographic results.

Table C-12: Home Characteristics

Home Characteristics	Percentage of Respondents (n = 526)
Single-family home, detached construction	89%
Townhome or duplex	6%
Apartment	1%
Preferred not to answer	4%
Square feet of home	**Percentage of Respondents (n = 529)**
Less than 1,000 square feet	7%
1,000-1,999 square feet	43%
2,000-2,999 square feet	25%
3,000-3,999 square feet	12%
4,000-4,999 square feet	2%
5,000 or greater square feet	2%
Did not know/Preferred not to answer	9%
Year Built	**Percentage of Respondents (n = 530)**
Before 1960	26%
1960 to 1969	12%
1970 to 1979	12%
1980 to 1989	7%
1990 to 1999	13%
2000 to 2009	20%
2010 to 2019	2%
2020 or newer	1%
Did not know/Preferred not to answer	7%
Main fuel source for heating in the home	**Percentage of Respondents (n = 530)**
Natural Gas	63%
Electricity	30%
Propane	2%
Did not know/Preferred not to answer	5%

Note: The sum of percentages may exceed 100% due to rounding.

Table C-13: Characteristics of Household

Own or Rent	Percentage of Respondents (n = 530)
Own	92%
Rent	6%
Preferred not to answer	2%
Number of people per household	**Percentage of Respondents (n = 528)**
1-2 people	55%
3-4 people	28%
5-6 people	8%
Preferred not to answer	8%
Household income before taxes	**Percentage of Respondents (n = 529)**
Less than $10,000	3%
$10,000 to less than $20,000	2%
$20,000 to less than $30,000	5%
$30,000 to less than $40,000	5%
$40,000 to less than $50,000	5%
$50,000 to less than $75,000	13%
$75,000 to less than $100,000	11%
$100,000 to less than $150,000	12%
$150,000 to less than $200,000	4%
$200,000 or more	6%
Did not know/Preferred not to answer	34%
Household education levels	**Percentage of Respondents (n = 530)**
Some high school	1%
High school graduate or GED equivalent	11%
Some college	16%
Associate degree	6%
Bachelor's degree	35%
Master's Degree	18%
Professional degree (MD, JD, DDS)	4%
Doctorate degree (Ph.D., D.Sc.)	2%
Preferred not to answer	8%

Note: The sum of percentages may exceed 100% due to rounding.

C.6.3 Trade Ally Survey

Trade allies were surveyed on their company information, program awareness and involvement, program procedures, customer interactions, program influence, and the market.

The majority of trade allies have been participating in utility-funded energy-efficiency programs for less than 10 years (60 percent) and the most common reasons trade allies decided to participate in the program was to be able to pass discounts/rebates onto customers (89 percent), to improve home efficiency for customers (64 percent), and to improve sales (61 percent). While only 31 percent of trade allies reported receiving training for the program in 2021, all respondents (100 percent) reported that the training was helpful. The trade allies were surveyed about their interactions and satisfaction with ICF program staff. Eighty-three percent of trade allies reported that the ICF program staff are very professional. Trade allies reported that the ICF program staff are very easy to reach when they have questions (83 percent) and respond very quickly to their emails/phone calls when trying to communicate with ICF program staff (83 percent). The majority of trade allies (75 percent) reported that the ICF program staff keeps them informed about the program

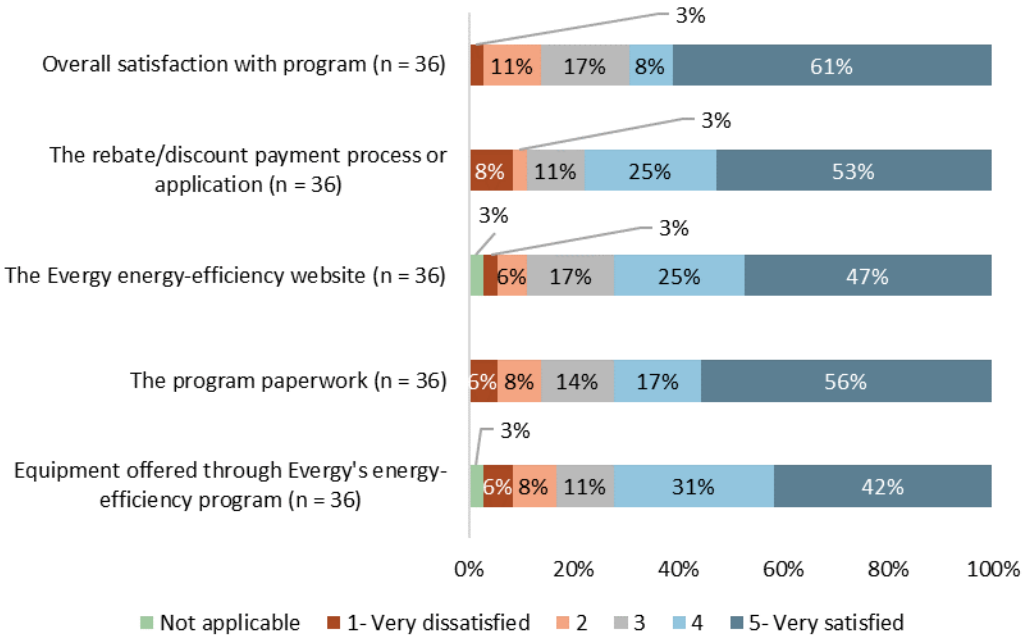
Trade allies were surveyed on their interactions with customers. The majority (81 percent) said that they initially present high efficiency options and equipment to customers when they first interact with them. Trade allies reported that the discount/rebate amount (50 percent) is the primary reason customers typically give for not wanting to participate in the program. The main benefits customers receive by participating in the program according to the trade allies were as higher efficiency equipment (36 percent) and lower utility bills (31 percent). The majority of trade allies (75 percent) rated the Evergy energy-efficiency discount/rebate program as a 5 or higher on a scale of 0 to 10 in influencing their level of marketing and selling of energy-efficient measures to Evergy customers during 2021. Half of the trade allies (50 percent) said they would have recommended different equipment types, quantities, or efficiency levels to customers if the program were not available.

The majority of respondents (61 percent) reported that Evergy's energy-efficiency rebate program has somewhat or greatly increased the number of home energy-efficiency projects they complete. The two biggest challenges reported by trade allies were qualifying equipment (28 percent) and qualifying customers (17 percent). Also, some trade allies noted that they would like to see higher-SEER central air conditioners offered in the program, as well as an increase in the incentives offered for higher-efficiency HVAC models. Trade allies also reported that the majority of their sales are in the greater Kansas City area and/or in rural areas.

Trade allies were surveyed on their satisfaction with different aspects of the program (see Figure C-7). The majority (72 percent) report being satisfied with Evergy's website, 78 percent were satisfied the discount/rebate payment process and/or application, 72

percent were satisfied with the program paperwork, and 72 percent were satisfied with the equipment offered through Evergy's energy-efficiency rebate program. The Heating, Cooling, and Home Comfort Program was overall well-received by trade allies with an overall satisfaction of 69 percent.

Figure C-7: Trade Ally Satisfaction with Different Aspects of the Program



C.6.4 Customer Journey Map

Customer journey mapping was completed for the Heating, Cooling, and Home Comfort Program in PY2. This visualization approach documents the thoughts, feelings, and actions across the stages of program participation. The map illustrates the program's processes, customer engagement points, and key performance indicators, as well as the overall customer experience, including key decision-points. One of the key benefits of this technique is to identify key "pain points" that should be addressed or eliminated to improve overall program operations. The customer journey maps for the Whole House Efficiency and Energy Savings Kit sub-programs were drafted separately and are outlined in Figure C-8 and Figure C-9.

Figure C-8: Customer Journey Map - Whole House Efficiency

Heating, Cooling, and Home Comfort Program

Customer Group: Whole House Efficiency sub-program participants

Objective: Create a common understanding of the participation experience, identify key touchpoints & opportunities for program improvement

	AWARENESS	CONSIDER	INSTALLATION	RECEIVE REBATE	FEEDBACK
TOUCHPOINT	*Trade Allies, Evergy/ICF Program Staff, Internet Search, Bill Insert, Word-of-Mouth, etc.*	*Trade Allies, Evergy/Spire website, Evergy/Spire Customer Service*	*Trade Allies, Evergy/ICF Program Staff*	*Trade allies, Evergy/ICF Program Staff*	*Trade allies, Evergy/ICF Program Staff, ADM Program Staff*
CUSTOMER ACTION	1. Reaches out to Evergy /ICF staff or trade allies to inquire about energy-efficient equipment OR 1. Researches available rebates for energy-efficient equipment available through the program OR 1. Learns about program from some other source (bill insert, community event, media coverage, social media, word-of-mouth)	1. Researches energy-efficient options 2. Works with trade ally to determine appropriate energy-efficient equipment/improvements to install in home	1. Coordinates with trade ally to complete equipment installations/improvements 2. Has a trade ally install rebated measures(s) part of the program	1. Receives discount/rebate from Evergy after measure installation is complete a) Trade ally submits rebate application on participant's behalf b) Receives rebate check in 6 to 8 weeks	1. Utilizes installed measures to keep home warm/cool while saving energy 2. Completes survey for decision making, satisfaction, overall experience, etc. with ADM Associates
CUSTOMER THOUGHTS	• **My home needs improvements** • I want updated equipment in my home • My home doesn't stay comfortable in the summer or winter • Am I eligible to receive a rebate for energy efficient equipment/home improvements? • **What type of equipment is eligible for a program rebate?** • The program should have additional HVAC units eligible for the program rebate	• I want my home to be more energy-efficient • I want to save energy/money on my monthly utility bills • **What is the out-of-pocket, upfront cost for the equipment/home improvements?** • Is financing available? • What are the participation requirements for each type of equipment/home improvement?	• **When will I be able to have the equipment/home improvements installed in my home?** • How long will installation take? • My service provider was knowledgeable about the value/benefits of the energy-efficient equipment/home improvements • I am satisfied with the overall experience with my service provider	• Coordination with the service provider was well executed • **My rebate took longer than expected to receive** • My service provider did not file for the rebate in a timely manner • **I am not satisfied with the rebate amount I received** • The amount of the rebate did not compare to the cost of the energy-efficient equipment	• I do not have time for a survey and/or survey is too long • I am satisfied with improvements made through program, program staff, service provider, and overall program experience

Figure C-9: Customer Journey Map - Energy Savings Kit

Heating, Cooling, and Home Comfort Program

Customer Group: Energy Savings Kit sub-program participants

Objective: Create a common understanding of the participation experience, identify key touchpoints & opportunities for program improvement

	AWARENESS	CONSIDER	INSTALLATION	FOLLOW-UP	SAVE ENERGY/ FEEDBACK
TOUCHPOINT	*Evergy Program Staff, Internet Search, Bill Insert, Word-of-Mouth, etc.*	*Evergy/Spire website, Evergy/Spire Customer Service*	*Energy-Efficiency Professional , Evergy/ICF Program Staff*	*Energy-Efficiency Professional, Program Participants*	*Program Participants, ADM Program Staff*
CUSTOMER ACTION	1. Reaches out to Evergy staff to inquire about energy-efficient equipment OR 1. Reaches out to Evergy staff to inquire about home energy assessments OR 1. Learns about program from some other source (bill insert, community event, media coverage, social media, word-of-mouth)	1. Researches how to receive a home energy assessment or Energy Savings Kit 2. Works with Evergy program staff to have a home energy assessment performed on their home and receive an Energy Savings Kit	1. Coordinates with an Energy - Efficiency Professional to complete home energy assessment and/or install Energy Savings Kit 2. Completes the home energy assessment and/or Energy Savings Kit with the Energy - Efficiency Professional a) In-person by an Energy - Efficiency Professional b) Virtually (self-installation)	1. Has energy-saving products installed in home 2. Receives a personalized summary from the home energy assessment a) Adopts next steps, tips for reducing your energy use and costs, and ways to improve your home's comfort	1. Utilizes installed energy-saving products and adopted energy - saving behaviors to save energy 2. Completes survey for decision making, satisfaction, overall experience, etc. with ADM Associates
CUSTOMER THOUGHTS	• **My home needs to be more energy efficient** • I want more energy-efficient equipment in my home • I want to save energy/money on my monthly utility bills • What are some ways that I can make my home more energy efficient? • What kind of energy-efficiency programs are available through Evergy? • It was difficult to find information about all the programs Evergy offers	• **How do I receive a personalized home energy assessment and Energy Savings Kit?** • What are the eligibility requirements to receive a home energy assessment and Energy Savings Kit? • Will it cost me anything to a home energy assessment or Energy Savings Kit? • Can I still participate if I rent my current residence?	• **When will I be able to have the home energy assessment performed and the energy - saving products installed in my home?** • How long will the appointment take? • Coordination with the Energy - Efficiency Professional was well executed • I am satisfied with the overall experience with the Energy-Efficiency Professional	• Overall, I am satisfied with the home energy assessment and Energy Savings Kit • **I am not satisfied with some of the aspects my Energy Savings Kit** • I did not receive any faucet aerators or low flow showerheads The smart power strips did not work/I did not know how to install them • The hot water pipe insulation was insufficient for my home	• I do not have time for a survey and/or survey is too long • I am satisfied with the home energy assessment, energy-saving products provided in the Energy Savings Kit, Energy-Efficiency Professional , and overall program experience

C.7 Conclusions and Recommendations

The evaluation team at ADM performed a process evaluation that assessed program documentation and primary data collected from program stakeholders. The evaluation included participant surveys, trade ally surveys, completed interviews with program staff, reviewed program documentation, and analyzing the program tracking data.

The following summarizes the key findings of the process evaluation of the Heating, Cooling, and Home Comfort Program for PY2:

- Due to pandemic restrictions, the Energy Savings Kit sub-program and home energy assessments went virtual in 2020. However, the option to have in-home assessments opened up early in 2021. Participants responded well to the in-home energy assessments, and most (70 percent) of the assessments were performed in-person in 2021.
- ICF could not be present during assessments in 2020 due to pandemic restrictions, but they were able to return to being present during these assessments after the first quarter in 2021.
- In 2021, communication between program staff remained effective due to conducting regular weekly, monthly, and quarterly meetings with program updates.
- The Heating, Cooling and Home Comfort Program has consistent structures in place with rebate distribution, a well-developed internal marketing team, and continued trade ally support.
- The greatest challenge for all aspects of the program has been the adaptation of having to conduct virtual interactions, as opposed to in-person. Trying to engage trade allies virtually can be much more challenging than in-person meetings where the focus of the trade ally is undivided. The outreach teams are planning on coordinating more in-person meetings with trade allies in 2022.
- The majority of survey participants first learned about the rebates/discounts offered by Evergy through their contractor or energy auditor.
- The Heating, Cooling, and Home Comfort Program was well-received by participants with the overall satisfaction of 97 percent. Participants reported satisfaction with the interactions with the energy-efficiency professional once the appointment had started (95 percent) and the condition in which the participant's home was left (94 percent). Most of the participants (61 percent) had their home energy assessments conducted in person. Finally, participants were asked to rate the usefulness of the post-appointment report. Most (99 percent) participants stated they were helpful.

- Participants were satisfied with their comprehensive energy audit and their energy auditor. The highest reported satisfaction ratings came from the condition in which the participant's home was left (65 percent). When asked about their satisfaction with the rebate, 92 percent of participants were satisfied with the timeliness in receiving their rebate, and 89 percent of participants were satisfied with the rebate amount.
- In addition to installing HVAC equipment, participants also installed other energy-efficient equipment. LED lightbulbs (80 percent) were the most commonly installed additional energy-efficient equipment. Other measures included air sealing (24 percent), low flow showerheads (17 percent), attic/ceiling insulation (11 percent), and smart power strips (10 percent).
- The main reasons that trade allies reported that they decided to participate in the program was to be able to pass discounts/rebates onto customers, to improve home efficiency for customers, and to improve sales.
- In regard to the Heating, Cooling and Home Comfort Program, trade allies were mostly satisfied with Evergy's website and the discount/rebate payment process and/or application. The Heating, Cooling, and Home Comfort Program was overall well-received by trade allies with an overall satisfaction of 69 percent.

The following recommendations are offered for continued improvement of the Heating, Cooling, and Home Comfort Program:

- **Monitor installation rates on an ongoing basis for the Energy Savings Kit sub-program.** The sub-program currently performs both direct install (~70 percent) to virtual install (~30 percent), and this comes with trade-offs of lower administration costs but greater risk of non-installation or measure removal. If the Energy Savings Kit sub-program is going to continue to perform virtual installs, additional customer resources, such as educational materials or a direct customer service line, may be needed to keep installation rates high.
- **Periodically review the incentive structure for higher-efficiency HVAC systems in the program.** When examining the benefit-cost ratios for higher-efficiency HVAC systems, Evergy can assess if incentives can be or need to be revised. Metrics for this may assessment include:
    - Balance between UCT and PCT ratios. If the UCT ratio exceeds the PCT ratio, Evergy can rebalance by increasing incentives.
    - Percent of incremental cost covered by incentives. If incremental cost coverage is below 50 percent, Evergy can consider increasing incentives while remaining within boundaries of industry norms for this measure group.

- **Develop a simplified and more automated application process to reduce the load on trade allies.** As it is, some trade allies reported that the application process has many required components that can be easily overlooked. Drop-down options with pre-programmed equipment and AHRI numbers could be utilized to reduce the time it takes for trade allies to look up the information themselves and would reduce input error.
- **Encourage the outreach team to set up in-person trainings for trade allies.** Trying to engage trade allies virtually can be much more challenging than in-person meetings where the focus of the trade ally is undivided. All trade allies that had trainings in 2021 described then as being helpful. Creating multiple in-person trainings may increase further trade ally support.
- **Add additional data collection requirements to the reporting fields for the program tracking data.** The air sealing and attic insulation measures calculate energy savings based on the heating fuel type for each home. Savings are calculated differently based on whether a home is gas heated or electric heated. However, the heating fuel type is currently not being collected in the tracking data for all air sealing and attic insulation projects in the program, which causes the verified savings calculations to use a default assumption of an electric-heated home. Out of all the air sealing and attic insulation projects in 2021, approximately 47% had heating fuel type data in the program tracking data. Out of those projects, approximately 95% were gas heated and 5% were electric heated. The verified savings calculations used the default assumption of an electric-heated home for approximately 53% of projects missing heating fuel type data due to the Evergy TRM utilizing an electric-heated home for all air sealing and attic insulation projects for all report savings calculations. Using the actual heating fuel type for each project would more accurately reflect the energy savings per home and would coincide with the verified savings calculations. It is important to note that starting in 2022, there will be a more automated data entry process and all data fields used in the savings calculations are now required to be filled out by the service providers. This should eliviate the issue of some of the air sealing and attic insulation projects missing heating fuel type data in the next program year.
- **Consider adding additional measures to the Evergy TRM based on the current mix of measure in the program tracking data.** Currently, there are measures in the 2021 program tracking data that are not specifically outlined in the Evergy TRM. This includes measures with multiple baselines as stipulated in the IL TRM. For example, a measure for an air sealing project in a gas heated home or a measure for a ground source heat pump project replacing an existing central AC are not currently included in the Evergy TRM. Adding additional measures to

the Evergy TRM based on the program tracking data could help better align the reported and verified savings calculations.

Appendix D Energy Saving Products Program-Specific Methodologies

This appendix describes the evaluation activities that were performed by ADM to evaluate the Energy Saving Products Program.

D.1 Program Overview

The Energy Saving Products (ESP) program focuses on promoting, cultivating, and facilitating the adoption of energy efficient products in residential settings. The program has been designed with two key focuses:

- *Education* – the expansion of both residential customer and sales associate knowledge of and familiarity with the advantages of various energy efficient products available; and
- *Efficient Product Adoption* – market transformation resulting from increased awareness of the benefits of energy efficient technology and is supported through financial, point-of-sale incentives for the purchase of products that meet high efficiency standards.

Through the ESP program, customers can receive instant discounts for a variety of efficient measures. In 2020 and 2021 these included a selection of LED lighting measures, including standard, specialty, and smart bulbs. In 2022 the program may be expanded to include other measures such as room air conditioners, and advanced power strips.

The actual number of participants in the program is unknown, as upstream measure purchaser information is not tracked by participating retailers. In total, 406,448 packages of LEDs, comprising 1,411,995 program bulbs were sold through participating retailers in 2021.

Table D-1 provides a summary of program metrics for the 2021 program year. Verified energy savings exceeded program targets but fell slightly short of the reported energy savings.

Table D-1: Performance Metrics – Energy Saving Products Program

Metric	PY2 Total	MO West	MO Metro
Number of Rebated Packages	406,448	225,672	180,776
Energy Savings (kWh)			
Targeted Energy Savings	20,139,568	10,416,978	9,722,590
Reported Energy Savings	55,384,812	30,519,963	24,864,849
Gross Verified Energy Savings	52,855,535	29,168,216	23,687,319
Net Verified Energy Savings	33,054,253	18,743,260	14,310,993
Peak Demand Reductions (kW)			
Targeted Peak Demand Reduction	1,480.66	755.85	724.81
Reported Peak Demand Reduction	7,132.64	3,928.17	3,204.47
Gross Verified Peak Demand Reduction	6,736.33	3,690.37	3,045.96
Net Verified Peak Demand Reduction	4,210.14	2,371.64	1,838.50
Benefit / Cost Ratios			
Total Resource Cost Test Ratio	3.31	3.11	3.62

D.2 EM&V Methodologies

The following section details the methodologies ADM used to verify retail sales, estimate energy and peak demand impacts, and assess the performance for the Energy Saving Products program.

D.2.1 Data Collection

Several primary and secondary data sources were used for the evaluation. Tracking data and supporting documentation for the program was obtained from the program implementor. This tracking data was used as the basis for quantifying participation and assessing program impacts. Tracking data contained the following information used for verification of program savings:

- Program sales
- Measure model number and description
- Measure characteristics (wattage, lumens, efficiency, lifetime)
- Retailer
- Invoice date

- Original retail price
- Evergy sponsored discounts
- Retail price, including all discounts
- Number of bulbs per package

D.2.2 Sampling Plan

Primary data collection activities included an online general population survey and interviews with program staff members. The general population survey was administered in two waves to a representative sample of Evergy customers. The first wave was contacted in July 2021 and the second in January 2022.

General Population Survey

The general population survey was sent to a randomly selected, representative sample of Evergy's residential customers. Customers were contacted via email and asked a variety of questions about recent purchases of energy efficient measures. Because customer information is not tracked for marked-down measures in the upstream program, a general population survey provides a cost-effective way of reaching many potential program participants. Each participant received a single-use unique survey link that they could use to participate in the survey. In addition, the survey instrument employed several screening questions to determine whether respondents had (a) purchased measures discounted through the upstream program within the program year and (b) that those purchases had been made through participating retailers.

Of the roughly 19,000 customers invited, 994 qualified for the survey and completed it fully. The survey collected data on program awareness and insights into energy-saving product purchases for lighting measures in addition to data regarding measure satisfaction, participant motivation, and household demographics.

Program Staff Interviews

To inform the process evaluation, ADM also conducted brief in-depth interviews with program staff at Evergy and the implementation contractor. These interviews provided insight into various aspects of the program, its organization, and any changes to the program that occurred during 2021. Interviewees also discussed aspects of the program operations that they considered to be successful, and the challenges faced over the course of the program year. These results are presented in the process evaluation results.

D.2.3 Gross Impact Methodology

This subsection summarizes the methods used to verify measure savings and calculate gross energy savings and gross demand reduction for each measure.

Reported energy and peak demand impacts for the program were calculated using savings algorithms from the Evergy TRM. ADM's evaluation consisted of: (1) reviewing the assumptions and inputs associated with the energy savings values, (2) verifying that the per-unit impacts were applied appropriately and (3) making appropriate adjustments for in-service rates and cross sector sales.

Tracking Data Verification

To verify the types and quantities of distributed measures, ADM reviewed the program tracking database to determine that the measures were claimed during the program year, reported measure wattage and lumens were accurate, and energy and demand impacts aligned with the Evergy TRM algorithms for each LED type. For 2021, ADM calculated verified energy and demand impacts based on the Evergy TRM and used adjusted Hours of Use, Coincident Factors, and waste heat factors as specified in the IL TRM v7, Volume 3, based on the installation locations reported in the general population survey.

Reported impacts were calculated in accordance with the savings algorithms. The model number, SKU, and model name for each program rebated bulb was used to verify the bulb wattage and lumen output for verified savings.

In Service Rate Adjustment

ADM used survey respondent data from the General Population Survey to calculate the ISR for the ESP program.

Hours of Use and Cross-Sector Sales Adjustments

An adjustment to gross impacts was made to account for the proportion of program bulbs estimated to be installed in non-residential settings, since hours of use (HOU) and coincident factor (CF) are typically higher for commercial sockets compared to residential sockets. For each installation location, ADM used the deemed hours of use (HOU), coincident factor (CF), and waste heat factors for energy and demand (WHFe and WHFd) specified in the IL TRM v7 vol3.

Surveyed customers who indicated they had purchased LEDs in 2021 were asked how many of the bulbs they purchased were installed in single-family homes, multi-family homes, outdoors, and in commercial spaces. ADM calculated average input values for Standard and Specialty bulbs in the Missouri West and Missouri Metro jurisdictions, respectively.

D.3 Gross Energy Savings and Demand Reduction

Based on the impact evaluation results, the total verified gross savings for the Energy Savings Products Program are 52,855,535 kWh, which resulted in a realization rate of 95 percent and 6,736.33 kW, for a kW realization rate of 94 percent. Table D-2 presents the gross verified energy and demand savings and realization rates by measure.

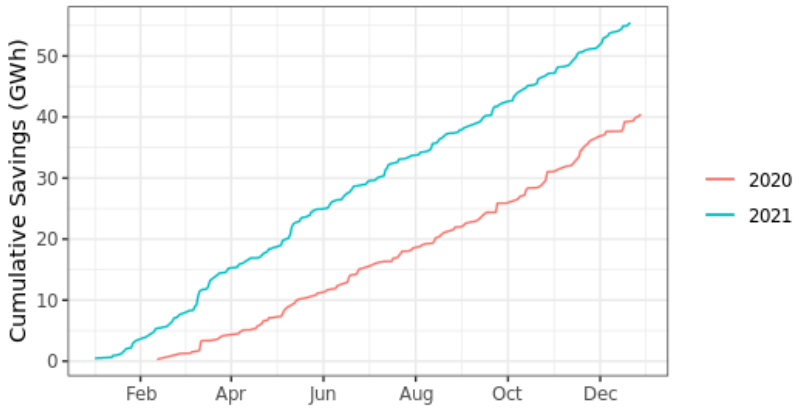
Table D-2: Reported and Verified Gross Energy Savings & Demand Reduction

Jurisdiction	Measure Type	Reported kWh	Gross Verified kWh	Reported kW	Gross Verified kW	RR_{kWh}	RR_{kW}
MO Metro	Standard LED	14,473,610	15,460,085	1,763.21	1,892.70	107%	107%
	Specialty LED	10,391,239	8,227,233	1,441.26	1,153.26	79%	80%
MO West	Standard LED	18,067,516	18,466,737	2,201.03	2,247.40	102%	102%
	Specialty LED	12,452,447	10,701,479	1,727.15	1,442.96	86%	84%
Total		**55,384,812**	**52,855,535**	**7,132.64**	**6,736.33**	**95%**	**94%**

D.3.1 Program Activity

The 2021 ESP program consistently outperformed the 2020 program thought the year. Figure D-1 below shows the cumulative reported kWh savings throughout the 2020 and 2021 program years.

Figure D-1 Accumulation of Reported Savings During the 2020 and 2021 Program Years



The tracking data compiled by the implementor and provided for the ESP program lighting component identified a total of 406,448 packages of LEDs were discounted through participating retail stores. Table D-3 shows the reported quantities and impacts of the standard and specialty LEDs distributed in Missouri Metro and Missouri West.

Table D-3: Reported Measure Quantities and Impacts

Jurisdiction	Measure Type	Package Quantity	Bulb Quantity	Reported kWh	Reported kW
MO Metro	Standard LED	108,905	400,729	14,473,610	1,763.21
	Specialty LED	71,871	232,461	10,391,239	1,441.26
MO West	Standard LED	134,958	500,233	18,067,516	2,201.03
	Specialty LED	90,714	278,572	12,452,447	1,727.15
Total		**406,448**	**1,411,995**	**55,384,812**	**7,132.64**

D.3.2 Verification on Measure Wattage

ADM identified 59 LED models in the program tracking data for which the reported measure wattage or lumens differed from the verified characteristics, cumulatively representing approximately 3.8 percent of total program savings. Adjusted measure specifications for the 20 bulbs with the greatest share of savings are shown in Table D-4. Differences between reported and verified measures specifications result from changes to the reported value in the ENERGY STAR database, rounding in the specifications reported in the program tracking data, or incorrect specifications reported in the tracking data.

Table D-4: Parameters Adjusted for Lighting Analysis

Model Number	Manufacturer	Reported Wattage	Verified Wattage	Reported Lumens	Verified Lumens	ENERGY STAR ID	% of total Savings
A7A19A100 WESD06	Leedarson America	15.5	15.5	1600	1680	2304791, 2328187, 2328190, 2337428	0.96%
93122536	General Electric	8	10	800	800	2339012	0.48%
93122484	General Electric	8	10	800	800	2339011, 2272701	0.29%
A20BR3065 WESD26	Leedarson America	9	8	665	680	2374629, 2374632	0.23%
A20BR3065 WESD56	Leedarson America	9	8	685	700	2374631, 2374634	0.20%
GVG25D4.5 WW273P	Elong International	4.5	3	500	350	2365454	0.16%
A20BR3065 WESD36	Leedarson America	9	8	665	680	2374630, 2374633	0.16%

Model Number	Manufacturer	Reported Wattage	Verified Wattage	Reported Lumens	Verified Lumens	ENERGY STAR ID	% of total Savings
40674	Sylvania LED Vance	4.5	5.5	450	450	2354573	0.13%
GV25D4.5W W503PN	Elong International	3	4.5	350	500	2365458	0.12%
93122480	General Electric	5	6	450	480	2272687	0.10%
A7A19A100 WESP02	Leedarson America	14.5	14.5	1600	1550	2338970	0.09%
93122482	General Electric	5	6	450	480	2272692	0.09%
93128616	General Electric	15	13	1300	1200	2320181	0.08%
93129212	General Electric	4	4	300	320	2362155	0.07%
GVG25D3W W503PTN	Elong International	3	3	250	350	2365454	0.05%
9290023513	Philips	29	15	2610	1400	2360770, 2391591, 2391701	0.04%
GV25D2.5W W273PN	Elong International	4.5	2.5	500	250	2365437	0.04%
GVG25D3W W503PTN	Elong International	3	3	250	350	2345892, 2365453	0.04%
93122666	General Electric	17	13.5	1600	1600	2358087	0.04%
93122667	General Electric	17	13.5	1600	1600	2358088	0.04%
93128619	General Electric	7	7	600	500	2321156	0.03%
GV25D4.5W W273PN	Elong International	4.5	3	500	350	2365454	0.03%
93121900	General Electric	13	10.5	1100	1100	2358076	0.03%
93121845	General Electric	13	10.5	1100	1100	2358075	0.03%
42279	General Electric	4.5	4.5	350	360	2362210	0.03%

D.3.3 Verification of In-Service Rate

In-service rates (ISRs) were determined from the General Population survey. The in-service rate assumption for the reported savings, sourced from the Evergy TRM, was 94.2 percent. Through analysis of survey data from the general population survey, ADM found in-service rates of 83.8 percent for standard LEDs and 90.6 percent for specialty LEDs, compared to the assumed in service rate of 94.2 percent for standard and specialty bulbs.

The verified ISRs per measure are summarized on the following page in Table D-5.

Table D-5: Measure-Level Verified ISRs

Measure Type	Jurisdiction	ISR
Standard LED	MO West	83.4%
	MO Metro	84.2%
Specialty LED	MO West	91.2%
	MO Metro	89.9%

D.3.4 Adjustment for Cross Sector Sales

Across both standard and specialty bulbs, roughly 85 percent of the bulbs installed went in single family homes, 1 percent to 4 percent went in multi-family homes, and 8 percent to 14 percent in exterior locations. According to survey responses, bulb installations in commercial locations accounted for less than 1 percent of bulb installations.

D.4 Net Savings Evaluation Findings

The following section details the free ridership, participant spillover, and leakage estimates used to determine net savings for the Energy Saving Products Program in PY2. Additional details regarding the net-to-gross evaluation approach are shown in Appendix A.

The survey-based effort for calculating free ridership was conducted using survey responses from a large sample of randomly selected residential customers. ADM's general population survey of Evergy customers was conducted using email invitations, an online survey platform, and small gift card incentive to those who completed the questionnaire. Survey respondents were asked a series of questions to elicit feedback regarding influences on their light bulb purchasing decisions and each respondent was then assigned a free ridership score based on a consistent free ridership scoring

algorithm developed by ADM for upstream lighting programs. ADM analyzed survey responses from 994 Evergy customers. Of these, 471 verified responses were used to calculate a free ridership score for standard LEDs, and 190 responses were used to calculate a free ridership score for specialty LEDs.

For program LEDs distributed through budget-retailers Dollar Tree, True Value, Habitat Restores, and Goodwill, ADM assumed there was no free ridership as these retailers would likely not stock ENERGY STAR® LEDs in the absence of the program.

Participant spillover was derived from a benchmarking study of recent evaluation of similar lighting programs. ADM estimated the total participant spillover to be 7.0 percent. Typical rates of participant spillover for similar lighting programs were found to range from 2 percent to 11 percent.

Estimates of leakage were assessed using an approach that combined responses from the general population survey with a geo-mapping analysis. Leakage was estimated for several types of retailers: Mass Merchants (Big Box retailers), DIY stores, and Member channels (e.g., Costco). Together, these three program channels represented 90 percent program savings. A savings-weighted leakage rate was applied to the remaining retailer types. ADM found that Evergy's overall leakage rate was 1.35 percent. Given the large and contiguous size of Evergy's service territory, the low leakage rate is to be expected.

The overall free ridership, spillover, leakage, and net-to-gross ratio for each jurisdiction are shown in Table D-6.

Table D-6: Measure-Level Free Ridership, Spillover, and Leakage

Jurisdiction	Spillover	Free Ridership	Leakage	Net-To-Gross Ratio
MO West	7.00%	41.38%	1.35%	64.26%
MO Metro	7.00%	45.29%	1.35%	60.42%

D.5 Impact Evaluation - Final Savings Tables

Based on the impact evaluation results, the total verified gross energy savings for the Energy Saving Products Program are 52,855,535 kWh, and the total verified gross peak demand savings are 6,736.33 kWh. Table D-7 below summarizes the verified gross energy and demand savings for the Energy Savings Products Program.

Table D-7: Program Gross Energy Savings (kWh) and Peak Demand Reduction (kW)

Jurisdiction	Reported Energy Savings (kWh)	Reported Demand Reduction (kW)	Gross Verified Energy Savings (kWh)	Gross Verified Demand Reduction (kW)	RR_{kWh}	RR_{kW}
MO West	30,519,963	3,928.17	29,168,216	3,690.37	96%	94%
MO Metro	24,864,849	3,204.47	23,687,319	3,045.96	95%	95%
Totals	**55,384,812**	**7,132.64**	**52,855,535**	**6,736.33**	**95%**	**94%**

The realization rate differed from 100 percent due to differences between assumptions used to model bulb savings and the actual bulb characteristics found in the analysis. The Evergy Technical Reference Manual (TRM) uses 2019 program averages to estimate the savings from standard and specialty bulbs. The difference between actual and baseline bulb wattage in the program tracking data was lower than assumed. In addition, the average hours of use and installation rates calculated from the program survey were lower than assumed by the Evergy TRM due to the differences between the actual and assumed installation locations.

Table D-8 and Table D-9 summarize the verified net impacts of the Energy Savings Products Program.

Table D-8: Verified Gross and Net Annual Energy Savings (kWh)

Jurisdiction	Spillover		Free Ridership	Leakage	NTG Ratio	Gross Verified Energy Savings (kWh)	Net Energy Savings (kWh)
	Participant	Non-Participant					
MO West	7.0%	0.0%	41%	1.4%	64%	29,168,216	18,743,260
MO Metro	7.0%	0.0%	45%	1.4%	60%	23,687,319	14,310,993
Total					**63%**	**52,855,535**	**33,054,253**

Table D-9: Verified Gross and Net Peak Demand Reduction (kW)

Jurisdiction	Spillover		Free Ridership	Leakage	NTG Ratio	Gross Verified Demand Reduction (kW)	Net Energy Savings (kW)
	Participant	Non-Participant					
MO West	7.0%	0.0%	41%	1.4%	64%	3,690.37	2,371.64
MO Metro	7.0%	0.0%	45%	1.4%	60%	3,045.96	1,838.50
Total					**62%**	**6,736.33**	**4,210.14**

D.6 Process Evaluation

D.6.1 Program Operations

ADM conducted in-depth interviews with Evergy's energy-efficiency products and services portfolio manager, Evergy's DSM portfolio manager, ICF's director of programs, and ICF's program manager for the Energy Saving Products (ESP) Program. The purpose of the in-depth interviews was to better understand ESP's program design, operations, challenges, and future opportunities.

Roles and Responsibilities

The role and responsibilities of each program staff member are listed below.

- The Evergy energy-efficiency products and services portfolio manager is responsible for managing the energy efficiency products and service team and working directly with ICF to support the ESP program.
- The Evergy DSM portfolio manager is responsible for ensuring the evaluation is done following Missouri rules and achieving set DSM goals.
- The ICF director of programs is responsible for overseeing staff and other residential programs and ensuring client and customer satisfaction.
- The ICF program manager is responsible for managing the day-to-day operations of the ESP program, which includes monitoring incentive levels, managing and allocating budgets, developing MOUs (memorandum of understanding) with retailers and partners, processing invoices, and supervising field staff.

Program Design

Evergy offers discounts on LED light bulbs at participating local retail stores within their Missouri jurisdiction. The LED discounts are provided at point-of-sale to customers. The LED manufacturers send an invoice with model numbers and sales. These data are

verified by ICF staff and used to calculate energy savings for the purchased LED measures.

The ICF program manager indicated that the program design has remained consistent for five years. The design and operations were described as successful. There were no significant changes to the retail or product mixes from the previous program year (2020). The program manager also stated that ICF works closely with retailers and manufacturers to provide instant discounts at the point-of-purchase and identify specific measures with their respective discounts. ICF works at a national level with retailers and manufacturers to achieve this design.

ICF staff indicated that most sales occurred at DIY chain stores, such as Home Depot and Lowes because they could educate the sales associates and managers on the program. ICF stated they developed relationships with store managers to influence product display. ICF also indicated some retailers were more challenging because of their limited available sales associates or stocking policies (e.g., not ordering enough due to inventory or budget constraints).

Evergy staff anticipated some changes to future program years. Staff anticipated the program would launch a permanent online marketplace throughout the year. The marketplace will be for lighting but will have the potential for additional non-lighting measures beginning in 2023. Staff also anticipates that the online marketplace will expand to small business owners and to the residents in the Kansas Jurisdiction.

Pandemic Impacts

ICF staff reported that the coronavirus pandemic impacted the ESP program in PY2. Field staff was limited to assisting customers directly due to social distancing policies, so they could not approach customers and talk about the program. ICF staff indicated that this limitation hampered customer education efforts. For example, there are no flyers or handouts available for in-store display, but the program offered tear pads with information about LED lighting for customers if they wanted to learn more. ICF staff also noted that pandemic-induced supply chain issues made it difficult for stores to restock some bulbs.

Program Participation and Marketing

ICF staff reported that PY2 program participation was adequate. They indicated that point-of-purchase tear-off pads generated the most customer awareness of the program. Evergy indicated that although they had to reduce their out-of-store marketing efforts, remaining marketing campaigns were customer-centered, used a universal message, and used positional tracking data (global positioning systems) to target specific customer groups. Additionally, the ESP program continues to be cross promoted through email and printed media with other programs such as the Heating, Cooling, and Home Comfort Program and with Home Energy Reports.

Communication

ICF and Evergy indicated they meet multiple times per week to discuss the ESP program; they also have ad-hoc meetings when necessary. Additionally, ICF staff meets with their national team to discuss various components of the ESP program (e.g., store lists, program information, and requirements, MOUs, etc.). ICF staff also has monthly meetings with their retail and manufacturing partners.

Data Tracking and Quality Assurances and Controls (QA/QC)

Program activity data is tracked through invoices, which ICF's national process center processes. A tool uploads the invoices, including program tracking data such as bulb SKU, pricing before and after the incentive, and quantity. The data is processed and sent to a PPM (product promotion management) reporting system accessible by Evergy staff. Evergy staff then put the data into monthly reports for easier viewing. ICF staff indicated the ESP program data system is streamlined and reliable, with very few errors.

ICF staff stated that many QA/QC procedures occur by monitoring the program data. The dedicated field staff from CrossMark primarily performs field QA/QC procedures. They go on-site at least once a month to ensure the quality of the audits, engage with store managers, and take pictures to document points-of-sale.

D.6.2 General Population Survey

The evaluation team gathered insights regarding the energy efficiency product purchases made by Evergy customers during 2021. The team created 19,834 individual survey links and sent them in an Evergy email blast. The first “wave” of the survey was sent on July 14, 2021, and the second on January 18, 2022. No additional reminder emails were sent; the survey remained in the field until January 24, 2022. Survey participants who completed the questionnaire received a monetary incentive for providing their feedback (see Table D-10).

Table D-10: Summary of Email Survey Response

Metric	Result
Initially Contacted	19,834
Completed	999
Response rate	**5%**

Lighting Purchases

The general population survey asked respondents about a variety of energy efficient products, including light bulbs, as it was also used to estimate spillover for the Heating, Cooling, and Home Comfort program. Almost three-quarters (74 percent) of respondents

purchased ENERGY STAR® LED light bulbs, making it the most popular measure in PY2. Of the people who purchased the measure (n = 736), 88 percent purchased standard LED light bulbs, 37 percent purchased specialty LED light bulbs, and 1 percent stated they purchased other light measures such as T12 LED light bulbs or fluorescent lighting. Percentages exceeded 100 percent because respondents had the option of choosing more than one LED type.

Of the respondents who purchased standard or specialty LEDs, 39 percent of LEDs purchasers and 42 percent of specialty LEDs purchasers knew Evergy had provided the discounts (see Table D-11). Sixty-four percent of people who bought standard LEDs (n = 107) stated the discount had been very important in their decision to buy the measures compared to 77 percent who bought specialty bulbs (n = 43).

Of the participants who were aware of Evergy's sponsored rebates (n = 90), 22 percent first learned about the rebates through an in-store display, 19 percent through an Evergy newsletter, 12 percent through bill inserts, and 11 percent through the Evergy website. Other sources included messages printed on the energy bill (eight percent) or the Home Energy Report (three percent).

Table D-11: Discounted Lighting Measures

Discount Awareness	Any Discount		Discounted by Evergy	
	Standard LEDs (n = 619)	Specialty LEDs (n = 267)	Standard LEDs (n = 127)	Specialty LEDs (n = 50)
Yes	22%	20%	39%	42%
No	47%	51%	44%	52%
Do not recall	31%	29%	17%	6%

Most respondents purchased the new lighting measures to replace burned-out bulbs, old bulbs, or working bulbs for a different color or brightness. Table D-12 summarizes the reasons for both the standard and specialty bulbs. Participants also expressed the top five characteristics important to them when buying light bulbs. According to respondents, energy efficiency (34 percent for standard LED purchases, 25 percent for specialty), bulb's lifespan (17 percent for standard, 19 percent for specialty), brightness (15 percent for standard, 18 percent for specialty), price (13 percent for standard, 11 percent for specialty), and color (13 percent for standard, 14 percent for specialty) were the most important reason for buying the new bulbs.

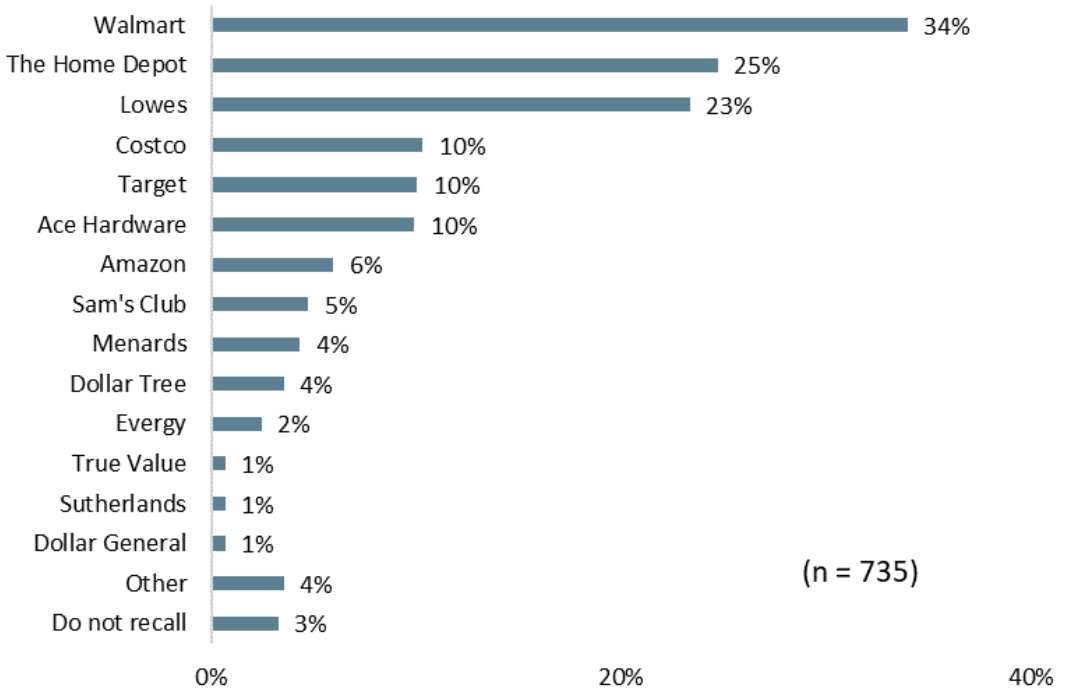
Table D-12: Reasons for LED Purchase

Reasons	Standard LEDs (n = 616)	Specialty LEDs (n = 263)
Replace burned-out bulbs	68%	53%
Replace old, inefficient bulbs	41%	37%
Replace working bulbs with a different color or brightness	14%	17%
Install new light fixture or lamp socket	13%	17%
To have spare bulbs on hand	18%	8%
Other	2%	5%

Note: Percentages may exceed 100% due to respondents being able to select more than one response.

Many respondents purchased the LED light bulbs from various retailers. The top stores were Walmart (34 percent), The Home Depot (25 percent), Lowes (23 percent), Costco (10 percent), Target (10 percent), and Ace Hardware (10 percent).

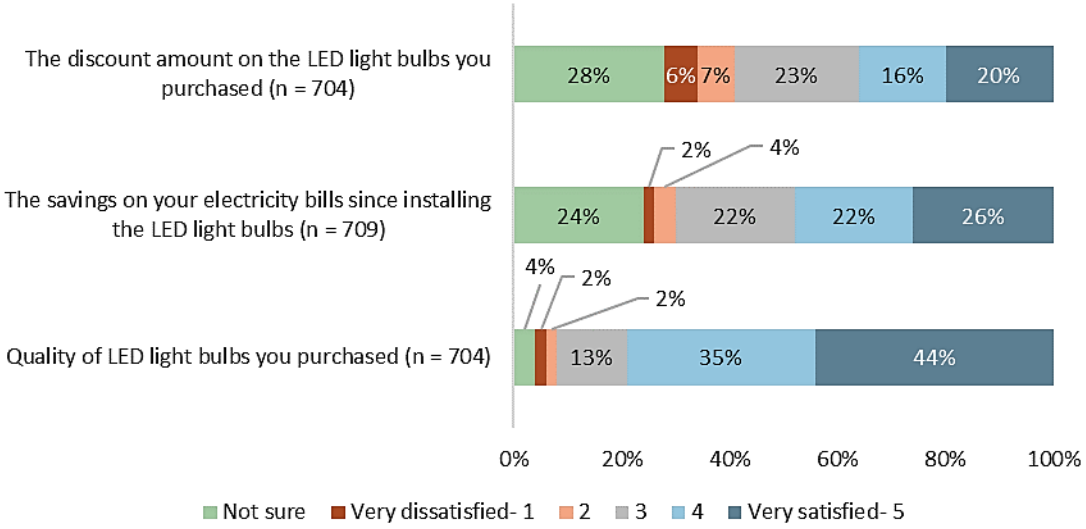
Figure D-2: LED Purchases by Retailer



Note: Percentages may exceed 100% due to respondents being able to select more than one response.

Participants who purchased the energy efficient light bulbs stated they were satisfied with the LED discount (36 percent), the savings on their electric bill (48 percent), and the quality of the LED measures (79 percent) (see Figure D-3 for more details).

Figure D-3: Customer Satisfaction



Demographics

A large majority of respondents reported owning a single-family, detached unit (Table D-13). About three-quarters of homes were reported to be at least 1,000 to just under 3,000 square feet. Almost half of the homes were built from 1960 to 1999.

Table D-13: Home Characteristics

Responses	Percent of Respondents
Home Ownership	**(n = 995)**
Own	66%
Rent	33%
Prefer not to answer	2%
Home Type	**(n = 992)**
Single-family home	73%
Apartment or condominium	17%
Duplex or townhome	8%
Manufactured or mobile home	2%
Not sure	<1%
Prefer not to answer	1%
Home Size (Square Feet)	**(n = 995)**
Less than 1,000 square feet	16%
1,000-1,999 square feet	45%
2,000-2,999 square feet	21%
3,000-3,999 square feet	6%
4,000 square feet or great	3%
Not sure	8%
Prefer not to answer	2%
Year Home Was Built	**(n = 992)**
Before 1960	23%
1960 to 1979	20%
1980 to 1999	20%
2000 to 2009	12%
2010 or later	13%
Not sure	11%
Prefer not to answer	1%

D.7 Conclusions and Recommendations

ADM performed a process evaluation that assessed program documentation and primary data collected from program stakeholders. The evaluation included an interview with program staff, general population surveys, a review of program documentation, and an analysis of program tracking data.

The following section summarizes the key findings from the process evaluation activities for the Energy Saving Products program for PY2:

- ESP program design has remained consistent from prior program years. The design and operations were described as successful, and there were no significant changes to the retail or product mixes from 2020. ICF staff stated they collaborate closely with retailers and manufacturers to provide instant discounts at the point-of-purchase and identify the specific measures with their respective discounts. ICF also works at a national level with some of these retailers and manufacturers to achieve the program design.
- Program participation has been adequate for PY2. ICF staff indicated that point-of-purchase generates the most customer awareness of the program. Evergy staff indicated that although they have reduced out-of-store marketing efforts, remaining marketing efforts are customer-centered, have a universal message, and use tracking data (global positioning systems) to target specific customers. The ESP program is cross promoted through email and paper copy with other programs such as the Heating, Cooling, and Home Comfort Program and the Home Energy Reports Program.
- Of the people who reported purchasing LED bulbs in 2021, 88 percent reported purchasing standard LED light bulbs, and 37 percent reported purchasing specialty bulbs. One percent stated they purchased other light measures such as T12 LED light bulbs or fluorescent lighting. Percentages exceeded 100 percent because respondents had the option of choosing more than one LED type. Most respondents purchased the new lighting measures to replace burned-out bulbs, old, inefficient bulbs, or working bulbs with a different color or brightness.
- Participants expressed the top five characteristics important to them when buying light bulbs. Among respondents, energy efficiency, bulb's lifespan, brightness, price, and color were the most important factors. Participants who purchased the energy efficient light bulbs stated they were satisfied with the LED discount (36 percent), savings on their electric bill (48 percent), and quality of the LED measures (79 percent).
- Participants who knew about Evergy's sponsored rebates first learned about them through an in-store display (22 percent), an Evergy newsletter (19 percent), bill inserts (12 percent), and the Evergy website (11 percent). Walmart and The Home Depot were the most popular stores for purchasing LED bulbs. Almost two-thirds

(64 percent) of people who bought standard LEDs stated the discount had been very important in their decision to buy the measures, as did more than three-quarters (77 percent) who bought specialty bulbs.

The following recommendations are offered for continued improvement of the Energy Saving Products program.

- **Provide additional customer education and cross-promotion of programs.** Customer awareness of the ESP program remains low. Additional educational materials in stores (as permitted by the retailers), as well as promotion through social media, bill inserts, and emails could improve the program performance and customer engagement.
- **Continue to develop an online marketplace.** Program staff indicated that the limited-time-only online marketplace was successful in PY2 and are exploring additional avenues for marketing the availability of the online marketplace and opportunities to add measures for purchase. The online marketplace provides an avenue to affect hard-to-reach customers and expand to provide additional measures.

Appendix E Income-Eligible Multi-Family Program-Specific Methodologies

ADM completed an impact and process evaluation of Evergy's Income-Eligible Multi-Family (IEMF) Program. The impact evaluation consists of verification of annual energy savings and peak demand reduction. The process evaluation provides insights into program design and implementation.

E.1 Program Overview

The IEMF program provides qualifying, income-eligible properties with assistance through energy assessments, program applications, technical support, and upgrade incentives. Evergy has contracted with ICF International Inc. to manage and implement the program. The program consists of three components: direct install, prescriptive, and custom measures. During 2021, the direct install measures included low-flow faucet aerators and showerheads, advanced power strips and LEDs that the implementation contractor installed in apartment units. Prescriptive measures were installed during building renovations; measures include air source heat pumps, bathroom exhaust fans, programable thermostats, and energy efficient appliances. Custom projects included the installation of in-unit and common area measures including LED lighting, water saving measures, heat pumps, thermostats and large equipment replacements (an elevator motor and a whole building chiller). Residents and property managers benefitted from the measures by increasing the value of the property, reducing utility bills, and making the property more comfortable, healthier, and safer.

To qualify for the IEMF program, the property must receive service from Evergy and meet one of the following requirements:

- Documented participation in a federal, state, or local housing program.
- Location in a low-income census tract.
- Rent roll documentation, where at least 50 percent of units have rents affordable to households at or below 80 percent of area median income, as published annually by the Department of Housing and Urban Development (HUD).
- Documented tenant income information demonstrating at least 50 percent of units are rented to households either at or below 200 percent of the federal poverty level, or at or below 80 percent of area median income.
- Documented information demonstrating the property is on the waiting list for, currently participating in, or has in the last five years participated in the Weatherization Assistance Program.

The program partners with the Low-Income Housing Tax Credit (LIHTC) program and has been enhanced to allow for a longer payout period for rebates up to 12 months after the cycle ends as to better coordinate with the LIHTC.

Table E-1 provides a summary of program metrics for the PY2. Reported annual energy savings exceeded program projections. Gross verified energy savings (kWh) had a 96 percent realization rate and a peak demand reduction (kW) had an 87 percent realization rate.

Table E-1: IEMF Program - Performance Metrics

Metric	PY2 Total	MO West	MO Metro
Number of Sites	21	9	12
Energy Impacts (kWh)			
Targeted Energy Savings	2,342,925	1,181,931	1,160,994
Reported Energy Savings	2,449,466	1,429,036	1,020,431
Gross Verified Energy Savings	2,278,225	1,316,934	961,292
Net Verified Energy Savings	2,278,225	1,316,934	961,292
Peak Demand Impacts (kW)			
Targeted Peak Demand Reduction	450.37	222.82	227.55
Reported Peak Demand Reduction	374.62	251.68	122.93
Gross Verified Peak Demand Reduction	307.14	194.51	112.63
Net Verified Peak Demand Reduction	307.14	194.51	112.63
Benefit / Cost Ratios			
Total Resource Cost Test Ratio	0.46	0.45	0.47

E.2 EM&V Methodology

This chapter provides an overview of the data collection activities and impact calculation methodologies that ADM employed in the evaluation of the IEMF program.

Data collection activities for the analysis consisted of a review of program materials, surveys with participating property decision makers, and interviews with Evergy and ICF program staff. A total of 10 property decision makers (47 percent) completed a survey that ADM used to collect data for the impact analysis and process evaluation. The process evaluation gained additional perspective from in-depth interviews with Evergy and ICF program staff.

E.2.1 Gross Impact Methodology

ADM used the following steps to evaluate IEMF program gross energy savings and peak demand reduction.

- Reviewed the program tracking data to determine the scope of the program and to ensure there were no duplicate or erroneous project entries.
- Attempted a survey of a census of properties, first with emailed surveys, followed by direct calls to property contacts at each of the 21 properties in the program. A survey of tenants was not attempted. ADM has found that tenant survey in low-income multifamily residences yield low responses and unreliable data.
- Reviewed all available data for each site including invoices, equipment cut sheets, pre- and post-inspection reports, and estimated savings calculators. This review process informed ADM's evaluation by identifying potential uncertainties and missing data, as well as providing model specifications and other measure characteristics.
- Calculated verified gross savings. The sources for energy savings algorithms are the 2021 Evergy Technical Reference Manual ("TRM") and Illinois TRM (version numbers are specified by measure).

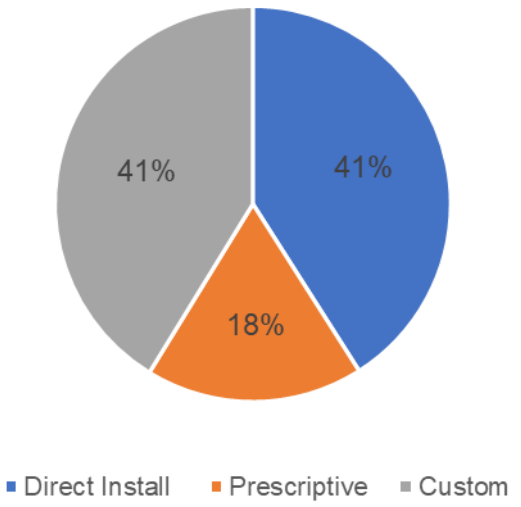
Specific impact evaluation algorithms used to calculate energy savings and demand reductions are detailed in Appendix N.

E.3 Gross Impact Findings

E.3.1 Program Activity

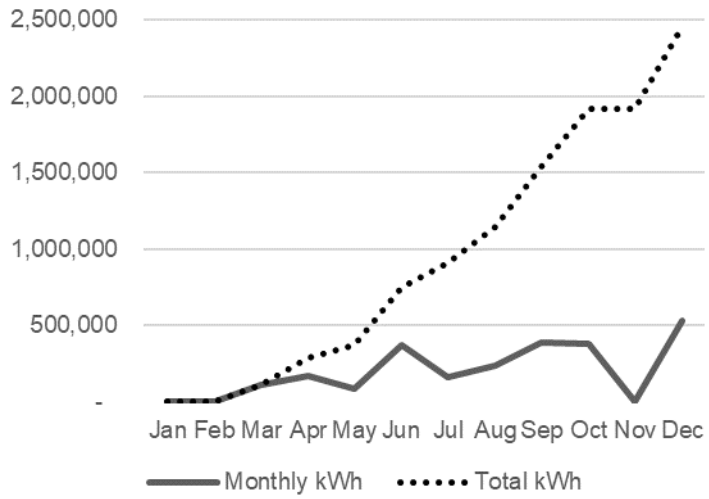
Figure E-1 summarizes IEMF Program activity by the percentage of verified savings across the custom, prescriptive, and direct install measures.

Figure E-1: IEMF Savings by Project Type



Participation in IEMF Program was relatively even throughout the year as shown in Figure E-2.

Figure E-2: Accrual of Reported kWh Savings during the Program Year



A total of 21 properties participated in the program in 2021, each contributing from 0.02 percent to 11 percent of total program savings. Each property's contribution to total program savings is shown in Table E-2. The four largest energy saving projects included a range of measures from heat pumps and appliances to aerators and light bulbs. The smaller saving projects were comprised mostly of LED lighting measures.

Table E-2: Property Contribution to Total Program Savings

Property Number	Verified Savings (kWh)	Program Contribution
1	255,091	11%
2	251,958	11%
3	233,049	10%
4	188,014	8%
5	206,336	9%
6	203,852	9%
7	164,983	7%
8	163,341	7%
9	148,624	7%
10	126,752	6%
11	116,336	5%
12	84,496	4%
13	49,063	2%
14	23,348	1%
15	14,275	1%
16	13,829	1%
17	12,651	1%
18	9,663	0.4%
19	7,480	0.3%
20	4,630	0.2%
21	455	0.02%
Total	**2,278,225**	**100%**

E.3.2 Gross Energy Savings and Demand Reduction

The verified gross annual energy savings (kWh) and peak demand reduction (kW) for IEMF are summarized by measure in Table E-3. The overall realization rates for energy savings and demand reduction were 96 percent and 87 percent. Detailed descriptions of the difference in savings calculations are in the measure level findings below.

Table E-3: Verified Gross kWh and kW

Measure		Qty	Reported		Verified		Realization Rate	
			kWh	kW	kWh	kW	kWh	kW
Direct Install	Faucet Aerator	1,569	46,395	30.16	17,511	16.56	38%	55%
	Smart Power Strip	4	412	0.05	412	0.05	100%	101%
	Lighting	21,887	816,676	98.49	861,159	104.15	105%	106%
	Showerhead	775	204,524	25.70	54,517	12.92	27%	50%
Prescriptive	Air Source Heat Pump	98	379,315	114.87	306,383	91.46	81%	80%
	Bathroom Fan	125	9,482	1.12	11,393	2.17	120%	193%
	Dishwasher	88	3,256	0.24	2,790	0.21	86%	86%
	Refrigerator	52	36,192	5.45	21,728	3.27	60%	60%
	Programmable Thermostat	143	35,570	0.00	62,816	0.00	177%	-
	Washing Machine	1	142	0.02	120	0.02	85%	85%
Custom	Aerator	74	7,215	0.00	5,242	3.62	73%	-
	Air Source Heat Pump	50	353,340	44.25	352,525	38.60	100%	87%
	Chiller	1	22,821	0.72	22,822	0.43	100%	60%
	Elevator	1	4,630	0.00	4,630	0.00	100%	-
	Common Area Exterior LED	284	119,153	0.65	119,024	0.53	100%	82%
	Common Area Interior LED	1,175	329,695	45.28	367,812	24.93	112%	55%
	In Unit LED	1,800	60,872	7.43	53,099	6.42	87%	86%
	Refrigerator	36	1,656	0.20	2,206	0.33	133%	165%
	Showerhead	48	14,131	0.00	9,205	1.23	65%	-
	Smart Thermostat	6	3,990	0.00	2,832	0.24	71%	-
Total		**28,217**	**2,449,466**	**374.62**	**2,278,225**	**307.14**	**93%**	**82%**

E.3.3 Methodologies and Discussion of Realization Rates

The source of the methodologies used to calculate savings and a discussion of realization rates, by measure, is included below.

Direct Installed Measures

Low-Flow Faucet Aerators

Energy savings and demand reductions for low-flow faucet aerators were calculated as specified in the Evergy TRM. Realization rates were negatively impacted by two factors: 1) verified occupancy (people per household) reported in the program tracking data (1.1) was lower than reported energy savings occupancy (2.1), and 2) claimed savings

included aerators that were installed in units with gas domestic hot water for which there was no verified electricity savings. ADM found a 38 percent realization rate for energy savings (kWh) and 55 percent realization rate for peak demand reduction (kW).

Low-Flow Showerheads

Energy savings and demand reductions for low-flow showerheads were calculated as specified in the Evergy TRM resulting in 27 percent realization for energy savings (kWh) and 50 percent realization rate for peak demand reduction (kW). Realization rates were negatively impacted by two factors: 1) verified occupancy (people per household) reported in the program tracking data (1.1) was lower than reported energy savings occupancy (2.1), and 2) claimed savings included showerheads that were installed in units with gas domestic hot water for which there was no verified electricity savings.

Smart Power Strips

Energy savings and demand reductions for smart power strips were calculated as specified in the Evergy TRM. The realization rate for energy savings (kWH) was 100 percent, and 101 percent for demand reduction (kW). Realization rate for demand is over 100 percent due to rounding in the reported kW reduction.

In-Unit LEDs

Energy savings were calculated as specified in the Evergy TRM using measure wattages reported in the program tracking data. Baseline wattage for 9W LEDs was specified in the Evergy TRM. For all other bulbs, baseline wattages were calculated based on the average baseline energy consumption for bulbs of similar type and wattage as found in the Evergy Energy Saving Products program. All other inputs were taken from the Evergy TRM. Direct install lighting realization rates were 105 and 106 percent for energy saving and peak demand reduction, respectively.

Prescriptive Measures

Air Source Heat Pumps (ASHP)

Energy savings and demand reductions from the installation of air source heat pumps (ASHP) was calculated as specified in the Evergy TRM using installed measure model specifications. The difference between assumed and actual specifications resulted in energy saving (kWh) realization rate of 81 percent and demand reduction (kW) realization rate of 80 percent.

Bathroom Exhaust Fans

Energy savings and demand reduction from bathroom exhaust fans were calculated as specified in the Evergy TRM. ADM calculated saving using model specifications reported in the ENERGY STAR database of energy efficient products for product model numbers reported in the program tracking data. The verified energy savings resulted in realization

rates of 120 percent and 193 percent for energy savings and demand reduction, respectively.

Dishwashers

Energy savings (kWh) and demand reductions (kW) from the installation of ENERGY STAR certified dishwashers were calculated as specified in the Evergy TRM. ADM used model specifications reported in the ENERGY STAR database of energy efficient products for product model numbers reported in the program tracking data. The verified energy savings resulted in realization rates of 86 percent for both energy and demand.

ENERGY STAR Refrigerators

Energy savings and demand reductions from the installation of ENERGY STAR certified refrigerators were calculated as specified in the Evergy TRM. ADM used model specifications reported in the ENERGY STAR database of energy efficient products for product model numbers reported in the program tracking data. Installed models all had automatic defrosting, while the reported savings values assumed refrigerators would be manual defrost models. This had a negative impact on realization rates. The verified energy savings resulted in realization rates of 60 percent for both energy and demand.

Programmable Thermostats

Energy savings and demand reductions resulting from the installation of programmable thermostats in multifamily units were calculated as specified in the Evergy TRM. The in-service rates used to calculate reported savings reflect self-installed units, while verified savings were calculated using 100 percent in-service rate standard for direct install measures. The differences in reported and verified in-service rates resulted in energy saving (kWh) realization rate of 177 percent. No peak demand savings reductions resulted from the measure.

ENERGY STAR Clothes Washers

Energy savings and demand reductions from the installation of ENERGY STAR certified clothes washers were calculated as specified in the Evergy TRM. ADM used the ENERGY STAR database of energy efficient products to adjust energy savings values from the TRM based on the model number of the installed clothes washer. The verified energy savings resulted in an 85 percent realization rate for both energy and demand.

Custom Measures

Low-Flow Faucet Aerators

Energy savings and demand reductions for low-flow faucet aerators were calculated as specified in the Evergy TRM. ADM used baseline specifications reported in program tracking data rather than deemed reported energy savings baseline conditions, resulting in higher realization rates for custom projects than for direct install projects. Energy

savings resulted in a 73 percent realization rate. No peak demand reduction was claimed. The realization rate was negatively impacted by verified occupancy (people per household) reported in the program tracking data (1.1) was lower than reported energy savings occupancy (2.1).

Low-Flow Showerheads

Energy savings and demand reductions for low-flow faucet showerheads were calculated as specified in the Evergy TRM resulting in 65 percent realization for energy savings (kWh); no peak demand reduction (kW) was claimed. Realization rates were negatively impacted by the verified savings occupancy (people per household) reported in the program tracking data (1.1) was lower than the reported energy savings occupancy (2.1).

Air Source Heat Pumps (ASHP)

Energy savings and demand reductions from the installation of air source heat pumps (ASHP) were calculated as specified in the Evergy TRM using installed measure model specifications. Verified savings resulted in energy saving (kWh) realization rate of 100 percent and demand reduction (kW) realization rate of 87 percent.

Chiller

ADM calculated energy savings for the chiller as indicated in the IL TRM v9.0 Vol 2, using specifications included in the program materials, resulting in a 100 percent realization rate for energy savings and 60 percent realization rate for peak demand reduction.

Elevator

ADM reviewed the savings calculations provided in the project documentation and found no discrepancies, resulting in a 100 percent realization rate for energy savings. No peak demand reduction resulted from the measure.

Interior and Exterior Lighting

ADM calculated energy savings for custom LED lighting projects as specified in the Evergy TRM. Baseline and efficient wattages were taken from program tracking data and verified with project documentation. Installation location and estimated hours of use were taken from program tracking data. Peak demand reduction (kW) was incorrectly calculated for several interior common lighting projects, reducing the realization rate. Custom lighting measures were categorized as interior in-unit, common area interior and common area exterior. For these categories, energy savings (kWh) realization rates ranged from 87 to 112 percent, and from 55 to 86 percent for demand reduction (kW).

Refrigerator

ADM calculated energy savings for refrigerators as specified in the Evergy TRM, using variables included in the program materials, resulting in a 133 percent realization rate for energy savings (kWh) and 165 percent realization rate for peak demand reduction (kW).

Smart Thermostats

Energy savings resulting from the installation of smart thermostats in multifamily units were calculated as specified in the Evergy TRM using variables provided in the tracking data, resulting in a 71 percent realization rate for energy savings (kWh). No demand reduction was claimed from programmable thermostats. The difference between TRM variable values and those found in the program tracking account for the realization rate.

E.4 Net Savings Evaluation Findings

The Net-To-Gross Ratio (NTGR) for the IEMF program is stipulated at 1.00, due to (1) the specific targeting of the low-income sector; and (2) the small contributions of the program to the overall portfolio saving, which do not justify the cost of conducting primary research needed to adjust the NTGR from stipulated values.

E.5 Impact Evaluation - Final Savings Tables

Based on the impact evaluation results, the total verified energy savings for the IEMF program was 2,278,225 kWh, and the total verified net peak demand reduction was 307.14 kW. Table E-4, Table E-5, and Table E-6 summarize the verified energy and demand savings for the IEMF program.

Table E-4: Program Gross Energy Savings (kWh) and Peak Demand Reduction (kW)

Jurisdiction	Reported Energy Savings (kWh)	Reported Demand Reduction (kW)	Gross Verified Energy Savings (kWh)	Gross Verified Demand Reduction (kW)	RR_{kWh}	RR_{kW}
MO West	1,429,036	251.68	1,316,934	194.51	92%	77%
MO Metro	1,020,431	122.93	961,292	112.63	94%	92%
Total	**2,449,466**	**374.62**	**2,278,225**	**307.14**	**93%**	**82%**

Table E-5: Verified Gross and Net Annual Energy Savings (kWh)

Jurisdiction	NTG Ratio	Gross Verified Energy Savings (kWh)	Net Energy Savings (kWh)
MO West	100%	1,316,934	1,316,934
MO Metro	100%	961,292	961,292
Total	**100%**	**2,278,225**	**2,278,225**

Table E-6: Verified Gross and Net Peak Demand Reduction (kW)

Jurisdiction	NTG Ratio	Gross Verified Demand Reduction (kW)	Net Demand Reduction (kW)
MO West	100%	194.51	194.51
MO Metro	100%	112.63	112.63
Total	**100%**	**307.14**	**307.14**

E.6 Program Metrics

MEIIA Cycle 3 specifies two program metrics to be used in evaluating the performance of the IEMF program.

- Spend at least 85 percent of budget: "The Spend of at least 85 percent of Budget performance element will create a threshold criterion that ensures at least 85 percent of the Commission-approved annual budget (administrative cost, plus customer incentive cost) for the program year is spent. The actual spend will be reported directly out of the Company's accounting system and included in the EM&V report. The Company will also provide a list of 'lock-in projects' and their locked-in date for inclusion for the program year spend."[6]
- Average Percent Energy Savings per Project: "The Average Percent Energy Savings Per Project performance element will be calculated using a pre-project property energy benchmarking tool to identify each project's energy usage and the TRM's energy savings values."[7]

E.6.1 Percentage of Budget Spent

The total 2021 program expenditures were 89 percent of the annual budget, exceeding the 85 percent spending requirement (see Table E-7). Long lead projects are projects that are approved in one year but not completed until the following year; long lead projects are included in the expenditure calculation of the year the expense is approved. As such, 2021 long lead time projects were added to this year's expenditures and 2020 long lead projects that were included in the 2020 calculation of percentage of budget spent were removed from the 2021 calculation.

[6] MEEIA 3 (2019 – 2022) filing, Nov 29, 2018. pg 59.
[7] Ibid.

Table E-7: Program Budget and Spending in 2021

Jurisdiction	2021 Program Budget	2021 Program Spending	2021 Long Lead Spending	2020 Long Lead Spending	Adjusted 2021 Spending	Percentage of Budget Spend
MO West	$891,255	$819,532	$99,321	$181,781	$737,071	83%
MO Metro	$781,827	$670,433	$343,909	$155,818[8]	$858,524	110%
Total	**$1,673,082**	**$1,489,965**	**$443,229**	**$337,599**	**$1,595,595**	**95%**

E.6.2 Average Percent Energy Savings per Project

ADM reviewed the total site consumption for each project reported in the program tracking data and calculated reported savings as a percentage of total site consumption prior to project completion. The average percent energy savings per project was 15 percent. One new construction project was excluded from the calculation as no pre-treatment consumption existed. Average percent savings by jurisdiction is reported in Table E-8.

Table E-8: Average Percent Energy Savings by Jurisdiction

Jurisdiction	Total Energy Use	Verified Total kWh	% Savings
MO West	5,066,223	1,151,951	23%
MO Metro	8,698,245	961,292	11%
Total	**13,764,468**	**2,113,243**	**15%**

E.7 Process Evaluation

E.7.1 Program Operations

ADM conducted in-depth interviews with Evergy's product manager, Evergy's DSM portfolio manager, ICF's portfolio manager, and ICF's program manager for the IEMF program. The purpose of the in-depth interviews is to gain a better understanding of the IEMF program design, operations, challenges, and future opportunities. ADM also surveyed project participants to verify measure installations and gather program feedback.

[8] The 2020 IEMF evaluation include long lead expenditures of $175,959 for MO Metro. The 2020 long lead expenses were later revised to $155,818. With this revision, the total 2020 spending was 96 percent of the budget, exceeding the 85 percent threshold requirement for PY1.

Roles and Responsibilities

The following is a summary of the role and responsibilities of the IEMF program staff:

- The Evergy product manager is responsible for supervising the program implementers and overseeing budget management.
- The Evergy DSM portfolio manager is responsible for ensuring the evaluation is done in accordance with Missouri rules and achieving set DSM targets.
- The ICF portfolio manager is responsible for overseeing staff and other residential programs and ensuring client and customer satisfaction.
- The ICF program manager is responsible for managing the day-to-day operations of the IEMF programs, meeting program goals, adhering to the program design, delivery, and evaluations.

Program Design and Program Performance

The IEMF program provides incentives designed to reach Evergy customers who may otherwise be unable to participate in energy efficiency programs. Many affordable housing units and multi-family properties do not invest in energy efficient equipment or appliances due to the upfront costs. As a result, renters or multi-family tenants bear the economic burden of energy waste from inefficient equipment in the apartment complex. The program aims to overcome the difference in cost between standard equipment and higher efficiency equipment to make higher efficiency equipment accessible to these groups.

Multi-family property managers can choose from different energy efficiency improvement options: direct install measures as well as in-unit upgrades and common area upgrades with a prescriptive or custom model option. Direct install measures include LED light bulbs (specialty and standard), low-flow showerheads and faucet aerators, and smart power strips (depending on the property). The prescriptive measures include dish washers, washing machines, programable thermostats, heat pumps, bathroom exhaust fans, and refrigerator replacement. The prescriptive option provides property owners with specific rebate amounts and increases the probability of program participation. Custom incentives include rebates for large lighting projects, HVAC systems, and additional equipment. Program staff works with participants and their properties to meet their specific needs.

ICF, the contracted implementer, expects that in future years savings generated through direct install measures will decrease as a percentage of total program savings while deeper savings are generated from heat pumps and energy efficient appliances through prescriptive and custom projects.

Supply chain issues caused by the COVID pandemic continued to impact the program in 2021 resulting in long and often unpredictable delays in receiving ordered measures,

especially appliances. Labor shortages also continued to impact the program; contractors struggled with labor shortages on retrofit projects, and the high turnover of property managers made recruitment of new projects challenging.

Program Participation and Marketing

Program and implementation staff noted that the low inventory of affordable housing in Missouri West jurisdiction makes it difficult to identify potential projects.

In 2021, as in the past, the biggest barrier to participation is available financing for affordable housing projects. A typical project may have up to a dozen funding sources. Nonetheless, the implementer indicated that Evergy incentives are robust and enable the installation of energy efficient measures that otherwise may not be considered.

The IEMF program staff promoted the program through newsletters, emails, in-person meetings, and phone calls to property managers. Historically, in-person contact has been the best marketing tool, but during the pandemic program staff were able to reach property managers more readily through the phone.

While major renovations with significant savings are often not possible because of the difficulty in securing financing, the implementer pursues properties with small scale projects to make incremental savings gains and to keep property managers engaged while pursuing longer term financing.

Communication

Program staff indicated that ICF and Evergy meet weekly and review the program's progress. Overall communication is effective and productive. Any projects that are not eligible for the IEMF program are referred to other Evergy energy efficiency programs.

Staff communicate with other stakeholders (e.g., energy efficiency interest groups, industry watchdogs, DSM program regulations, and economic groups) about program status. The stakeholders' main concern is budget management. In general, the program has not faced issues and the stakeholders have expressed approval of program operations.

Data Tracking and Quality Assurances and Controls (QA/QC)

ADM received data from Evergy and the implementer. The tracking dataset of record from Evergy includes one dataset for direct install and prescriptive measures and a second dataset for custom projects. The implementer also provided a dataset that included all measures installed through the program. The datasets were reconciled to help corroborate measure installations.

A single project site may have one or as many as all three measure types (direct install, prescriptive and custom). However, the current reporting data do not include a data

element that identifies a project site across datasets. This is an understandable result of the evolving nature of the program. Program verification and evaluation could be simplified by adding a project identifier across all datasets that would allow unambiguous aggregation of expenses and savings for a single project site.

Direct install and prescriptive measures are identified in the tracking data using the Evergy TRM primary key, a unique identifier that ties the installed measure to the correct measure in the TRM. In contrast, all custom measures are identified with the same primary key simply indicating that it is a custom measure, even when the measure is itself a standard measure, for example, low-flow fixtures or LED bulbs. Additionally, tracking data for custom measures include baseline conditions reported on project documentation, where direct install and prescriptive measures rely on deemed baseline values from the TRM.

As a result, the savings calculated for the same measure may not be the same across all measure categories (direct install, prescriptive and custom).

Challenges for IEMF Program

Program staff offered insight into program challenges. Below are the main challenges discussed during the in-depth interview.

First, the ICF program manager expressed that capital continues to be an issue, especially because affordable housing properties have very limited budgets. Engaging decision makers with relatively small direct install projects builds a pipeline to future, larger projects with deeper savings.

Second, Missouri West has limited affordable housing inventory. Program staff is focused on identifying potential projects in that jurisdiction.

And thirdly, labor shortages caused by the pandemic continued to challenge the program for numerous reasons. Project recruitment is a long process that was exacerbated by high turnover of property managers. Trade allies continued to experience labor shortages through 2021, plaguing projects after successfully clearing the financing and planning hurdles.

And finally, supply chain issues stalled progress on projects when building supply scarcity and extended lead times, sometimes causing a partially finished project to languish while contractors waited for building materials or appliances.

E.7.2 IEMF Decision-Maker Survey

ADM surveyed multi-family property decision-makers who participated in the IEMF program in 2021. ADM contacted the participants by email and phone. ADM attempted to contact all 17 decision-makers; ten completed the survey. Survey participants varied in the number and type of upgrades received through the program.

The total number of units in each property varied from 6 to 750 units; 80 percent of projects had fewer than 100 units and the largest project included 750 units. According to survey participants, most of the properties made improvements to most or all their units during 2021.

Program Experience

The most common way that decision makers learned about the program was through contractors (see Table E-9).

Table E-9. Program Awareness

Communication method	Percent of Responses (n = 10)
Contractor	30%
Word of mouth from friends, relatives, or others	20%
Evergy program staff	20%
Information that came in the mail	10%
Evergy email	10%
Quarterly IEMF newsletter	0%
Newspaper or magazine article or ad	0%
Radio ad	0%
Information included with Evergy bill	0%
Evergy's website	0%
Other (Please specify)	0%
Not sure	10%

Survey participants provided feedback about the reasons they participated in the program (see Table E-10). Most participants indicated they wanted to reduce utility bills for the property owner and for residents.

Table E-10: Reasons for Program Participation

Reasons	Percent of Responses (n = 10)
Reduce property utility bills	90%
Take advantage of rebates/no-cost efficiency improvements	80%
Improve tenant comfort and satisfaction	80%
Make the units more attractive to prospective tenants	70%
Reduce tenant utility bills	60%
Replace old or non-functioning equipment	40%

Note: Percentages may exceed 100% due to respondents being able to select more than one response.

Regarding the enrollment process, most respondents stated they completed the application form by themselves or with the help of others.

Measures Experience

All survey respondents confirmed that all the claimed measures were installed, and none were aware of any measures that had been removed.

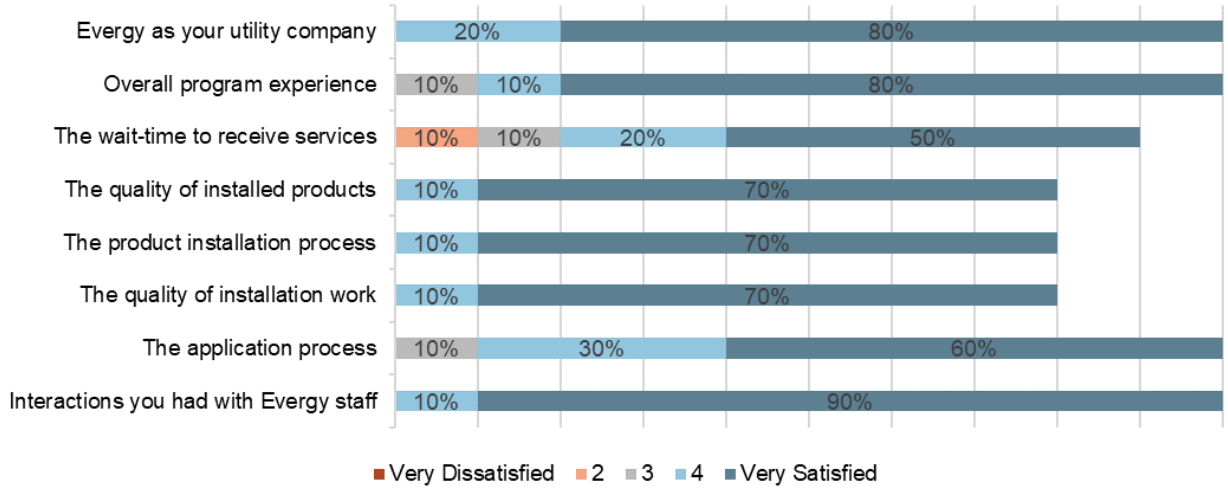
Tenant Characteristics

According to property staff, most tenants pay their own utility bills (70 percent), while other properties include the utilities in the rent. The percentage of tenants receiving some form of rental assistance ranged from 2 to 95 percent. Most respondents indicated that tenant unemployment increased during the pandemic increasing the number of tenants who were unable to pay rent on time.

Program Satisfaction

All respondents stated they were satisfied with Evergy as their service energy provider and 90 percent indicated they were satisfied with the program. The only indication of dissatisfaction with an aspect of the program was one respondent who was dissatisfied with wait-time to receive services. Overall, ratings were very positive with all aspects of the program (see Figure E-3).

Figure E-3: Satisfaction with Different Aspects of the Program[9]



Survey participants expressed their preferred method to receive communication from Evergy is through email and newsletters.

Survey respondents praised trade allies who worked on projects and expressed interest in engaging with Evergy on additional projects.

E.8 Conclusions and Recommendations

The following summarizes the key findings from the evaluation activities for the IEMF program.

- The 2021 IEMF program generated 2,278,225 kWh in energy savings and 307.14 in kW demand reduction.
- The realization rate for energy savings (kWh) was 93 percent and for 82 percent peak demand reduction (kW).
- The IEMF program spent 89 percent of its 2021 approved budget, meeting the obligation to spend at least 85 percent of the program budget during the program year.
- The average percent energy savings (kWh) for projects in 2021 was 15 percent.
- During 2021, the COVID-19 pandemic continued to impact IEMF program operations with labor shortages and supply chain constraints. As a result, some projects that were expected to be completed in 2021 will be completed in 2022.

[9] For responses that don't add to 100 percent, remaining responses were "*Does not apply"* (n=10).

- IEMF program challenges include staff turnover at properties, limited budgets, and complex project needs. The ICF program manager expressed that financing continues to be the biggest barrier to new project engagement.
- The ICF program manager expects direct install measures to contribute a smaller portion of savings in the future, while still playing an important role of keeping property managers engaged in the program until financing can be secured for projects with larger savings potential from prescriptive and custom measures.
- Program participants were highly satisfied with all aspects of the program and with Evergy as their service energy provider.

ADM makes the following are recommendations to improve overall program performance:

- Consider including a data element to program tracking data that identifies a project property across all measure types (direct install, prescriptive and custom). This may reduce errors in aggregating project level analysis and evaluation. ICF reports that a data element that ties all project applications associated with a premise has been added to the tracking data.
- Using primary key measure identifier for custom measures wherever possible could increase consistency of savings calculations and reduce the calculation burden for direct install or prescriptive measures installed under a custom project application as a custom measure.
- Consider expanding the Evergy TRM to include measures that more accurately reflect measure models that are installed through the program, such as auto-defrost refrigerators.
- Additional data entry controls to verify that unit savings are reported consistently could prevent reduced or inflated claimed savings and improve realization rates. For example, ensuring that LED bulb savings are reported by bulb rather than by fixture, could increase accuracy of reported savings.

Appendix F Home Energy Reports Program-Specific Methodologies

F.1 Program Overview

The Home Energy Report (HER) Program began providing Home Energy Reports (HERs) in 2013 to a portion of single-family residential customers. The program is designed to provide information intended to educate and influence customers' behavior to lower energy usage. The HER is delivered in paper and/or e-mail format and is composed of several modules of information to help customers understand and manage their energy use. The household receives personalized information about their own energy consumption as well as a comparison to the household energy consumption of similar homes, or "neighbors". Also included on the reports is information on other Evergy energy-efficiency programs to encourage additional home improvements in support of reducing energy usage.

Table F-1 provides a summary of program metrics for PY2.

Table F-1: Performance Metrics - Home Energy Report Program

Metric	PY2 Total	MO West	MO Metro	MO Metro Low-Income
Number of Participants	255,258	156,279	90,454	8,525
Energy Savings (kWh)				
Targeted Energy Savings	32,862,521	20,355,375	9,579,000	2,928,146
Reported Energy Savings	41,454,763	23,194,337	17,764,315	496,111
Gross Verified Energy Savings	39,309,811	22,654,916	15,173,099	1,481,796
Net Verified Energy Savings	39,309,811	22,654,916	15,173,099	1,481,796
Peak Demand Reduction (kW)				
Targeted Peak Demand Reduction	4,116.02	2,550.00	1,200.00	366.02
Reported Peak Demand Reduction	8,397.18	4,302.65	3,922.40	172.13
Gross Verified Peak Demand Reduction	6,604.47	3,806.27	2,549.24	248.96
Net Verified Peak Demand Reduction	6,604.47	3,806.27	2,549.24	248.96
Benefit / Cost Ratios				
Total Resource Cost Test Ratio (HER)	1.42	1.35	1.54	-
Total Resource Cost Test Ratio (Income-Eligible HER)	0.48	-	0.48	-

Since its launch, the program has expanded to include eleven cohorts. One of the cohorts, launched in 2014, consists of income-eligible customers. This single cohort defines the Income-Eligible HER Program. All cohorts have experimental design using randomized

controlled trials (RCT), which randomly assign a subset of Evergy's residential customers into a treatment or control group.

Table F-2 summarizes the cohorts implemented in the HER Program within the Evergy service area. The counts in this table represent the total number of customers active at any point during PY2.

Table F-2: Summary of Evergy Home Energy Report Program Participation

Jurisdiction	Cohort	Treatment Start Date	Number of Treatment Group Customers	Number of Control Group Customers
MO West	201309_e_gmo	September 2013	29,341	14,924
	201503_e_gmo	March 2015	8,164	5,961
	201604_e_gmo	April 2016	44,617	5,614
	201706_e_gmo	June 2017	14,132	6,622
	201904_e_gmo	April 2019	37,889	14,958
	202002_e_gmo	March 2020	22,136	8,818
MO Metro	201407_e_high_users	April 2014	49,889	6,678
	201503_e_kmo	May 2015	3,229	2,561
	201607_e_kmo	June 2016	7,011	4,542
	202002_e_kmo	July 2020	30,325	15,392
MO Metro: Low-Income	201407_e_low_income	August 2014	8,525	5,213
Total			**255,258**	**91,283**

Although the program currently uses the third-party implementation contractor, Oracle, ADM estimated savings for HER Program using the originally designated control groups developed by Oracle. ADM analyzed each of the cohorts treated during the 2021 program year using the same methodology. The following table displays the impact evaluation findings for the HER Program.

Table F-3 Home Energy Report Program Impact Evaluation Results

Cohort	Reported kWh Savings (kWh)	Reported Demand Savings (kW)	Verified kWh Savings (kWh)	Verified Demand Savings (kW)	Verified kWh Realization Rate	Verified kW Realization Rate
kcpl_201309_e_gmo	5,922,946	318.29	5,883,888	988.56	99.34%	310.58%
kcpl_201503_e_gmo	2,656,010	624.15	2,375,501	399.11	89.44%	63.94%
kcpl_201604_e_gmo	6,814,757	1,411.53	6,573,844	1,104.48	96.46%	78.25%
kcpl_her_201706_e_gmo	1,665,300	391.61	1,831,177	307.66	109.96%	78.56%
kcpl_her_201904_e_gmo	5,651,102	1,546.56	4,167,894	700.25	73.75%	45.28%
kcpl_her_202002_e_gmo	484,222	10.51	1,822,613	306.22	376.40%	2,913.61%
kcpl_201407_e_high_users	14,798,248	3,412.53	12,302,853	2,067.01	83.14%	60.57%
kcpl_201503_e_kmo	607,544	56.75	0	0.00	0.00%	0.00%
kcpl_201607_e_kmo	1,161,158	252.87	1,714,241	288.01	147.63%	113.90%
kcpl_her_202002_e_kmo	1,197,365	200.25	1,156,005	194.22	96.55%	96.99%
kcpl_201407_e_low_income	496,111	172.13	1,481,796	248.96	298.68%	144.63%
Total	**41,454,763**	**8,397.18**	**39,309,811**	**6,604.47**	**94.83%**	**78.65%**

ADM found the HER Program verified savings to be 39,309,811 kWh with an average annual household savings value of 175.49 kWh. The sections below provide further details on the methodology used and the impact evaluation results.

F.2 EM&V Methodology

This section describes the gross impact evaluation of the HER Program. Each of the cohorts treated during PY2 were analyzed using the same methodology.

The participant and control group billing data in the pre-period (defined as the period *before* a household starts receiving HERs) and in the post-period (defined as the period *after* a household starts receiving HERs that also occurs during PY2) was used to estimate program impact for each cohort. The methods detailed in the Uniform Methods Project (UMP) behavioral chapter by the National Renewable Energy Laboratory[10] were followed for this evaluation. In addition, the cross-participant savings were estimated from other downstream energy-efficiency programs offered to Evergy residential and low-income customers.

[10] Li, M.; Haeri, H.; Reynolds, A. (2018). The Uniform Methods Project: Methods for Determining Energy-Efficiency Savings for Specific Measures. Golden, CO; National Renewable Energy Laboratory. NREL/SR-7A40-70472. http://www.nrel.gov/docs/fy18osti/70472.pdf

F.2.1 Gross Impact Methodologies

ADM's analysis was divided into six distinct steps:

1. Data preparation and cleaning, including true-up, calendarization, and combination with weather data;
2. Validity testing of remaining treatment and control groups during the baseline period;
3. Estimation of monthly and annual billed consumption differences between treatment and control groups via regression modeling;
4. Estimation and removal of cross-participant savings from other programs (uplift);
5. Estimation of demand savings; and
6. Estimation of program attrition.

The following section describes each of these steps in detail.

Data Preparation and Cleaning

Evergy provided the following data to support the analysis:

- Pre-treatment and post-treatment monthly electric billing data for all treatment and control group homes. ADM received data from June 1, 2012 through January 1, 2022, with the start date depending on when customers were added to program cohorts;
- Treatment and control group account activation and account inactivation dates; and,
- Participant tracking data, including date of installation and reported kWh savings for each measure installed through each Evergy program.

True-Up

In some cases, Evergy uses estimated meter readings. As part of the data preparation process, ADM corrected for estimated readings by adjusting actual readings to account for them, otherwise known as a "true-up" process. For each metered reading and all estimated readings immediately preceding it, ADM summed the billed usage and number of days spanning those bills. The total billed usage for that cumulative period was then divided by the total number of days to calculate an average usage per day. This average usage per day was multiplied by the number of days in each individual bill to generate a corrected usage value. Because the number of estimated readings per actual reading is inconsistent, the number of estimated readings prior to the first actual reading in the provided dataset cannot be assumed. Therefore, the first metered reading in the billing data, and all estimated readings preceding, were excluded from the dataset. Similarly, estimated readings that did not have a corresponding actual reading (generally towards

the tail end of provided billing data) were also excluded from analysis. The following equation provides the method of calculating the adjusted usage for billing data after the first metered reading and all prior estimated readings have been excluded:

Equation F-1: Billing Data Adjustment Calculation

$$Adjusted\ usage_m = Billing\ days_m \times \sum_i^n \frac{Billed\ usage}{\sum_i^n Billing\ days}$$

Where:

i	= First estimated bill in a sequence of estimated bills leading to a metered bill
n	= A metered bill providing an adjustment factor for preceding estimated bills
m	= The billing month of interest
Billed usage	= The total kWh billed in a monthly bill
Billing days	= The total number of days in a monthly bill's billing period

Calendarization

Monthly billing periods in utility bill data do not fall on consistent dates between participants. For example, one customer's June bill may run from May 16 to June 17 while another may run from May 20 to July 5. To make the monthly billing data consistent between participants and to represent each month accurately, ADM calendarized the data such that monthly billing data matched calendar dates. For example, if 15 days in a billing period belonged to June and 15 days belonged to July, 50 percent of the billed usage would be attributed to June and 50 percent attributed to July. The proportioned usage and number of days that fall under a given calendar month are then summed to generate a calendarized usage value and the number of billed days for that month. The following equation provides the method for calculating the monthly usage by calendar month:

Equation F-2 Monthly Billing Data Calculation

$$Monthly\ usage_m = \sum_i^n \left(Adjusted\ usage_i \times \frac{Month\ days_i}{Billing\ days_i} \right)$$

Where:

i	= First bill containing the month of interest
n	= Last bill containing the month of interest
m	= The month of interest
$Monthly\ usage$	= The calendarized monthly usage for a given month

$Month\ days$ = The number of days belonging to the month of interest in a billing period

$Billing\ days$ = The number of days in a billing period

Restrictions

After calendarization was completed, an average daily usage value was calculated by dividing the monthly usage by the number of billed days in a month. Additionally, data was filtered using the following criteria:

- Customer billing data that had inconsistent or missing account inactivation and/or activation dates were removed from the initial data set.
- Customer billing data that extended outside the active account date ranges were excluded.
- Bills that had less than 10 or more than 90 days duration were removed.
- Customer data with less than 8 months of both pre- and post-period data were removed.
- Customer data which had average daily usage that differed from the first quartile or third quartile by three times the inter-quartile range or more at the cohort level were excluded from analysis. Such records were considered outlier data since the average daily kWh usage was unusually small or unusually large. These levels of consumption are unrealistic for residential households and can be reasonably categorized as the result of a reading error rather than a valid reading from high or low users.

Overall, ADM aimed to remove erroneous readings rather than remove high and low users, as these subgroups contribute real behaviors to the average savings estimates.

Weather Data

ADM identified the US Air Force code for each airport closest to each customer's listed ZIP code. Weather data from the National Oceanic and Atmospheric Administration was utilized to calculate heating degree days (HDD) and cooling degree days (CDD) for each unique weather station. This data was then combined with customers' calendarized billing data to assign HDD and CDD values, matching based on US Air Force airport code, billing start date, billing end date, and customer ID.

HDD and CDD are defined as the difference between the daily temperature and a pre-defined temperature setpoint during the heating and cooling seasons, respectively. These values were estimated using a range of setpoints (55- to 75-degree temperature base), with the HDD and CDD combination that yielded the largest model R-square value used in the final analysis. This accounts for the "dead-band" in residential heating and cooling

loads, as there is a range of temperatures in which a residential customer will be neither heating nor cooling.

After data preparation and cleaning, validity testing was performed for all cohorts evaluated. The details of this step are provided in the next section.

Validity Testing

The method for evaluation requires the counterfactual group remains statistically valid for each treatment group. Validity is tested by examining each billing record in the pre-treatment period for customers both the treatment and control groups. Each calendarized monthly record is tested for statistically significant differences using a simple two-tailed t-test. Equivalency tests were performed for each month between the provided treatment group and the provided control group.

The validity of each RCT was tested by completing t-tests for the average daily usage of each of the pre-period months between the remaining treatment group and remaining control. If the pre-period average daily usage rejected the null hypothesis at the 95 percent confidence level for several of the 12 pre-period months, the RCT was considered invalid.

For cohorts that did not pass equivalency testing, propensity score matching (PSM) was performed to create an ad-hoc control group comprising of participants that have not received HERs. Equivalency testing is performed on the created control group to confirm that it is statistically comparable to the treatment group in pre-period usage. All cohorts passed equivalency testing at the 95 percent confidence level during the evaluation of the 2021 program year and therefore the creation of an ad-hoc control group was not required.

Panel Regression Modeling

A difference-in-differences (D-i-D) panel regression model was used to compare the treatment group and valid comparison control group. The comparison control group used was the original group created during the RCT design.

The D-i-D mixed-effects model specification contains customer-specific dummy variables to account for the natural variation in household electricity usage that cannot be explicitly controlled for. The specification of customer specific effects allows the model to capture much of the baseline differences across customers while obtaining reliable estimates of the impact of participation in the program.

Independent variables, such as CDD and HDD, were included to account for the impact that weather has on energy usage. ADM then fit a linear mixed-effects panel regression model to estimate energy usage differences between treatment and control households.

Equation F-3: Linear Mixed-Effects Difference-in-Difference (D-in-D) Panel Regression Model Specification

$$ADC_{it} = \alpha_{0i} + \beta_1(Post)_{it} + \beta_2(Treatment)_{it} + \beta_3(Post * Treatment)_{it} + \beta_4(CDD)_{it} + \beta_5(HDD)_{it} + \varepsilon_{it}$$

Where:

t	= The monthly period for which energy usage is being predicted
i	= Subscript corresponding to customer-level random effect
ADC_{it}	= Estimated average daily consumption (dependent variable) in home i during period t
α_{0i}	=The model intercept for home i
$Post_{it}$	= Dummy variable indicating whether period t was in pre- or post-retrofit
$Treatment_{it}$	= Dummy variable indicating whether household i was in treatment group or control group
CDD_{it}	= Average cooling degree days during period t at home i
HDD_{it}	= Average heating degree days during period t at home i
ε_{it}	= Customer-level random error
$\{\beta_1,\beta_2,\beta_3,\beta_4,\beta_5\}$	= Coefficients determined via regression

Remove Double Counted Savings

Participants in both the treatment and control groups participate in other Evergy residential energy-efficiency programs. Additionally, the HERs sent to customers include information about other Evergy incentives and programs, which may lead to customers adopting more energy-efficient upgrades for their home. This additional participation of HERs recipients in other Evergy programs can lead to an increase in regression-derived savings, referred to as uplift. When a household participates in an efficiency program because of this encouragement, the utility might count their savings twice: once in the regression-based estimate of HER program savings and again in the estimate of savings for the other energy efficiency program. Although uplift rarely displays a statistically significant difference between the treatment and control groups, the UMP recommends removing uplift from each group at the household level.

The double counted savings, whether positive or negative, are subtracted from the cohort's savings estimates from the regression analysis to get total verified savings. The approach for removal of double counted savings will differ based on whether the other program is a downstream program. The following sections detail our proposed methodology for each.

Downstream Programs

Downstream programs traditionally track installed measures at the customer level. Evergy delivered customer-level tracking data for other programs offered to residential customers. ADM evaluated these programs and used the verified savings from each program to use towards downstream double counting for the HERs Program. The residential Evergy programs included in the double counting analysis are the Heating, Cooling, and Home Comfort Program, the Income-Eligible Multi-Family Program, and the Smart Thermostats Program.

ADM corrected for cross-program participation that occurred after treatment began if the treatment group participated in other programs at a higher rate than the control group. The double count savings were calculated on a per-household level for each treatment group in each cohort as follows:

Equation F-4*: Double Count Specification*

$$Double\ Counting = \left(\frac{OP\ kWh}{Household_{Treatment}} - \frac{OP\ kWh}{Household_{Control}}\right) \times \#\ Accounts_{Treatment}$$

Where:

$\frac{OP\ kWh}{Household_{Treatment}}$ = Other program kWh per household in the treatment group

$\frac{OP\ kWh}{Household_{Control}}$ = Other program kWh per household in the control group

$\#\ Accounts_{Treatment}$ = Total accounts in the treatment group

To estimate double counted program savings from downstream program uplift, the following steps were performed:

1. HER program treatment and control group customers were matched to the utility energy-efficiency program tracking data by customer ID;
2. The difference between treatment and control group customers in average savings attributable to other energy-efficiency programs was calculated to estimate the savings per participant due to uplift; and
3. The savings due to uplift was multiplied by the number of “weighted customers” in the treatment group to determine the savings adjustment for the entire cohort. Customers are weighted by the proportion of days during PY2 that they are active in the program.

ADM summarized and removed uplift due to participation in the Heating, Cooling, and Home Comfort Program, the Income-Eligible Multi-Family Program, and the Smart Thermostats Program for each cohort. The double counted savings analysis included all downstream savings from these programs that occurred during PY2. It also included any

downstream savings from these program measures that occurred during PY1, if PY2 was within that measure's effective useful life (EUL).

Upstream Programs

Estimating savings from program uplift for measures that the utility does not track at the customer level is more difficult. Because upstream programs are unable to track participation at the customer level, the approach to estimating program uplift differs from that of downstream programs. Upstream program uplift estimation therefore requires household surveys to be conducted.

To determine if there was a significant difference in the number of incentivized lightbulbs purchased by the treatment and control groups, ADM included questions in the program's participant survey asking if participants had received a discount or rebate on any LED lightbulbs during PY2. ADM then performed a two-sample z-test using the responses from these questions. The responses for PY2 indicated that there was no statistically significant difference in the number of incentivized lightbulbs purchased by the treatment and control groups, therefore savings calculations do not include any program uplift removal. See Section F.3.3 for more information.

Estimate Demand Savings

ADM estimate demand savings for the program using monthly billing data provided by Evergy. Specifically, coincident demand savings are calculated by taking the estimated energy savings from August, dividing it by the number of hours in August times a factor of 1.5. The demand reduction was evaluated for each cohort and summed to calculate the program-level demand reduction.

Equation F-5: Demand Savings Calculation, Per Participant

$$Demand\ Savings = (AugSavings/h) * 1.5$$

Where:

$AugSavings$ = Per participant energy savings estimated for the month of August

h = Number of hours in August

Attrition Analysis

The tracking of treatment and control households can be affected by either move-outs or opt-outs (known collectively as 'attrition'). If a household's final bill was the end of the evaluated post-period, it is considered a move-out and bills occurring after move-out will be removed from the analysis. Opt-outs, however, remain in the regression analysis, as the program savings estimated is the "intent-to-treat" savings. It remains useful to estimate attrition to gather information on persistence of savings.

ADM summarized the cumulative level of both treatment and control move-outs over the program life by month, cohort, and treatment/control status for each program year by identifying if customers' last bills were sent or their accounts were labeled as inactive prior to the end of the program year. Customers with missing inactive account dates were presumed to be moveouts if their last bill was sent prior to November 1, 2021.

F.3 Gross Impact Evaluation Findings

This section details the level of program activity for 2021 as well as the reported and verified gross savings.

The program-level savings are calculated by multiplying the average annual household impact estimate (corrected for double counted savings) by the weighted number of active program participants in the treatment group. Weights are calculated by taking the total number of program evaluation days in the program year and dividing by the number of days for that year.

ADM calculated the percent savings per home by dividing the average annual energy savings by the average annual energy consumption of the control group. That value is then adjusted for uplift from downstream measures. This methodology is presented in the UMP Chapter 17 Residential Behavior Protocol.[11]

F.3.1 Data Preparation and Cleaning

Billing data provided by Evergy was prepared and cleaned. The following table represents the unique number of customers per cohort and treatment group throughout the data cleaning process.

[11] https://energy.gov/sites/prod/files/2015/02/f19/UMPChapter17-residential-behavior.pdf

Table F-4: Treatment Group Customer Counts by Cohort - Missouri West

Restriction	201309_E	201503_E	201604_E	201706_E	201904_E	202002_E
All accounts listed as active in the program during PY2	29,341	8,164	44,617	14,132	37,889	22,136
After true-up, calendarization, and outlier removal	29,336	8,163	44,602	14,122	37,876	22,119
After removing customers with an insufficient amount of billing data	27,158	7,726	41,611	12,769	28,132	11,467

Table F-5: Treatment Group Customer Counts by Cohort – Missouri Metro

Restriction	201407_E_High_Users	201503_E_KMO	201607_E	202002_E_KMO
All accounts listed as active in the program during PY2	49,889	3,229	7,011	30,325
After true-up, calendarization, and outlier removal	49,872	3,226	7,007	30,315
After removing customers with an insufficient amount of billing data	46,361	2,827	6,191	20,456

Table F-6: Treatment Group Customer Counts by Cohort - Missouri Metro (Low-Income)

Restriction	201407_E_Low_Income
All accounts listed as active in the program during PY2	8,525
After fixing acct active and inactive dates	8,515
After removing customers with an insufficient amount of billing data	7,593

F.3.2 Validity Testing

Clean data was tested for statistically significant differences in usage between the treatment and control groups for each of the 12 pre-period months by cohort. Table F-7 details differences and statistical significance between each cohort's treatment and control groups for each of the 12 months in the pre-period, relative to each cohort's intervention date.

Table F-7: 201309_E Cohort T-Test Results – Missouri West

Pre-Period Month	Treatment Group Average Daily Usage (kWh/day)	Control Group Average Daily Usage (kWh/day)	Average Daily Usage Difference (kWh/day)	P-value	Significant Difference?
January	48.6739	48.9379	-0.2640	0.3559	No
February	46.7417	46.9855	-0.2438	0.3841	No
March	44.4908	44.7066	-0.2159	0.4074	No
April	38.0128	38.2449	-0.2321	0.2355	No
May	36.9670	37.1948	-0.2278	0.1381	No
June	47.2278	47.5697	-0.3419	0.0670	No
July	56.6724	57.1085	-0.4362	0.0469	Yes
August	55.6301	56.0774	-0.4473	0.0268	Yes
September	39.9495	40.2749	-0.3255	0.0378	Yes
October	33.0954	33.2673	-0.1719	0.2277	No
November	39.3791	39.5778	-0.1987	0.3160	No
December	47.3312	47.5788	-0.2476	0.3475	No

Table F-8: 201503_E_GMO Cohort T-Test Results – Missouri West

Pre-Period Month	Treatment Group Average Daily Usage (kWh/day)	Control Group Average Daily Usage (kWh/day)	Average Daily Usage Difference (kWh/day)	P-value	Significant Difference?
January	81.82	82.0368	-0.2132	0.7264	No
February	78.99	80.1693	-1.1822	0.4853	No
March	67.46	67.7365	-0.2795	0.5346	No
April	47.90	48.0313	-0.1263	0.6255	No
May	50.70	50.9586	-0.2588	0.3984	No
June	60.59	61.0175	-0.4323	0.2706	No
July	64.26	64.8129	-0.5565	0.1767	No
August	66.37	67.1212	-0.7542	0.0726	No
September	49.42	49.6819	-0.2603	0.4122	No
October	42.60	42.7598	-0.1598	0.5135	No
November	69.07	69.1960	-0.1295	0.7812	No
December	80.15	80.1467	0.0066	0.9904	No

Table F-9: 201604_E_GMO Cohort T-Test Results – Missouri West

Pre-Period Month	Treatment Group Average Daily Usage (kWh/day)	Control Group Average Daily Usage (kWh/day)	Average Daily Usage Difference (kWh/day)	P-value	Significant Difference?
January	29.6282	29.9109	-0.2827	0.2208	No
February	26.3992	26.6104	-0.2112	0.3061	No
March	21.6348	21.8192	-0.1844	0.4590	No
April	20.6365	20.7033	-0.0668	0.5988	No
May	23.3411	23.4150	-0.0739	0.6043	No
June	36.6942	36.7171	-0.0229	0.9104	No
July	44.9085	45.1043	-0.1958	0.4035	No
August	40.0844	40.2738	-0.1894	0.3793	No
September	31.4873	31.6637	-0.1764	0.3316	No
October	22.0437	22.1883	-0.1446	0.2684	No
November	24.4060	24.4845	-0.0785	0.6334	No
December	28.4114	28.5387	-0.1273	0.5312	No

Table F-10: 201706_E_GMO Cohort T-Test Results – Missouri West

Pre-Period Month	Treatment Group Average Daily Usage (kWh/day)	Control Group Average Daily Usage (kWh/day)	Average Daily Usage Difference (kWh/day)	P-value	Significant Difference?
January	23.4245	23.2509	0.1735	0.5801	No
February	20.5982	20.7129	-0.1146	0.6829	No
March	19.1068	18.9489	0.1578	0.5213	No
April	17.5738	17.4403	0.1335	0.5152	No
May	19.8482	19.9043	-0.0561	0.8052	No
June	24.6531	24.6545	-0.0015	0.9979	No
July	35.4903	35.4852	0.0051	0.9874	No
August	31.8068	31.8913	-0.0845	0.7825	No
September	24.7190	24.7359	-0.0169	0.9474	No
October	17.8530	17.8568	-0.0038	0.9845	No
November	19.8264	19.7350	0.0914	0.7108	No
December	24.1205	23.8858	0.2346	0.4580	No

Table F-11: 201904_E_GMO Cohort T-Test Results – Missouri West

Pre-Period Month	Treatment Group Average Daily Usage (kWh/day)	Control Group Average Daily Usage (kWh/day)	Average Daily Usage Difference (kWh/day)	P-value	Significant Difference?
January	36.6040	36.6339	-0.030	0.92	No
February	36.6303	36.6666	-0.036	0.91	No
March	32.6254	32.7508	-0.125	0.64	No
April	31.1637	26.2598	4.904	0.01	Yes
May	34.8803	35.1049	-0.225	0.29	No
June	46.0171	46.2344	-0.217	0.39	No
July	46.6651	46.7176	-0.053	0.83	No
August	41.2885	41.3660	-0.078	0.73	No
September	33.4958	33.4494	0.046	0.80	No
October	26.0048	25.9110	0.094	0.54	No
November	31.9684	32.0284	-0.060	0.80	No
December	35.2464	35.2717	-0.025	0.93	No

Table F-12: 200200_E_GMO Cohort T-Test Results – Missouri West

Pre-Period Month	Treatment Group Average Daily Usage (kWh/day)	Control Group Average Daily Usage (kWh/day)	Average Daily Usage Difference (kWh/day)	P-value	Significant Difference?
January	48.5709	48.6565	-0.0857	0.8556	No
February	50.3725	51.0466	-0.6741	0.2179	No
March	43.2468	43.3851	-0.1383	0.7961	No
April	32.6029	32.7639	-0.1610	0.6087	No
May	34.4667	34.4984	-0.0318	0.9102	No
June	49.0617	48.8486	0.2131	0.5390	No
July	53.5201	53.3311	0.1890	0.5856	No
August	48.4224	48.3815	0.0409	0.8944	No
September	39.3283	39.2377	0.0905	0.7330	No
October	33.7265	33.7807	-0.0542	0.8131	No
November	39.1044	39.1826	-0.0782	0.8228	No
December	45.2857	45.3026	-0.0168	0.9675	No

Table F-13: 201407_E_High_Users Cohort T-Test Results – Missouri Metro

Pre-Period Month	Treatment Group Average Daily Usage (kWh/day)	Control Group Average Daily Usage (kWh/day)	Average Daily Usage Difference (kWh/day)	P-value	Significant Difference?
January	33.55	33.3878	0.16	0.5545	No
February	31.96	31.7025	0.26	0.3306	No
March	27.75	27.4406	0.31	0.1702	No
April	24.27	24.0450	0.23	0.1920	No
May	30.09	29.7547	0.33	0.1165	No
June	36.33	35.7483	0.58	0.0824	No
July	45.35	44.8021	0.55	0.0445	Yes
August	44.13	43.5968	0.53	0.0495	Yes
September	36.71	36.1863	0.52	0.0207	Yes
October	25.57	25.2714	0.30	0.0883	No
November	29.20	28.9177	0.29	0.2139	No
December	33.54	33.3135	0.22	0.4055	No

Table F-14: 201503_E_KMO Cohort T-Test Results – Missouri Metro

Pre-Period Month	Treatment Group Average Daily Usage (kWh/day)	Control Group Average Daily Usage (kWh/day)	Average Daily Usage Difference (kWh/day)	P-value	Significant Difference?
January	31.6045	31.12	0.4799	0.4079	No
February	30.0697	30.39	-0.3243	0.6957	No
March	26.5393	26.36	0.1744	0.7314	No
April	22.3830	22.62	-0.2381	0.5231	No
May	26.9668	27.36	-0.3886	0.3501	No
June	34.8864	35.68	-0.7958	0.1220	No
July	37.9421	39.01	-1.0680	0.0478	Yes
August	39.0578	39.92	-0.8660	0.1123	No
September	28.5041	29.01	-0.5059	0.2281	No
October	22.4373	22.68	-0.2466	0.4804	No
November	28.9046	28.82	0.0799	0.8774	No
December	32.2244	31.70	0.5239	0.3659	No

Table F-15: 201607_E Cohort T-Test Results – Missouri Metro

Pre-Period Month	Treatment Group Average Daily Usage (kWh/day)	Control Group Average Daily Usage (kWh/day)	Average Daily Usage Difference (kWh/day)	P-value	Significant Difference?
January	26.2254	26.2246	0.0008	0.9987	No
February	23.7175	23.9530	-0.2356	0.5924	No
March	20.2743	20.2151	0.0592	0.8670	No
April	18.0190	17.9457	0.0732	0.7970	No
May	21.0736	20.9891	0.0845	0.7863	No
June	30.4279	30.3287	0.0992	0.8557	No
July	34.2700	33.7587	0.5113	0.2631	No
August	31.2680	30.9496	0.3185	0.4549	No
September	24.3125	24.0904	0.2221	0.5247	No
October	18.6777	18.5300	0.1476	0.5978	No
November	22.0164	22.1107	-0.0943	0.8041	No
December	25.3030	25.5768	-0.2738	0.5437	No

Table F-16: 202002_E_KMO Cohort T-Test Results – Missouri Metro

Pre-Period Month	Treatment Group Average Daily Usage (kWh/day)	Control Group Average Daily Usage (kWh/day)	Average Daily Usage Difference (kWh/day)	P-value	Significant Difference?
January	44.9272	44.8709	0.0563	0.8429	No
February	44.7583	44.6918	0.0665	0.8303	No
March	39.3576	39.3058	0.0518	0.8515	No
April	31.5830	31.6510	-0.0680	0.7224	No
May	34.4015	34.6181	-0.2167	0.1718	No
June	49.2337	49.3811	-0.1474	0.4922	No
July	55.3160	55.5221	-0.2061	0.3878	No
August	50.6008	50.8301	-0.2292	0.2998	No
September	41.5029	41.7391	-0.2362	0.2373	No
October	34.1130	34.2905	-0.1775	0.2593	No
November	38.2333	38.5438	-0.3105	0.1898	No
December	42.7039	42.9311	-0.2271	0.3858	No

Table F-17: 201407_E_Low_Income Cohort T-Test Results – Missouri Metro (Low-Income)

Pre-Period Month	Treatment Group Average Daily Usage (kWh/day)	Control Group Average Daily Usage (kWh/day)	Average Daily Usage Difference (kWh/day)	P-value	Significant Difference?
January	34.6113	33.99	0.6190	0.0979	No
February	33.3317	32.75	0.5788	0.1195	No
March	28.5855	28.46	0.1299	0.6866	No
April	23.4127	23.30	0.1098	0.6083	No
May	27.1627	27.13	0.0340	0.8813	No
June	32.7706	32.87	-0.0972	0.8039	No
July	41.5701	41.41	0.1601	0.6146	No
August	40.0415	39.88	0.1605	0.6026	No
September	33.4093	33.39	0.0187	0.9428	No
October	24.5649	24.65	-0.0706	0.7338	No
November	30.0881	30.10	-0.0079	0.9806	No
December	34.2511	34.01	0.2429	0.5091	No

A tolerance band was set allowing three months out of 12 to vary in pre-period usage at the 90 percent confidence level. All eleven cohorts passed this threshold and remained balanced at the 90 percent confidence level in the pre-period. Therefore, ADM continued to the next step and conducted linear regressions on each of the RCT cohorts.

F.3.3 Double Counting Analysis

Participants in both the treatment and control groups participate in other Evergy residential energy efficiency programs. The double counted savings, defined in the methodology, whether positive or negative, are subtracted from the cohort's gross savings estimates from the regression analysis to get total verified savings. This section summarizes the results of the double counting analysis.

Downstream Programs

For downstream program savings, Evergy delivered tracking data for the Heating, Cooling, and Home Comfort Program, the Income-Eligible Multi-Family Program, and the Smart Thermostats Program, as part of the impact evaluation. The average treatment customer, average control customer, and average incremental savings attributed to the three residential programs for each cohort were identified and summarized.

Table F-18 displays the verified cross-participation savings to be subtracted from each group's annual program savings for each program year and evaluation period. The double counted savings analysis included all downstream savings from residential programs that occurred during PY2. It also included any downstream savings from residential program measures that occurred during PY1, if PY2 was within that measure's effective useful life (EUL).

Note that cohort kcpl_201503_e_kmo was not included, as no statistically significant savings could be estimated for it in PY2.

Table F-18: Downstream Double Counting Results by Cohort

Cohort	Average Treatment Household Annual Savings (kWh/year)	Average Control Household Annual Savings (kWh/year)	Average Household Annual Savings Adjustment (kWh/year)	Weighted Treatment Customers	Downstream Program Double Count Savings (kWh/year)
kcpl_201309_e_gmo	45.7633	48.3901	2.6268	28,724.31	75,453
kcpl_201407_e_high_users	35.8911	32.0848	-3.8063	48,181.54	-183,395
kcpl_201407_e_low_income	23.8367	17.5541	-6.2826	8,106.55	-50,930
kcpl_201503_e_gmo	56.6789	77.0021	20.3231	7,901.40	160,581
kcpl_201604_e_gmo	34.6370	24.3898	-10.2472	42,890.61	-439,510
kcpl_201607_e_kmo	31.3011	24.5855	-6.7156	6,581.59	-44,199
kcpl_201706_e_gmo	28.6195	33.8099	5.1903	13,406.38	69,584
kcpl_201904_e_gmo	32.9600	29.9700	-2.9900	34,939.17	-104,467
kcpl_202002_e_gmo_re	29.8083	40.5187	10.7103	18,747.30	200,790
kcpl_202002_e_kmo_re	33.5918	27.6432	-5.9486	26,024.43	-154,809
Total	**-**	**-**	**-**	**235,503.28**	**-470,902**

The results are separated by cohort. PY2 has a total of -470,902 kWh in double counted savings. The double counted savings are the difference between the average treatment and control group savings for each household at the cohort level.

Upstream Programs

For upstream program savings, the utility is unable to track savings at the customer level. Because of this, the approach to estimating program uplift differs from that of downstream programs, as it requires household surveys to be conducted. Specifically, to determine if there was a statistically significant difference in the number of incentivized lightbulbs purchased by the treatment and control groups, ADM included questions in the program's participant survey asking if participants had received a discount or rebate on any LED

lightbulbs during PY2. Table F-19 shows a summary of all participants that responded to these survey questions.

Table F-19: Summary of Discounted LED Survey Question Responses

Did Customer Receive a Discounted LED Bulb During PY2?	Control Group		Treatment Group	
	Response Count	Percentage of Respondents	Response Count	Percent of Respondents
Yes	66	19%	61	17%
No	244	71%	250	70%

ADM then performed a two-sample z-test using the responses from these questions. The results of the test yielded a z-score of -0.55, which is not statistically significant at a 90 percent confidence level. This indicated that there was no statistically significant difference in the number of incentivized light bulbs purchased by the treatment and control groups, therefore the double counted savings removal process did not include any upstream program savings.

F.3.4 Linear Regression Modeling Results

A difference-in-differences model is presented in Equation F-2 to estimate daily consumption differences between homes that received HERs and homes that did not receive HERs. This section details the regression results of each of the evaluated cohort.

Missouri West Results

This section describes the linear regression results, double counting adjustments, and final household and program-level savings for each cohort within Missouri West.

201309_E Cohort Results

As shown in the table below, the coefficient of interest (Post * Treatment) is negative, indicating lower usage per month in the post-period for treatment customers. In addition, this coefficient is statistically significant at the 90 percent level. This indicates a statistically significant energy savings effect resulting from members of this cohort participating in the program.

Table F-20: 201309_E Cohort Regression Coefficients – Missouri West

Coefficient	Estimate	Std Error	T-Value	5%	95%
(Intercept)	24.672	0.142	173.5	24.43	24.91
Post	-0.221	0.165	-1.3	-0.49	0.05
Treatment	-3.514	0.051	-68.5	-3.59	-3.43
Post * Treatment	-0.554	0.063	-8.8	-0.66	-0.45
CDD	2.312	0.005	483.4	2.30	2.32
HDD	0.728	0.002	375.6	0.72	0.73
Conditional R-Squared: 0.561					

The verified gross kWh savings of HER Program for this cohort is summarized below by evaluation period and program year. Total verified kWh savings is calculated by multiplying the annual adjusted kWh savings per home by the weighted number of treatment customers in the post period (the method to calculate weighted customers is explained in Section F.3).

Table F-21: 201309_E Cohort Verified Annual kWh Savings – Missouri West

Cohort	Annual Unadjusted Savings Per Home (kWh/year)	Double Counted Savings Adjustment (kWh/year)	Annual Adjusted Savings Per Home (kWh/year)	Annual Control Group Usage Per Home (kWh/year)	Annual Percent Savings Per Home
201309_e	202.21	2.63	204.84	14,846.24	1.38%

This cohort displayed 1.38 percent annual household savings for PY2. The double-counted savings adjustment increased the annual household savings because the control group for this cohort exhibited greater annual savings due to downstream participation than the treatment group (see Table F-18). After adjusting for cross-participant savings found in the Smart Thermostats (ST), Heating, Cooling, and Home Comfort (HCHC), or Income-Eligible Multi-Family (IEMF) programs, average annual household savings for treated customers in this cohort was 204.84 kWh.

201503_E_GMO Cohort Results

As shown in the table below, the coefficient of interest (Post * Treatment) is negative, indicating lower usage per month in the post-period for treatment customers. In addition, this coefficient is statistically significant at the 90 percent level. This indicates a statistically significant energy savings effect resulting from members of this cohort participating in the program.

Table F-22: 201508_E_GMO Cohort Regression Coefficients – Missouri West

Coefficient	Estimate	Std Error	T-Value	5%	95%
(Intercept)	27.889	0.240	116.014	27.49	28.28
Post	-0.380	0.283	-1.343	-0.85	0.09
Treatment	-4.850	0.114	-42.573	-5.04	-4.66
Post * Treatment	-0.768	0.150	-5.134	-1.01	-0.52
CDD	3.203	0.012	263.431	3.18	3.22
HDD	1.585	0.005	338.686	1.58	1.59
Conditional R-Squared: 0.462					

The verified gross kWh savings of HER Program for this cohort is summarized below by evaluation period and program year. The number of customers used to calculate total verified kWh savings is the number of weighted treatment customers in the post-period, which accounts for the total number of treated days a customer has in the post-period.

Table F-23: 201503_E_GMO Cohort Verified Annual kWh Savings – Missouri West

Cohort	Annual Unadjusted Savings Per Home (kWh/year)	Double Counted Savings Adjustment (kWh/year)	Annual Adjusted Savings Per Home (kWh/year)	Annual Control Group Usage Per Home (kWh/year)	Annual Percent Savings Per Home
201503_e_gmo	280.32	20.32	300.64	20,996.74	1.43%

This cohort displayed 1.43 percent annual household savings for PY2. The double-counted savings adjustment increased the annual household savings because the control group for this cohort exhibited greater annual savings due to downstream participation than the treatment group (see Table F-18). After adjusting for cross-participant savings found in the ST, HCHC, and IEMF Programs, average annual household savings for treated customers in this cohort was 300.64 kWh.

201604_E_GMO Cohort Results

This section describes the impact evaluation results for the 201604_E_GMO cohort within Missouri West.

As shown in the table below, the coefficient of interest (Post * Treatment) is negative, indicating lower usage per month in the post-period for treatment customers. In addition, this coefficient is statistically significant at the 90 percent level. This indicates a statistically significant energy savings effect resulting from members of this cohort participating in the program.

Table F-24: 201604_E_GMO Cohort Regression Coefficients – Missouri West

Coefficient	Estimate	Std Error	T-Value	5%	95%
(Intercept)	16.477	0.147	112.343	16.24	16.72
Post	-0.145	0.154	-0.945	-0.40	0.11
Treatment	-0.449	0.057	-7.940	-0.54	-0.36
Post * Treatment	-0.448	0.060	-7.474	-0.55	-0.35
CDD	2.008	0.003	707.441	2.00	2.01
HDD	0.412	0.001	336.782	0.41	0.41
Conditional R-Squared: 0.605					

The verified gross kWh savings of HER Program for this cohort is summarized below by evaluation period and program year. The number of customers used to calculate total verified kWh savings is the number of weighted treatment customers in the post-period, which accounts for the total number of treated days a customer has in the post-period.

Table F-25: 201604_E_GMO Cohort Verified Annual kWh Savings – Missouri West

Cohort	Annual Unadjusted Savings Per Home (kWh/year)	Double Counted Savings Adjustment (kWh/year)	Annual Adjusted Savings Per Home (kWh/year)	Annual Control Group Usage Per Home (kWh/year)	Annual Percent Savings Per Home
201604_e_gmo	163.52	-10.25	153.27	11,029.43	1.39%

This cohort displayed 1.39 percent annual household savings for PY2. The double-counted savings adjustment decreased the annual household savings because the treatment group for this cohort exhibited greater annual savings due to downstream participation than the control group (see Table F-18). After adjusting for cross-participant savings found in the ST, HCHC, and IEMF Programs, average annual household savings for treated customers in this cohort was 153.27 kWh.

201706_E_GMO Cohort Results

As shown in the table below, the coefficient of interest (Post * Treatment) is negative, indicating lower usage per month in the post-period for treatment customers. In addition, this coefficient is statistically significant at the 90 percent level. This indicates a statistically significant energy savings effect resulting from members of this cohort participating in the program.

Table F-26: 201706_E_GMO Cohort Regression Coefficients – Missouri West

Coefficient	Estimate	Std Error	T-Value	5%	95%
(Intercept)	12.11	0.207	58.559	11.77	12.45
Post	0.098	0.246	0.399	-0.31	0.50
Treatment	1.508	0.052	29.265	1.42	1.59
Post * Treatment	-0.360	0.062	-5.781	-0.46	-0.26
CDD	1.547	0.004	358.172	1.54	1.55
HDD	0.369	0.002	202.525	0.37	0.37
Conditional R-Squared: 0.741					

The verified gross kWh savings of HER Program for this cohort is summarized below by evaluation period and program year. The number of customers used to calculate total verified kWh savings is the number of weighted treatment customers in the post-period, which accounts for the total number of treated days a customer has in the post-period.

Table F-27: 201706_E_GMO Cohort Verified Annual kWh Savings – Missouri West

Cohort	Annual Unadjusted Savings Per Home (kWh/year)	Double Counted Savings Adjustment (kWh/year)	Annual Adjusted Savings Per Home (kWh/year)	Annual Control Group Usage Per Home (kWh/year)	Annual Percent Savings Per Home
201706_e_gmo	131.40	5.19	136.59	9,104.76	1.50%

This cohort displayed 1.50 percent annual household savings for PY2. The double-counted savings adjustment increased the annual household savings because the control group for this cohort exhibited greater annual savings due to downstream participation than the treatment group (see Table F-18). After adjusting for cross-participant savings found in the ST, HCHC, and IEMF Programs, average annual household savings for treated customers in this cohort was 136.59 kWh.

201904_E_GMO Cohort Results

As shown in the table below, the coefficient of interest (Post * Treatment) is negative, indicating lower usage per month in the post-period for treatment customers. In addition, this coefficient is statistically significant at the 90 percent level. This indicates a statistically significant energy savings effect resulting from members of this cohort participating in the program.

Table F-28: 201904_E_GMO Cohort Regression Coefficients – Missouri West

Coefficient	Estimate	Std Error	T-Value	5%	95%
(Intercept)	16.985	0.165	102.697	16.71	17.26
Post	-0.084	0.186	-0.453	-0.39	0.22
Treatment	1.182	0.054	22.004	1.09	1.27
Post * Treatment	-0.335	0.063	-5.338	-0.44	-0.23
CDD	2.069	0.005	451.357	2.06	2.08
HDD	0.576	0.002	311.576	0.57	0.58
Conditional R-Squared: 0.634					

The verified gross kWh savings of HER Program for this cohort is summarized below by evaluation period and program year. The number of customers used to calculate total verified kWh savings is the number of weighted treatment customers in the post-period, which accounts for the total number of treated days a customer has in the post-period.

Table F-29: 201904_E_GMO Cohort Verified Annual kWh Savings – Missouri West

Cohort	Annual Unadjusted Savings Per Home (kWh/year)	Double Counted Savings Adjustment (kWh/year)	Annual Adjusted Savings Per Home (kWh/year)	Annual Control Group Usage Per Home (kWh/year)	Annual Percent Savings Per Home
201904_e_gmo	122.28	-2.99	119.29	12,622.48	0.95%

This cohort displayed 10.95 percent annual household savings for PY2. The double-counted savings adjustment decreased the annual household savings because the treatment group for this cohort exhibited greater annual savings due to downstream participation than the control group (see Table F-18). After adjusting for cross-participant savings found in the ST, HCHC, and IEMF Programs, average annual household savings for treated customers in this cohort was 119.29 kWh.

202002_E_GMO Cohort Results

As shown in the table below, the coefficient of interest (Post * Treatment) is negative, indicating lower usage per month in the post-period for treatment customers. In addition, this coefficient is statistically significant at the 90 percent level. This indicates a statistically significant energy savings effect resulting from members of this cohort participating in the program.

Table F-30: 202002_E_GMO Cohort Regression Coefficients – Missouri West

Coefficient	Estimate	Std Error	T-Value	5%	95%
(Intercept)	21.959	0.217	101.345	21.60	22.32
Post	-0.040	0.238	-0.169	-0.43	0.35
Treatment	1.392	0.099	14.028	1.23	1.55
Post * Treatment	-0.237	0.116	-2.037	-0.43	-0.05
CDD	2.244	0.008	294.794	2.23	2.26
HDD	0.802	0.003	233.421	0.80	0.81
Conditional R-Squared: 0.504					

The verified gross kWh savings of HER Program for this cohort is summarized below by evaluation period and program year. The number of customers used to calculate total verified kWh savings is the number of weighted treatment customers in the post-period, which accounts for the total number of treated days a customer has in the post-period.

Table F-31: 202002_E_GMO Cohort Verified Annual kWh Savings – Missouri West

Cohort	Annual Unadjusted Savings Per Home (kWh/year)	Annual Double Counted Savings Per Home (kWh/year)	Annual Adjusted Savings Per Home (kWh/year)	Annual Control Group Usage Per Home (kWh/year)	Annual Percent Savings Per Home
202002_e_gmo	86.51	10.71	97.22	15,912.24	0.61%

This cohort displayed 0.61 percent annual household savings for PY2. The double-counted savings adjustment increased the annual household savings because the control group for this cohort exhibited greater annual savings due to downstream participation than the treatment group (see Table F-18). After adjusting for cross-participant savings found in the ST, HCHC, and IEMF Programs, average annual household savings for treated customers in this cohort was 97.22 kWh.

Missouri Metro Results

This section describes the linear regression results, double counting adjustments, and final household and program-level savings for each cohort within the MO Metro Jurisdiction.

201407_E_High_Users Cohort Results

As shown in the table below, the coefficient of interest (Post * Treatment) is negative, indicating lower usage per month in the post-period for treatment customers. In addition, this coefficient is statistically significant at the 90 percent level. This indicates a

statistically significant energy savings effect resulting from members of this cohort participating in the program.

Table F-32: 201407_E_High_Users Cohort Regression Coefficients – Missouri Metro

Coefficient	Estimate	Std Error	T-Value	5%	95%
(Intercept)	18.547	0.186	99.489	18.24	18.85
Post	0.293	0.196	1.493	-0.03	0.62
Treatment	-2.126	0.057	-37.428	-2.22	-2.03
Post * Treatment	-0.710	0.060	-11.758	-0.81	-0.61
CDD	1.826	0.003	660.752	1.82	1.83
HDD	0.378	0.001	336.691	0.38	0.38
Conditional R-Squared: 0.680					

The verified gross kWh savings of HER program for this cohort is summarized below by evaluation period and program year. The number of customers used to calculate total verified kWh savings is the number of weighted treatment customers in the post-period, which accounts for the total number of treated days a customer has in the post-period.

Table F-33: 201407_E_High_Users Cohort Verified Annual kWh Savings – Missouri Metro

Cohort	Annual Unadjusted Savings Per Home (kWh/year)	Double Counted Savings Adjustment (kWh/year)	Annual Adjusted Savings Per Home (kWh/year)	Annual Control Group Usage Per Home (kWh/year)	Annual Percent Savings Per Home
201407_e_high_users	259.15	-3.81	255.34	11,046.79	2.31%

This cohort displayed 2.31 percent annual household savings for PY2. The double-counted savings adjustment decreased the annual household savings because the treatment group for this cohort exhibited greater annual savings due to downstream participation than the control group (see Table F-18). After adjusting for cross-participant savings found in the ST, HCHC, and IEMF Programs, average annual household savings for treated customers in this cohort was 255.34 kWh.

201503_E_KMO Cohort Results

As shown in the table below, the coefficient of interest (Post * Treatment) is positive, indicating higher usage per month in the post-period for treatment customers. However, the coefficient is not statistically significant (at the 90 percent level). Given this, we are not able to estimate with confidence any impact that participating in the program had on energy usage. As a result, no verified gross kWh savings were given to customers in cohort 201503_e_kmo during PY2.

Table F-34: 201503_E_KMO Cohort Regression Coefficients – Missouri Metro

Coefficient	Estimate	Std Error	T-Value	5%	95%
(Intercept)	16.72	0.321	52.018	16.19	17.25
Post	-0.367	0.409	-0.897	-1.04	0.31
Treatment	0.965	0.104	9.284	0.79	1.14
Post * Treatment	0.119	0.138	0.860	-0.11	0.35
CDD	1.684	0.010	170.428	1.67	1.70
HDD	0.432	0.004	100.109	0.42	0.44
Conditional R-Squared: 0.623					

201607_E Cohort Results

As shown in the table below, the coefficient of interest (Post * Treatment) is negative, indicating lower usage per month in the post-period for treatment customers. In addition, this coefficient is statistically significant at the 90 percent level. This indicates a statistically significant energy savings effect resulting from members of this cohort participating in the program.

Table F-35: 201607_E Cohort Regression Coefficients – Missouri Metro

Coefficient	Estimate	Std Error	T-Value	5%	95%
(Intercept)	13.697	0.282	48.620	13.23	14.16
Post	0.154	0.353	0.434	-0.43	0.73
Treatment	1.683	0.073	23.064	1.56	1.80
Post * Treatment	-0.732	0.093	-7.849	-0.88	-0.58
CDD	1.295	0.006	212.757	1.28	1.30
HDD	0.391	0.003	133.764	0.39	0.40
Conditional R-Squared: 0.714					

The verified gross kWh savings of HER Program for this cohort is summarized below by evaluation period and program year. The number of customers used to calculate total verified kWh savings is the number of weighted treatment customers in the post-period, which accounts for the total number of treated days a customer has in the post-period.

Table F-36: 201607_E Cohort Verified Annual kWh Savings – Missouri Metro

Cohort	Annual Unadjusted Savings Per Home (kWh/year)	Double Counted Savings Adjustment (kWh/year)	Annual Adjusted Savings Per Home (kWh/year)	Annual Control Group Usage Per Home (kWh/year)	Annual Percent Savings Per Home
201607_e	267.18	-6.72	260.46	9,796.61	2.66%

This cohort displayed 2.66 percent annual household savings for PY2. The double-counted savings adjustment decreased the annual household savings because the treatment group for this cohort exhibited greater annual savings due to downstream participation than the control group (see Table F-18). After adjusting for cross-participant savings found in the ST, HCHC, and IEMF Programs, average annual household savings for treated customers in this cohort was 260.46 kWh.

202002_E_KMO Cohort Results

As shown in the table below, the coefficient of interest (Post * Treatment) is negative, indicating lower usage per month in the post-period for treatment customers. In addition, this coefficient is statistically significant at the 90 percent level. This indicates a statistically significant energy savings effect resulting from members of this cohort participating in the program.

Table F-37: 202002_E_KMO Cohort Fixed-Effects Regression Coefficients – Missouri Metro

Coefficient	Estimate	Std Error	T-Value	5%	95%
(Intercept)	23.881	0.134	178.426	23.66	24.10
Post	-0.156	0.151	-1.035	-0.40	0.09
Treatment	-0.245	0.063	-3.913	-0.35	-0.14
Post * Treatment	-0.138	0.077	-1.796	-0.26	-0.01
CDD	2.014	0.005	415.215	2.01	2.02
HDD	0.651	0.002	271.007	0.65	0.65
Conditional R-Squared: 0.476					

The verified gross kWh savings of HER Program for this cohort is summarized below by evaluation period and program year. The number of customers used to calculate total verified kWh savings is the number of weighted treatment customers in the post-period, which accounts for the total number of treated days a customer has in the post-period.

Table F-38: 202002_E_KMO Cohort Verified Annual kWh Savings – Missouri Metro

Cohort	Annual Unadjusted Savings Per Home (kWh/year)	Annual Double Counted Savings Per Home (kWh/year)	Annual Adjusted Savings Per Home (kWh/year)	Annual Control Group Usage Per Home (kWh/year)	Annual Percent Savings Per Home
202002_e_kmo	50.37	-5.95	44.42	15,420.52	0.29%

This cohort displayed 0.29 percent annual household savings for PY2. The double-counted savings adjustment decreased the annual household savings because the treatment group for this cohort exhibited greater annual savings due to downstream participation than the control group (see Table F-18). After adjusting for cross-participant savings found in the ST, HCHC, and IEMF Programs, average annual household savings for treated customers in this cohort was 44.42 kWh.

Missouri Metro (Low-Income) Results

This section describes the linear regression results, double counting adjustments, and final household and program-level savings for each cohort within the MO Metro Low-Income Jurisdiction.

201407_E_Low_Income Cohort Results

As shown in the table below, the coefficient of interest (Post * Treatment) is negative, indicating lower usage per month in the post-period for treatment customers. In addition, this coefficient is statistically significant at the 90 percent level. This indicates a statistically significant energy savings effect resulting from members of this cohort participating in the program.

Table F-39: 201407_E_Low_Income Cohort Regression Coefficients – Missouri Metro (Low-Income)

Coefficient	Estimate	Std Error	T-Value	5%	95%
(Intercept)	16.978	0.191	89.09	16.66	17.29
Post	0.166	0.227	0.729	-0.21	0.54
Treatment	-1.418	0.073	-19.533	-1.54	-1.29
Post * Treatment	-0.518	0.092	-5.636	-0.67	-0.37
CDD	1.623	0.006	259.624	1.61	1.63
HDD	0.462	0.003	178.219	0.46	0.47
Conditional R-Squared: 0.542					

The verified gross kWh savings of HER Program for this cohort is summarized below by evaluation period and program year. The number of customers used to calculate total

verified kWh savings is the number of weighted treatment customers in the post-period, which accounts for the total number of treated days a customer has in the post-period.

Table F-40: 201407_E_Low_Income Cohort Verified Annual kWh Savings – Missouri Metro (Low-Income)

Cohort	Annual Unadjusted Savings Per Home (kWh/year)	Double Counted Savings Adjustment (kWh/year)	Annual Adjusted Savings Per Home (kWh/year)	Annual Control Group Usage Per Home (kWh/year)	Annual Percent Savings Per Home
201407_e_low_income	189.07	-6.28	182.79	10,796.96	1.69%

This cohort displayed 1.69 percent annual household savings for PY2. The double-counted savings adjustment decreased the annual household savings because the treatment group for this cohort exhibited greater annual savings due to downstream participation than the control group (see Table F-18). After adjusting for cross-participant savings found in the ST, HCHC, and IEMF Programs, average annual household savings for treated customers in this cohort was 182.79 kWh.

Aggregated Cohort Results

Positive, statistically significant savings are presented for all cohorts evaluated. Regression results were adjusted with double counted savings from the downstream programs to arrive at the final program savings estimate. The following tables summarize each cohort's annual household energy savings impact for PY2.

Table F-41: Program Savings Summary by Cohort – Missouri West

Cohort	Weighted Customers	Annual Adjusted Household Savings (kWh)	Program Savings (kWh)
201309_e_gmo	28,724.31	204.84	5,883,888
201503_e_gmo	7,901.40	300.64	2,375,501
201604_e_gmo	42,890.61	153.27	6,573,844
201706_e_gmo	13,406.38	136.59	1,831,177
201904_e_gmo	34,939.17	119.29	4,167,894
202002_e_gmo	18,747.30	97.22	1,822,613
Total	**146,609**	**-**	**22,654,916**

Table F-42: Program Savings Summary by Cohort – Missouri Metro

Cohort	Weighted Customers	Annual Adjusted Household Savings (kWh)	Program Savings (kWh)
201407_e_high_users	48,181.54	255.34	12,302,853
201503_e_kmo	3,043.90	0.00	0
201607_e_kmo	6,581.59	260.46	1,714,241
202002_e_kmo	26,024.43	44.42	1,156,005
Total	**80,788**	**-**	**15,173,099**

Table F-43: Program Savings Summary – Missouri Metro (Low-Income)

Cohort	Weighted Customers	Annual Adjusted Household Savings (kWh)	Program Savings (kWh)
201407_e_low_income	8,106.55	182.79	1,481,796

F.3.5 Demand Savings

Demand savings were estimated for each of the cohorts using the methodology presented in Section F.3.5. The following table displays the calculation of the demand savings for each cohort. Note that cohort kcpl_201503_e_kmo was not included, as no statistically significant savings could be estimated for it in PY2.

Table F-44: Demand Savings by Cohort

Cohort	Savings in August (kWh)	Hours in August	Multiplier	Demand Savings per Household (kW)	Weighted Treatment Customers	Reported Demand Savings (kW)
kcpl_201309_e_gmo	17.07	744	1.5	0.03	28,724.31	988.56
kcpl_201503_e_gmo	25.05	744	1.5	0.05	7,901.40	399.11
kcpl_201604_e_gmo	12.77	744	1.5	0.03	42,890.61	1104.48
kcpl_her_201706_e_gmo	11.38	744	1.5	0.02	13,406.38	307.66
kcpl_her_201904_e_gmo	9.94	744	1.5	0.02	34,939.17	700.25
kcpl_her_202002_e_gmo	8.10	744	1.5	0.03	18,747.30	306.22
kcpl_201407_e_high_users	21.28	744	1.5	0.04	48,181.54	2067.01
kcpl_201607_e_kmo	21.71	744	1.5	0.04	6,581.59	288.01
kcpl_her_202002_e_kmo	3.70	744	1.5	0.01	26,024.43	194.22
kcpl_201407_e_low_income	15.23	744	1.5	0.03	8,106.55	248.96
Total	**-**	**-**	**-**	**-**	**238,546.18**	**6,604.47**

The following table summarizes the verified demand savings compared to the expected demand savings for each cohort in the HER Program.

Table F-45: Reported and Verified Demand Savings by Cohort

Cohort	Reported Demand Savings (kW)	Verified Demand Savings (kW)	Verified kW Realization Rate
kcpl_201309_e_gmo	318.29	988.56	310.58%
kcpl_201503_e_gmo	624.15	399.11	63.94%
kcpl_201604_e_gmo	1,411.53	1,104.48	78.25%
kcpl_her_201706_e_gmo	391.61	307.66	78.56%
kcpl_her_201904_e_gmo	1,546.56	700.25	45.28%
kcpl_her_202002_e_gmo	10.51	306.22	2913.61%
kcpl_201407_e_high_users	3,412.53	2,067.01	60.57%
kcpl_201503_e_kmo	56.75	0.00	0.00%
kcpl_201607_e_kmo	252.87	288.01	113.90%
kcpl_her_202002_e_kmo	200.25	194.22	96.99%
kcpl_201407_e_low_income	172.13	248.96	144.63%
Total	**8,397.18**	**6,604.47**	**78.65%**

F.3.6 Attrition Analysis

ADM estimated the cumulative number of treatment and control group customer move-outs by month and cohort. The following table displays the total move-out rate for all cohorts. Attrition since inception for the entire program was 48.54 percent. This rate is within the normal range, given the duration the HERs Program has been implemented. However, attrition during PY2 was 7.09 percent.

Table F-46: Program Moveout Rates by Program Year

Period	Treatment Customers	Control Customers	Treatment Moveout Percent	Control Moveout Percent
2021	30,880	12,199	7.09%	7.80%
Since Inception	211,377	78,120	48.54%	49.93%

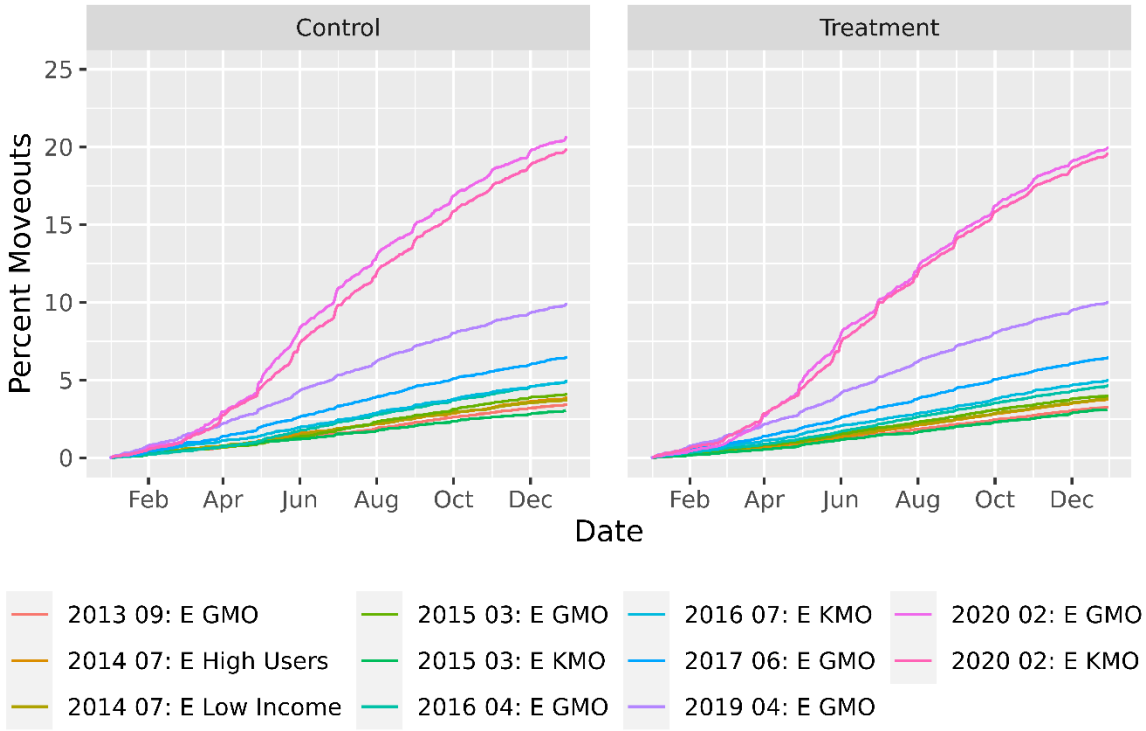
The move-out rates for each cohort during the 2021 program year range between roughly 3 percent and 20 percent. The cohorts with the highest move-out rates display an average move-out rate of approximately 16 percent. The two most recently formed cohorts, 202002_e_gmo and 202002_e_kmo, have move-out rates that are proportionately much larger than the corresponding rates for the other cohorts. The move-out rates for each cohort in PY2 are summarized in Table F-47.

Table F-47: Move-out Rates by Cohort

Cohort	Treatment Customers	Control Customers	Treatment Move-out Customers	Control Move-out Customers	Treatment Move-out Percent	Control Move-out Percent
201309_e_gmo	59,281	29,758	1,933	1,019	3.26%	3.42%
201407_e_high_users	91,328	12,199	3,441	471	3.77%	3.86%
201407_e_low_income	20,366	12,213	780	456	3.83%	3.73%
201503_e_gmo	13,238	9,655	528	396	3.99%	4.10%
201503_e_kmo	12,216	9,675	380	296	3.11%	3.06%
201604_e_gmo	77,395	9,702	3,596	478	4.65%	4.93%
201607_e_kmo	17,317	11,097	863	546	4.98%	4.92%
201706_e_gmo	25,001	11,595	1,610	751	6.44%	6.48%
201904_e_gmo	59,704	23,451	5,984	2,323	10.02%	9.91%
202002_e_gmo	24,842	9,738	4,959	2,010	19.96%	20.64%
202002_e_kmo	34,770	17,390	6,806	3,453	19.57%	19.86%

The following figure visualizes the cumulative move-out rates by month for each cohort and each treatment group during PY2.

Figure F-1: Monthly Move-out Rates by Cohort and Treatment Group



F.4 Net Savings Evaluation Findings

For this program, the net savings estimates are equivalent to the gross savings estimates, as the net-to-gross ratio for behavioral programs is 1.00.

F.5 Impact Evaluation - Final Savings Tables

Based on the impact evaluation results, the total verified net energy savings for the HER Program were 39,309,811 kWh, and the total verified net peak demand savings are 6,604.47 kW. A summary of gross verified energy and demand savings is shown in Table F-48.

Table F-48: Reported and Verified Gross Energy and Demand Savings

Jurisdiction	Reported Energy Savings (kWh)	Reported Demand Reduction (kW)	Verified Energy Savings (kWh)	Verified Demand Reduction (kW)	Verified kWh Realization Rate	Verified kW Realization Rate
MO West	23,194,337	4,302.65	22,654,916	3,806.27	97.67%	88.46%
MO Metro	17,764,315	3,922.40	15,173,099	2,549.24	85.41%	64.99%
MO Metro Low-Income	496,111	172.13	1,481,796	248.96	298.68%	144.63%
Total	**41,454,763**	**8,397.18**	**39,309,811**	**6,604.47**	**94.83%**	**78.65%**

F.6 Process Evaluation

F.6.1 Program Operations

ADM conducted an interview with Evergy's new HER Product Manager and EM&V manager as well as Oracle's HERs Service Delivery Manager in December 2021. The interview covered updates to the information on roles and responsibilities, program communication, program design and implementation, as well as goals and performance, obtained for the previous year's evaluation.

The new Evergy Product Manager took over from the previous Product Manager in April of 2021. He manages both HERs. The new Manager reported no other changes in roles and responsibilities or in program communications. In general, no significant changes have been made to program goals, design, implementation, or delivery. The new Product Manager noted the following updates that occurred:

- Some changes were made to the report's appearance. The layout now maximizes the space on the print report. It provides more graphics and colors than on the previous version.

- Evergy has inserted “quite a few” smart thermostat promotions on the HERs this year as well as promotions for time-of-use rates, the PAYS program and the LED in-store discount program.

When asked about future changes being contemplated, the Manager noted that they were considering trying to disaggregate electric usage from electric vehicles in home energy use comparisons. They also plan to send a “welcome report” to all report recipients that explains the new reporting experience. The Manager also reported that the program is considering removing customers that have home medical equipment from the program, as that type of equipment reduces the validity of comparisons to other homes.

F.6.2 Participant Survey

ADM collaborated with Oracle in fielding the participant survey. Each year, Oracle fields a Customer Engagement Tracker (CET) survey to assess customer engagement with HERs and with Evergy’s Home Energy Analyzer (“Energy Analyzer”). This year as well as last year, ADM contributed questions to the survey to address research questions specific to this process evaluation. This year, the CET also assessed customer experience with three additional Evergy energy-related customer outreach efforts:

- Weekly Energy Analysis (WEA) emails, which show how customers’ energy usage in the current week compared to their usage in the previous week.
- Rate Coach emails, which show customers’ hourly on-peak and off-peak usage and provide tips on how to shift usage to save money.
- High Bill Alerts, sent to customers who are on track to have a higher-than-normal bill.

Oracle implemented the CET survey with four groups of customers:

- A proportional stratified random sample of 7,500 HERs recipients (participants, or the treatment group).
- A proportional stratified random sample of 6,250 customers in the HERs control group.
- A random sample of 2,500 customers in Evergy’s Kansas service territory who had received a Weekly Energy Analysis email or a High Bill Alert.

The strata in the two stratified random samples were the waves of program participation, and the sample was selected such that the distribution of the sample across the participation waves was proportional to the distribution of recipients across waves. A relatively small percentage of customers receive High Bill Alerts, and none of the sampled customers who had received those alerts responded to the survey.

A total of 358 HERs recipients completed the survey, for an overall response rate of 4.8%.

As detailed below, the survey revealed the following:

- Customers reported high overall satisfaction with Evergy, agreeing that Evergy provides useful tools for learning about energy usage and useful suggestions for reducing energy usage and lowering energy bills.
- Respondents indicated high familiarity with Evergy energy efficiency or conservation programs, particularly those for smart thermostats and LED lighting.
- A high percentage of respondents confirmed receiving an Evergy HERs in the past three months and generally paid at least some attention to the contents; somewhat under half read it thoroughly.
- Respondents had generally positive attitudes toward the reports, particularly the comparisons with past usage, comparisons to other homes, and energy efficiency tips.
- Those who reported not liking the reports most commonly said it was because the neighbor comparison was inappropriate for various reasons. Others were simply uninterested in the comparison or said the information on their home's energy usage was inaccurate.
- Receiving the reports generally did not affect respondents' satisfaction with Evergy, nor had favorability toward the reports themselves changed in the past year.
- About one-fifth of report recipients had engaged with the Energy Analyzer. Those who had engaged with it generally reported positive attitudes toward it.
- A large majority of report recipients reported receiving Weekly Energy Analysis emails and the Rate Coach emails, and those generally reported positive attitudes toward them.
- In general, respondents were more likely to report favorable attitudes toward any Evergy outreach effort or tool (they like the effort or tool, it provides useful or valuable information) than to say the effort or tool actually motivated them to save energy.

Respondent Characteristics

Respondents tended to skew older: 72% of those who provided a response said they were at least 55 years old. By contrast, this age range constitutes 44% of householders in Evergy's Missouri service territory (Table F-49). The older age skew is more extreme than in the previous year's survey, in which 58 percent of respondents were at least 55 years old ($z = 3.87$, $p < .001$).

Table F-49: HERs Treatment Group Age Distribution

Which of the following categories best describes your age?	Percent	Percent of Respondents	U.S. Census Data
18 to 24	0%	0%	22%
25 to 34	2%	3%	
35 to 44	8%	10%	17%
45 to 54	13%	16%	18%
55 to 64	18%	21%	19%
65 to 74	30%	36%	14%
75 or over	12%	15%	11%
Prefer not to answer	17%	-	-

Respondents also skewed toward higher education levels, with 53 percent reporting a four-year college degree or higher, compared to 31 percent of householders in Evergy's Missouri service territory (Table F-50).

Table F-50: HERs Treatment Group Education Level

Which of the following categories best describes your highest level of education?	Percent	Percent of Respondents	U.S. Census Data
Some high school or less	0%	0%	8%
High school graduate or GED	12%	15%	29%
Some college or trade / technical school	18%	22%	33%
Trade / technical school / two-year college graduate	8%	9%	
Four-year college graduate	18%	22%	31%
Some post-graduate work	6%	7%	
Post-graduate degree	20%	24%	
Prefer not to answer	19%	-	-

Finally, a much higher percentage of survey respondents were homeowners (87 percent) compared to the Evergy customer population (64 percent).

The differences between the survey respondents and Evergy's general customer population may reflect biases for older or more educated householders to respond or to something else not identified.

New this year, the survey asked respondents whether they or another member of their household currently worked from home. Of those who provided a response, 30 percent said that someone in their household worked from home.

Attitudes Toward Evergy

Customers reported high overall satisfaction with Evergy. On a scale from 0 (extremely dissatisfied) to 10 (completely satisfied), 77 percent of respondents rated their satisfaction a 7 or higher and 47 percent gave a rating of 9 or 10.

Respondents generally agreed that Evergy provides useful tools for learning about energy usage and useful suggestions for reducing energy usage and lowering energy bills (Table F-51). They also agreed, but less strongly, that Evergy provides a variety of energy efficiency programs and services and that Evergy messaging is attention-getting. Respondents were least likely – although more likely than not – to report that Evergy helps them manage their monthly energy usage or that Evergy wants to help them save energy.

Table F-51: HERs Treatment Group Attitudes about Evergy

Thinking about Evergy, how much do you agree or disagree with each of the following statements?	Disagree	Neither Agree nor Disagree	Agree
Evergy provides customers with useful tools to learn about energy usage	7%	18%	75%
Evergy provides useful suggestions on ways I can reduce my energy usage and lower my monthly bills	11%	21%	69%
Evergy creates messages that get my attention	8%	30%	62%
Evergy provides a variety of energy efficiency programs and services	6%	34%	60%
Evergy helps me manage my monthly energy usage	10%	36%	54%
Evergy wants to help me save money	16%	31%	54%

Awareness of Evergy Energy Efficiency Offerings

Two-thirds of respondents said that they were either somewhat (56 percent) or very (11 percent) familiar with Evergy energy efficiency or conservation programs. When

asked which Evergy energy efficiency initiatives they were familiar with, more than three-quarters reported familiarity with an initiative for smart thermostats and two-thirds said they were familiar with initiatives for LED lighting (Table F-52). Fewer reported familiarity with offerings for heating and cooling or for insulation and air sealing. Awareness of smart thermostats was greater than reported in last year's evaluation ($z = 3.16$, $p < .002$).

Table F-52: HERs Treatment Group Awareness of Evergy Energy Efficiency Offerings

Energy Efficiency Measure	Percent Aware of Offering
Smart Thermostat	81%
LED Lighting	66%
Heating and Cooling	50%
Insulation and Air Sealing	39%

Use of and Attitudes Toward the HERs

A large majority (94 percent) of respondents confirmed they had received an Evergy HERs in the past three months. Those respondents generally paid at least some attention to the report's contents. Of those who confirmed receiving the HERs and who reported what they did with it, three-quarters said they read the report thoroughly (40 percent) or read some of the content (36 percent). Nearly all of the remaining respondents (22 percent) said they glanced at the pictures or graphs. The percentage of respondents reporting they at least read some content was lower than reported in last year's evaluation ($z = -2.05$, $p < 0.05$).

Respondents had generally positive attitudes toward the reports (Table F-53). About two-thirds reported they like the reports, with varying percentages reporting liking specific aspects of the reports. Respondents most commonly endorsed the information comparing current to previous energy usage. Somewhat fewer expressed positive attitudes toward the reports' energy efficiency tips or the comparisons with other similar homes. Respondents were least likely to agree (but still more likely than not) that the reports help them make better decisions about energy or motivate them to reduce energy use.

Table F-53: HERs Treatment Group Attitudes About Reports

Thinking about the Home Energy Reports you've received, how much do you agree or disagree with each of the following statements?	Disagree	Neither Agree nor Disagree	Agree
I like the Home Energy Reports	10%	21%	69%
I like the information on how my home's current energy use compares to its previous use	7%	13%	79%
The energy efficiency tips in the Home Energy Report are useful	10%	22%	68%
I like the information on how my home's energy use compares to the energy use of other similar homes	21%	16%	64%
The Home Energy Reports help me make better decisions to use and save energy	16%	29%	55%
The reports motivated me to reduce my energy use	18%	28%	53%

The PY2 survey offered respondents who reported they liked the reports an opportunity to say what they liked best about them. It also offered those who were neutral or did not like the reports to explain why.

Just under half (45 percent) of those who reported liking the reports declined the opportunity to expand on their ratings. Of 96 respondents who provided a response, somewhat more than half (59 percent) mentioned being able to track their home's energy usage or comparing their current usage with previous usage. About 10 percent specifically mentioned the week-to-week comparisons. Somewhat less than one-third reported liking how they compared to other homes (30 percent). Ten percent of respondents commented on the charts and graphs. A total of six respondents (6 percent) identified several miscellaneous features (the energy-saving tips, comprehensibility, thoroughness) or provided no specific response.

The 29 respondents who reported not liking the reports (they disagreed with the statement that they like the reports) were asked to identify their reason for not liking them. About half (52 percent) said the comparison was inappropriate, most commonly because the respondents' home is older or larger or has more occupants than comparison homes. About one-third (30 percent) of respondents said the reason they do not like the reports is that they are just not interested in the comparisons it provides, and about one-quarter said they believe the information about their home's energy usage is inaccurate.

Table F-54: HERs Treatment Group's Perspective on Home Usage Comparison

You indicated you don't like the information on how your home's energy use compares to the energy use of other similar homes. Why is that?	Percent of Respondents
The comparison is inappropriate – because their home…	52%
Is older	39%
Is larger	35%
Is occupied (i.e., it is being compared with some vacant residences)	29%
Has more residents	26%
Is all electric	16%
Does not have solar panels	16%
Houses a business or office	3%
Other	39%
I am simply not interested in the comparison	30%
The information on how much energy my home uses is inaccurate	23%
Other	22%
Don't Know	0%

The attitudes about the comparison to other homes were strongly related to how thoroughly respondents read the reports (see Table F-55). Specifically, respondents who said they at least read some of the report content were far more likely to agree, and less likely to disagree, with the comparisons to other homes. This may suggest that belief that the comparisons are inaccurate may stem at least partly from an incomplete understanding of how the comparisons are made.

Table F-55: HERs Treatment Group's Perspective on Home Usage Comparison

Thinking of the reports you've received in general what do you do with them?	I like the information on how my home's current energy use compares to its previous use	
	Agree	Disagree
Read the report thoroughly	72%	8%
Read some of the content	67%	6%
Glanced at the pictures or graphs	44%	22%

Despite the generally favorable attitudes toward the reports, just over half of respondents (57 percent) said that receiving the reports had not affected their level of satisfaction with Evergy. To the extent that receiving the reports had an effect, however, it was largely

positive: of the respondents who did not say their opinion of Evergy was unchanged, about two-thirds said that they were more satisfied (Table F-56).

Table F-56: Effect of HERs on Satisfaction with Evergy

Has receiving the reports made you more or less satisfied with Evergy or has your opinion not changed?	Percent of Respondents
More satisfied	30%
Opinion unchanged	57%
Less satisfied	7%
Don't know	3%
Prefer not to answer	4%

Respondents' opinions about the reports were largely unchanged since last year (Table F-57). To the extent that their opinions had changed, though, they were more favorable.

Table F-57: Comparison of HERs Favorability to Previous Year

Which of the following best describes how your opinion about the Home Energy Report changed compared to last year?	Percent of Respondents
More favorable now	15%
About the same	68%
Less favorable now	4%
Don't Know	7%
Prefer not to answer	5%

Engagement with the Energy Analyzer

Three-quarters (75 percent) of surveyed report recipients reported they had at some point logged onto their account on the Evergy website. Of those, about one-quarter (24 percent) said they had used the online Energy Analyzer tool on Evergy's website. Both percentages were lower than those found in last year's evaluation (75 percent vs. 84 percent, $z = -3.30$, $p < .001$; 24 percent vs. 44 percent, $z = -4.96$, $p < .0001$).

The 56 respondents who reported they had used the Energy Analyzer most commonly reported using the Trend function of the tool, which shows how usage and costs relate to weather over time (Table F-58). This is consistent with the fact that the ability to track usage was one of the most common things respondents reported liking about the HERs. Respondents also frequently reported use of the Compare and Save functions.

Table F-58: HERs Treatment Group's Use of Energy Analyzer Components

Which of the following parts of the Energy Analyzer tool have you engaged with?	Percent of Respondents
Trend: shows how usage and costs relate to the weather over time	64%
Compare: compares your usage to that of similar homes	57%
Save: shows energy saving tips for your home	55%
Analyze: an on-line interactive tool that disaggregates usage based on survey responses	36%

A large majority of respondents reported they like the Energy Analyzer and that it provides useful information (Table F-59). Somewhat fewer reported that it motivated them to save energy.

Table F-59: HERs Treatment Group's Perspective on the Energy Analyzer

Thinking about the Energy Analyzer tool, how much do you agree or disagree with each of the following statements?	Disagree	Neither Agree nor Disagree	Agree
I like the Energy Analyzer tool	4%	14%	82%
The Energy Analyzer tool provides useful information	5%	11%	84%
The Energy Analyzer tool motivated me to save energy	7%	20%	73%

Experience with Weekly Energy Analysis Emails

This year, the participant survey assessed respondents' experiences with Weekly Energy Analysis (WEA) emails that Evergy sends to customers. The WEA emails show how customers' energy usage in the current week compared to their usage in the previous week. A large majority (86 percent) of respondents indicated they had received one or more WEA emails.

About three-quarters of those who reported receiving the emails said that they liked them, and two-thirds said the information was valuable. However, just over half said the emails helped them make better energy-related decisions (see Table F-60).

Table F-60: HERs Treatment Group's Perspective on the Weekly Energy Analysis Emails

Thinking about the Weekly Energy Analysis emails, how much do you agree or disagree with each of the following statements?	Disagree	Neither Agree nor Disagree	Agree
I like the Weekly Energy Analysis	11%	16%	73%
The information in the Weekly Energy Analysis is valuable	11%	22%	67%
The Weekly Energy Analysis helps me make better decisions about how I can reduce my energy use and save money	17%	31%	52%

Experience with Rate Coach Emails

This year, the participant survey assessed respondents' experiences with Rate Coach emails that Evergy sends to some customers. These emails show customers' hourly on-peak and off-peak usage and provide tips on how to shift usage to save money. A majority (80 percent) of respondents indicated they had received one or more Rate Coach emails.

More than 90 percent of those who reported receiving the emails said that they liked them, and all said the information was valuable. Somewhat fewer – but still a large majority – said the emails helped them make better energy-related decisions (see Table F-61).

Table F-61: HERs Treatment Group's Perspective on the Rate Coach Emails

Thinking about the Rate Coach emails, how much do you agree or disagree with each of the following statements?	Disagree	Neither Agree nor Disagree	Agree
I like the Rate Coach emails	8%	0%	92%
The information in the Rate Coach emails is valuable	0%	0%	100%
Rate Coach emails help me make better decisions about how I can reduce my energy use and save money	8%	8%	83%

F.6.3 Control Survey

As described previously, Oracle implemented the CET survey with a sample of about 6,250 HERs control group customers. A total of 342 HERs control group customers completed the survey, for an overall response rate of 5.5 percent.

In presenting the results of the control group survey, we identify any differences from the HERs recipient respondents (participants) that are statistically significant at an alpha of .05 or less. If we do not state that any control group results differ from those of the recipients, then the difference did not achieve statistical significance.

As detailed below, the survey revealed the following:

- Respondent attitudes toward Evergy and its energy-related outreach efforts and tools were comparable to those reported by HERs recipients.
- Customers reported high overall satisfaction with Evergy, agreeing that Evergy provides useful tools for learning about energy usage and useful suggestions for reducing energy usage and lowering energy bills.
- Respondents indicated high familiarity with Evergy energy efficiency or conservation programs, particularly those for smart thermostats. They reported less awareness than did HERs recipients of LED lighting offerings.
- About one-quarter of control group respondents had engaged with the Energy Analyzer. Those who had engaged with it generally reported positive attitudes toward it.
- A large majority of report recipients reported receiving Weekly Energy Analysis emails and Rate Coach emails, and those generally reported positive attitudes toward them.
- In general, respondents were more likely to report favorable attitudes toward any Evergy outreach effort or tool (they like the effort or tool, it provides useful or valuable information) than to say the effort or tool actually motivated them to save energy.

Respondent Characteristics

The age distribution among control survey respondents was similar to that of HERs recipients. Respondents tended to skew older than the general population: 68 percent of those who provided a response said they were at least 55 years old, compared to 44 percent of householders in Evergy's Missouri service territory (see Table F-62).

Table F-62: HERs Control Group Age Distribution

Which of the following categories best describes your age?	Percent	Percent of Respondents	U.S. Census Data
18 to 24	0%	0%	1%
25 to 34	3%	11%	13%
35 to 44	10%	20%	25%
45 to 54	15%	8%	10%
55 to 64	21%	19%	23%
65 to 74	26%	5%	7%
75 or over	12%	18%	22%
Prefer not to answer	14%	17%	-

Again, as with the recipients, control survey respondents skewed toward higher education levels than the general population, with 49 percent reporting a four-year college degree or higher, compared to 31 percent of householders in Evergy's Missouri service territory (see Table F-63).

Table F-63: HERs Control Group Education Level

Which of the following categories best describes your highest level of education?	Percent	Percent of Respondents	U.S. Census Data
Some high school or less	0%	0%	8%
High school graduate or GED	12%	15%	29%
Some college or trade / technical school	18%	22%	33%
Trade / technical school / two-year college graduate	8%	9%	
Four-year college graduate	18%	22%	31%
Some post-graduate work	6%	7%	
Post-graduate degree	20%	24%	
Prefer not to answer	19%	-	-

Finally, the percentage of survey respondents who reported being homeowners (84 percent) was similar to that in the recipients and much higher than the Evergy customer population (64 percent).

The above differences between the survey respondents and Evergy's general customer population may reflect biases for older or more educated householders to respond, but they could reflect something else unidentified.

New this year, the survey asked respondents whether they or another member of their household currently worked from home. Of those who provided a response, 29 percent said that someone in their household worked from home.

Attitudes Toward Evergy

Attitudes toward Evergy were similar to those of recipients.

Customers reported high overall satisfaction with Evergy. On a scale from 0 (extremely dissatisfied) to 10 (completely satisfied), 75 percent of respondents rated their satisfaction a 7 or higher and 51 percent gave a rating of 9 or 10.

Respondents generally agreed that Evergy provides useful tools for learning about energy usage and useful suggestions for reducing energy usage and lowering energy bills (see Table F-64). They also agreed, but less strongly, that Evergy provides a variety of energy efficiency programs and services and that Evergy messaging is attention-getting. Respondents were least likely – although more likely than not – to report that Evergy helps them manage their monthly energy usage or that Evergy wants to help them save energy.

Table F-64: HERs Control Group's Attitudes About Evergy

Thinking about Evergy, how much do you agree or disagree with each of the following statements?	Disagree	Neither Agree nor Disagree	Agree
Evergy provides customers with useful tools to learn about energy usage	9%	20%	71%
Evergy provides useful suggestions on ways I can reduce my energy usage and lower my monthly bills	11%	21%	68%
Evergy creates messages that get my attention	11%	29%	60%
Evergy provides a variety of energy efficiency programs and services	8%	29%	63%
Evergy helps me manage my monthly energy usage	12%	27%	61%
Evergy wants to help me save money	18%	27%	54%

Awareness of Evergy Energy Efficiency Offerings

Three-fifths of respondents said that they were either somewhat (50 percent) or very (10 percent) familiar with Evergy energy efficiency or conservation programs. This is somewhat lower than the level of familiarity that recipients reported ($z = 2.17$, $p < .03$).

When asked which Evergy energy efficiency initiatives they were familiar with, control group respondents' reported levels of awareness of smart thermostats, heating and cooling, and insulation and air sealing were similar to those of HERs recipients (see Table F-65). Control respondents reported somewhat lower awareness of LED lighting (56 percent) than did recipients (66 percent; $z = 2.58$, $p < .01$).

Table F-65: HERs Control Group's Awareness of Evergy Energy-Efficiency Offerings

Energy Efficiency Measure	Percent Aware of Offering
Smart Thermostat	78%
LED Lighting	56%
Heating and Cooling	46%
Insulation and Air Sealing	36%

Engagement with the Energy Analyzer

Three-quarters (77 percent) of control group respondents reported they had at some point logged onto their account on the Evergy website. Of those, about one-third (36 percent) said they had used the online Energy Analyzer tool on Evergy's website. While the percentage who reported logging on was comparable to that reported by recipients, the percentage reporting use of the Energy Analyzer was higher than for recipients (36 percent vs. 24 percent, $z = -2.83$, $p < .005$). The latter was in fact closer to the percentages reported last year for both recipients and controls.

Use of the tool's specific functions reflects that of HERs recipients. The 86 respondents who reported they had used the Energy Analyzer most commonly reported using the Trend function of the tool, which shows how usage and costs relate to weather over time (see Table F-66). Respondents also frequently reported use of the Compare and Save functions.

Table F-66: HERs Control Group's Use of Energy Analyzer Components

Which of the following parts of the Energy Analyzer tool have you engaged with?	Percent of Respondents
Trend: shows how usage and costs relate to the weather over time	72%
Compare: compares your usage to that of similar homes	47%
Save: shows energy saving tips for your home	51%
Analyze: an on-line interactive tool that disaggregates usage based on survey responses	26%

Nearly three-quarters of respondents reported they like the Energy Analyzer and more than three-quarters said it provides useful information (see Table F-67). Somewhat fewer reported that it motivated them to save energy.

Table F-67: HERs Control Group's Attitudes about the Energy Analyzer Tool

Thinking about the Energy Analyzer tool, how much do you agree or disagree with each of the following statements?	Disagree	Neither Agree nor Disagree	Agree
I like the Energy Analyzer tool	5%	25%	71%
The Energy Analyzer tool provides useful information	5%	14%	81%
The Energy Analyzer tool motivated me to save energy	8%	28%	64%

Experience with Weekly Energy Analysis Emails

This year, the participant survey assessed respondents' experiences with Weekly Energy Analysis (WEA) emails that Evergy sends to customers. The WEA emails show how customers' energy usage in the current week compared to their usage in the previous week. A large majority (94 percent) of respondents indicated they had received one or more WEA emails.

About three-quarters of those who reported receiving the emails said that they liked them, and that the information was valuable. However, just over half said the emails helped them make better energy-related decisions (see Table F-68).

Table F-68: HERs Control Group's Attitudes about the Weekly Energy Analysis Emails

Thinking about the Weekly Energy Analysis emails, how much do you agree or disagree with each of the following statements?	Disagree	Neither Agree nor Disagree	Agree
I like the Weekly Energy Analysis	8%	17%	74%
The information in the Weekly Energy Analysis is valuable	13%	14%	74%
The Weekly Energy Analysis helps me make better decisions about how I can reduce my energy use and save money	17%	25%	58%

Experience with Rate Coach Emails

This year, the participant survey assessed respondents' experiences with Rate Coach emails that Evergy sends to some customers. These emails show customers' hourly on-peak and off-peak usage and provide tips on how to shift usage to save money. A large majority (91 percent) of respondents indicated they had received one or more Rate Coach emails.

A large majority of those who reported receiving the emails said that they liked them, and that the information was valuable. Somewhat fewer, but still a large majority, said the emails helped them make better energy-related decisions (see Table F-69). This may suggest that efforts to shift usage may be more effective than those to reduce usage.

Table F-69: HERs Control Group's Attitudes about the Rate Coach Emails

Thinking about the Rate Coach emails, how much do you agree or disagree with each of the following statements?	Disagree	Neither Agree nor Disagree	Agree
I like the Rate Coach emails	5%	10%	85%
The information in the Rate Coach emails is valuable	5%	10%	85%
Rate Coach emails help me make better decisions about how I can reduce my energy use and save money	10%	15%	75%

F.7 Conclusions and Recommendations

The following summarizes the key findings of the impact evaluation of the Home Energy Reports Program for PY2:

- The verified program energy savings of 39,309,811 kWh and verified program demand savings of 6,604.47 kW for PY2.
- Cohorts where statistically significant savings could be estimated displayed an average annual electric savings of between 0.29 percent and 2.66 percent of annual billed use. Typical behavioral programs display average annual electric savings between 1 percent and 3 percent.
- The two newest cohorts showed the two lowest annual percent savings (between 0.29 percent to 0.61 percent for PY2). Despite this cohort beginning to receive home energy reports in PY1, these cohorts were assigned many customers who were not sent HERs until PY2. It is possible that these customers have simply not had enough time to implement the behavioral changes due to the reports yet.
- ADM estimated downstream double counted savings at -470,902 kWh for PY2. ADM removed this double counted savings from the regression results.
- The total attrition for the program since inception is 48.54 percent. This number is expected to be large due to the number of years the program has been deployed.

The findings from the program and implementer staff interviews, the review of program materials, and the participant and control surveys suggest the following conclusions:

- HER participants (recipients) and nonparticipants (controls) are generally satisfied with Evergy and the tools it provides for learning about and reducing energy usage.
- HER participants generally open reports and pay attention to at least some content, particularly energy saving tips and neighbor comparisons. The HERs' neighbor comparison is a source of report satisfaction but also a primary source of dissatisfaction among those who question the accuracy or basis of the comparison. In particular, some customers believe the report compares their home to others that are different in size, occupancy, fuel types, or other respects. This may partly be because more than half of report recipients do not read the report thoroughly. Recall that thoroughness of report review was strongly related to the belief that the comparison was accurate, which may suggest that belief that the comparisons are inaccurate may stem at least partly from an incomplete understanding of how the comparisons are made. The percentage of respondents who read at least part of the report content was lower this year than last year. Program staff reported that, near the end of the program year, the report was revised to improve readability. This occurred close to the time that the survey was fielded, and so respondent comments may not well reflect the changes that were made. Next year's survey

should be a better indicator of whether the changes in readability resulted in more complete review of reports and/or better understanding of how comparisons are made. If not, further research may be needed to determine what drives the thoroughness of report review and how to get customers to read them more thoroughly..

- Less than one-fifth of participants and just over one-quarter of nonparticipants have engaged with the Energy Analyzer. By contrast, large majorities of both groups reported having received both the Weekly Energy Analysis and Rate Coach emails, suggesting that proactive email outreach may be more effective at generating engagement than requiring customers to access the website.
- Respondents reported generally positive attitudes toward all three forms of information, with the Rate Coach receiving the most favorability, followed by Weekly Energy Analysis. This may suggest that the idea of shifting energy usage is perceived more favorably than reducing usage in general.
- Across the board, respondents were more likely to say they like a tool or that it provides useful information than to say it motivates behavior change. This may demonstrate the importance of assessing motivation or intent to engage in the recommended behaviors in addition to assessing attitudes toward the communication or tool.
- Participants and nonparticipants are generally familiar with Evergy energy efficiency or conservation programs. Familiarity with offerings for heating and cooling and for insulation and air sealing lags behind that for smart thermostats and LED lighting. This may simply reflect the greater number of customers that may be considering purchase of those items. The levels of awareness of the heating/cooling and insulation/air sealing offerings are on a par with, or even somewhat higher, than the levels often found in program nonparticipant surveys.

The following recommendations are offered for continued improvement of the Home Energy Reports Program:

- **Evergy and Oracle should assess whether changes made late in the current program year resulted in more thorough review by recipients and, if they did not have this effect, should consider carrying out additional research to determine what drives the thoroughness of report review and how to get customers to read them more thoroughly.** Evergy and Oracle can determine whether the changes had the desired effect by continuing to assess customer readership and understanding of, as well as reactions to, the reports.
- **Evergy should consider doing additional research to assess what increases motivation or intent to engage in the recommended behaviors and use that**

information to increase the effectiveness of its various outreach efforts and tools.

- **If it has not yet done so, Oracle may also consider discontinuing the practice of telling recipients (and Energy Analyzer users) they are being compared to their "neighbors".** A one-mile radius encompasses far more homes than many individuals may consider to be a neighbor. This practice may reinforce an inaccurate interpretation of how the comparison is actually made.

Appendix G Online Home Energy Audit Program-Specific Methodologies

ADM conducted a process evaluation of the Online Home Energy Audit (OHEA).

G.1 Program Overview

The Online Home Energy Audit (OHEA) program was designed with three primary objectives: increasing awareness of residential customers' energy consumption in the home, expanding knowledge about energy efficiency, and developing customers' familiarity with the variety of demand side management (DSM) programs available to help them achieve their energy efficiency goals. This program provides Evergy customers with a range of online tools through its My Account portal. This set of tools includes an online Home Energy Analysis (HEA), or home audit, as well as other educational material designed to educate Evergy customers about energy consumption in their home, promote the advantages of adopting energy efficient technologies and behaviors, and provide a path towards implementing energy efficient practices through Evergy's programs.

G.2 Process Evaluation

G.2.1 Program Staff Interviews

The process evaluation did not include interviews with program staff, as Evergy had reported no changes to the program since last year.

G.2.2 Participant Survey

ADM collaborated with Oracle in fielding the participant survey. Each year, Oracle fields a Customer Engagement Tracker (CET) survey to assess customer engagement with Evergy's Home Energy Reports (HERs) and Home Energy Analyzer ("Energy Analyzer"). This year as well as last year, ADM contributed questions to the survey to address research questions specific to this process evaluation. This year, the CET also assessed customer experience with three additional Evergy energy-related customer outreach efforts:

- Weekly Energy Analysis (WEA) emails, which show how customers' energy usage in the current week compared to their usage in the previous week.
- Rate Coach emails, which show customers' hourly on-peak and off-peak usage and provide tips on how to shift usage to save money.
- High Bill Alerts, sent to customers who are on track to have a higher-than-normal bill.

- Oracle implemented the CET survey with four groups of customers:
  - A proportional stratified random sample of 7,500 HERs recipients (participants, or the treatment group).
  - A proportional stratified random sample of 6,250 customers in the HERs control group.

The strata in the two stratified random samples were the waves of program participation, and the sample was selected such that the distribution of the sample across the participation waves was proportional to the distribution of recipients across waves.

A total of 700 customers in the two stratified random samples completed the survey, for an overall response rate of 5.1 percent. Of those, 178 reported they had ever used the Energy Analyzer tool on the Evergy website.

Note that the HERs population – both recipients and controls – are selected nonrandomly from the general Evergy population. Therefore, there is a chance that responses from these survey respondents are not representative of all Energy Analyzer users. In last year's evaluation, we found that survey respondents tended to skew older and less educated than did a sample of general population survey respondents from Evergy's Kansas service territory, who may more closely approximate a representative sample of the Missouri customer population. However, we cannot determine whether such differences reflect a bias for older or more educated householders to log onto the Evergy website, to respond to the survey, both, or something else. Without that knowledge, we cannot determine whether it would be appropriate to weight the results to reflect the general population of Energy Analyzer users.

As detailed below, the survey revealed the following:

- Customers reported high overall satisfaction with Evergy, agreeing that Evergy provides useful tools for learning about energy usage and useful suggestions for reducing energy usage and lowering energy bills.
- Respondents indicated high familiarity with Evergy energy efficiency or conservation programs, particularly those for smart thermostats and LED lighting.
- Respondents generally reported positive attitudes toward the Energy Analyzer. They most commonly reported using the Trend tool and were least likely to report using the Analyze tool.
- A large majority of report recipients reported receiving Weekly Energy Analysis emails and the Rate Coach emails, and those generally reported positive attitudes toward them.
- In general, respondents were more likely to report favorable attitudes toward any Evergy outreach effort or tool (they like the effort or tool, it provides useful or

valuable information) than to say the effort or tool actually motivated them to save energy.

Respondent Characteristics

Respondents tended to skew older than the general population: 66 percent of those who provided a response said they were at least 55 years old. By contrast, this age range constitutes 44 percent of householders in Evergy's Missouri service territory (Table F-49).

Table G-1: Energy Analyzer User Age

Which of the following categories best describes your age?	Percent	Percent of Respondents	U.S. Census Data
18 to 24	1%	1%	22%
25 to 34	6%	6%	
35 to 44	14%	15%	17%
45 to 54	11%	12%	18%
55 to 64	26%	27%	19%
65 to 74	28%	29%	14%
75 or over	10%	10%	11%
Prefer not to answer	4%	-	-

Respondents also skewed toward higher education levels, with 53 percent reporting a four-year college degree or higher, compared to 31 percent of householders in Evergy's Missouri service territory (Table G-2).

Table G-2: Energy Analyzer User Education Level

Which of the following categories best describes your highest level of education?	Percent	Percent of Respondents	U.S. Census Data
Some high school or less	1%	1%	8%
High school graduate or GED	11%	11%	29%
Some college or trade / technical school	26%	28%	33%
Trade / technical school / two-year college graduate	7%	8%	
Four-year college graduate	24%	25%	31%
Post-graduate degree	6%	6%	
Some post-graduate work	21%	22%	
Prefer not to answer	5%	-	-

Finally, a much higher percentage of survey respondents were homeowners (85 percent) compared to the Evergy customer population (64 percent).

The differences between the survey respondents and Evergy's general customer population may reflect biases for older or more educated householders to respond or to something else not identified.

New this year, the survey asked respondents whether they or another member of their household currently worked from home. Of those who provided a response, 34 percent said that someone in their household worked from home.

Attitudes Toward Evergy

Customers reported high overall satisfaction with Evergy. On a scale from 0 (extremely dissatisfied) to 10 (completely satisfied), 82 percent of respondents rated their satisfaction a 7 or higher and 54 percent gave a rating of 9 or 10.

Respondents generally agreed that Evergy provides useful tools for learning about energy usage and useful suggestions for reducing energy usage and lowering energy bills (Table F-51). They also agreed, but less strongly, that Evergy provides a variety of energy efficiency programs and services and that Evergy messaging is attention-getting. Respondents were least likely – although more likely than not – to report that Evergy helps them manage their monthly energy usage or that Evergy wants to help them save energy.

Table G-3: Energy Analyzer User Attitudes About Evergy

Thinking about Evergy, how much do you agree or disagree with each of the following statements?	Disagree	Neither Agree nor Disagree	Agree
Evergy provides customers with useful tools to learn about energy usage	5%	14%	81%
Evergy provides useful suggestions on ways I can reduce my energy usage and lower my monthly bills	10%	13%	77%
Evergy creates messages that get my attention	8%	20%	72%
Evergy provides a variety of energy efficiency programs and services	6%	25%	69%
Evergy helps me manage my monthly energy usage	10%	21%	70%
Evergy wants to help me save money	15%	20%	65%

Awareness of Evergy Energy Efficiency Offerings

Three-quarters of respondents said that they were either somewhat (57 percent) or very (19 percent) familiar with Evergy energy efficiency or conservation programs. When asked which Evergy energy efficiency initiatives they were familiar with, well more than three-quarters reported familiarity with an initiative for smart thermostats and more than two-thirds said they were familiar with initiatives for LED lighting (Table F-52). Fewer reported familiarity with offerings for heating and cooling or for insulation and air sealing.

Table G-4: Energy Analyzer User Awareness of Evergy Energy Efficiency Offerings

Energy Efficiency Measure	Percent Aware of Offering
Smart Thermostat	83%
LED Lighting	70%
Heating and Cooling	57%
Insulation and Air Sealing	47%

Engagement with the Energy Analyzer

The respondents who reported they had used the Energy Analyzer most commonly reported using the Trend function of the tool, which shows how usage and costs relate to weather over time (Table F-58). Respondents also frequently reported use of the Compare and Save functions. They were least likely to use the Analyze function.

Table G-5: Energy Analyzer User Use of Energy Analyzer Components

Which of the following parts of the Energy Analyzer tool have you engaged with?	Percent of Respondents
Trend: shows how usage and costs relate to the weather over time	69%
Compare: compares your usage to that of similar homes	51%
Save: shows energy saving tips for your home	53%
Analyze: an on-line interactive tool that disaggregates usage based on survey responses	26%

A large majority of respondents reported they like the Energy Analyzer and that it provides useful information, see Table G-6. Somewhat fewer reported that it motivated them to save energy.

Table G-6: Energy Analyzer User Perspective on the Energy Analyzer

Thinking about the Energy Analyzer tool, how much do you agree or disagree with each of the following statements?	Disagree	Neither Agree nor Disagree	Agree
I like the Energy Analyzer tool	3%	23%	74%
The Energy Analyzer tool provides useful information	5%	16%	80%
The Energy Analyzer tool motivated me to save energy	8%	28%	64%

Experience with Weekly Energy Analysis Emails

This year, the participant survey assessed respondents' experiences with Weekly Energy Analysis (WEA) emails that Evergy sends to customers. The WEA emails show how customers' energy usage in the current week compared to their usage in the previous week. A large majority (94 percent) of respondents indicated they had received one or more WEA emails.

A large majority of those who reported receiving the emails said that they liked them, and that the information was valuable. A somewhat smaller majority said the emails helped them make better energy-related decisions, see Table G-7.

Table G-7: Energy Analyzer User Perspective on the Weekly Energy Analysis Emails

Thinking about the Weekly Energy Analysis emails, how much do you agree or disagree with each of the following statements?	Disagree	Neither Agree nor Disagree	Agree
I like the Weekly Energy Analysis	4%	7%	89%
The information in the Weekly Energy Analysis is valuable	5%	11%	84%
The Weekly Energy Analysis helps me make better decisions about how I can reduce my energy use and save money	10%	16%	74%

Experience with Rate Coach Emails

This year, the participant survey assessed respondents' experiences with Rate Coach emails that Evergy sends to some customers. These emails show customers' hourly on-peak and off-peak usage and provide tips on how to shift usage to save money. A large majority (94 percent) of respondents indicated they had received one or more Rate Coach emails.

A large majority of those who reported receiving the emails said that they liked them, that the information was valuable, and that the emails helped them make better energy-related decisions, see Table G-8.

Table G-8: Energy Analyzer User Perspective on the Rate Coach Emails

Thinking about the Rate Coach emails, how much do you agree or disagree with each of the following statements?	Disagree	Neither Agree nor Disagree	Agree
I like the Rate Coach emails	7%	13%	80%
The information in the Rate Coach emails is valuable	0%	7%	93%
Rate Coach emails help me make better decisions about how I can reduce my energy use and save money	13%	7%	80%

G.2.3 Non-Participant Survey

ADM collaborated with Oracle in fielding the participant survey. Each year, Oracle fields a Customer Engagement Tracker (CET) survey to assess customer engagement with Evergy's Home Energy Reports (HERs) and Home Energy Analyzer ("Energy Analyzer"). This year as well as last year, ADM contributed questions to the survey to address

research questions specific to this process evaluation. This year, the CET also assessed customer experience with three additional Evergy energy-related customer outreach efforts:

- Weekly Energy Analysis (WEA) emails, which show how customers' energy usage in the current week compared to their usage in the previous week.
- Rate Coach emails, which show customers' hourly on-peak and off-peak usage and provide tips on how to shift usage to save money.
- High Bill Alerts, sent to customers who are on track to have a higher-than-normal bill.
- Oracle implemented the CET survey with four groups of customers:
    - A proportional stratified random sample of 7,500 HERs recipients (participants, or the treatment group).
    - A proportional stratified random sample of 6,250 customers in the HERs control group.

The strata in the two stratified random samples were the waves of program participation, and the sample was selected such that the distribution of the sample across the participation waves was proportional to the distribution of recipients across waves.

A total of 700 customers in the two stratified random samples completed the survey, for an overall response rate of 5.1 percent. Of those, 256 were in the HERs control group (and so were not HERs participants) and did not report they had used the Energy Analyzer tool on the Evergy website.

Note that the HERs population – both recipients and controls – are selected nonrandomly from the general Evergy population. Therefore, there is a chance that responses from these survey respondents are not representative of all Energy Analyzer users. In last year's evaluation, we found that survey respondents tended to skew older and less educated than did a sample of general population survey respondents from Evergy's Kansas service territory, who may more closely approximate a representative sample of the Missouri customer population. However, we cannot determine whether such differences reflect a bias for older or more educated householders to log onto the Evergy website, to respond to the survey, both, or something else. Without that knowledge, we cannot determine whether it would be appropriate to weight the results to reflect the general population of Energy Analyzer users.

As detailed below, the survey revealed the following:

- Customers reported high overall satisfaction with Evergy, agreeing that Evergy provides useful tools for learning about energy usage and useful suggestions for reducing energy usage and lowering energy bills.

- Respondents indicated high familiarity with Evergy energy efficiency or conservation programs, particularly those for smart thermostats and LED lighting.
- Respondents generally reported positive attitudes toward the Energy Analyzer. They most commonly reported using the Trend tool and were least likely to report using the Analyze tool.
- A large majority of report recipients reported receiving Weekly Energy Analysis emails and the Rate Coach emails, and those generally reported positive attitudes toward them. Attitude toward the Rate Coach emails were on a par with those reported by participants, but favorability toward the Weekly Energy Analysis emails was lower than that reported by participants.
- In general, respondents were more likely to report favorable attitudes toward any Evergy outreach effort or tool (they like the effort or tool, it provides useful or valuable information) than to say the effort or tool actually motivated them to save energy.

Respondent Characteristics

As with participants, respondents tended to skew older than the general population, with 67 percent of those who provided a response saying they were at least 55 years old, compared to 44 percent of householders in Evergy's Missouri service territory (Table G-9).

Table G-9: HERs Control Group Age

Which of the following categories best describes your age?	Percent	Percent of Respondents	U.S. Census Data
18 to 24	0%	0%	22%
25 to 34	2%	2%	
35 to 44	9%	11%	17%
45 to 54	16%	20%	18%
55 to 64	20%	23%	19%
65 to 74	23%	28%	14%
75 or over	13%	16%	11%
Prefer not to answer	17%	-	-

Respondents also skewed toward higher education levels, with 47 percent reporting a four-year college degree or higher, compared to 31 percent of householders in Evergy's Missouri service territory (Table G-10).

Table G-10: HERs Control Group Education Level

Which of the following categories best describes your highest level of education?	Percent	Percent of Respondents	U.S. Census Data
Some high school or less	1%	1%	8%
High school graduate or GED	11%	14%	29%
Some college or trade / technical school	21%	25%	33%
Trade / technical school / two-year college graduate	11%	13%	
Four-year college graduate	20%	24%	31%
Post-graduate degree	4%	5%	
Some post-graduate work	15%	18%	
Prefer not to answer	17%	-	-

Finally, a much higher percentage of survey respondents were homeowners (83 percent) compared to the Evergy customer population (64 percent).

The differences between the survey respondents and Evergy's general customer population may reflect biases for older or more educated householders to respond or to something else not identified.

New this year, the survey asked respondents whether they or another member of their household currently worked from home. Of those who provided a response, 29 percent said that someone in their household worked from home.

Attitudes Toward Evergy

Customers reported high overall satisfaction with Evergy. On a scale from 0 (extremely dissatisfied) to 10 (completely satisfied), 73 percent of respondents rated their satisfaction a 7 or higher and 48 percent gave a rating of 9 or 10. However, while the satisfaction was high, it was lower than that found among participants ($z = 2.18$, $p < .03$).

Respondents generally provided moderate to moderately high agreement that Evergy provides useful tools for learning about energy usage, useful suggestions for reducing energy usage, and a variety of energy efficiency programs and services, that Evergy messaging is attention-getting, that Evergy helps them manage their energy usage, and that Evergy wants to help them save money (Table G-11). Their agreement with all these propositions was lower than for participants (z ranges from 1.94 to 3.80, p ranges from ≈.05 to .0001).

Table G-11: HERs Control Group Attitudes About Evergy

Thinking about Evergy, how much do you agree or disagree with each of the following statements?	Disagree	Neither Agree nor Disagree	Agree
Evergy provides customers with useful tools to learn about energy usage	9%	21%	69%
Evergy provides useful suggestions on ways I can reduce my energy usage and lower my monthly bills	12%	24%	65%
Evergy creates messages that get my attention	12%	34%	55%
Evergy provides a variety of energy efficiency programs and services	10%	31%	59%
Evergy helps me manage my monthly energy usage	13%	31%	56%
Evergy wants to help me save money	19%	31%	50%

Awareness of Evergy Energy Efficiency Offerings

Just over half of respondents said that they were either somewhat (47 percent) or very (6 percent) familiar with Evergy energy efficiency or conservation programs. This proportion was lower than for participants ($z = 4.95$, $p < .0001$).

When asked which Evergy energy efficiency initiatives they were familiar with, about three-quarters reported familiarity with an initiative for smart thermostats and about half said they were familiar with initiatives for LED lighting (Table G-12). Fewer reported familiarity with offerings for heating and cooling or for insulation and air sealing. Familiarity with all four measure types was lower than for participants (z ranges from 3.15 to 3.85, p ranges from .03 to .0001).

Table G-12: HERs Control Group Awareness of Evergy Energy Efficiency Offerings

Energy Efficiency Measure	Percent Aware of Offering
Smart Thermostat	74%
LED Lighting	51%
Heating and Cooling	40%
Insulation and Air Sealing	31%

Experience with Weekly Energy Analysis Emails

This year, the participant survey assessed respondents' experiences with Weekly Energy Analysis (WEA) emails that Evergy sends to customers. The WEA emails show how customers' energy usage in the current week compared to their usage in the previous week. A large majority (93 percent) of respondents indicated they had received one or more WEA emails.

About two-thirds of those who reported receiving the emails said that they liked them, and that the information was valuable, but fewer said the emails helped them make better energy-related decisions (Table G-13). Agreement with all three propositions was lower than for participants (z ranges from 2.77 to 4.28, p ranges from.06 to <.0001).

Table G-13: HERs Control Group Perspective on the Weekly Energy Analysis Emails

Thinking about the Weekly Energy Analysis emails, how much do you agree or disagree with each of the following statements?	Disagree	Neither Agree nor Disagree	Agree
I like the Weekly Energy Analysis	10%	20%	70%
The information in the Weekly Energy Analysis is valuable	15%	15%	70%
The Weekly Energy Analysis helps me make better decisions about how I can reduce my energy use and save money	20%	31%	50%

Experience with Rate Coach Emails

This year, the participant survey assessed respondents' experiences with Rate Coach emails that Evergy sends to some customers. These emails show customers' hourly on-peak and off-peak usage and provide tips on how to shift usage to save money. A large majority (83 percent) of respondents indicated they had received one or more Rate Coach emails. However, this proportion was lower than for participants (z = 3.45, p < 0.001).

Large majorities of those who reported receiving the emails said that they liked them, and that the information was valuable; a somewhat smaller majority said the emails helped them make better energy-related decisions (Table G-14). Agreement with all three propositions was comparable to that for participants.

Table G-14: HERs Control Group Perspective on the Rate Coach Emails

Thinking about the Rate Coach emails, how much do you agree or disagree with each of the following statements?	Disagree	Neither Agree nor Disagree	Agree
I like the Rate Coach emails	10%	0%	90%
The information in the Rate Coach emails is valuable	10%	10%	80%
Rate Coach emails help me make better decisions about how I can reduce my energy use and save money	10%	20%	70%

G.3 Conclusions and Recommendations

The findings from the participant and non-participant surveys suggest the following conclusions for the Online Home Energy Audit Program:

- Participants (Energy Analyzer self-reported users) and nonparticipants (non-users) are generally satisfied with Evergy and the tools it provides for learning about and reducing energy usage, but – with the exception of attitudes toward the Rate Coach emails – participants are more satisfied than are nonparticipants. The direction of causality might go either way: experience with the Energy Analyzer may increase satisfaction with and favorable attitudes toward Evergy or those who have greater satisfaction and more positive attitudes may make greater efforts to use the resources that Evergy offers, including the Energy Analyzer.
- Respondents reported generally positive attitudes toward the Energy Analyzer, Weekly Energy Analysis, and Rate Coach, with the latter receiving the most favorability, followed by Weekly Energy Analysis. This may suggest that the idea of shifting energy usage is perceived more favorably than reducing usage in general.
- Across the board, respondents were more likely to say they like a tool or that it provides useful information than to say it motivates behavior change. This may demonstrate the importance of assessing motivation or intent to engage in the recommended behaviors in addition to assessing attitudes toward the communication or tool.

- Participants and nonparticipants are generally familiar with Evergy energy efficiency or conservation programs, but participants are more familiar with them than are nonparticipants. Familiarity with offerings for heating and cooling and for insulation and air sealing lags behind that for smart thermostats and LED lighting. This may simply reflect the greater number of customers that may be considering purchase of those items. The levels of awareness of the heating/cooling and insulation/air sealing offerings are on a par with, or even somewhat higher, than the levels often found in program nonparticipant surveys.

Based on the above, ADM offers the following recommendations for the Online Home Energy Audit Program:

- Evergy should consider doing additional research to assess why motivation to engage in the recommended behaviors is lower than the favorability toward the outreach efforts and tools. This might provide information on what Evergy could do to increase the motivation or intent to engage in the recommended behaviors, thereby increasing the effectiveness of its various outreach efforts and tools.

Appendix H Business Demand Response Program-Specific Methodologies

This chapter describes the evaluation activities that were performed by ADM to evaluate the Business Demand Response Program.

H.1 Program Overview

The Business Demand Response (BDR) Program is designed to reduce participant load during peak periods to improve system reliability, offset forecasted system peaks that could result in future generation capacity additions, and/or provide a more economical option to generation or purchasing energy in the wholesale market. The Program can call events from June 1 to September 30 within the designated curtailment hours of 12:00 p.m. to 8:00 p.m., Monday through Friday excluding holidays.

The BDR Program provides an incentive for those commercial customers who reduce their electrical load during events. The incentive for customers enrolled in the program for one year is calculated as:

Equation H-1: One Year Incentive Calculation

$$Incentive = \$28.00 \times kW\ Enrolled \times Percentage\ of\ Enrolled\ kW\ Achieved$$

For incentive purposes, “kW Enrolled” refers to the electrical load that participants, with assistance from Evergy, have identified that can be eliminated or shifted (curtailed) during demand response events. After events, Evergy estimates what the electric load would have been if an event had not taken place and subtracts the actual energy usage to determine the demand reduction (kW) achieved during events. This “kW achieved” is then divided by the “kW enrolled” to calculate the “Percentage of Enrolled kW Achieved”.

The incentive for customers enrolled in the program for multiple years is calculated as:

Equation H-2: Multi-Year Incentive Calculation

$$Incentive = \$30.00 \times kW\ Enrolled \times Percentage\ of\ Enrolled\ kW\ Achieved$$

Expected Energy Savings and Demand Reduction

Energy and demand impact goals for the Business Demand Response program years 2020 - 2022 are shown in the tables below. These goals were provided in the KCP&L filing EO-2019-0132.

Table H-1: Program Goal Savings by Year - Missouri Metro

Program Year	Energy Savings Goal (kWh)	Peak Demand Reductions Goal (kW)
2020	0	15,000
2021	0	15,000
2022	0	15,000
Total	**0**	**45,000**

Table H-2: Program Goal Savings by Year - Missouri West

Program Year	Energy Savings Goal (kWh)	Peak Demand Reductions Goal (kW)
2020	0	49,488
2021	0	52,092
2022	0	54,834
Total	**0**	**156,414**

Table H-3 below provides a summary of program metrics for the PY2.

Table H-3: Performance Metrics - Business Demand Response Program

Metric	PY2 Total	MO West	MO Metro
Number of Participants*	160	142	18
Energy Savings (kWh)			
Targeted Energy Savings	0	0	0
Reported Energy Savings	0	0	0
Gross Verified Energy Savings	0	0	0
Net Verified Energy Savings	0	0	0
Peak Demand Reduction (kW)			
Targeted Peak Demand Reduction	67,092.00	52,092.00	15,000.00
Reported Peak Demand Reduction	73,600.60	50,387.50	23,213.10
Gross Verified Peak Demand Reduction	73,618.76	51,094.86	22,523.90
Net Verified Peak Demand Reduction	73,618.76	51,094.86	22,523.90
Benefit / Cost Ratios			
Total Resource Cost Test Ratio	2.28	2.45	1.97

*Represents the number of unique account numbers in the program.

H.2 EM&V Methodologies

In evaluating the PY2 Business Demand Response Program, ADM implemented a variety of impact evaluation practices that include estimates of gross and net peak demand reductions (kW) as framed by the following research questions:

- How many Evergy customers participated in the program?
- What are the demand savings achieved by participants, according to the reported energy savings DERMS customer baselines (CBLs)?
- Can the Distributed Energy Resource Management System (DERMS) CBL estimates and incentive payments be independently reproduced?
- Which baseline estimation technique produces the least error and bias in estimating loads during non-event days?
- What is the average load (kW) reduction during event hours compared to the baseline?

- Demand Response Events in 2021

H.3 Sampling Plan

ADM evaluated a census of participants for the impact evaluation. For the process evaluation, ADM attempted to survey 50 participants.

H.4 Data collection

Data used for this evaluation include:

- Program tracking data. This data identifies which customers participated in the program and contains data fields such as contract curtailment amount, hourly usage, hourly baseline estimate used to calculate the incentive, CBL method used to make baseline estimate, and other relevant data fields
- 15-minute interval meter data (AMI) for each customer participating in the BDR Program
- A full schedule of BDR Program events, including the time of the event
- Weather Data: ADM collected recorded weather data from the National Oceanographic and Atmospheric Administration (NOAA) to estimate the impact of weather on usage and for use in weather adjustments for a portion of CBLs tested on each site. Data was collected from the Kansas City International Airport.

ADM reviewed the data tracking systems associated with the program to ensure that the data provided sufficient information to calculate energy and demand impacts. ADM determined that all the relevant data fields were included in the tracking data. In addition, ADM was able to replicate the following data:

- Hourly usage in tracking data
- Hourly baseline estimates
- Incentive payment calculation

H.5 Gross Impact Methodology

This section describes the impact evaluation activities and methodology that ADM performed for Evergy's PY2 Business Demand Response Program. Based on Missouri regulations, ADM used method 1a and protocol 2a to evaluate the BDR program. Evergy does not claim energy savings for DRI; thus, the evaluation team did not calculate energy savings. ADM assumes energy loads to be mostly shifted to times outside of the event period. The methodology in the following sections describes ADM's approach for the calculation of demand reduction.

H.5.1 Program Activity

As shown in Table H-4, there were four BDR events called in 2021. The curtailment events began at 1400 CDT and ended at 1800 CDT.

Table H-4: DR Events in 2021

Event Date	Time
June 17th	2-6 PM
July 29th	2-6 PM
August 11th	2-6 PM
August 25th	2-6 PM

Table H-5 provides a count of service point IDs for Evergy utilities. Many participants had several service point IDs enrolled in the program.

Table H-5: Device Types by Jurisdiction

Jurisdiction	Number of Service Point IDs	Number of Participants
MO West	404	142
MO Metro	105	18
Total	**509**	**160**

H.5.2 Gross Energy Savings and Demand Reduction

Estimating Evaluation Impacts - Customer Baseline (CBL)

In the evaluation of demand response programs, energy savings are estimated by comparing a participant's load shape during a demand response event with a baseline load shape. This baseline load is assumed to be a good estimate of the counterfactual load—that is, the load that would have manifested had there not been an event called that day.

In general, determining this baseline is a non-trivial task, especially in the context of commercial and industrial customers whose energy usage could theoretically be a function of the weather, the number of orders received, shift schedules, economic trends, and any number of variables that cannot always be explicitly modeled. Due to the intractability of modeling energy usage at this level of detail, baselines are typically estimated using heuristic rules applied to historical usage data. For example, if an event were called for Tuesday afternoon, a very simple heuristic would be to use Monday afternoon's load profile as the Tuesday event's baseline.

While the above baseline rule seems overly simplistic, it could perform adequately for a certain kind of business, such as one whose energy needs do not change from day to day. However, for most businesses, these assumptions do not hold, and this simple baseline rule would not be adequate. Both Evergy and ADM employed more sophisticated techniques to estimate counterfactual baseline usage.

The following terms are used for describing Evergy and ADM estimates and are referenced in the tables in the sections below.

- **Lookback Window** – Days prior to the event day that are eligible for inclusion in the CBL. The quantity of days and type of day included are determined by "Day Type" and "Days in Lookback Window" which are described below.
- **Day Type** – One of the eligibility requirements for a day to be included in the "Lookback Window" for the CBL.
- **"Any Weekday"** CBLs use any non-holiday, non-event weekdays.
- **"Similar Day of Week"** CBLs use any non-holiday, non-event days that are a "similar day" to the event. For Evergy and ADM CBLs, Monday and Friday are defined as similar. Tuesday, Wednesday, and Thursday are also defined as similar days.
- **"Same Day of Week"** CBLs use any non-holiday, non-event days that are the same day of the week as the event.
- **Days in Lookback Window** – Number of days in the lookback window. These days will be ranked by usage during the hours determined by "Hours Used to Determine Baseline Day Selection."
- **Hours Used to Determine Baseline Day Selection** – The hours that are selected for averaging usage and ranking days in the lookback window.
- **Days Selected from Lookback window** – Number of days selected from the lookback window. The highest ranked are selected.
- **Unadjusted Baseline** – Once the days are selected from the lookback window, they are averaged across hours. This creates the "unadjusted baseline."
- **Load Adjustment** – The "unadjusted baseline" can be adjusted to account for weather or usage prior to the event.
- **Weather based** - a weather adjustment is made by comparing historic customer usage and weather data. For example, ADM used a linear correction term with facility demand as the dependent variable and the dry bulb temperature as the independent variable.

- **Usage based – Multiplicative** – If the load prior to event notification on the event day is different than the unadjusted baseline, the unadjusted baseline is multiplied by event day usage / unadjusted baseline usage.
- **Usage based – Additive** - If the load prior to event notification on the event day is different than the unadjusted baseline, the sum of the difference between the event day usage and the unadjusted baseline is added to the unadjusted baseline.
- **Load Adjustment Min** – This is the lower bound for the Load Adjustment. A downward adjustment is capped at the "Load Adjustment Min" multiplied by the unadjusted baseline.
- **Load Adjustment Max** – This is the upper bound for the Load Adjustment. An upward adjustment is capped at the "Load Adjustment Max" multiplied by the unadjusted baseline.
- **Proxy Event Day** – The highest system usage non-holiday weekdays where no event was called. CBLs are tested against these days as they serve as a good proxy for actual event days.

In the next sections, Evergy's CBLs are described.

Customer Baseline Selection

Evergy selected one of the CBL scenarios in Table H-6 to apply to each of the participants in the BDR Program. The CBL results were used for calculating "Percentage of Enrolled kW Achieved" for the incentive calculation and for expected kW.

Table H-6: Baselines

Days in Lookback Window	Days Selected from Lookback Window	Day Type	Hours Used to Determine Baseline Day Selection	Load Adjustment	Load Adjustment Min	Load Adjustment Max
4	3	Any weekday	2-6pm	None	-	-
9	2	Any weekday	2-6pm	Usage based - Multiplicative	0.8	1.2
3	3	Similar day of week	2-6pm	Usage based - Multiplicative	-	-
10	3	Any weekday	2-6pm	Usage based - Multiplicative	-	-
3	2	Same day of week	12-8pm	None	-	-
2	2	Any weekday	2-6pm	Usage based - Multiplicative	0.8	1.2
4	3	Same day of week	2-6pm	Usage based - Multiplicative	0.7	1.3
8	2	Similar day of week	12-3pm	Usage based - Multiplicative	0.8	1.2
4	2	Same day of week	2-6pm	Usage based - Multiplicative	0.8	1.2
9	2	Any weekday	2-6pm	Usage based - Multiplicative	0.7	1.3

The selection for appropriate CBL for each participant was made using a four-step process:

1. Selection of test days: the top 2 highest load, non-event, non-holiday, weekdays for each month during the DR season (July - September) of 2021 were selected for each customer. The test days are identified as the days with the highest temperature during the test event period, 2 PM – 6 PM.
2. All ten of the CBLs above are calculated for each customer on the test days.
3. Bias screen: any method which underpredicts load on test days greater than 70 percent of the time, or less than 30 percent of the time is eliminated.
4. Accuracy Rank: rank-order remaining methods by RMSE and choose the most accurate method (lowest RMSE).

Evaluation Customer Baseline Selection

In the case of evaluating demand reduction impacts associated with the BDR Program, CBLs should represent what participants' usage would have been if the event had not occurred. ADM tested multiple baseline models and selected the best fitting models (i.e., models that produced load profiles which best represented participant's usage in absence of the program as determined by a statistical test) for each customer. The list of CBLs can be found in Table H-7.

Table H-7: BDR Savings Summary

Days in Lookback Window	Days Selected from Lookback Window	Day Type	Hours Used to Determine Baseline Days	Load Adjustment[12]	Load Adj. Min	Load Adj. Max
4	3	Any weekday	2-6pm	None	NA	NA
4	3	Any weekday	2-6pm	Usage Based - Additive	0.8	1.2
4	3	Any weekday	2-6pm	Usage Based - Additive	0.7	1.3
4	3	Any weekday	2-6pm	Usage Based - Additive	NA	NA
4	3	Any weekday	2-6pm	Usage Based - Multiplicative	0.8	1.2
4	3	Any weekday	2-6pm	Usage Based - Multiplicative	0.7	1.3
4	3	Any weekday	2-6pm	Usage Based - Multiplicative	NA	NA
4	3	Any weekday	2-6pm	Weather Based[13]	NA	NA
9	2	Any weekday	2-6pm	None	NA	NA
9	2	Any weekday	2-6pm	Usage Based - Additive	0.8	1.2
9	2	Any weekday	2-6pm	Usage Based - Additive	0.7	1.3
9	2	Any weekday	2-6pm	Usage Based - Additive	NA	NA
9	2	Any weekday	2-6pm	Usage Based - Multiplicative	0.8	1.2
9	2	Any weekday	2-6pm	Usage Based - Multiplicative	0.7	1.3
9	2	Any weekday	2-6pm	Usage Based - Multiplicative	NA	NA
9	2	Any weekday	2-6pm	Weather Based	NA	NA
10	3	Any weekday	2-6pm	None	NA	NA
10	3	Any weekday	2-6pm	Usage Based - Additive	0.8	1.2
10	3	Any weekday	2-6pm	Usage Based - Additive	0.7	1.3
10	3	Any weekday	2-6pm	Usage Based - Additive	NA	NA
10	3	Any weekday	2-6pm	Usage Based - Multiplicative	0.8	1.2
10	3	Any weekday	2-6pm	Usage Based - Multiplicative	0.7	1.3
10	3	Any weekday	2-6pm	Usage Based - Multiplicative	NA	NA
10	3	Any weekday	2-6pm	Weather Based	NA	NA
2	2	Any weekday	2-6pm	None	NA	NA
2	2	Any weekday	2-6pm	Usage Based - Additive	0.8	1.2
2	2	Any weekday	2-6pm	Usage Based - Additive	0.7	1.3
2	2	Any weekday	2-6pm	Usage Based - Additive	NA	NA
2	2	Any weekday	2-6pm	Usage Based - Multiplicative	0.8	1.2
2	2	Any weekday	2-6pm	Usage Based - Multiplicative	0.7	1.3
2	2	Any weekday	2-6pm	Usage Based - Multiplicative	NA	NA
2	2	Any weekday	2-6pm	Weather Based	NA	NA
7	5	Any weekday	12-8pm	None	NA	NA
7	5	Any weekday	12-8pm	Usage Based - Additive	0.8	1.2
7	5	Any weekday	12-8pm	Usage Based - Additive	0.7	1.3
7	5	Any weekday	12-8pm	Usage Based - Additive	NA	NA
7	5	Any weekday	12-8pm	Usage Based - Multiplicative	0.8	1.2
7	5	Any weekday	12-8pm	Usage Based - Multiplicative	0.7	1.3

[12] The hours used for load adjustment will be 10am-12pm for testing models and the two hours prior to event notification for modeling events.

[13] ADM plans to used hourly weather data downloaded through NOAA from the Kansas City International Airport. The adjustment used a linear correction term with facility demand as the dependent variable and the drybulb temperature as the independent variable.

Days in Lookback Window	Days Selected from Lookback Window	Day Type	Hours Used to Determine Baseline Days	Load Adjustment[12]	Load Adj. Min	Load Adj. Max
7	5	Any weekday	12-8pm	Usage Based - Multiplicative	NA	NA
7	5	Any weekday	12-8pm	Weather Based	NA	NA
10	5	Any weekday	12-3pm	None	NA	NA
10	5	Any weekday	12-3pm	Usage Based - Additive	0.8	1.2
10	5	Any weekday	12-3pm	Usage Based - Additive	0.7	1.3
10	5	Any weekday	12-3pm	Usage Based - Additive	NA	NA
10	5	Any weekday	12-3pm	Usage Based - Multiplicative	0.8	1.2
10	5	Any weekday	12-3pm	Usage Based - Multiplicative	0.7	1.3
10	5	Any weekday	12-3pm	Usage Based - Multiplicative	NA	NA
10	5	Any weekday	12-3pm	Weather Based	NA	NA
3	3	Similar day of week	2-6pm	None	NA	NA
3	3	Similar day of week	2-6pm	Usage Based - Additive	0.8	1.2
3	3	Similar day of week	2-6pm	Usage Based - Additive	0.7	1.3
3	3	Similar day of week	2-6pm	Usage Based - Additive	NA	NA
3	3	Similar day of week	2-6pm	Usage Based - Multiplicative	0.8	1.2
3	3	Similar day of week	2-6pm	Usage Based - Multiplicative	0.7	1.3
3	3	Similar day of week	2-6pm	Usage Based - Multiplicative	NA	NA
3	3	Similar day of week	2-6pm	Weather Based	NA	NA
8	2	Similar day of week	12-3pm	None	NA	NA
8	2	Similar day of week	12-3pm	Usage Based - Additive	0.8	1.2
8	2	Similar day of week	12-3pm	Usage Based - Additive	0.7	1.3
8	2	Similar day of week	12-3pm	Usage Based - Additive	NA	NA
8	2	Similar day of week	12-3pm	Usage Based - Multiplicative	0.8	1.2
8	2	Similar day of week	12-3pm	Usage Based - Multiplicative	0.7	1.3
8	2	Similar day of week	12-3pm	Usage Based - Multiplicative	NA	NA
8	2	Similar day of week	12-3pm	Weather Based	NA	NA
5	3	Similar day of week	2-6pm	None	NA	NA
5	3	Similar day of week	2-6pm	Usage Based - Additive	0.8	1.2
5	3	Similar day of week	2-6pm	Usage Based - Additive	0.7	1.3
5	3	Similar day of week	2-6pm	Usage Based - Additive	NA	NA
5	3	Similar day of week	2-6pm	Usage Based - Multiplicative	0.8	1.2
5	3	Similar day of week	2-6pm	Usage Based - Multiplicative	0.7	1.3
5	3	Similar day of week	2-6pm	Usage Based - Multiplicative	NA	NA
5	3	Similar day of week	2-6pm	Weather Based	NA	NA
4	3	Similar day of week	2-6pm	None	NA	NA
4	3	Similar day of week	2-6pm	Usage Based - Additive	0.8	1.2
4	3	Similar day of week	2-6pm	Usage Based - Additive	0.7	1.3
4	3	Similar day of week	2-6pm	Usage Based - Additive	NA	NA
4	3	Similar day of week	2-6pm	Usage Based - Multiplicative	0.8	1.2
4	3	Similar day of week	2-6pm	Usage Based - Multiplicative	0.7	1.3
4	3	Similar day of week	2-6pm	Usage Based - Multiplicative	NA	NA
4	3	Similar day of week	2-6pm	Weather Based	NA	NA
6	4	Similar day of week	12-8pm	None	NA	NA
6	4	Similar day of week	12-8pm	Usage Based - Additive	0.8	1.2
6	4	Similar day of week	12-8pm	Usage Based - Additive	0.7	1.3
6	4	Similar day of week	12-8pm	Usage Based - Additive	NA	NA
6	4	Similar day of week	12-8pm	Usage Based - Multiplicative	0.8	1.2
6	4	Similar day of week	12-8pm	Usage Based - Multiplicative	0.7	1.3
6	4	Similar day of week	12-8pm	Usage Based - Multiplicative	NA	NA
6	4	Similar day of week	12-8pm	Weather Based	NA	NA
7	5	Similar day of week	2-6pm	None	NA	NA
7	5	Similar day of week	2-6pm	Usage Based - Additive	0.8	1.2
7	5	Similar day of week	2-6pm	Usage Based - Additive	0.7	1.3
7	5	Similar day of week	2-6pm	Usage Based - Additive	NA	NA
7	5	Similar day of week	2-6pm	Usage Based - Multiplicative	0.8	1.2
7	5	Similar day of week	2-6pm	Usage Based - Multiplicative	0.7	1.3
7	5	Similar day of week	2-6pm	Usage Based - Multiplicative	NA	NA
7	5	Similar day of week	2-6pm	Weather Based	NA	NA
3	2	Same day of week	12-8pm	None	NA	NA
3	2	Same day of week	12-8pm	Usage Based - Additive	0.8	1.2
3	2	Same day of week	12-8pm	Usage Based - Additive	0.7	1.3
3	2	Same day of week	12-8pm	Usage Based - Additive	NA	NA

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3	2	Same day of week	12-8pm	Usage Based - Multiplicative	0.8	1.2
3	2	Same day of week	12-8pm	Usage Based - Multiplicative	0.7	1.3
3	2	Same day of week	12-8pm	Usage Based - Multiplicative	NA	NA
3	2	Same day of week	12-8pm	Weather Based	NA	NA
4	2	Same day of week	2-6pm	None	NA	NA
4	2	Same day of week	2-6pm	Usage Based - Additive	0.8	1.2
4	2	Same day of week	2-6pm	Usage Based - Additive	0.7	1.3
4	2	Same day of week	2-6pm	Usage Based - Additive	NA	NA
4	2	Same day of week	2-6pm	Usage Based - Multiplicative	0.8	1.2
4	2	Same day of week	2-6pm	Usage Based - Multiplicative	0.7	1.3
4	2	Same day of week	2-6pm	Usage Based - Multiplicative	NA	NA
4	2	Same day of week	2-6pm	Weather Based	NA	NA
4	3	Same day of week	2-6pm	None	NA	NA
4	3	Same day of week	2-6pm	Usage Based - Additive	0.8	1.2
4	3	Same day of week	2-6pm	Usage Based - Additive	0.7	1.3
4	3	Same day of week	2-6pm	Usage Based - Additive	NA	NA
4	3	Same day of week	2-6pm	Usage Based - Multiplicative	0.8	1.2
4	3	Same day of week	2-6pm	Usage Based - Multiplicative	0.7	1.3
4	3	Same day of week	2-6pm	Usage Based - Multiplicative	NA	NA
4	3	Same day of week	2-6pm	Weather Based	NA	NA
4	4	Same day of week	2-6pm	None	NA	NA
4	4	Same day of week	2-6pm	Usage Based - Additive	0.8	1.2
4	4	Same day of week	2-6pm	Usage Based - Additive	0.7	1.3
4	4	Same day of week	2-6pm	Usage Based - Additive	NA	NA
4	4	Same day of week	2-6pm	Usage Based - Multiplicative	0.8	1.2
4	4	Same day of week	2-6pm	Usage Based - Multiplicative	0.7	1.3
4	4	Same day of week	2-6pm	Usage Based - Multiplicative	NA	NA
4	4	Same day of week	2-6pm	Weather Based	NA	NA
3	3	Same day of week	12-8pm	None	NA	NA
3	3	Same day of week	12-8pm	Usage Based - Additive	0.8	1.2
3	3	Same day of week	12-8pm	Usage Based - Additive	0.7	1.3
3	3	Same day of week	12-8pm	Usage Based - Additive	NA	NA
3	3	Same day of week	12-8pm	Usage Based - Multiplicative	0.8	1.2
3	3	Same day of week	12-8pm	Usage Based - Multiplicative	0.7	1.3
3	3	Same day of week	12-8pm	Usage Based - Multiplicative	NA	NA
3	3	Same day of week	12-8pm	Weather Based	NA	NA
5	3	Same day of week	12-3pm	None	NA	NA
5	3	Same day of week	12-3pm	Usage Based - Additive	0.8	1.2
5	3	Same day of week	12-3pm	Usage Based - Additive	0.7	1.3
5	3	Same day of week	12-3pm	Usage Based - Additive	NA	NA
5	3	Same day of week	12-3pm	Usage Based - Multiplicative	0.8	1.2
5	3	Same day of week	12-3pm	Usage Based - Multiplicative	0.7	1.3
5	3	Same day of week	12-3pm	Usage Based - Multiplicative	NA	NA
5	3	Same day of week	12-3pm	Weather Based	NA	NA

ADM identified CBL “best fits” for each customer using residual root mean squared error (RRMSE) scores from the event window (2-6PM) during test days. These days serve as a good proxy for event days as they were days when an event was close to being called and will be referred to as “proxy event days.” For 2021, 6/10/2021, 6/16/2021, 7/28/2021, 7/30/2021, 8/23/2021, 8/26/2021, 9/7/2021, and 9/17/2021 were used.

It has been ADM’s experience that CBL construction methods often produce generally consistent results, but in some cases CBLs may produce divergent results. To minimize calculation bias, ADM employed the same bias screen described in step 3 in Section H.5.2 above. In addition, ADM combined results as a weighted average of the best three models for each customer. The weights were the inverse squares of the model

RRMSEs. For example, of three models having RRMSEs of 5 percent, 11 percent, and 52 percent respectively, their relative weights will be 82 percent, 17 percent, and 1 percent, respectively.

Two participants had highly variable (coefficient of variation > 50), process driven usage. ADM chose to use a 9 of 10 “any weekday” CBL with no adjustment for these participants. A weather adjustment was not used because the usage was not weather sensitive. A day of adjustment was not used because of both participants can ramp up and ramp down their usage quickly and unpredictably which can lead to poor estimates.

Estimating Gross Peak Demand Reductions (kW)

Peak demand reduction from the BDR Program events is estimated on a customer-by-customer basis. The customer demand reduction is calculated as the average load shed (in kW) during the duration of all events. The program peak demand reduction is equal to the sum of each customer’s demand reduction. Hourly load shed is calculated by subtracting hourly usage from the CBL baseline calculated for each customer for each event.

H.5.3 COVID-19 Impact Considerations

Prior to June 16, 2020, Missouri was under Phase 1 of its COVID-19 reopening plan which had restrictions on business operations. Phase 2 of Missouri’s reopening plan began on June 16, 2020 and contains no statewide public health order. Since all DR events and baseline days used in the analysis were during Phase 2, ADM determined that CBL estimates were still appropriate for energy impact estimation and that no adjustment needed to be made to lookback window length.

While the analysis methodology did not require modification due to the COVID-19 pandemic, many participants stated that their ability to participate in events in 2021 was impacted. As Table H-8 shows, 50 percent of the respondents said the pandemic adversely affected business operations by providing a rating of "4" or "5."

Table H-8: Level of COVID Impacts Regarding Energy Efficiency Operations

The impact of COVID on daily operations relating to energy efficiency		Percent of Responses (n = 48)
Not impacted	1	8%
	2	4%
	3	23%
	4	19%
Greatly impacted	5	31%
Not sure	-	4%
Prefer not to answer	-	10%

Most of these impacts were manifested as shutdowns or curtailed business operations, staff storages, and supply chain disruptions. One participant shifted to curbside operations during the pandemic, while another moved to online sales. Despite the impact of COVID-19, the program exceeded the kW goal in 2021.

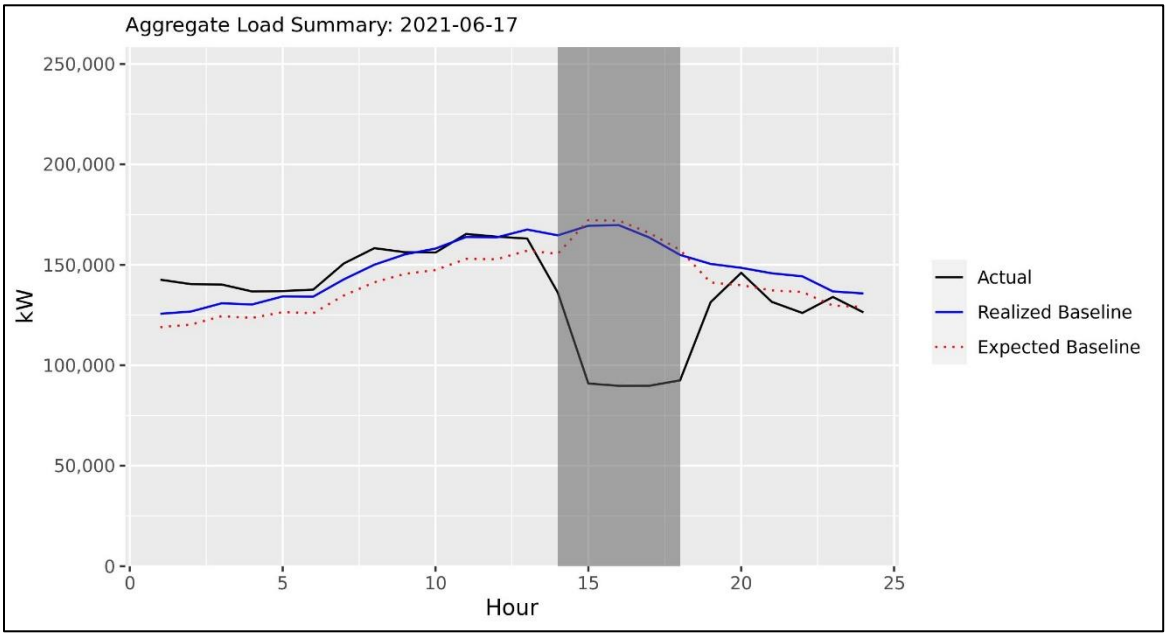
H.6 Gross Impact Evaluation Findings

The following sections provide the results of the impact evaluation for the BDR Program.

H.6.1 Peak Demand Reduction from Demand Response Events

Peak demand reduction (kW) was determined as the average hourly difference between event hours and a counterfactual non-event period. The method used to determine the counterfactual baseline is described in the methodology section of this chapter (Section H.5). The figures below provide the aggregate load shapes on event days. A significant reduction in consumption is present during the event periods. In the graphs below, the realized baseline and expected baseline represent the counterfactual baselines calculated by ADM and Evergy respectively. Evergy's baseline was calculated using the 10 models listed in Table H-6 while ADM's realized baseline was calculated using the complete list of models in Table H-7.

Figure H-1: BDR Load Shape, Event 1



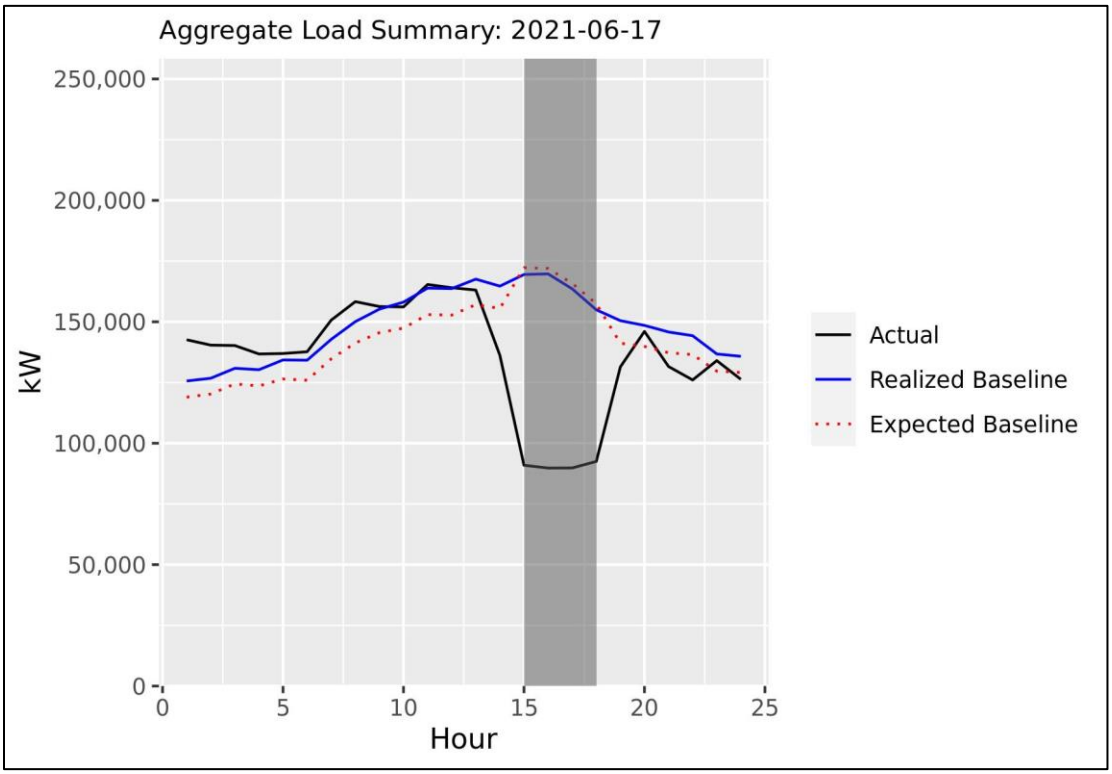
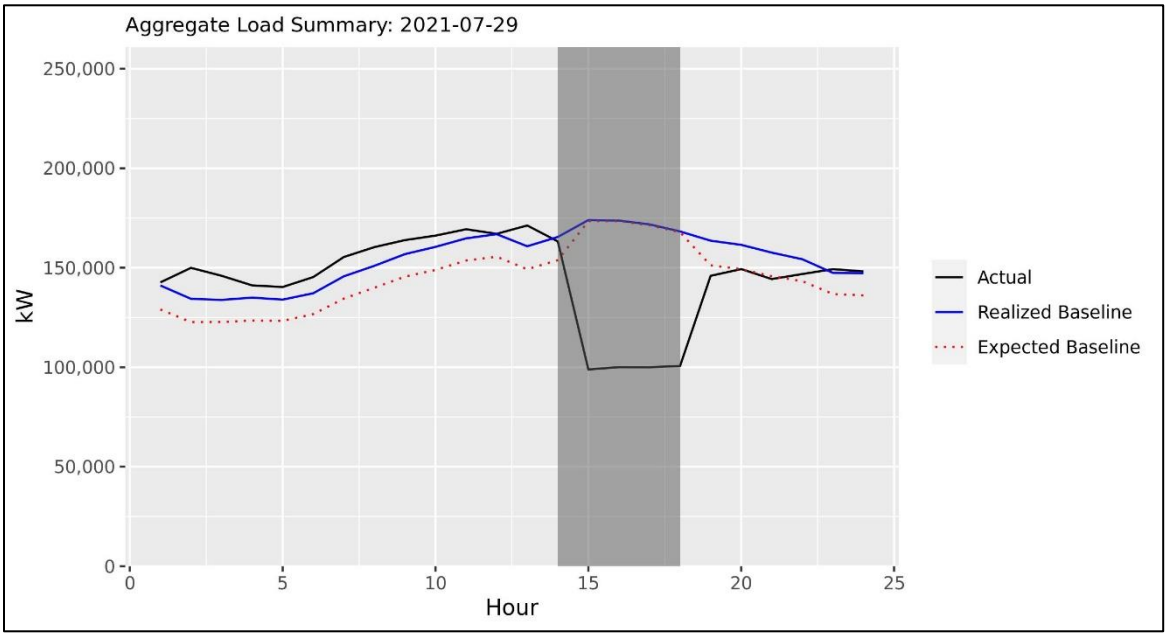


Figure H-2: BDR Load Shape, Event 2



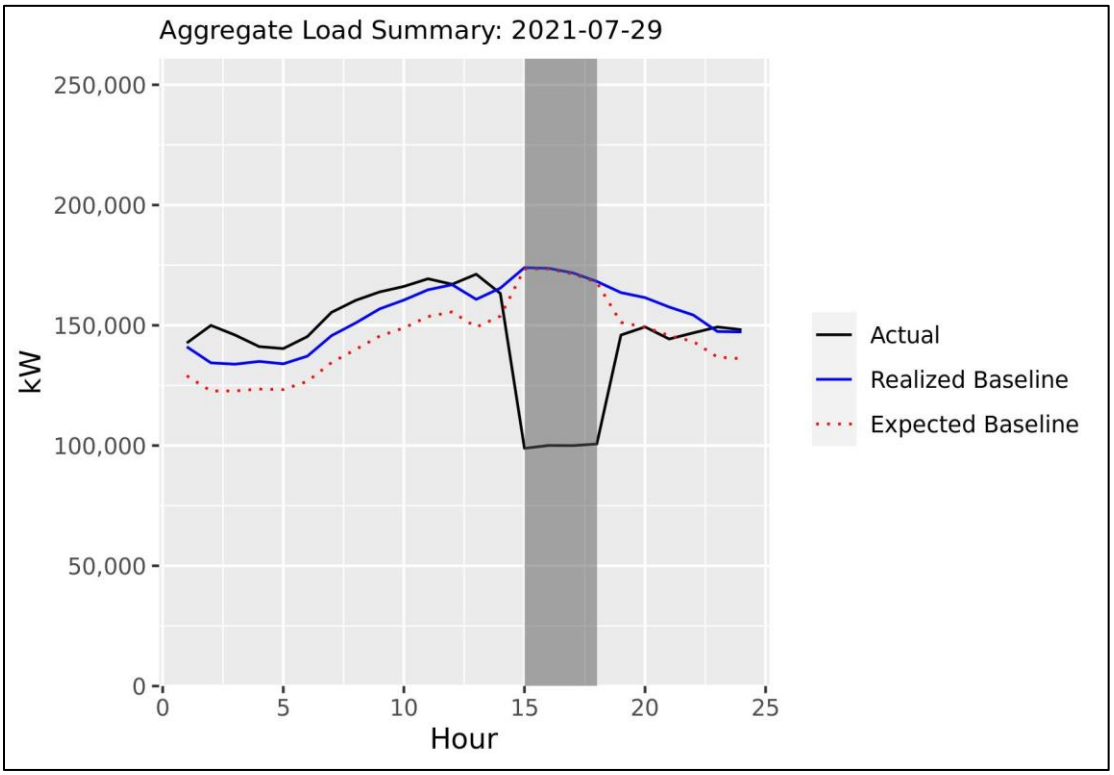
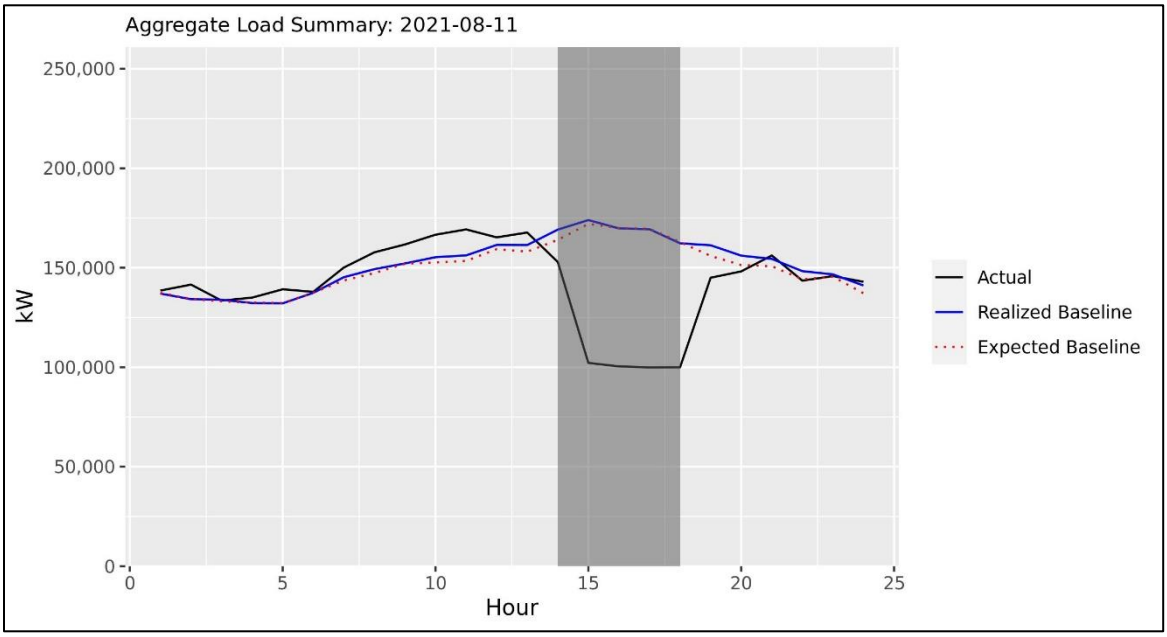


Figure H-3: BDR Load Shape, Event 3



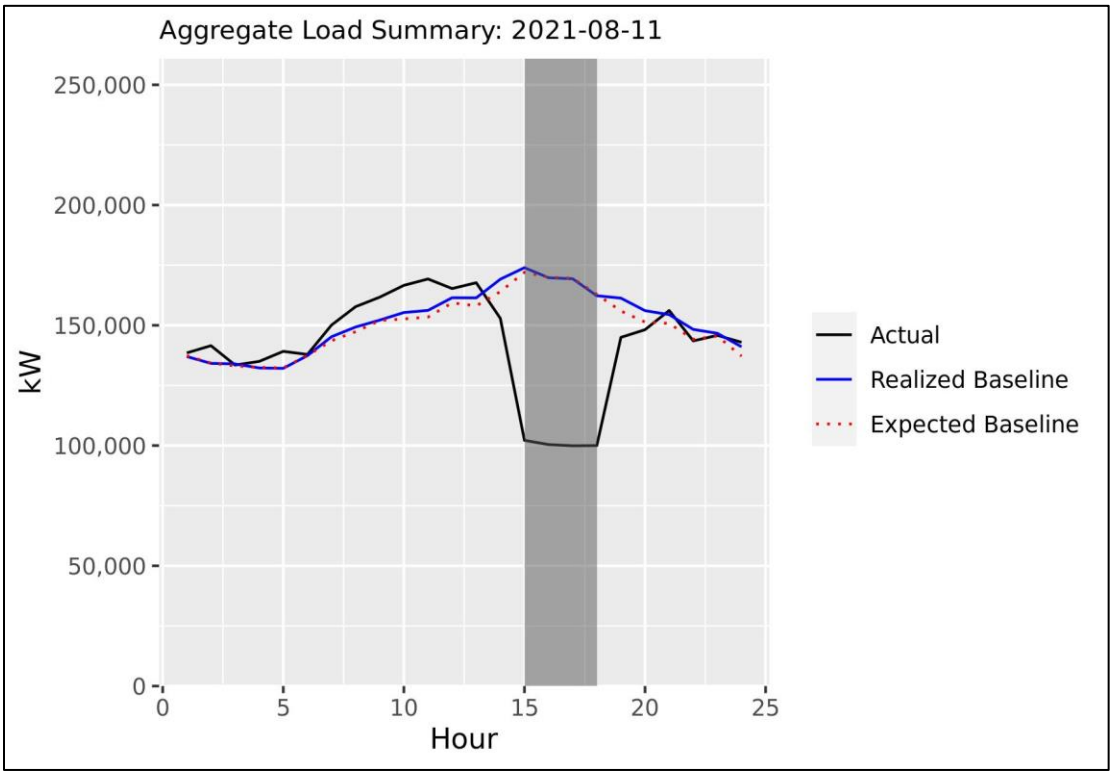
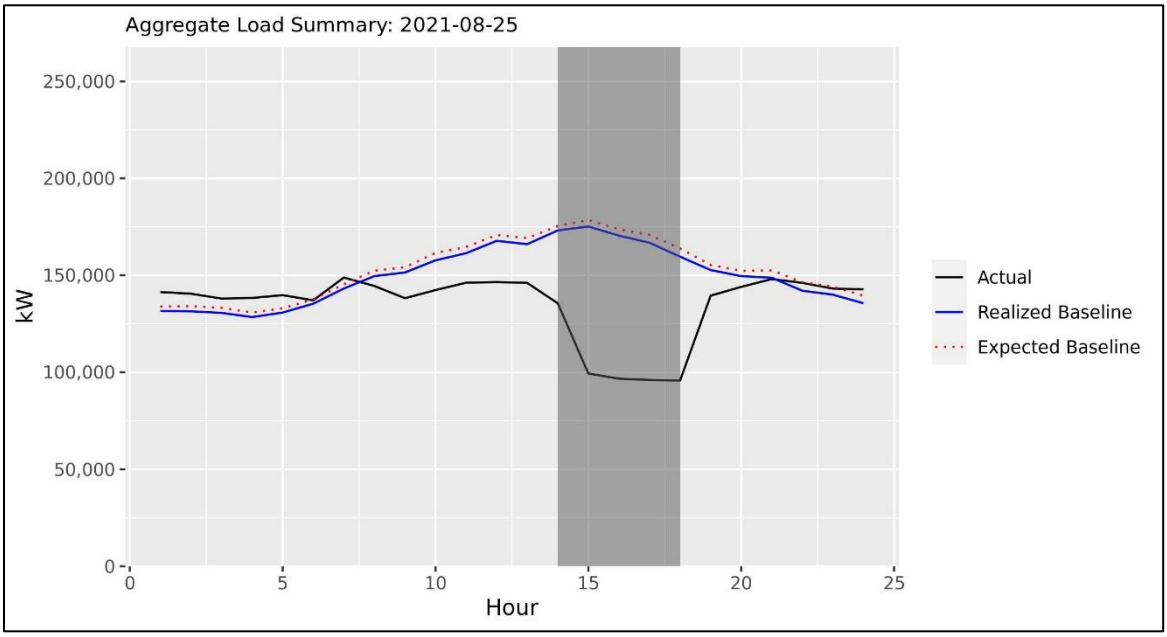


Figure H-4: BDR Load Shape, Event 4



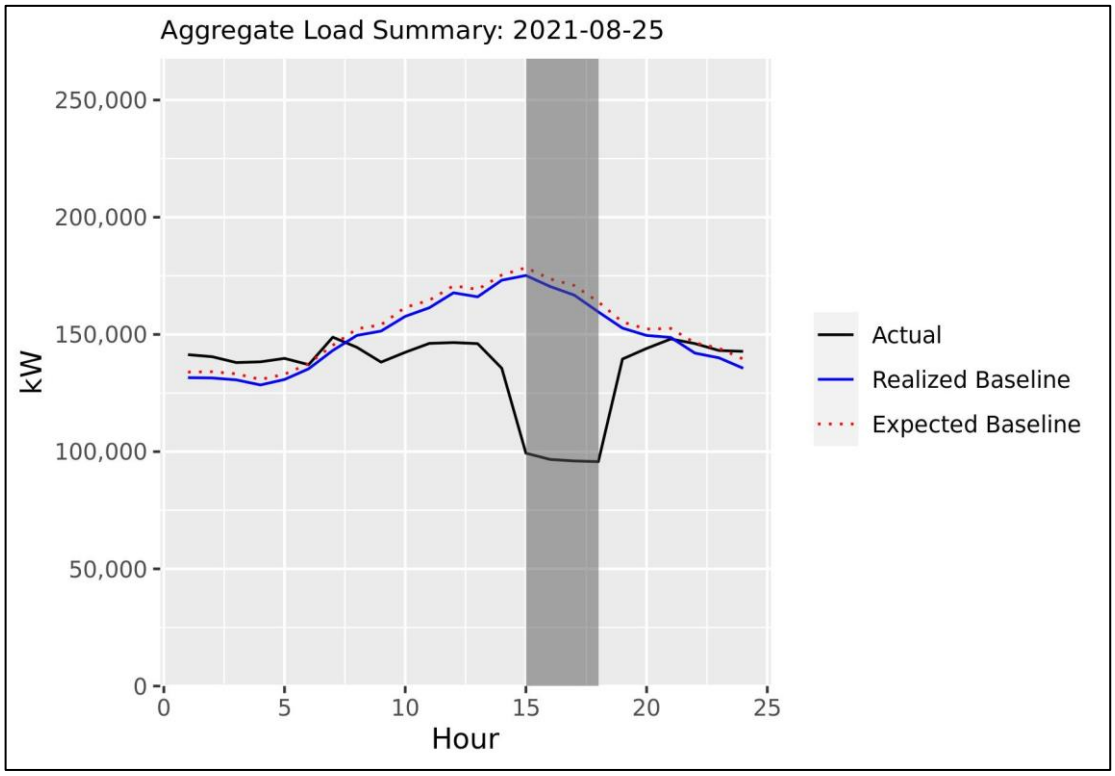


Table H-9 provides impact results for all BDR events called in Cycle 3 PY2. The DR events resulted in a peak demand reduction representing 110% of the program goal and 100% of the expected reduction. The difference in the average realized kW per customer is due to Missouri Metro having much higher usage participants enrolled in the program allowing them to make greater reductions during events. The average kW for Missouri

Metro participants during the DR season was 1,251 while Missouri West participants averaged 360 kW.

Table H-9: BDR Savings Summary

Jurisdiction	# of Customers	# of Service Point IDs	Expected kW	Realized kW	Realization Rate
MO West	142	404	50,387.50	51,094.86	101%
MO Metro	18	105	23,213.10	22,523.90	97%
Total	**160**	**509**	**73,600.60**	**73,618.76**	**100%**

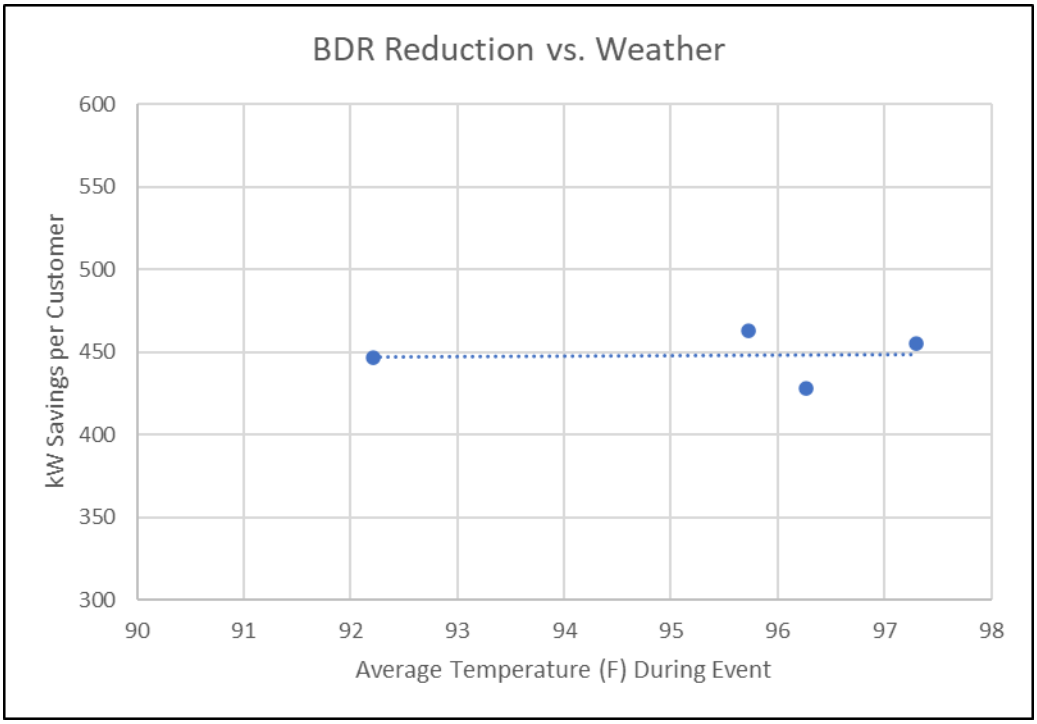
In addition to testing CBLs that incorporated weather data on each participant, ADM analyzed weather's impact on the program overall. Table H-10 provides DR event savings versus weather during event hours.

Table H-10: DR Event Savings vs. Weather

Jurisdiction	Event Date	Realized kW	Avg. Temp (ºF) Event Hours
MO Metro	6/17/2021	23,091	95.72
MO Metro	7/29/2021	23,202	97.295
MO Metro	8/11/2021	19,416	96.26
MO Metro	8/25/2021	21,148	92.21
MO West	6/17/2021	50,937	95.72
MO West	7/29/2021	49,666	97.295
MO West	8/11/2021	49,008	96.26
MO West	8/25/2021	50,274	92.21

Figure H-5 shows BDR event reduction and average temperature on event days. Many of the customers usage is process driven, and ADM found little relationship between event time temperature and savings.

Figure H-5: BDR Savings vs. Weather



H.7 Net Impact Evaluation Findings

In demand response programs, it is typically assumed that there are neither spillover effects (customers are not expected to curtail without participating), nor free ridership. Although customers can find workarounds to make up for lost productivity due to demand response events, they are compensated only if they reduce their load during the peak demand window, the primary program goal. As such, the net-to-gross ratio for this program is assumed to be one (1).

H.8 Impact Evaluation - Final Savings Tables

Table H-11 summarizes the verified peak demand reduction for the Business Demand Response Program. Evergy does not claim energy savings for DRI; thus, the evaluation team did not calculate energy savings.

Table H-11: Peak Demand Reduction (kW)

Jurisdiction	# of Customers	# of Service Point IDs	Expected kW	Realized kW	Realization Rate
MO West	142	404	50,387.50	51,094.86	101%
MO Metro	18	105	23,213.10	22,523.90	97%
Total	**160**	**509**	**73,600.60**	**73,618.76**	**100%**

H.9 Process Evaluation

H.9.1 Program Operations

The BDR program is managed by Evergy's product manager, who coordinates the external program operations with the third-party implementer, CLEAResult, and manages the internal operations with Evergy's marketing team. Evergy's program manager also reviews and processes the incentive checks and bill credits for each program participant at the end of the season.

The program manager's primary responsibility is "to make sure that all the data are flowing" between CLEAResult and the database manager who works with DERMS. The program manager also facilitates program recruitment by coordinating marketing and outreach activities to recruit business customers into the program.

CLEAResult's team includes the program manager, manages all program operations, including recruitment, and a data scientist who develops the curtailment plans for each program participant. Two additional senior staff from CLEAResult provide guidance and strategic direction for this program. “The program staff have worked closely for years and have developed an effective working relationship." (Evergy Program Manager)

Program Design

The BDR program was designed based on the specific tariff requirements for Evergy's business customers. The program design has remained consistent during the past three years for Missouri West or Missouri Metro. Missouri West jurisdiction has changed, as the DR goals have increased every year. While the focus of Missouri Metro has been to maintain program participation rates, activities in Missouri West focus on increasing enrollments to achieve more significant kW savings.

" Missouri West has increased goals each program year, so not only are we trying to maintain participation with our existing customers... but we also have to think about gaining new customers to make sure that we have we're filling the bucket with enough kW so that we can (meet) our goals… So we're focused on getting that additional kW." (Program Implementer)

"…our relationship with economic development has flourished to a point where now part of our recruitment plan is working with Economic Development an eye on new facilities that are coming through the economic growth in the city." (Program Implementer)

Program Enrollment

Participation goals were based on the tariff filings applied to customers in these specific rate classes. These goals have remained consistent over the past three years; however, the goals are across the two Evergy jurisdictions. As the program manager explained, the

focus of enrollment in MO West is to find new customers that will generate additional kW savings, while the goal in MO East is to maintain the number of program participants.

The MO West Jurisdiction includes rural areas, so the program implementer focused on recruiting customers in those areas, often working with the Economic Development offices in these locations.

"We are keeping an eye on new facilities and the economic growth in MO West, identifying companies who are putting down roots and then (enroll them) in the program when they do open new facilities." (Program Implementer)

Program Participation

Evergy and the program implementer have developed a clear path to engage enrolled customers in the BDR program. Once a customer indicates an interest in the program, the implementer works with the participant to design a curtailment plan, which determines the amount of kW available that could be shed during an event. The curtailment plan clearly describes the specific actions the customer will take during a DR event, the types of notifications that the customers will receive, the length of the agreement and the amount of the incentives. From the initial contact through contract signing usually takes four to five weeks.

Program recruitment runs from mid-January through mid-May. There were no carry-overs from the previous year in the first year of a three-year cycle, so the initial participation was zero and increased to 100 participants in 2020 and then added 50 new participants in 2021.

Although customers are recruited throughout the winter months, they are not officially enrolled until June 1.

Overall, the participation rates in the DR events in 2021 were higher than expected. The staff attributed this outcome to excellent customer outreach in recruiting and enrollment. The implementer was also able to "over recruit' customers in some locations as a way to increase overall participation rates. This strategy increased the pool of eligible participants, increasing the overall participation rate for each DR event.

The curtailment plan is developed based on a careful review of the participant's energy usage, which is informed by reviewing the data tracked in the DERMS system. The implementer relies on the DERMS data to determine participant performance and depends on that system to report the actual kW savings after each event. This process has improved over time as the team has experience in "matching up the data," leading to improved program performance.

After each curtailment event, the program implementation staff review the results with each participant. They also follow up with customers who did not participate or those who

were having difficulty participating in these DR events to increase DR participation going forward.

Program Marketing

The implementer used various marketing tactics to identify and engage with potential participants. First, the implementer identified the most significant industrial and manufacturing companies in each Jurisdiction. Before COVID, marketing outreach relied primarily on visits to each customer location. However, with COVID, the team shifted to sending texts, emails, and social media followed up by telephone calls.

Evergy also coordinated its marketing and outreach activities with the program implementer, so marketing expanded to include mailers and postcards in addition to email blasts. The BDR program was also cross promoted with Evergy's Business Energy Efficiency Program, managed by another implementation contract.

Communication

The Evergy and CLEAResult staff have established a practical communications approach, in which they share documents and information to improve overall program performance. The two teams concentrate on "risk mitigation" and have developed an effective working relationship.

The implementer also conducts a test DR event which includes pulling data from the DERMS database to ensure that "the right customers are listed and connected" correctly in the program database.

"*It is a manual and intricate process to get the customers assigned for notification, and we can capture all those issues and look at who is not responding… We can identify gaps in the communication process with the customer, and we contact the team ASAP."* (Program Implementer)

Data Tracking and Quality Assurances and Controls (QA/QC)

The staff reported some data processing glitches in 2021, which delayed the processing of the DR event reports to program participants. Going forward, the implementer is working with the DERMS and the evaluation team to "make sure CLEAResult is analyzing the data properly."

"…from a reporting and tracking perspective, I think that we did have some gaps this year, unfortunately, due to Energy's internal systems." (Evergy Program Staff)

The program implementation team works closely with the Evergy staff in conducting Quality Assurance/Quality Control activities. The program documentation is updated annually. The team has also created a "pre-season checklist" to ensure that all reporting and tracking steps are identified and followed.

"…From a QA/QC perspective, we're positioned well this year to make up for a lot …Our go-forward method is just building on everything that we've learned from 2020 and 2021." (Program Staff)

Challenges for Program

In 2021, the program successfully developed strategies that led to increased program participation, program recruitment, and customer engagement compared to 2020. The staff reported that the new payment-based incentive is clearly explained to customers, which helped them understand the transition to a new program design.

However, data tracking issues with the DERMS database are still problematic. While the staff acknowledges that they are better at understanding the system, addressing data gaps remains an ongoing challenge.

"We are focused on this year is communicating with our customers more successfully through DERMS so… that's our opportunity to adjust (if there are errors). (Program Implementer)

Identifying future program participants is another challenge, as the implementation staff would like to open the program to smaller customers.

"*The next most logical barrier is simply getting more businesses to realize that they can participate at lower levels… We have captured nearly all of the top energy users, and now we are starting to capture kW in smaller amounts."* (Program Implementer)

The program staff also refine their outreach tactics to attract more participants, especially in the Missouri West Jurisdiction.

COVID Impacts

Participant recruitment evolved during the pandemic, as in-person meetings were no longer a feasible approach.

"*We had to use unconventional channels of communication such as text messages, and we pivoted on how we communicated with (customers)."* (Program Implementer)

However, the conversion rates dropped from 50 percent to 12-15 percent during 2021, as the telephone calls were less effective than in-person visits. But the implementer explained that because the program was already up and running, the staff used networking with existing participants to identify new participants.

"We had a lot of larger production companies in small towns, and we had to network with them. We had to get inventive on how to do outreach one-on-one." (Program Implementer)

The COVID-19 pandemic also affected 40 percent of the enrolled businesses as many operations were shut down for several weeks or even months. These shut-downs directly impacted overall program operations, as described more fully in the next section.

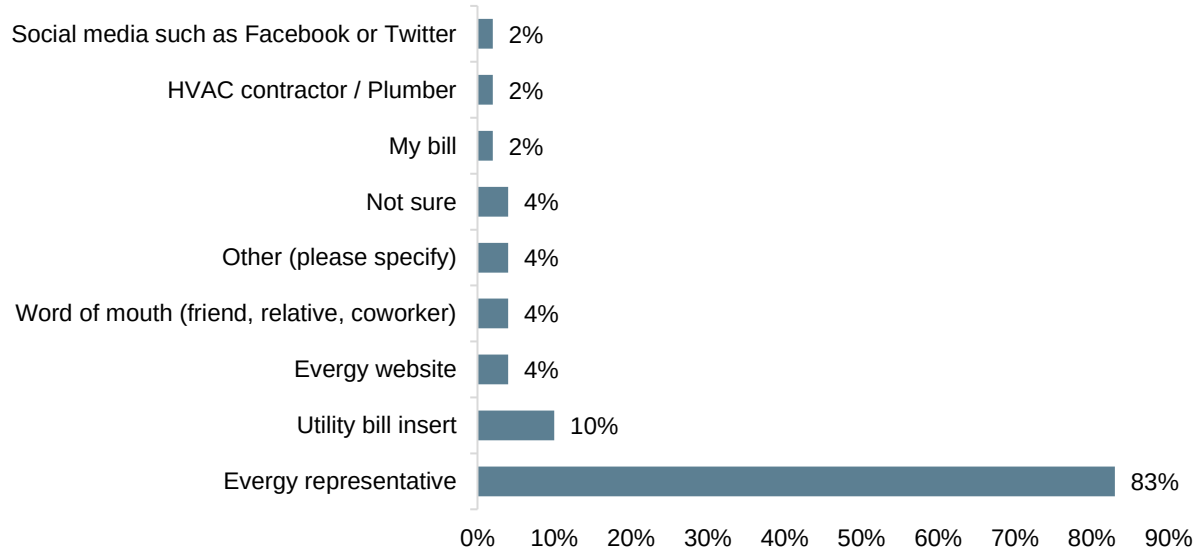
H.9.2 Participant Survey

A total of 48 respondents completed the online survey regarding their experiences with the Evergy's Business Demand Response (BDR) Program offered in 2021. All of these respondents indicated that Evergy was their electric service provider.

Sources of Awareness

An overwhelming majority of respondents (83 percent) said they learned about this program directly from an Evergy representative. Other sources of awareness were less frequently mentioned, including the bill insert (10 percent) and the Evergy website (4 percent).

Figure H-6: How BDR Participants Learned about the DR Program

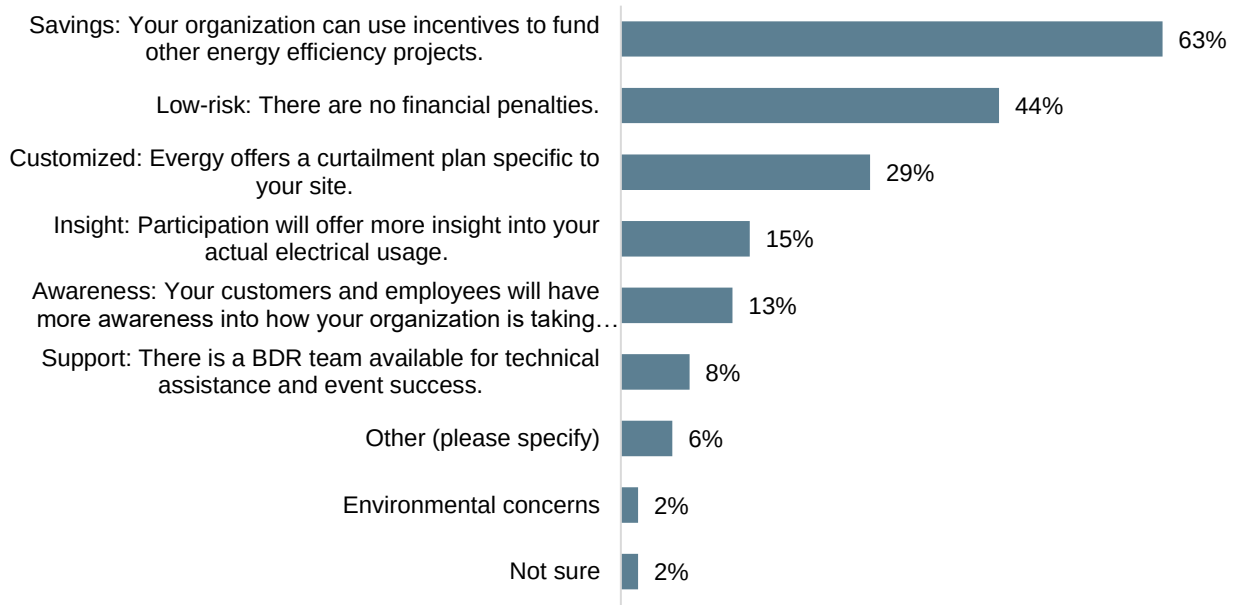


Note: Percentages may exceed 100% due to respondents being able to select more than one response.

Reasons for Participating in the BDR Program

Saving money was the most frequently mentioned reason (34 percent) for enrolling in the program, followed by the desire to use less energy, which accounted for 19 percent of these responses.

Figure H-7: Reasons for Participating in the Residential DR Program



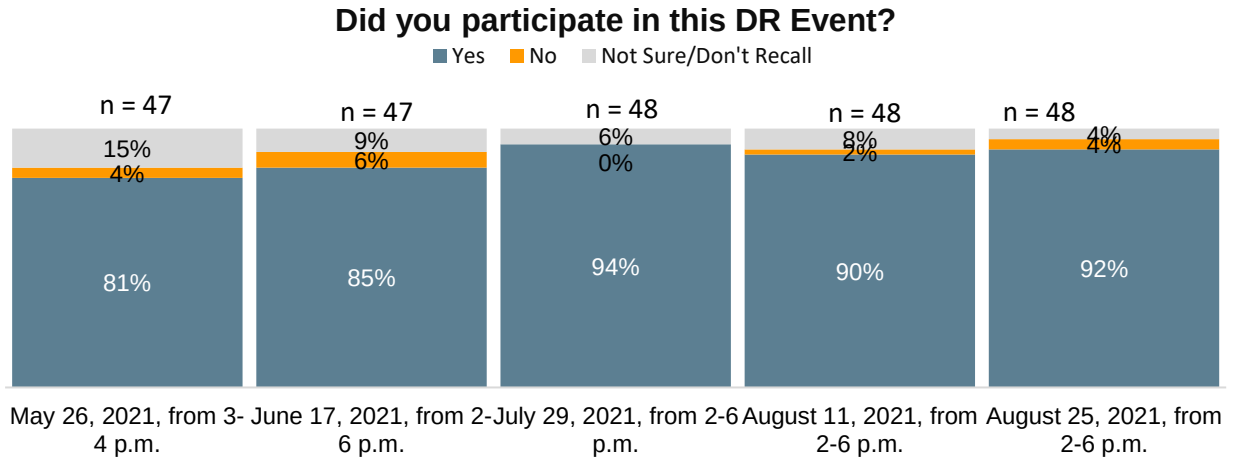
Note: Percentages may exceed 100% due to respondents being able to select more than one response.

Participation in DR Events

Two-thirds of the respondents (64 percent) recalled receiving a customized curtailment plan from Evergy, while 17 percent did not. Another 19 percent were unsure.

Overall, most respondents participated in the six DR events called in the Summer of 2021, as Figure H-8 illustrates. On May 26, 2021, the first event reported the lowest overall participation rates (81 percent), while the July 29 event had the highest rate (94 percent).

Figure H-8: Participation Rates in Each DR Event

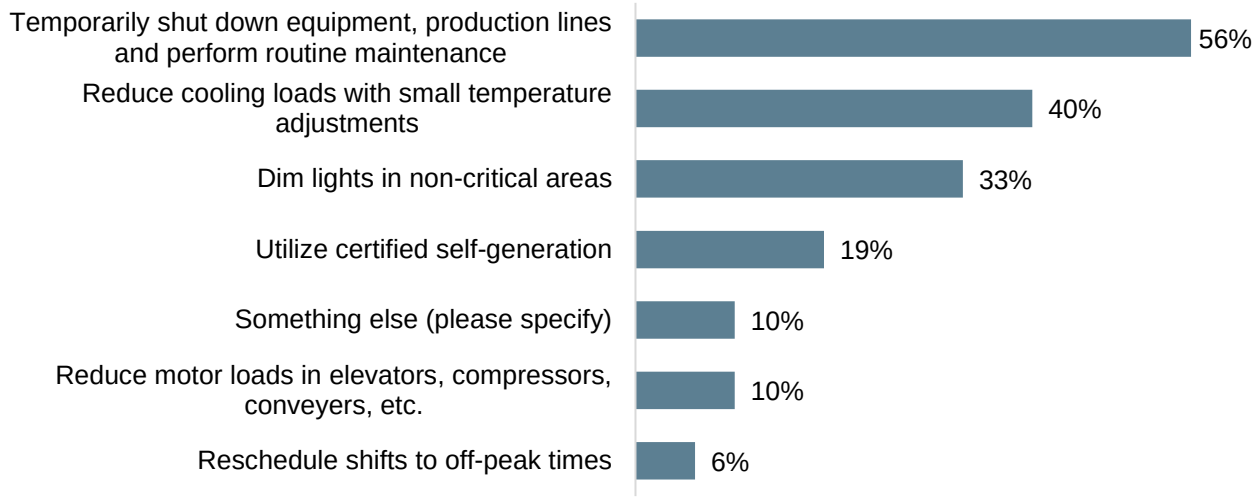


Reasons For Not Participating in DR Events

Some participants explained why they chose not to participate in a specific DR event. These reasons include not being aware of the event or not receiving a notification from Evergy, lack of available staff to shut down the equipment, or being unable to shut down due to specific organizational needs such as receptions or large meetings.

Most respondents (56 percent) temporarily shut down equipment to curtail load during each event, while other actions included reducing cooling loads specifically (40 percent) or dimming lighting (33 percent). Fewer respondents mentioned rescheduling their plant operations (6 percent). A few respondents provided specifics taken to completely shut down the air conditioning loads.

Figure H-9: Actions Taken to Curtail Energy Load during Peak Events



Note: Percentages may exceed 100% due to respondents being able to select more than one response.

Most of the respondents (93 percent) recalled receiving notifications before each DR event, while 4 percent did not.

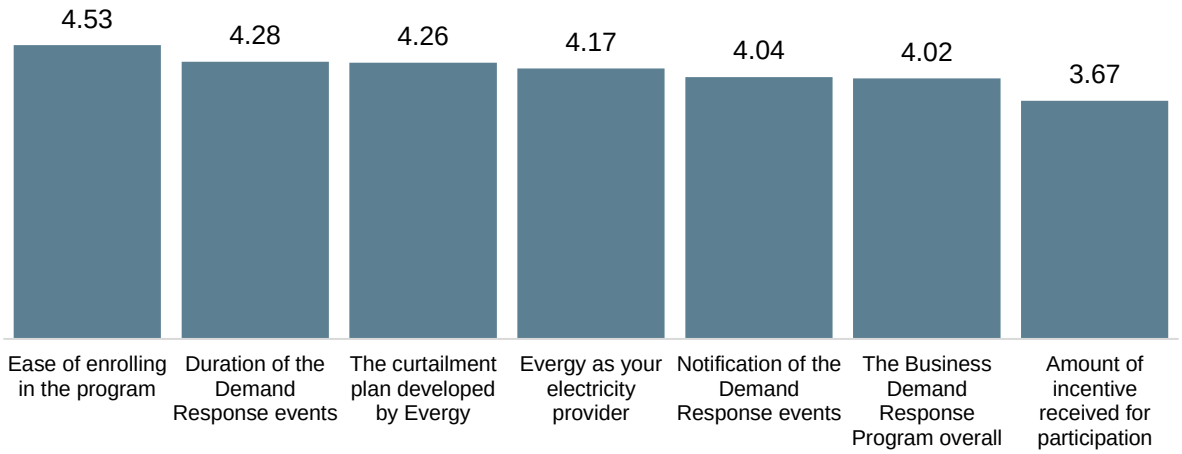
Satisfaction with the BDR Program Components

However, when the participants were asked to rate their overall satisfaction with the BDR program on a five-point scale, where "1" meant "Very Dissatisfied" and "5" meant "Very Satisfied," event notification received the lowest satisfaction rating of all program components, with an average score of 4.04. These satisfaction ratings are summarized in Table H-12 and Figure H-10.

Table H-12: Satisfaction Ratings for the BDR Program Components

Program Component	% "Very Dissatisfied" "1"	"2"	"3"	"4"	% "Very Satisfied" "5"
Ease of enrolling in the program	0%	0%	8%	25%	56%
Duration of the Demand Response events	0%	4%	21%	27%	46%
The curtailment plan developed by Evergy	0%	2%	17%	23%	46%
Evergy as your electricity provider	0%	0%	27%	25%	44%
Notification of the Demand Response events	4%	11%	11%	26%	49%
The Business Demand Response Program overall	0%	8%	23%	23%	42%
Amount of incentive received for participation	6%	13%	19%	27%	31%

Figure H-10: Average Satisfaction Ratings with BDR Program Components



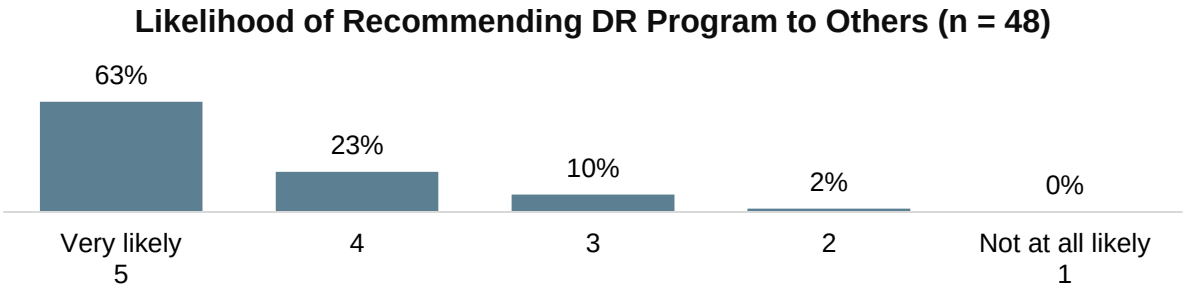
Five respondents indicated that the program was easy to participate in, and they reported good interactions with the Evergy team. However, two respondents were disappointed in the lower level of incentives compared to previous years. At the same time, three indicated that the curtailment events lasted too long or were difficult for them to participate in at 5 p.m. One respondent said the curtailment period made their work environment "uncomfortable."

Likelihood of Recommending the BDR Program to Others

The participants also rated their likelihood of recommending the program to others using a five-point scale where "1" means "Not at all Likely and "5" means "Very Likely."

More than three-quarters (86 percent) of the program participants would recommend this program, as Figure H-11 illustrates.

Figure H-11: Likelihood of Recommending the BDR Program to Others



COVID Impacts

Most of these impacts focused on shut down or curtailing business operations, staff storage and supply chain disruptions. One participant shifted to curbside operations during the pandemic, while another moved to online sales.

As Table H-13 shows, the participants reported that the pandemic impacted program operations using the same five-point scale. Overall, 50 percent of the respondents said the pandemic adversely affected business operations by providing a rating of "4" or "5."

Table H-13: Level of COVID Impacts Regarding Energy Efficiency Operations

The impact of COVID on daily operations relating to energy efficiency		Percent of Responses (n = 48)
Not impacted	1	8%
	2	4%
	3	23%
	4	19%
Greatly impacted	5	31%
Not sure	-	4%
Prefer not to answer	-	10%

Business Firmographics

The survey participants represented a broad range of businesses, including farm equipment dealers, long-term care facilities, manufacturing facilities, and water treatment plants. Approximately one-quarter (27 percent) of these survey respondents were schools, universities, or colleges (see Table H-14).

Table H-14: Types of Businesses

Type of Business	Percent of Responses (n = 48)
Other	29%
School / College / University	27%
Religious / House of Worship	21%
Warehouse	8%
Retail store	6%
Hospital	6%
Office	2%

Most respondents (83 percent) only have one business operation, but the average number of locations was 3.5. One participant reported having 24 business locations.

These businesses are well-established, operating 41.10 years on average. Most (84 percent) own the building, while 13 percent rent. The average square footage for their companies was 131,878, and they employed, on average, 59.32 full-time staff.

Most respondents (64 percent) did not provide their annual gross revenues. However, as Table H-15 shows, among those who did, 23 percent reported gross revenues of more than $1 million annually.

Table H-15: Approximate Gross Annual Revenues in 2021

Approximate Gross Annual Revenue	Percent of Responses (n = 47)
Less than $50,000	2%
$50,000-$100,000	0%
$100,001-$250,000	2%
$250,001- $500,000	2%
$500,001- $1 million	6%
More than $1 million	23%
Prefer not to answer	64%

H.9.3 Conclusions and Recommendations

ADM performed a process evaluation that assessed program documentation and primary data collected from program stakeholders. The evaluation included fielding two customer surveys and conducting in-depth interviews with the utility and third-party implementation staff.

The following summarizes the key findings of the process evaluation of the Business Demand Response Program for PY2:

- The BDR program had a successful program year, with higher than anticipated participation rates in the DR events. Program participants also reported high satisfaction rates overall for most program elements. In addition, more than three-quarters (84 percent) of program participants would recommend this program to others.
- The COVID pandemic negatively affected participants' operations, with 81 percent reporting that they had to shut down or curtail operations. However, participation rates in individual DR events remained higher than expected, suggesting that overall, the pandemic did not affect program operations.
- Despite the recruitment challenges due to the pandemic, the implementer was able to recruit new participants to reach its savings goals. The program implementer developed innovative approaches to recruit new program participants by relying more on social media and text messaging than the one-on-one recruitment strategy used in previous years.
- Significant barriers to program participation remain, including:
  - Challenges in recruiting participants in the rural MO West Jurisdiction, which typically has fewer industrial and manufacturing customers.

- Finding participants who can enroll at a lower savings goal as a way to expand beyond the top 1,000 energy users.
- Glitches with the program tracking database caused delays in reporting progress to program participants in 2021.

The following recommendations are offered for continued improvement of the Business Demand Response Program:

- **Evergy staff should continue to work with both the DERMS database provider and the implementation contractor to improve the accuracy of capturing participant performance promptly.** After each DR event, providing participant reports of savings will reinforce the program's value to these customers and perhaps encourage greater kW savings efforts.
- **The program implementer should continue to look for creative ways to market this program to smaller commercial and industrial customers by scaling the kW enrollment targets.** This approach may be especially effective at reaching smaller customers in the rural Missouri West jurisdiction.

Appendix I Residential Demand Response Program-Specific Methodologies

This chapter describes the evaluation activities that were performed by ADM to evaluate the Residential Demand Response Program.

I.1 Program Overview

The Residential Demand Response (RDR) program uses automatic event call technology to curtail energy use during peak demand periods. Eligible customers are provided an incentive to participate in curtailment events.

Participation Channels:

- Customers can purchase devices and install the device themselves.
- Customers can receive devices provided at a discounted price and receive professional installation.
- Customers can enroll their eligible existing device.

Called upon devices (Cycle 3) will increase a customer's setpoint between 2- and 5-degrees Fahrenheit. Pre-cooling occurs prior to an event and the customer receives notification via their smart device application.

Expected Energy Savings and Demand Reduction

Targeted energy and demand impact for the Residential Demand Response program years 2020 - 2022 are shown in the tables below. These Targeted savings are taken from KCP&L filing EO-2019-0132.

Table I-1: Program Goal Savings by Year - Missouri Metro

Program Year	Energy Savings Goal (MWh)	Peak Demand Reductions Goal (MW)
2020	1,171	8.68
2021	1,330	9.96
2022	1,466	11.14
Total	**3,967**	**29.78**

Table I-2: Program Goal Savings by Year - Missouri West

Program Year	Energy Savings Goal (MWh)	Peak Demand Reductions Goal (MW)
2020	1,221	9.22
2021	1,402	10.60
2022	1,549	11.17
Total	**4,172**	**30.99**

Table I-3 below provides a summary of program metrics for the PY2.

Table I-3: Performance Metrics – Residential Demand Response Program

Metric	PY2 Total	MO West	MO Metro
Number of Participants	7,437	3,870	3,567
Energy Savings (kWh)			
Targeted Energy Savings	2,731,904	1,402,388	1,329,516
Reported Energy Savings	1,875,637	944,615	931,022
Gross Verified Energy Savings	1,763,715	888,248	875,466
Net Verified Energy Savings	1,763,715	888,248	875,466
Peak Demand Reduction (kW)			
Targeted Peak Demand Reduction	20,566.32	10,609.20	9,957.12
Reported Peak Demand Reduction	13,141.80	6,717.20	6,424.60
Gross Verified Peak Demand Reduction	12,468.74	6,489.81	5,978.93
Net Verified Peak Demand Reduction	12,468.74	6,489.81	5,978.93
Benefit / Cost Ratios			
Total Resource Cost Test Ratio	1.39	1.39	1.39

I.2 EM&V Methodologies

This chapter describes the impact evaluation activities and methodology that ADM performed for Evergy's 2021 Residential Demand Response Program. Table I-4 provides a summary of the savings approach by program year.

Table I-4: Savings Approaches by Program Year

Program Year	kW Savings (Demand Response)	kWh Savings
2020	Calculated	Evergy TRM
2021	Calculated	Calculated
2022	Calculated	PY2 Value

In evaluating the 2021 Residential Demand Response Program, ADM implemented a variety of impact evaluation exercises including estimation of gross and net energy savings (kWh) as well as peak demand reductions (kW) as framed by the following research questions:

- How many Evergy customers participated in the program? What is the quantity and type of measures incentivized/rebated?
- What is the energy savings for each incentivized measure?
- What is the peak demand reduction for each incentivized measure?
- What percentage of gross savings is directly attributable to the program (net savings analysis)?

I.2.1 Demand Response Events in 2021

As shown in Table J-5, there were eight demand response events called in 2021 falling in the months of June, July, August, and September. Curtailment events were called between the hours of 4 p.m. through 6 p.m. CDT for all demand response events.

Table I-5: Demand Response Events in 2021

Year	Event Date
2021	6/10/2021
	6/17/2021
	6/18/2021
	7/28/2021
	7/29/2021
	8/11/2021
	8/25/2021
	9/13/2021

I.2.2 Smart Thermostat Devices

Table J-6 provides the quantity of devices for each device type and utility.[14] Across both the Missouri West and Missouri Metro jurisdictions, more participants installed ecobee thermostats compared to Google thermostats.

Table I-6: Device Types by Jurisdiction

Jurisdiction	Device Type	# of Devices
MO West	ecobee	3,419
MO West	Google Nest	591
MO Metro	ecobee	3,031
MO Metro	Google Nest	694

[14] Counts include all devices present in PY2 tracking data, with the exclusion of devices that were removed or returned in PY2.

Table I-7: Device Subtypes by Jurisdiction

Jurisdiction	Device Type	# of Devices
MO Metro	ecobee3 Lite	2,457
MO Metro	ecobee SmartThermostat with voice control	483
MO Metro	Google Nest Learning Thermostat	413
MO Metro	Google Nest Thermostat	170
MO Metro	Google Nest Thermostat E	73
MO Metro	ecobee4	53
MO Metro	ecobee3	38
MO Metro	Google Nest 2nd Gen	37
MO Metro	Google Nest 1st Gen	1
MO West	ecobee3 Lite	2,715
MO West	ecobee SmartThermostat with voice control	637
MO West	Google Nest Learning Thermostat	391
MO West	Google Nest Thermostat	134
MO West	Google Nest Thermostat E	50
MO West	ecobee4	39
MO West	ecobee3	28
MO West	Google Nest 2nd Gen	15
MO West	Google Nest 1st Gen	1

Table I-8 provides the number of Smart Thermostat units installed and the number of customers for each measure type.[15] Do-it-yourself (DIY) installations were the most frequent measure type for the RDR program and accounted for 66 percent of installations in 2021. In addition, Professional (PRO) installations accounted for 27 percent of device installations while Bring-Your-Own-Thermostat (BYOT) installations accounted for the remaining 15 percent of installed units.

[15] Counts include all devices present in PY2 tracking data, with the exclusion of devices that were removed or returned in PY2.

Table I-8 Smart Thermostat Installations by Measure Type

Jurisdiction	Measure Type	# of Smart Thermostat Units	# of Customers
MO West	BYOT Installation	566	519
MO West	DIY Installation	2,537	2,531
MO West	PRO Installation	907	816
MO Metro	BYOT Installation	595	559
MO Metro	DIY Installation	2,160	2,154
MO Metro	PRO Installation	970	852

I.3 Sampling Plan

ADM evaluated each participating thermostat for each event. An extrapolated peak demand reduction value from the analyzed thermostats was applied to thermostats with installation after all events took place.

I.4 Data Collection

Data used for this evaluation include:

- Program tracking data for 2021. This data identifies which customers participated in the program and contains data fields such as thermostat installation date, number of devices installed, thermostat device type, measure type, and other relevant data fields.
- 15-minute interval meter data (AMI) for each participating customer.
- A full schedule of program events, including the time of the event.

ADM reviewed the data tracking systems associated with the program to ensure that the data provides sufficient information to calculate energy and demand impacts. ADM determined that all the relevant data fields were included in the tracking data and savings reported in the tracking system complied with energy savings calculations and guidelines set by the Evergy Technical Reference Manual (TRM).

ADM collected two types of weather data for the evaluation: 1) actual recorded weather from the National Oceanographic and Atmospheric Administration (NOAA) and 2) 30-year weather normal or Typical Meteorological year (TMY) weather data. Actual weather data was used when fitting the models and TMY data was used to extrapolate savings (if appropriate).

ADM collected hourly Heating Degree Hours (HDH) and Cooling Degree Hours (CDH) from NOAA.gov for use in the regression analysis. Data was collected from the nearest available weather stations and assigned to each customer based on customer zip code. Daily HDDs are calculated as the sum of hourly average temperature values under the heating setpoint (65°F) on each day, while daily CDDs are calculated as the sum of hourly average temperature values over the cooling setpoint (65°F) on each day. The setpoint values for HDDs and CDDs were determined by running regressions with multiple setpoints from 60°F - 80°F and choosing the setpoint combination with the highest adjusted R-squared value (i.e., best fit).

ADM collected Typical Meteorological Year (TMY) data[16] from the nearest relevant weather station/s to extrapolate estimated annual savings, as shown in Table I-9.

Table I-9 TMY for Kansas City International Airport

Annual TMY	HDD	CDD
	5,581	1,461

I.5 Gross Impact Methodology

This section describes the impact evaluation activities and methodology that ADM performed for Evergy's PY2 Residential Demand Response Program.

I.5.1 Gross Energy Savings and Demand Reduction

Demand Response Demand Reduction (kW) Methodology

Demand savings for the demand response portion of the program was estimated using a weather-adjusted Linear Fixed Effects Regression (LFER) model. The model uses customers' 15-minute AMI data on non-event baseline days and extrapolates the model to event days to estimate the impact on energy demand. The LFER model specifies energy demand as a function of temperature and other variables that influence usage. ADM identified non-event baseline days during the same month as demand response events whose weather pattern most closely matches the weather pattern on event days, and these days served as the counterfactual baseline. ADM defined baseline days as those with a maximum daily temperature greater than or equal to the minimum observed maximum temperature during all demand response events.

When fitting regression models, ADM tested correlations between explanatory variables, statistical significance of variables, and the impact of each variable on model fit. The final form of the model is shown below.

[16] https://rredc.nrel.gov/solar/old_data/nsrdb/1991-2005/tmy3/by_state_and_city.html

Equation I-1: Linear Fixed Effects Regression Model

$$Usage\ (kWh)_{it} = \alpha_0 + \sum_{m=1}^{12} \alpha_m\, Month_{it} + \sum_{w=1}^{7} \alpha_w\, DOW_{it} + \beta_3 CDH_{it} + \beta_4 MA24CDH_{it} + \sum_{h=1}^{24} \alpha_h\, Hour_{it,h} * \sum_{i=1}^{n} \alpha_i\, Customer_{it} + \epsilon_{it}$$

Where:

α_0	*= intercept term*
m	*= index for month m*
w	*= index for day of the week m*
t	*= time interval*
i	*= index for customer i*
n	*= number of sampled smart thermostat households*
$Usage(kWh)$	*= average usage during the time interval for customer i*
$\beta_k, \alpha_m, \alpha w_i, \alpha_h, \alpha_i$	*= vectors of coefficients*
$Month$	*= vector of dummy variables for each month m*
DOW	*= vector of dummy variables for each day of the week w*
CDH	*= cooling degree hours*
$MA24CDH$	*= moving average of the last 24 hours CDH*
$Hour$	*= vector of dummy variables for each hour of the day*
$Customer$	*= vector of dummy variables for each customer i*
ϵ	*= error term*

ADM estimated savings rates kW/unit separately for both Missouri Metro and Missouri West.

Prior to running the model, ADM removed devices that fail to meet certain criteria, including:

- Missing zip code for a device/customer (due to inability to map to correct weather data)
- Incomplete or missing data during the DR season (<1 percent of households)
- Average usage of 0 during the DR season (<1 percent of households)

- Devices that were returned or removed before the end of the DR season

Classification of Non-Contributing Devices using AMI Billing Data

ADM identified non-contributing households to assess its impact on demand reductions. Example reasons why a household may be a non-contributor includes:

- Non-responding devices (NRD) are devices that are not responsive to the curtailment signal.
- Opt-outs are customer who opt-out of a DR event.
- Customers that are not running their AC (i.e., they are away on vacation or at work during the event).

A device is considered a “non-responding device” (NRD) if it is not responsive to the curtailment signal. This would indicate that the switch communications were not working.

Switch communications may be interrupted for a variety of reasons: the A/C unit may not be powered on, the switch may become disconnected or defective, or the participant’s household wiring may prevent communication. In some cases, it may be difficult for utilities to determine the reason the switch is not communicating.

Opt-outs are different than non-responding devices, though the resulting observations are similar. Opt-outs occur when a customer chooses not to participate in the curtailment event. In most cases, when a customer chooses to opt-out, the customer is declining to participate in all subsequent events, rather than a single event. Opt-outs are similar to non-responding devices in that AMI meter data for the household displays no demand reductions during the curtailment event. However, opt-outs can be categorized as opt-outs using customer communication records, or program tracking of opt-out customers.

Customers who are not running their AC unit during the DR event will have a load shape similar to NRD and opt-out customers and appear to not have a demand reduction. For instance, the customer may be on vacation, away at work, or have an AC unit problem.

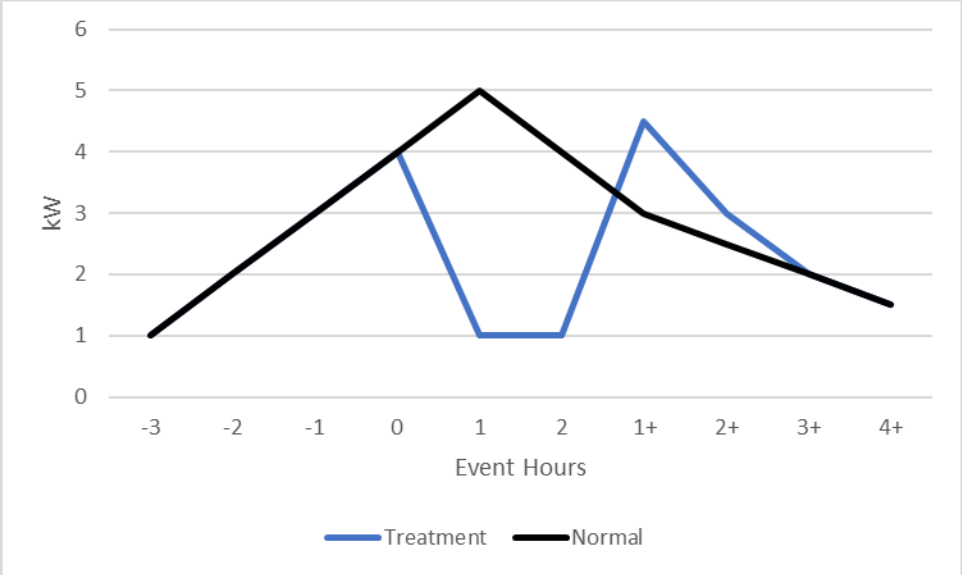
ADM attempted to quantify a separate opt-out rate for the program; however, information on customer opt-outs was not available for the program. As such, a rate that includes all non-contributing households was calculated.

ADM identified non-contributing households using a combination of three algorithms:

1. A cumulative sum (CSUM) change in slope analysis
2. A linear 10% decrease in load detection
3. A snapback analysis

When a DR event is called, each device is sent curtailment instructions that result in a significant load drop over the duration of the event. This drop is illustrated in Figure I-1, which provides an example event and an example of a typical or "baseline" usage curve.

Figure I-1: Example of Site-Level Load Shapes During Event Hours



ADM define the methodology applied for each algorithm in the following sections.

CSUM Analysis

The CSUM smoothing technique is a rolling sum defined as:

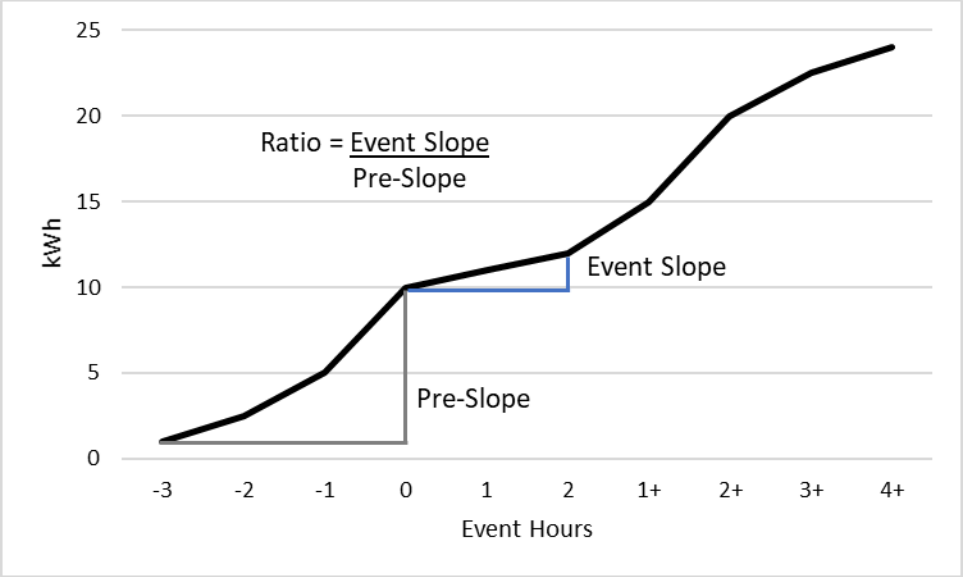
$$x = (a, b, c, \ldots, z)\ CSUM(x) = (a, a + b, a + b + c, \ldots, a + \ldots + z)$$

Where:

x = a vector of kWh measures taken at increasing one-hour intervals during the event day

A smoothed, increasing curve is created by taking the CSUM of each treatment site during the demand response period (Figure I-2).

Figure I-2: Example of Site-Level CSUM Slope Changes During Event Hours



The slopes of this curve for the three hours prior to the start of the event and the hours during the event are calculated (Figure I-2). The ratio of the event period slope divided by the pre-period slope was calculated to test if there is a significant change in the slope due to the demand response event. A contributing device is detected by a decrease in the line slope. Therefore, the ratio is less than one. Using this test, ADM defined sites with a slope less than one to be a contributing device, which indicates a decrease in demand during the demand response event.

Linear 10 Percent Decrease Analysis

In parallel with the CSUM analysis, a linear test for 10 percent reduction in consumption during the demand response event is also employed. For each unique device, the consumption for the hour prior to the event is compared to the consumption during the first hour of the event (Figure I-2) to detect a reduction in demand greater than 10 percent with the following equation:

Equation I-2: Non-Contributing Device for 10% Decrease Analysis

$$\text{Non} - \text{Contributing Device} = T1_{kWh} \leq T2_{kWh}$$

Where:

$T1_{kWh}$ = $PriorHr_{kWh} - EventHr_{kWh}$

$T2_{kWh}$ = $PriorHr_{kWh} * 10\%$

$PriorHr_{kWh}$ = Demand displayed during the hour prior to the demand response event

$EventHr_{kWh}$ = Demand displayed during the first hour of the demand response event

By taking advantage of the processing speed of vectorized programming in the R-Studio environment, every individual site in the program is tested per event.

Snapback Analysis

ADM observed that some customers had higher loads than the baseline would predict during the curtailment event. However, a snapback was observed for these customers in the first hour after the event ended, suggesting these customers had in fact curtailed AC usage, but had higher than expected non-AC usage during the event.

An additional test was developed such that if a customer had a higher load during the first snapback hour compared to the maximum load seen during the curtailment event, they are not classified as a non-contributor.

Annual Energy Savings (kWh) Methodology

Annual energy savings for smart thermostat customers were estimated using a weather-adjusted Post Period Regression (PPR) ordinary least-squares (OLS) model. A matched comparison group was created using a Propensity Score Matching (PSM) approach. With the PSM approach, a propensity score is estimated for treatment customers (i.e., those who received program services) and a group of customers who did not receive program services using a logit model. Customers in the treatment and control groups are matched based on seasonal pre-period usage (e.g., summer, spring, fall, and winter) and zip code (or other factors such as rate code). In addition, demand response event days are removed from the data to avoid creating bias.

Control group customers were selected from customers who have not participated in any demand response or energy efficiency programs. In addition, the PPR model utilized post period data only. Data for control customers was restricted to the post period timeframe for their matched participant (to ensure the same number of observations in the post period). After creating a matched comparison group, the program impacts were estimated with the following regression. The final form of the model is shown below.

Equation I-3: RDR Final Model

$$Usage\ (kWh)_{it} = \alpha_0 + \sum_{m=1}^{12} \alpha_m\, Month_{m,t} * \sum_{p=1}^{4} \alpha_p\, Pre - Period\ Usage_{p,it} + \beta_1 * Treatment_{it} + \beta_2 * HDH_{it} + \beta_3 * CDH_{it} + \beta_4 * Treatment_{it} * HDH_{it} + \beta_5 * Treatment_{it} * CDH_{it} + \epsilon_{it}$$

Where:

α_0	*= intercept term*
t	*= index for the time interval*
i	*= index for the customer*
m	*= index for month of the year*
p	*= index for season of the year (spring, summer, fall, winter)*
Month	*= dummy variable for month of the year*
Pre-Period Usage	*= average pre-period usage for season p (spring, summer, fall, winter) for customer i*
Treatment	*= dummy variable*
	= 1 if in the treatment group, and 0 otherwise
HDH_{it}	*= average heating degree hours for time interval t*
CDH_{it}	*= average cooling degree hours for time interval t*
ϵ_{it}	*= error term*
α, β	*= parameters to be estimated by the model.* $\beta_1, \beta_4, and\ \beta_5$ *are the parameters of interest for estimating the reduction in kWh usage*

The total annual energy savings (kWh) for the program is calculated by taking the estimated kWh savings/unit and multiplying by the number of thermostat units considered part of the program in 2021.

Estimating Net Savings

In demand response programs, it is typically assumed that there are neither spillover effects nor free ridership (only participating customers are expected to curtail usage). As such, the net-to-gross ratio for this program is assumed to be 1.00.

I.5.2 COVID-19 Impact Considerations

Prior to June 16, 2020, Missouri was under Phase 1 of its COVID-19 reopening plan which had restrictions on business operations. Phase 2 of Missouri's reopening plan began on June 16, 2020 and contains no statewide public health order. Since all DR events were called after Phase 2, ADM determined there were no impacts to the DR events from the COVID-19 pandemic.

I.6 Gross Impact Evaluation Findings

The following sections provide the results of the impact evaluation for the Residential Demand Response Program.

I.6.1 Peak Demand Reduction from Demand Response Events

Figure I-3 provides average customer baseline and event load shapes for Missouri West, while Figure I-4 provides the same for Missouri Metro.

Figure I-3: RDR Event Load Shapes - Missouri West

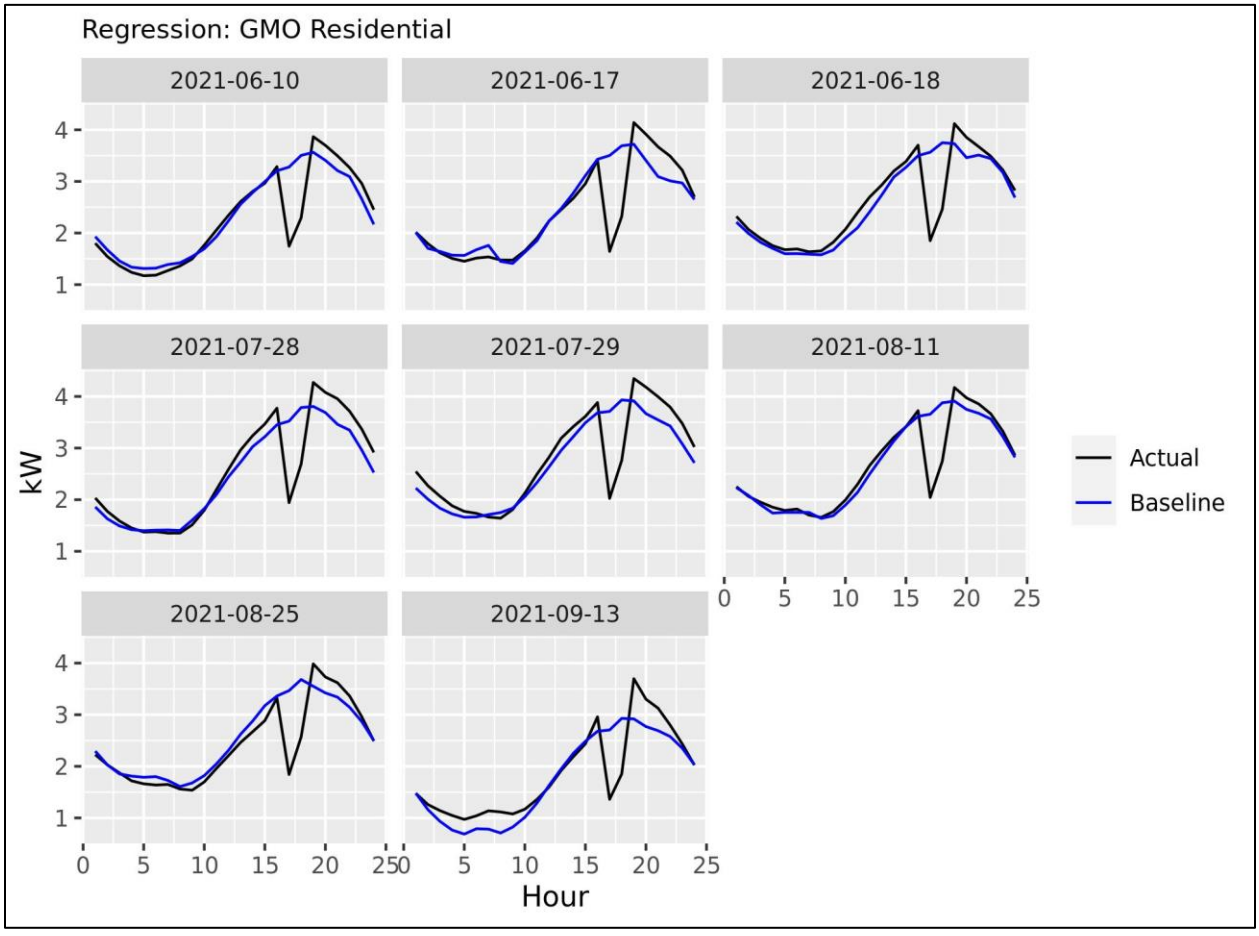


Figure I-4: RDR Event Load Shapes - Missouri Metro

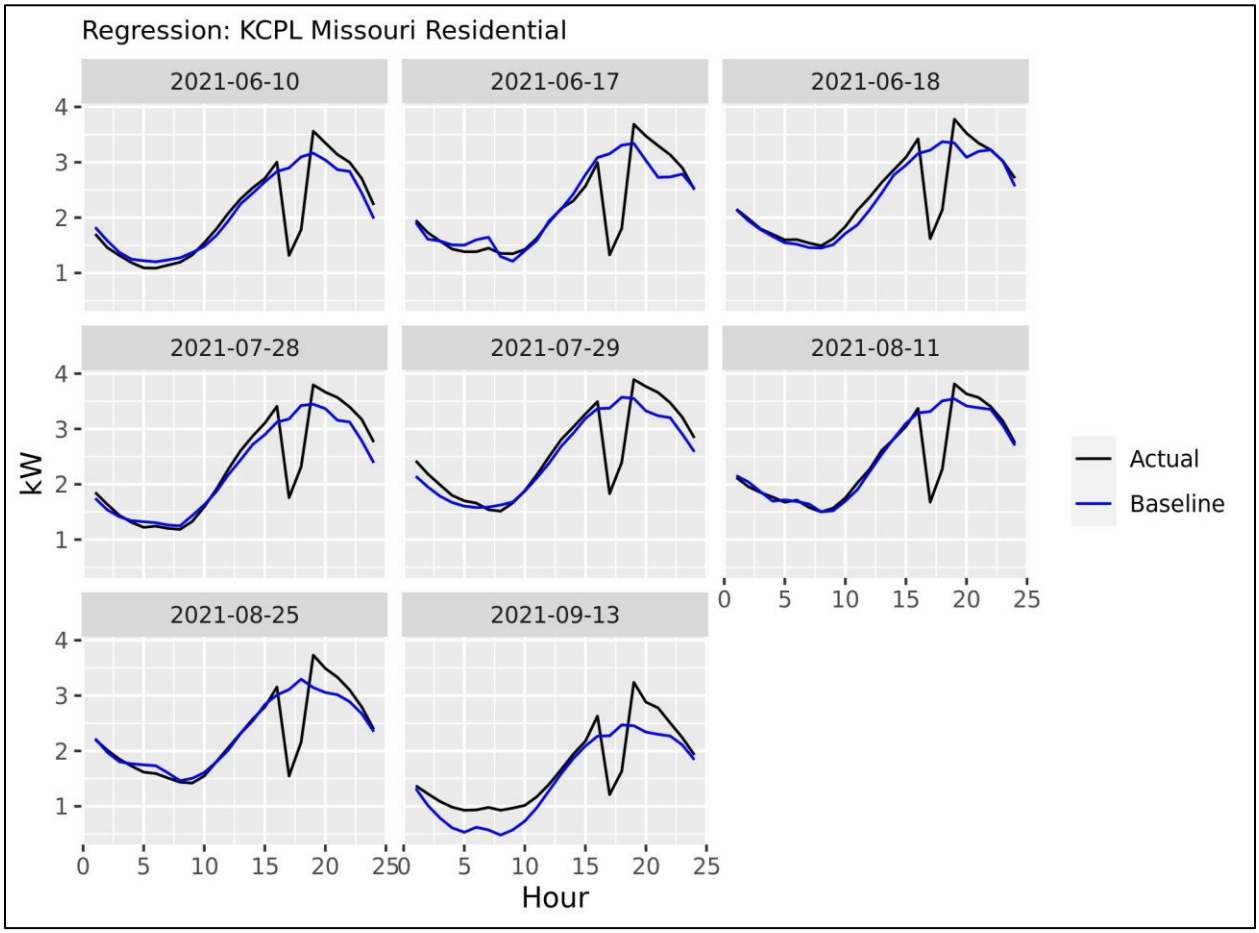


Table I-10 provides the correlation matrix for the continuous variables included in the DR regression. ADM tested the exclusion of highly correlated variables during the modeling process and found very limited impacts on savings and model fit.

Table I-10: DR Regression Variable Correlation Matrix

Variable	CDD	MA24CDH
CDH	1.000	0.572
MA24CDH	0.572	1.000

The tables below provide the DR regression results for each utility jurisdiction. The fixed effects of hour of the day and customer-specific dummy variables and their interactions are not shown for the sake of brevity.

Table I-11: DR Regression Results - Missouri West

Variable	Coefficient	CI Lower	CI Upper
July	0.107	0.088	0.126
Aug	0.141	0.122	0.159
Monday	0.008	-0.003	0.018
Tuesday	0.014	0.002	0.027
Wednesday	-0.059	-0.068	-0.049
Thursday	-0.026	-0.038	-0.013
CDH	0.906	0.878	0.935
MA24CDH	0.882	0.841	0.924
Adjusted R2 = 0.718			

Table I-12: DR Regression Results - Missouri Metro

Variable	Coefficient	CI Lower	CI Upper
July	0.131	0.110	0.152
Aug	0.160	0.139	0.181
Monday	0.000	-0.011	0.011
Tuesday	0.003	-0.010	0.016
Wednesday	-0.072	-0.083	-0.061
Thursday	-0.039	-0.052	-0.026
CDH	1.036	1.002	1.070
MA24CDH	0.913	0.869	0.957
Adjusted R2 = 0.702			

The following columns are referenced in the tables below:

- **Service Area** – This column describes which service area the results cover.
- **Event Date** – This column contains the date of each DR event.
- **% Non-Contributing Devices** – This column contains the percent of non-contributing devices on DR event days.
- **Expected kW/Unit Savings** – This column contains the expected DR event kW/Unit savings = 1.40.

- **Realized kW/Unit Savings** – This column contains the realized average DR event kW/Unit savings. In PY2021, this value includes non-contributing households.
- **Expected kWh/Unit Savings** – This column contains the expected annual kWh/Unit savings = 197.
- **Realized kWh/Unit Savings** – This column contains the realized annual kWh/Unit savings.
- **% Non-Contributing Households** – This column contains the percentage of households with non-contributing devices.
- **Eligible Units** – This column contains the number of devices eligible for savings. For kWh savings, a device is deemed eligible if the measure type is Do-it-Yourself (DIY) or Professional (PRO); Bring-Your-Own-Thermostat (BYOT) is ineligible for annual kWh savings as the assumption is that these customers would have installed the device in the absence of the program. In addition, the device must have been installed in PY2 and not returned or removed.[17] For kWh eligible units, devices must have been installed but do not have to be available for DR events. For kW devices, the device must be enrolled in the DR program during the program year and be available for curtailment events.
- **Expected kW Savings** – This column contains the total expected DR kW savings = Expected kW/Unit Savings*Eligible Units.
- **Realized kW Savings** – This column contains the total DR kW savings = Realized kW/Unit Savings * Eligible Units. In PY2021, this value includes non-contributing households.
- **Expected kWh Savings** – This column contains the total expected annual kWh savings = Expected kWh/Unit Savings*Eligible Units.
- **Realized kWh Savings** – This column contains the total realized annual kWh savings = Realized kWh/Unit Savings*Eligible Units.

Table I-13 provides impact results for each RDR demand response event called in 2021. In addition, Table I-15 provides demand response event savings versus weather during event hours.

[17] Evergy also removes devices returned or removed in PY2 that were available or installed in prior program years. The Eligible Unit counts reflect these annual adjustments.

Table I-13: RDR DR Savings by Event Date

Jurisdiction	Event Date	Reported kW/Unit Savings	Verified kW/Unit Savings
MO West	6/10/2021	1.40	1.33
MO West	6/17/2021	1.40	1.57
MO West	6/18/2021	1.40	1.46
MO West	7/28/2021	1.40	1.29
MO West	7/29/2021	1.40	1.38
MO West	8/11/2021	1.40	1.33
MO West	8/25/2021	1.40	1.32
MO West	9/13/2021	1.40	1.16
MO Metro	6/10/2021	1.40	1.40
MO Metro	6/17/2021	1.40	1.61
MO Metro	6/18/2021	1.40	1.37
MO Metro	7/28/2021	1.40	1.22
MO Metro	7/29/2021	1.40	1.32
MO Metro	8/11/2021	1.40	1.39
MO Metro	8/25/2021	1.40	1.29
MO Metro	9/13/2021	1.40	0.89

Table I-14 shows the average percentage of devices that were non-contributing during the DR events.

Table I-14: Average % Non-Contributing Devices

Jurisdiction	% Non-Contributing Devices
MO West	14%
MO Metro	14%

Table I-15: RDR DR Event Weather

Year	Event Date	Average Event Time Temperature (F)	Average Event Time CDH	Average Event Day Temperature (F)	Event Day CDD
2021	6/10/2021	91.49	1.104	83.03	18.03
	6/17/2021	95.99	1.291	84.85	19.85
	6/18/2021	95.99	1.291	87.43	22.43
	7/28/2021	96.08	1.295	84.79	19.79
	7/29/2021	96.53	1.314	86.75	21.75
	8/11/2021	95.54	1.273	87.78	22.78
	8/25/2021	92.48	1.145	83.96	18.96
	9/13/2021	84.47	0.811	76.03	11.03
Average		**93.57**	**1.190**	**84.33**	**19.33**

The figures below show RDR demand response event savings and weather correlations. Both the Missouri West and Missouri Metro jurisdictions show a positive correlation between realized kW/Unit savings and CDD on the event day.

Figure I-5: RDR DR Savings vs. Weather - Missouri West

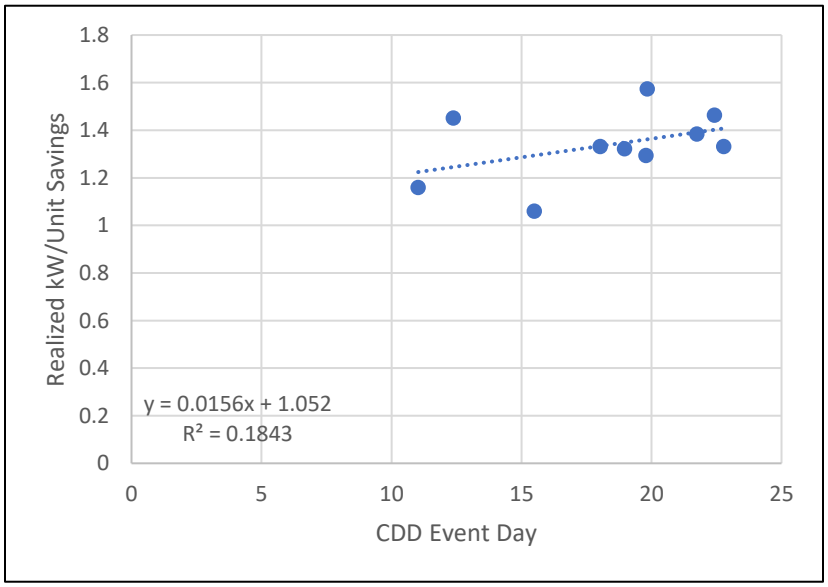
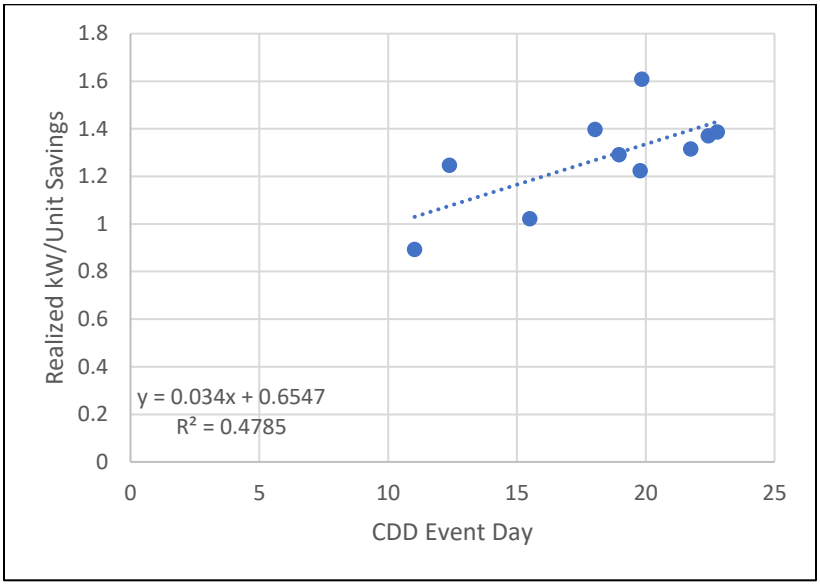


Figure I-6: Demand Response Savings vs. Weather - Missouri Metro



Reported and verified kW savings for RDR DR is shown in Table I-16 below. The realization rate for kW savings is 95 percent.

Table I-16: RDR Savings

Jurisdiction	Reported kW/Unit Savings	Verified kW/Unit Savings	Eligible Units	Reported kW Savings	Verified kW Savings	RR
MO West	1.40	1.35	4,798	6,717.20	6,487.81	97%
MO Metro	1.40	1.30	4,589	6,424.60	5,978.93	93%
Total			**9,387**	**13,141,.80**	**12,468.74**	**95%**

I.6.2 Annual Energy Savings (kWh)

ADM was successful in creating a matched cohort and the results of Propensity Score Matching (PSM) and the annual consumption estimate for RDR are summarized below. ADM used nearest neighbor, 2 to 1 ratio matching with replacement for control customers and had a considerable pool of control customers to draw upon, as shown in Table I-17. Customers were matched on their average monthly pre-period usage.

Prior to matching, customers were required to have at least 6 months of post-period data. In addition, demand response event days were removed from the post-period to avoid creating bias.

Table I-17: PSM Customer Matches

Status	Control	Treated
All	6,752	881
Matched	1,463	878
Unmatched	5,289	3

Table I-18 presents the propensity score covariate summary of pre-period usage for treatment and control customers before and after matching.[18] The standardized mean difference prior to matching is often over 0.1 for many covariates; however, after matching the absolute value of the standardized mean difference is less than 0.1, which is an ideal outcome.

Table I-18: PSM Covariate Summary

Variable	Before Matching			After Matching		
	Mean Treated	Mean Control	Standardized Mean Difference	Mean Treated	Mean Control	Standardized Mean Difference
Distance	0.132	0.113	0.289	0.129	0.129	0.000
Pre-period Jan	34.578	34.335	0.008	34.501	33.355	0.039
Pre-period Feb	31.840	32.092	-0.010	31.782	30.813	0.038
Pre-period Mar	25.979	25.073	0.057	25.995	25.627	0.023
Pre-period Apr	25.627	23.954	0.105	25.661	25.725	-0.004
Pre-period May	27.352	24.060	0.192	27.420	27.534	-0.007
Pre-period June	51.604	44.468	0.310	51.693	51.703	0.000
Pre-period July	51.646	45.946	0.252	51.737	52.054	-0.014
Pre-period Aug	44.286	39.248	0.246	44.364	44.695	-0.016
Pre-period Sept	42.765	37.773	0.248	42.846	43.089	-0.012
Pre-period Oct	24.900	23.571	0.092	24.926	24.631	0.020
Pre-period Nov	29.097	28.670	0.020	29.080	28.399	0.033
Pre-period Dec	32.886	32.275	0.025	32.853	31.995	0.036

Table I-19 provides results for a t-test which helps determine the success of matching. The test measures whether there are statistically significant differences in average daily consumption used between the treatment and comparison groups in the pre-period by month. Statistically significant differences are defined as a p-value of less than 0.05 at the 95 percent significance level. As shown below, the p-value is greater than 0.05 for

[18] PSM covariate summary results for each Rate code and 3-digit Zip code have been omitted for the sake of brevity.

each month tested. This result further indicates propensity score matching performed well because the differences between the treatment and comparison groups are not statistically significant.

Table I-19: Post Matching T-Test of Difference in Pre-Period Usage by Month

Month	Average Daily kWh Control	Average Daily kWh Treatment	T Stat	Std Error	P-Value	Reject Null?
Jan	33.489	34.501	-0.805	1.257	0.421	No
Feb	30.955	31.782	-0.744	1.113	0.457	No
Mar	25.451	25.995	-0.759	0.715	0.448	No
Apr	25.336	25.661	-0.471	0.691	0.637	No
May	26.911	27.420	-0.696	0.731	0.486	No
June	50.735	51.693	-0.933	1.027	0.351	No
July	51.120	51.737	-0.604	1.022	0.546	No
Aug	43.783	44.364	-0.630	0.921	0.529	No
Sept	42.240	42.846	-0.676	0.896	0.499	No
Oct	24.381	24.926	-0.863	0.632	0.388	No
Nov	28.362	29.080	-0.797	0.900	0.425	No
Dec	32.037	32.853	-0.772	1.056	0.440	No

Figure I-7 displays the density of seasonal pre-period usage, before conducting matching. Figure I-8 displays the density of seasonal pre-period usage, after conducting matching.

Figure I-7: Seasonal Pre-Period Usage Before Matching

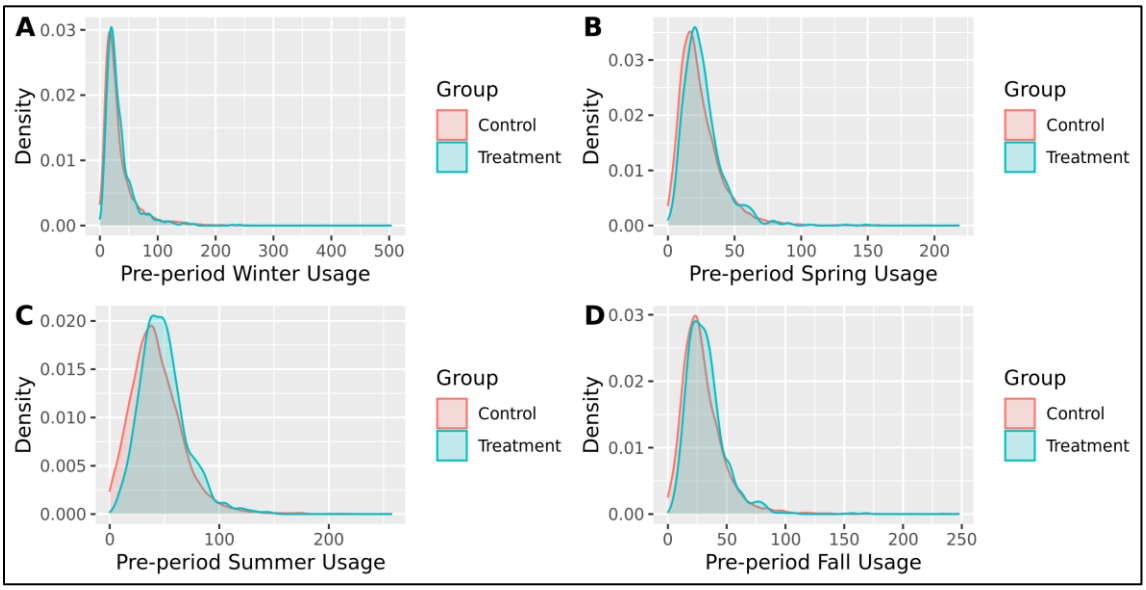
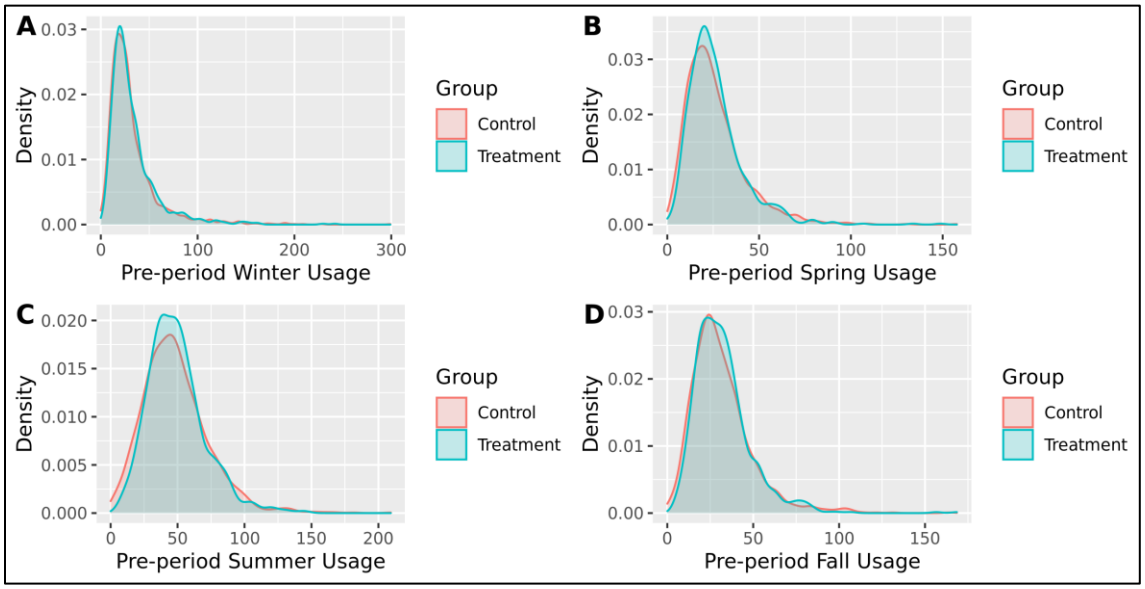


Figure I-8 Seasonal Pre-Period Usage After Matching



Lastly, the joint chi-square test for covariate balance had a p-value of 1.00, meaning we failed to reject the null hypothesis of covariate imbalance (i.e., the treatment and comparison group are similar).

Table I-20 provides regression results for annual energy savings (kWh) savings post matching. Interaction variables between pre-period usage and month have been omitted for the sake of brevity.

Table I-20: Annual Energy Savings (kWh) Regression Results

Variable	Estimate	Std Error	T-Statistic	P-Value	95% CI Lower	95% CI Upper
(Intercept)	-10.312	6.351	-1.624	0.104	-20.760	0.135
Pre-Period Usage Fall	0.490	0.046	10.642	0.000	0.414	0.566
Pre-Period Usage Winter	-0.034	0.019	-1.821	0.069	-0.065	-0.003
Pre-Period Usage Summer	0.255	0.022	11.509	0.000	0.219	0.292
July	-11.641	11.123	-1.047	0.295	-29.937	6.655
Aug	-12.261	12.673	-0.967	0.333	-33.108	8.586
Sept	-12.973	13.778	-0.942	0.346	-35.637	9.691
Oct	-4.664	6.244	-0.747	0.455	-14.935	5.607
Nov	2.344	2.818	0.832	0.406	-2.292	6.980
Dec	-1.982	11.732	-0.169	0.866	-21.280	17.316
Treatment	-5.265	15.206	-0.346	0.729	-30.278	19.748
CDD	-0.338	0.570	-0.592	0.554	-1.276	0.600
HDD	2.045	1.340	1.526	0.127	-0.159	4.248
Treatment*CDD	0.823	0.903	0.912	0.362	-0.662	2.309
Treatment*HDD	-0.090	0.052	-1.735	0.083	-0.176	-0.005
Adjusted R2 = 0.79, Sample Size = 878						

The kWh savings were derived using the following equation:

Equation I-4: Energy Savings (kWh) for RDR Program

$$Annual\ kWh\ Savings = Treatment * 365.25 + Treatment{:}CDH * 1{,}461 + Treatment{:}HDH * 5{,}581$$

Where:

Treatment = *dummy variable*

= *1 if in the treatment group, and 0 otherwise*

HDH_{it} = *average heating degree hours for time interval t*

CDH_{it} = *average cooling degree hours for time interval t*

The kWh savings estimate for RDR is statistically significant at the 99 percent level and the PPR model provided a good fit for the data (adjusted R2 = 0.79).

Table I-21 shows annual expected and realized energy savings for Residential Demand Response. Average annual pre-period usage for RDR customers was 13,050 kWh and realized annual energy savings of 185 kWh/Unit represent 1.4 percent of annual usage.

Table I-21: RDR Annual kWh Savings

Jurisdiction	Expected kWh/Unit Savings	Realized kWh/Unit Savings	Eligible Units	Expected kWh Savings	Realized kWh Savings	RR
MO West	197	185	4,795	944,615	888,248	94%
MO Metro	197	185	4,726	931,022	875,466	94%
Total			**9,521**	**1,875,637**	**1,763,715**	**94%**

I.7 Impact Evaluation - Final Savings Tables

Based on the impact evaluation results, the total verified net energy savings for the Residential Demand Response Program are 1,763,715 kWh, and the total verified net peak demand savings are 12,468.74 kW.

Table I-22 and Table I-23 summarize the verified net energy and demand savings for the Residential Demand Response Program.

Table I-22: RDR Peak Reduction (kW)

Jurisdiction	Reported kW/Unit Savings	Verified kW/Unit Savings	Eligible Units	Reported kW Savings	Verified kW Savings	RR
MO West	1.40	1.35	4,798	6,717.20	6,487.81	97%
MO Metro	1.40	1.30	4,589	6,424.60	5,978.93	93%
Total			**9,387**	**13,141.80**	**12,468.74**	**95%**

Table I-23: RDR Annual Energy Savings (kWh)

Jurisdiction	Reported kWh/Unit Savings	Verified kWh/Unit Savings	Eligible Units	Reported kWh Savings	Verified kWh Savings	RR
MO West	197	185	4,795	944,615	888,248	94%
MO Metro	197	185	4,726	931,022	875,466	94%
Total			**9,521**	**1,875,637**	**1,763,715**	**94%**

I.8 Process Evaluation

I.8.1 Program Operations

According to the program staff, the Residential Demand Response (RDR) and the Business Smart Thermostat (BST) programs operate identically but target two different customer groups: residential customers and small business customers. This section summarizes Johnson consulting's (a subcontractor to ADM) findings from the in-depth interviews conducted with Evergy program staff and its implementer, CLEAResult to gain a better understanding of the program design, operations, challenges, and future opportunities.

Roles and Responsibilities

The Evergy program staff works closely with the program implementer to manage the daily operations for both programs. These responsibilities include coordinating with the operational aspects of the program, such as calling the DR events, with two staff members from CLEAResult. The program manager also sets the price points for the co-payments to the program participants in consultation with the program implementation staff.

The implementation staff works directly on all aspects of the program operations, including assisting with customer enrollment, scheduling and supervising the technicians who install smart thermostats and tracking program operations.

Program Design

The program design changed slightly in 2021 to accommodate additional smart thermostats. Customers could receive the ecobee3 smart thermostat for free during 2021. The program manager explained that two major factors drove this change. Offering a free option was designed as a way to boost program enrollment. Secondly, since the program was now charging for thermostat installation, the manager wanted to offset some of that cost by offering a free device.

Program Participation

Overall, participation remained consistent in 2021, according to the program manager. At the end of 2021, enrollment is 50 percent of the three-year goal. However, the program did not reach its participation goals in 2020 either.

Program Enrollment

The Residential Smart Thermostat Program is open to Evergy residential electric customers who are residential electric service account holders with an installed WiFi-enabled thermostat, have a wireless network at the service address, and active account linked to the WiFi-enabled thermostat. Renters may participate if they receive the property owner's permission to install the smart thermostat.

In 2021, Evergy provided free ecobee3 lite smart thermostats to all customers. There are three enrollment options for program participants (see Table I-24: Initial Enrollment Incentives): enroll their previously enabled Wi-Fi thermostat into the program and receive a $50.00 incentive; self-install a qualifying thermostat or pay $50.00 for a service technician to install one qualifying device[19]. The enrollment option determines their program incentive. Regardless of the enrollment path, all participants receive a $25.00 incentive after one year of program participation.

Table I-24: Initial Enrollment Incentives[20]

Enrollment Type	Description	Initial Incentive[21]	Annual Participation Reward[22]
Bring Your Own Thermostat (“BYOT”)	Enroll previously owned and installed eligible smart thermostat	$50 enrollment incentive	$25 after a full year of participation
Customer Self-Installed (“DIY”)	Purchase at discounted price and install eligible smart thermostat from the Online Customer Portal	$0	$25 after a full year of participation
Professional Installation	Discounted Professional Installation of eligible smart thermostat at discounted price	$0	$25 after a full year of participation

CLEAResult staff schedule and manage the installation appointments for the Professional installations. Customers may also order qualifying thermostats through Evergy's online portal. These thermostats are shipped within 10-14 days. If a DIY thermostat has not been installed, then the customer will receive an automatic reminder to install and activate the thermostat.

According to the program staff, it was a "busy fall and winter" for the three full-time technicians who installed and serviced the smart thermostats. Currently, the technicians are booked for up to several months, which created a "longer wait that we would like,"

[19] There is an $35 charge for additional smart thermostat installed at the same residence.
[20] Source: https://thermostatenroll.evergy.com/programdetails
[21] Paid after Enrollment Date
[22] Check or credited on Customer’s November bill

according to the program staff. In 2022, CLEAResult hired another technician and customer service representative to reduce the wait time.

To encourage enrollment in the program, the program implementer sends out an email 14 days after receiving the thermostat and another "urgent" email two weeks later. According to the program staff, these email reminders have significantly increased the overall activation rate and led to more than 120 activations in 2021.

Overall, the program manager explained that the activation rate is at 90 percent for customers, which is significantly higher than the industry average rates.

Program Performance

The Residential Demand Response Program called eight events in 2021. These events only occur on weekdays between June 1 and September 30 and between 12 pm and 9 pm. The number of events is capped at 15 savings events each summer and will last no longer than four hours. Customers also can opt out of an event. The residence is pre-cooled before the event. The survey results in Figure I-11: Participation in the DR Events provide details regarding the customer participation levels in each DR event.

Program Marketing

Evergy's launched a comprehensive marketing campaign to residential and small business customers as a way to encourage program participation. The program manager explained that "we do every marketing tactic available," including email, cross-promotions with other Evergy offerings, prominent placement on the Evergy website and Point-of-Purchase advertising. Unfortunately, the marketing did generate the desired results.

Evergy also ran some television commercials in 2021 to reach out to the larger mass market, including spots on local news and sporting events. The program also sent out specialized emails to targeted groups, including low-income households.

Communication

The communication between Evergy and the implementation contractor is frequent and provides the information needed. The staff meets biweekly to discuss the program and communicate more frequently as needed.

The staff also reported generally positive feedback from the program participants. The only negative feedback is from customers who could not enroll more than two thermostats in the program. More details are provided in the customer survey findings, but most customers are pleased with the program as they are "people are super excited" to get the free thermostats.

Data Tracking and Quality Assurances and Controls (QA/QC)

No changes have been made in QA/QC procedures as the installations are reviewed and compared monthly. One CLEAResult staff member also provides a daily review of the installations.

The implementation staff also works with the smart thermostat distributor to track online sales of smart thermostats. The staff also work to resolve any discrepancies in the order within two weeks.

Challenges for Program

Reaching enrollment goals continues to be an ongoing challenge for this program. Market saturation may be a contributing factor in these declining enrollments. As the program manager explained, this program has been offering free thermostats since 2016, and the program offering is now quite mature and well-known. Therefore, enrolling new participants has been more challenging during this program cycle.

Evergy continues to use a wide variety of in-bound and out-bound marketing tactics to increase enrollment, but they have not been as effective as they would like.

COVID Impacts

The program continued to be affected negatively by the pandemic. Although some technicians could install the thermostats in residences or small businesses, they had to follow the CDC guidelines.

A few technicians were also exposed to the virus, which meant rescheduling appointments which extended the customer wait time. In addition, "people don't want outsiders in their home. They don't want direct installs," as the program manager explained.

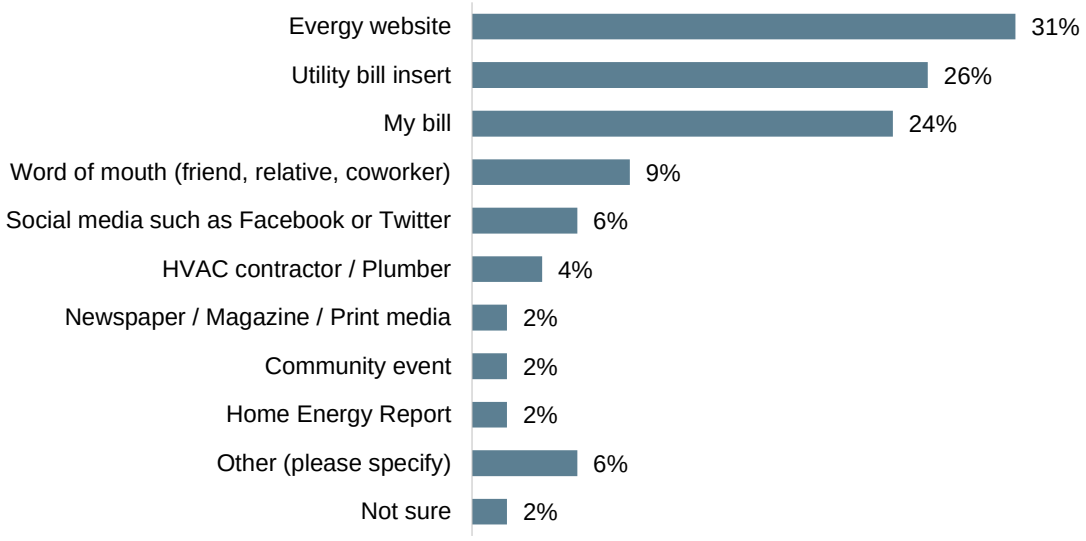
I.8.2 Participant Survey

A total of 58 respondents completed the online survey regarding their participation in Evergy's Residential Demand Response (DR) Program. Overall, 53 of these respondents named Evergy as their electric provider, while 4 percent named Ameren MO, and two were unsure.

Sources of Awareness

Most participants learned about this program directly from an Evergy source, including the website (31 percent), bill inserts (26 percent) or bill information (24 percent). Of note, the least mentioned sources of awareness include print media (2 percent) and the Home Energy Report (2 percent). One respondent said learning about the program through a local Chamber of Commerce.

Figure I-9: Sources of Awareness



Note: Percentages may exceed 100% due to respondents being able to select more than one response.

Enrollment Timing

The majority of these participants enrolled in the program before June 2021, as Table I-25 shows. However, eight respondents (15 percent) could not recall when they first enrolled in the program.

Table I-25: Enrollment Timing

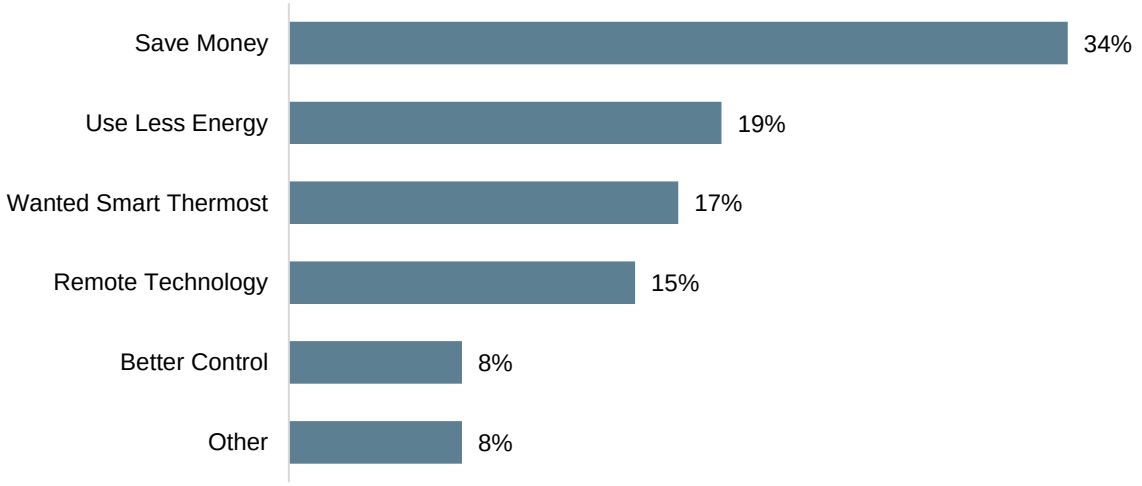
When did you enroll in the program?	Percent of Responses (n = 54)
Before June 2021	54%
Between June 2021 and July 2021	15%
Between July 2021 and August 2021	11%
Between August 2021 and September 2021	6%
Not sure / Do not recall	15%

Most participants self-installed their thermostats (59 percent) while 39 percent used an installation contractor to install the equipment; one respondent could not recall.

Reasons for Program Participation

To save money was the most frequently mentioned reason (34 percent) for enrolling in the program, followed by the desire to use less energy, which accounted for 19 percent of these responses.

Figure I-10: Reasons for Participating in the Residential DR Program



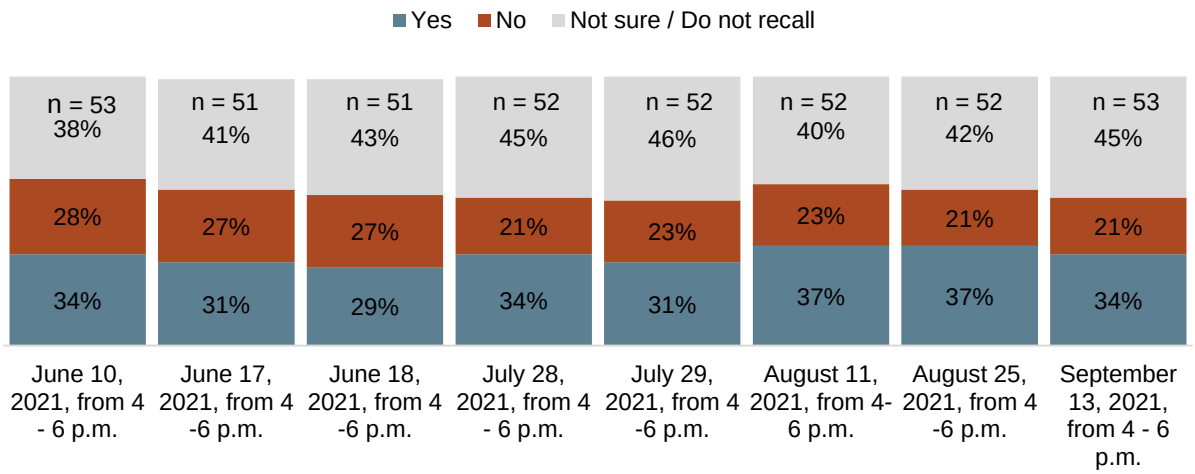
Note: Percentages may exceed 100% due to respondents being able to select more than one response.

Other reasons for participating included wanting to "be green" and being "curious about the program," as mentioned by one respondent each.

Participation in DR Events

Approximately one-third of these respondents recalled participating in each DR event; however, more than one-third did not recall. Of note, 46 percent of the respondents did not recall participating in the July 29 event, and 45 percent could not recall participating in the July 28 or September 13 events.

Figure I-11: Participation in the DR Events



Reasons for not Participating in DR Events

Respondents did not participate in the DR events because they either had not yet received or installed their smart thermostats; this was mentioned a total of 11 times across all DR events. Other reasons for not participating included not being aware of the event, said six times by respondents or having a work conflict also mentioned six times by these respondents.

Received Notification

The majority (57 percent) of the respondents recalled receiving notification before the DR event, while 30 percent did not. Another 13 percent were unsure or could not remember.

Program Satisfaction

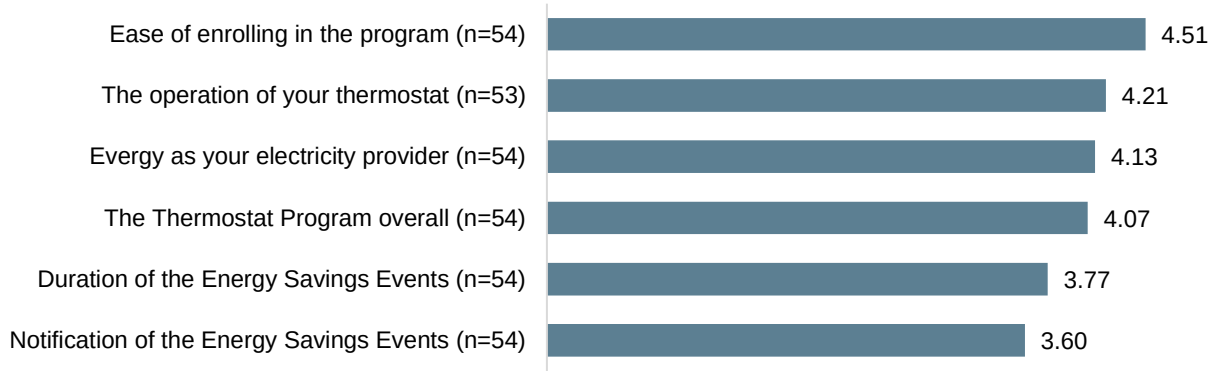
The survey respondents rated their satisfaction with the Residential DR Program and its components on a five-point scale, where "1" meant "Very Dissatisfied" and "5" meant "Very Satisfied." Table I-26 summarizes these ratings. Overall, the participants were most satisfied with the ease of program enrollment, with 75 percent of the participants awarding a rating of "4" or "5."

In contrast, they were least satisfied with the notification of the DR events, with only 61 percent awarding a score of "4" or "5".

Table I-26: Satisfaction Ratings for the Residential DR Program Components

Program Component	% "Very Dissatisfied" "1"	"2"	"3"	"4"	% "Very Satisfied" "5"
Ease of enrolling in the program (n = 53)	0%	2%	11%	26%	69%
The operation of your thermostat (n = 52)	6%	4%	11%	15%	53%
Evergy as your electricity provider (n = 54)	0%	9%	22%	20%	44%
The Thermostat Program overall (n = 54)	4%	9%	17%	23%	44%
Duration of Energy Savings Events (n = 43)	2%	4%	19%	30%	30%
Notification of Energy Savings Events (n = 53)	9%	6%	20%	30%	31%

Figure I-12: Average Satisfaction Ratings with Residential DR Program Components



The major drivers of program satisfaction were the ease of the program, the information provided by Evergy through its customer service and website, and the thermostat itself. The major reasons for program dissatisfaction focused on a lack of communication about the program, uncertainty about the thermostat's operation, and several were uncomfortable during the DR events.

COVID-19 Impacts

Nearly half (55 percent) of the participants reported that the COVID-19 pandemic had affected their households, while 43 percent indicated that pandemic had an effect on their household.

The participants also rated the impact of the COVID-19 pandemic on a five-point scale, where "1" meant "Not Impacted" and "5" meant "Greatly Impacted." Overall, 40 percent of the respondents gave a rating of "1" while 19 percent provided a rating of "5," suggesting their household was "Greatly Impacted" by the pandemic. Nine participants reported that because of the COVID-19 pandemic, they were now spending more time working from home, four lost jobs, and two respondents said a family member had been sick or died due to COVID. Another two cited increased worry and stress because of the COVID-19 pandemic.

However, only one respondent indicated that the pandemic "had greatly affected" their ability to participate in the DR events (2 percent). In contrast, 83 percent (n = 43) suggested that the pandemic did not affect their participation in the program.

Respondent Demographics

This section summarizes the demographic characteristics of the survey respondents. Overall, most respondents (83 percent) lived in a single-family home, while eight others lived in a duplex or apartment (see Table I-27). Most survey respondents owned their homes (89 percent) compared to those who rented (11 percent). Seventy-one percent of

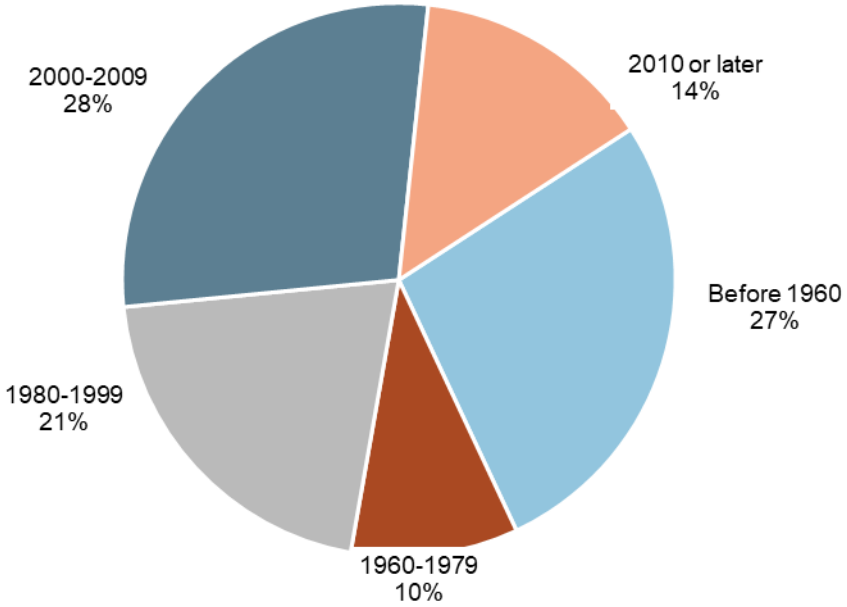
these respondents live in three-person households, while 43 percent live in two-person households.

Table I-27: Housing Type of Respondents

Housing Type	Percent of Responses (n = 53)
Single-family home	83%
Duplex or townhouse	8%
Apartment or condominium	8%
Manufactured or mobile home	2%

Most of these homes were built between 1980 (21 percent) and 2009 (28 percent), as Figure I-13 shows.

Figure I-13: Estimated Average Age of the Residence



Most respondents used natural gas (83 percent) to heat their homes compared to 17 percent who relied on electricity.

The respondents reported their annual household incomes using a range; however, 21 percent declined to answer this question. Of those who responded, the annual household income levels ranged from less than $25,500 to more than $70,300, with most respondents reporting annual household incomes between $34,500 to $53,400.

I.9 Conclusions and Recommendations

ADM performed a process evaluation that assessed program documentation and primary data collected from program stakeholders. The evaluation included fielding two customer

surveys and conducting in-depth interviews with the utility and third-party implementation staff.

The following summarizes the key findings of the RDR and BST programs' process evaluation.

- Despite deploying various marketing strategies, program enrollment is still only 50 percent of the program participation goals. This program is approaching maturity, as it has been operated for multiple program cycles, so attracting new participants will continue to be a challenge.
- Offering free thermostats led to increased program enrollments; however, this offer was most successful when coupled with an email activation campaign.
- Overall customer satisfaction is high for both the program and Evergy among residential and small business customers. Qualitatively, customers are most satisfied with the smart thermostats and least satisfied with event notification.
- The implementation staff effectively manages the program, provides timely communications, and proactively looks for ways to increase program enrollment.

The following recommendations are offered to improve the RDR and BST programs.

- **Evergy staff should continue to reinforce customer messaging regarding program enrollment as there seems to be some lack of customer understanding about the timing of these events.**
- **Evergy should continue to offer free smart thermostats to entice new customers into the program.**
- **The program implementation staff should continue to monitor activation rates through the multiple email strategy, which has led to noticeable increases in new enrollments.**

Appendix J Business Smart Thermostats Program-Specific Methodologies

This chapter describes the evaluation activities that were performed by ADM to evaluate the Business Smart Thermostat Program.

J.1 Program Overview

The Business Smart Thermostat (BST) program offers customers the ability to control and monitor energy usage through their smart thermostat.

Participation Channels:

- Customers can purchase devices and install the device themselves.

Customers can enroll their eligible existing device

- Customers can receive discounted devices and receive professional installation.

Called upon devices (Cycle 3) will increase a customer's setpoint between 2- and 5-degrees Fahrenheit. Pre-cooling occurs prior to an event and the customer receives notification via their smart device application.

Expected Energy Savings and Demand Reduction

Targeted energy and demand impact for the Business Smart Thermostat program years 2020 - 2022 are shown in the tables below. These Targeted savings are taken from KCP&L filing EO-2019-0132.

Table J-1: Program Goal Savings by Year - Missouri Metro

Program Year	Energy Savings Goal (MWh)	Peak Demand Reductions Goal (MW)
2020	29	0.21
2021	58	0.43
2022	87	0.64
Total	**174**	**1.28**

Table J-2: Program Goal Savings by Year - Missouri West

Program Year	Energy Savings Goal (MWh)	Peak Demand Reductions Goal (MW)
2020	28	0.21
2021	57	0.41
2022	85	0.62
Total	**170**	**1.24**

Table J-3 below provides a summary of program metrics for the PY2.

Table J-3: Performance Metrics – Business Smart Thermostats Program

Metric	PY2 Total	MO West	MO Metro
Number of Participants	91	54	37
Energy Savings (kWh)			
Targeted Energy Savings	115,048	56,736	58,312
Reported Energy Savings	42,355	23,049	19,306
Gross Verified Energy Savings	83,517	45,449	38,068
Net Verified Energy Savings	83,517	45,449	38,068
Peak Demand Reduction (kW)			
Targeted Peak Demand Reduction	840.96	414.72	426.24
Reported Peak Demand Reduction	327.60	166.60	161.00
Gross Verified Peak Demand Reduction	219.92	92.81	127.11
Net Verified Peak Demand Reduction	219.92	92.81	127.11
Benefit / Cost Ratios			
Total Resource Cost Test Ratio	0.98	0.85	1.12

J.2 EM&V Methodologies

This chapter describes the impact evaluation activities and methodology that ADM performed for Evergy's 2021 Business Smart Thermostat Program. Table J-4 provides a summary of the savings approach by program year.

Table J-4: Savings Approaches by Program Year

Program Year	kW Savings	kWh Savings
2020	Calculated	Calculated
2021	Calculated	Calculated
2022	Calculated	PY2 Value

In evaluating the 2021 Business Smart Thermostat Program, ADM implemented a variety of impact evaluation exercises including estimation of gross and net energy savings (kWh) as well as peak demand reductions (kW) as framed by the following research questions:

- How many Evergy customers participated in the program? What is the quantity and type of measures incentivized/rebated?
- What is the energy savings for each incentivized measure?
- What is the peak demand reduction for each incentivized measure?
- What percentage of gross savings is directly attributable to the program (net savings analysis)?

J.2.1 Demand Response Events in 2021

As shown in Table J-5, there were eight demand response events called in 2021 falling in the months of June, July, August, and September. Curtailment events were called between the hours of 4 p.m. through 6 p.m. CDT for all demand response events.

Table J-5 Demand Response Events in 2021

Year	Event Date
2021	6/10/2021
	6/17/2021
	6/18/2021
	7/28/2021
	7/29/2021
	8/11/2021
	8/25/2021
	9/13/2021

J.2.2 Smart Thermostat Devices

Table J-6 provides the quantity of devices for each device type and utility.[23] Across both the Missouri West and Missouri Metro jurisdictions, more participants installed ecobee thermostats compared to Google thermostats.

Table J-6 Device Types by Jurisdiction

Jurisdiction	Device Type	# of Devices
MO West	ecobee	79
MO West	Google Nest	7
MO Metro	ecobee	80
MO Metro	Google Nest	5

As shown in Table J-7, the most common device was the ecobee3 Lite which accounted for 89 percent of all devices across both jurisdictions.

[23] Counts include all devices present in PY2 tracking data, with the exclusion of devices that were removed or returned in PY2.

Table J-7: Device Subtypes by Jurisdiction

Jurisdiction	Device Type	# of Devices
MO Metro	ecobee3 Lite	80
MO Metro	Google Nest 2nd Gen	2
MO Metro	Google Nest Learning Thermostat	2
MO Metro	Google Nest Thermostat	1
MO West	ecobee3 Lite	72
MO West	ecobee SmartThermostat with voice control	7
MO West	Google Nest Learning Thermostat	3
MO West	Google Nest Thermostat	2
MO West	Google Nest 2nd Gen	1
MO West	Google Nest Thermostat E	1

Table J-8 provides the number of Smart Thermostat units installed and the number of customers for each measure type.[24] Professional (PRO) installations were the most frequent measure type for the BST program and accounted for 51 percent of installations in 2021. In addition, Do-it-yourself (DIY) accounted for 27 percent of installations while Bring-Your-Own-Thermostat (BYOT) installations accounted for the remaining 22 percent of installed units.

[24] Counts include all devices present in PY2 tracking data, with the exclusion of devices that were removed or returned in PY2.

Table J-8 Smart Thermostat Installations by Measure Type

Jurisdiction	Measure Type	# of Smart Thermostat Units	# of Customers
MO West	BYOT Installation	11	7
MO West	DIY Installation	30	30
MO West	PRO Installation	45	16
MO Metro	BYOT Installation	26	5
MO Metro	DIY Installation	16	16
MO Metro	PRO Installation	43	16

J.3 Sampling Plan

ADM evaluated each participating thermostat for each event. An extrapolated peak demand reduction value from the analyzed thermostats was applied to thermostats with installation after all events took place.

J.4 Data collection

Data used for this evaluation include:

- Program tracking data for 2021. This data identifies which customers participated in the program and contains data fields such as thermostat installation date, number of devices installed, thermostat device type, measure type, and other relevant data fields.
- 15-minute interval meter data (AMI) for each participating customer
- A full schedule of program events, including the time of the event

As a first step, ADM reviewed the data tracking systems associated with the program to ensure that the data provides sufficient information to calculate energy and demand impacts. ADM determined that all the relevant data fields were included in the tracking data and savings reported in the tracking system complied with energy savings calculations and guidelines set by the Evergy Technical Reference Manual.

J.4.1 Weather Data

ADM collected two types of weather data for the evaluation: 1) actual recorded weather from the National Oceanographic and Atmospheric Administration (NOAA) and 2) 30-year weather normal or Typical Meteorological year (TMY) weather data. Actual weather data was used when fitting the models and TMY data was used to extrapolate savings (if appropriate).

ADM collected hourly Heating Degree Hours (HDH) and Cooling Degree Hours (CDH) from NOAA.gov for use in the regression analysis. Data was collected from the nearest available weather stations and assigned to each customer based on customer zip code. Daily HDDs are calculated as the sum of hourly average temperature values under the heating setpoint (65°F) on each day, while daily CDDs are calculated as the sum of hourly average temperature values over the cooling setpoint (65°F) on each day. The setpoint values for HDDs and CDDs were determined by running regressions with multiple setpoints from 60°F-80°F and choosing the setpoint combination with the highest adjusted R-squared value (i.e., best fit).

ADM collected Typical Meteorological Year (TMY) data[25] from the nearest relevant weather station/s to extrapolate estimated annual savings, as shown in Table J-9.

Table J-9 TMY for Kansas City International Airport

Annual TMY	HDD	CDD
	5,581	1,461

J.5 Gross Impact Methodology

This section describes the impact evaluation activities and methodology that ADM performed for Evergy's PY2 Business Smart Thermostat Program.

J.5.1 Gross Energy Savings and Demand Reduction

Demand Response Demand Reduction (kW) Methodology

Demand savings for the demand response portion of the program was estimated using a weather-adjusted Linear Fixed Effects Regression (LFER) model. The model uses customers' 15-minute AMI data on non-event baseline days and extrapolates the model to event days to estimate the impact on energy demand. The LFER model specifies energy demand as a function of temperature and other variables that influence usage. ADM identified non-event baseline days during the same month as demand response events whose weather pattern most closely matches the weather pattern on event days, and these days served as the counterfactual baseline. ADM defined baseline days as those with a maximum daily temperature greater than or equal to the minimum observed maximum temperature during all demand response events.

When fitting regression models, ADM tested correlations between explanatory variables, statistical significance of variables, and the impact of each variable on model fit.

The final form of the model is shown below.

[25] https://rredc.nrel.gov/solar/old_data/nsrdb/1991-2005/tmy3/by_state_and_city.html

Equation J-1: Linear Fixed Effects Regression Model

$$Usage\ (kWh)_{it} = \alpha_0 + \sum_{m=1}^{12} \alpha_m\, Month_{it} + \sum_{w=1}^{7} \alpha_w\, DOW_{it} + \beta_3 CDH_{it} + \beta_4 MA24CDH_{it} + \sum_{h=1}^{24} \alpha_h\, Hour_{it,h} * \sum_{i=1}^{n} \alpha_i\, Customer_{it} + \epsilon_{it}$$

Where:

α_0	*= intercept term*
m	*= index for month m*
w	*= index for day of the week m*
t	*= time interval*
i	*= index for customer i*
n	*= number of sampled smart thermostat households*
$Usage(kWh)$	*= average usage during the time interval for customer i*
$\beta_k, \alpha_m, \alpha w_i, \alpha_h, \alpha_i$	*= vectors of coefficients.*
$Month$	*= vector of dummy variables for each month m*
DOW	*= vector of dummy variables for each day of the week w*
CDH	*= cooling degree hours*
$MA24CDH$	*= moving average of the last 24 hours CDH*
$Hour$	*= vector of dummy variables for each hour of the day*
$Customer$	*= vector of dummy variables for each customer i*
ϵ	*= error term*

ADM estimated savings rates kW/unit separately for both Missouri Metro and Missouri West.

Prior to running the model, ADM removed devices that fail to meet certain criteria, including:

- Missing zip code for a device/customer (due to inability to map to correct weather data)
- Incomplete or missing data during the DR season (<1% of households)
- Average usage of 0 during the DR season (<1% of households)

- Devices that were returned or removed before the end of the DR season

Classification of Non-Contributing Devices using AMI Billing Data

ADM identified non-contributing households to assess its impact on demand reductions. Example reasons why a household may be a non-contributor includes:

- Non-responding devices (NRD) are devices that are not responsive to the curtailment signal.
- Opt-outs are customer who opt-out of a DR event.
- Customers that are not running their AC (i.e. they are away on vacation or at work during the event).

A device is considered a “non-responding device” (NRD) if it is not responsive to the curtailment signal. This would indicate that the switch communications were not working.

Switch communications may be interrupted for a variety of reasons: the A/C unit may not be powered on, the switch may become disconnected or defective, or the participant’s household wiring may prevent communication. In some cases, it may be difficult for utilities to determine the reason the switch is not communicating.

Opt-outs are different than non-responding devices, though the resulting observations are similar. Opt-outs occur when a customer chooses not to participate in the curtailment event. In most cases, when a customer chooses to opt-out, the customer is declining to participate in all subsequent events, rather than a single event. Opt-outs are similar to non-responding devices in that AMI meter data for the household displays no demand reductions during the curtailment event. However, opt-outs can be categorized as opt-outs using customer communication records, or program tracking of opt-out customers.

Customers who are not running their AC unit during the DR event will have a load shape similar to NRD and opt-out customers and appear to not have a demand reduction. For instance, the customer may be on vacation, away at work, or have an AC unit problem.

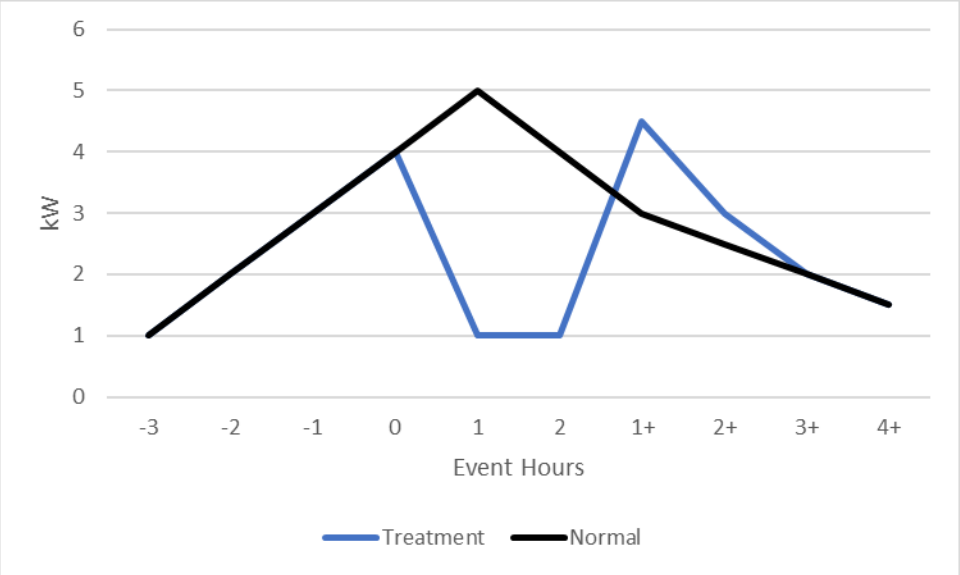
ADM attempted to quantify a separate opt-out rate for the program; however, information on customer opt-outs was not available for the program. As such, a rate that includes all non-contributing households was calculated.

ADM identified non-contributing households using a combination of three algorithms:

1. A cumulative sum (CSUM) change in slope analysis
2. A linear 10% decrease in load detection
3. A snapback analysis

When a DR event is called, each device is sent curtailment instructions that result in a significant load drop over the duration of the event. This drop is illustrated in Figure J-1, which provides an example event and an example of a typical or "baseline" usage curve.

Figure J-1: Example of Site-Level Load Shapes During Event Hours



ADM defined the methodology applied for each algorithm in the following sections.

CSUM Analysis

The CSUM smoothing technique is a rolling sum defined as:

Equation J-2: CSUM Smoothing Technique

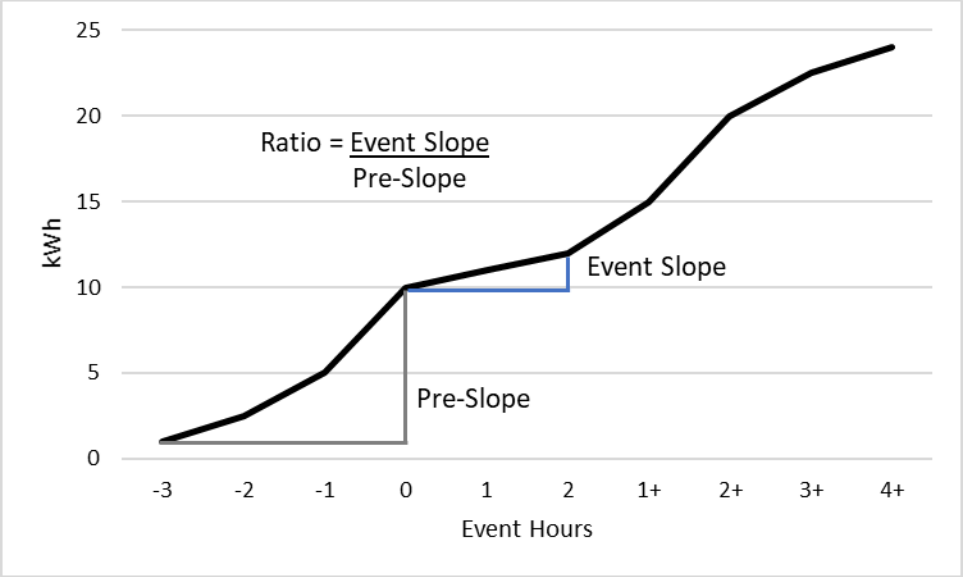
$$x = (a, b, c, \ldots, z)\ CSUM(x) = (a, a+b, a+b+c, \ldots, a+\ldots+z)$$

Where:

x = a vector of kWh measures taken at increasing one-hour intervals during the event day

A smoothed, increasing curve is created by taking the CSUM of each treatment site during the demand response period (Figure J-2).

Figure J-2: Example of Site-Level CSUM Slope Changes During Event Hours



The slopes of this curve for the three hours prior to the start of the event and the hours during the event are calculated (Figure J-2). ADM calculated a ratio of the event period slope divided by the pre-period slope to test if there was a significant change in the slope due to the demand response event. A contributing device is detected by a decrease in the line slope. Therefore, the ratio is less than one. Using this test, ADM defined sites with a slope less than one to be a contributing device, which indicates a decrease in demand during the demand response event.

Linear 10 Percent Decrease Analysis

In parallel with the CSUM analysis, a linear test for 10 percent reduction in consumption during the demand response event is also employed. For each unique device, the consumption for the hour prior to the event is compared to the consumption during the first hour of the event (Equation J-3) to detect a reduction in demand greater than 10 percent with the following equation:

Equation J-3: Non-Contributing Device for 10% Decrease Analysis

$$\text{Non} - \text{Contributing Device} = T1_{kWh} \leq T2_{kWh}$$

Where:

$T1_{kWh} =$ = $PriorHr_{kWh} - EventHr_{kWh}$

$T2_{kWh} =$ = $PriorHr_{kWh} * 10\%$

$PriorHr_{kWh}$ = demand displayed during the hour prior to the demand response event

$EventHr_{kWh}$ = demand displayed during the first hour of the demand response event

By taking advantage of the processing speed of vectorized programming in the R-Studio environment, every individual site in the program is tested per event.

Snapback Analysis

ADM observed that some customers had higher loads than the baseline would predict during the curtailment event. However, a snapback was observed for these customers in the first hour after the event ended, suggesting these customers had in fact curtailed AC usage, but had higher than expected non-AC usage during the event.

An additional test was developed such that if a customer had a higher load during the first snapback hour compared to the maximum load seen during the curtailment event, they are not classified as a non-contributor.

Annual Energy Savings (kWh) Methodology

Annual energy savings for smart thermostat customers were estimated using a weather-adjusted Post Period Regression (PPR) ordinary least-squares (OLS) model. A matched comparison group was created using a Propensity Score Matching (PSM) approach. With the PSM approach, a propensity score is estimated for treatment customers (i.e., those who received program services) and a group of customers who did not receive program services using a logit model. Customers in the treatment and control groups are matched based on seasonal pre-period usage (e.g., summer, spring, fall, and winter) and zip code (or other factors such as rate code). In addition, demand response event days are removed from the data to avoid creating bias.

Control group customers were selected from customers who have not participated in any demand response or energy efficiency programs. In addition, the PPR model utilized post period data only. Data for control customers was restricted to the post period timeframe for their matched participant (to ensure the same number of observations in the post period). After creating a matched comparison group, the program impacts were estimated with the following regression.

The final form of the model is shown below.

Equation J-4: Final Model

$$Usage\ (kWh)_{it} = \alpha_0 + \sum_{m=1}^{12} \alpha_m\, Month_{m,t} * \sum_{p=1}^{4} \alpha_p\, Pre - Period\ Usage_{p,it} + \beta_1 * Treatment_{it} + \beta_2 * HDH_{it} + \beta_3 * CDH_{it} + \beta_4 * Treatment_{it} * HDH_{it} + \beta_5 * Treatment_{it} * CDH_{it} + \epsilon_{it}$$

Where:

α_0	*= intercept term*
t	*= index for the time interval*
i	*= index for the customer*
m	*= index for month of the year*
p	*= index for season of the year (spring, summer, fall, winter)*
Month	*= dummy variable for month of the year*
Pre-Period Usage	*= average pre-period usage for season p (spring, summer, fall, winter) for customer i*
Treatment	*= dummy variable*
	= 1 if in the treatment group, and 0 otherwise
HDH_{it}	*= average heating degree hours for time interval t*
CDH_{it}	*= average cooling degree hours for time interval t*
ϵ_{it}	*= error term*
α, β	*= parameters to be estimated by the model.* $\beta_1, \beta_4, and\ \beta_5$ *are the parameters of interest for estimating the reduction in kWh usage*

The total annual energy savings (kWh) for the program is calculated by taking the estimated kWh savings/unit and multiplying by the number of thermostat units considered part of the program in 2021.

Estimating Net Savings

In demand response programs, it is typically assumed that there are neither spillover effects nor free ridership (only participating customers are expected to curtail usage). As such, the net-to-gross ratio for this program is assumed to be 100 percent.

J.5.2 COVID-19 Impact Considerations

Prior to June 16, 2020, Missouri was under Phase 1 of its COVID-19 reopening plan which had restrictions on business operations. Phase 2 of Missouri's reopening plan began on June 16, 2020 and contains no statewide public health order. Since all DR events were called after Phase 2, ADM determined there were no impacts to the DR events from COVID-19.

J.6 Gross Impact Evaluation Findings

The following sections provide the results of the impact evaluation for Business Smart Thermostats Program.

J.6.1 Peak Demand Reduction from Demand Response Events

Figure J-3 provides baseline and event load shapes for Missouri West, while Figure J-4 provides the same for Missouri Metro.

Figure J-3: BST DR Event Load Shapes - Missouri West

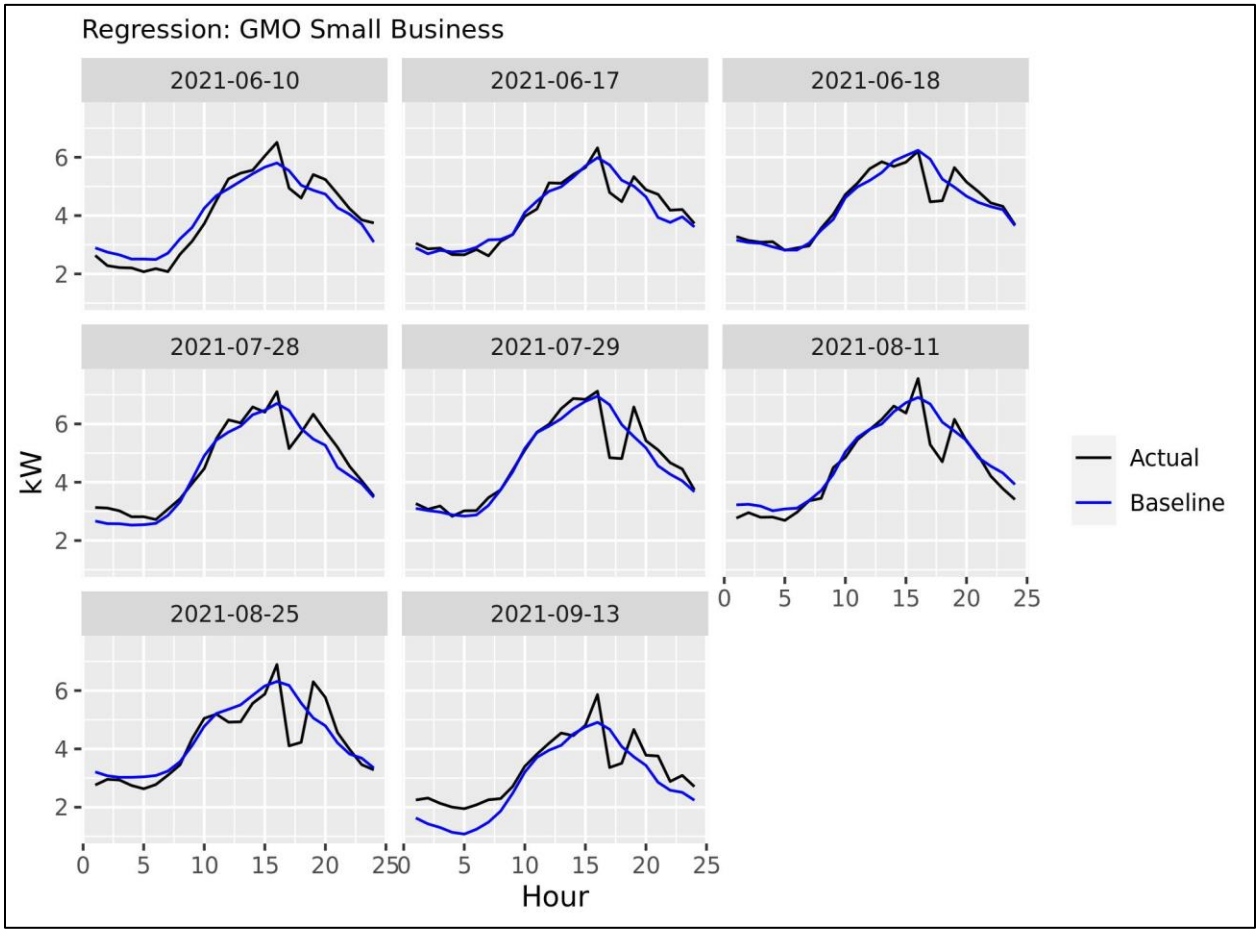


Figure J-4: BST DR Event Load Shapes - Missouri Metro

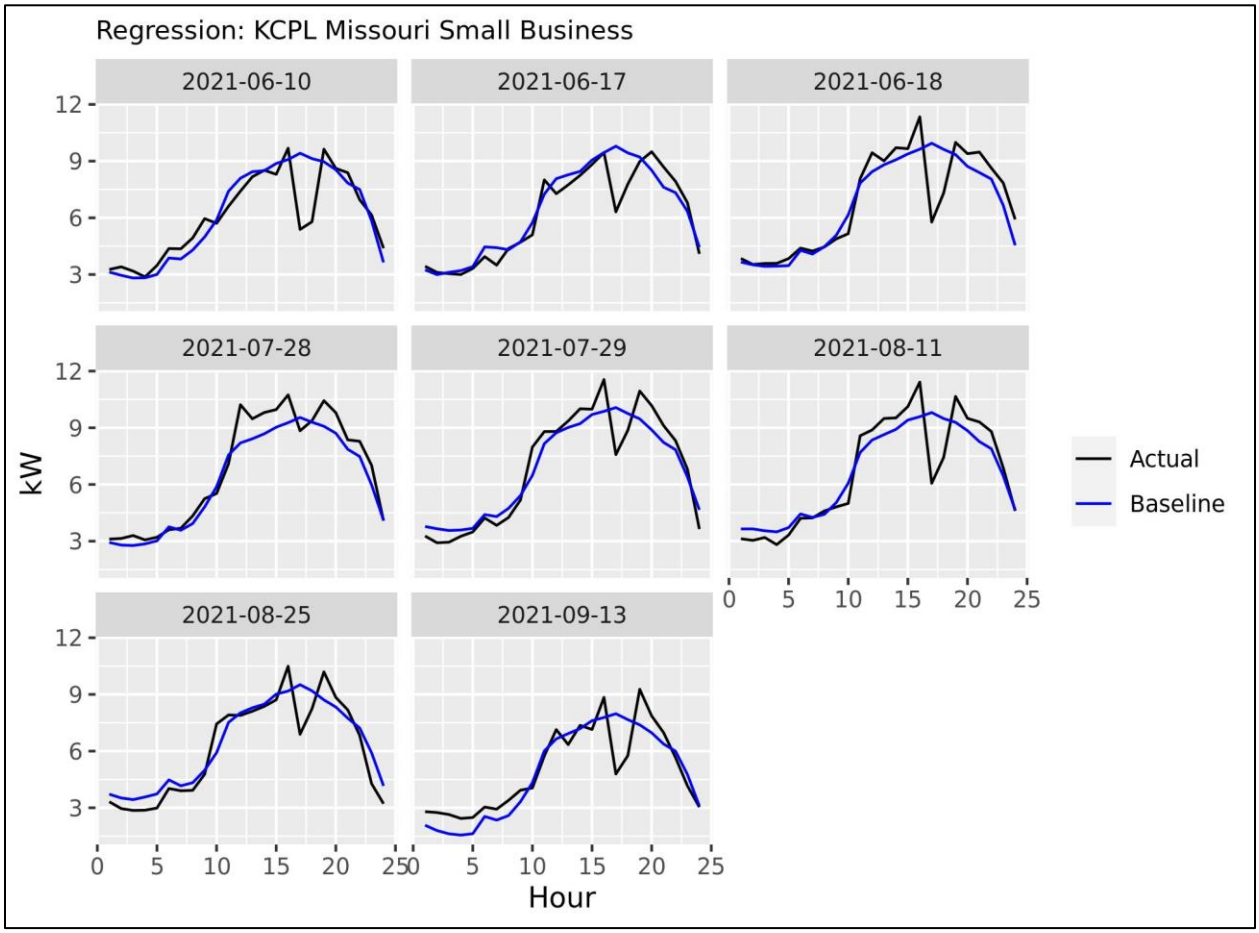


Table J-10 provides the correlation matrix for the continuous variables included in the DR regression. ADM tested the exclusion of highly correlated variables during the modeling process and found very limited impacts on savings and model fit.

Table J-10: DR Regression Variable Correlation Matrix

Variable	CDD	MA24CDH
CDH	1.000	0.572
MA24CDH	0.572	1.000

The tables below provide the DR regression results for each utility jurisdiction. The fixed effects of hour of the day and customer-specific dummy variables and their interactions are not shown for the sake of brevity.

Table J-11: DR Regression Results - Missouri West

Variable	Coefficient	CI Lower	CI Upper
July	0.326	-0.057	0.709
Aug	0.556	0.107	1.006
Monday	0.045	-0.187	0.276
Tuesday	0.037	-0.203	0.278
Wednesday	-0.012	-0.198	0.173
Thursday	0.055	-0.252	0.361
CDH	1.209	0.727	1.691
MA24CDH	1.327	0.612	2.041
Adjusted R2 = 0.941			

Table J-12 : DR Regression Results - Missouri Metro

Variable	Coefficient	CI Lower	CI Upper
July	0.305	-0.235	0.845
Aug	0.452	-0.251	1.156
Monday	-0.274	-0.561	0.013
Tuesday	0.187	-0.041	0.415
Wednesday	-0.225	-0.508	0.058
Thursday	-0.146	-0.569	0.276
CDH	1.578	0.586	2.570
MA24CDH	1.061	-0.189	2.310
Adjusted R2 = 0.920			

The following columns are referenced in the tables below:

- **Service Area** – This column describes which service area the results cover.
- **Event Date** – This column contains the date of each DR event.
- **% Non-Contributing Devices** – This column contains the percent of non-contributing devices on DR event days.
- **Expected kW/Unit Savings** – This column contains the expected DR event kW/Unit savings = 1.40.
- **Realized kW/Unit Savings** – This column contains the realized average DR event kW/Unit savings. In PY2021, this value includes non-contributing households.
- **Expected kWh/Unit Savings** – This column contains the expected annual kWh/Unit savings = 197.
- **Realized kWh/Unit Savings** – This column contains the realized annual kWh/Unit savings.

- **% Non-Contributing Households** – This column contains the percentage of households with non-contributing devices.
- **Eligible Units** – This column contains the number of devices eligible for savings. For kWh savings, a device is deemed eligible if the measure type is Do-it-Yourself (DIY) or Professional (PRO); Bring-Your-Own-Thermostat (BYOT) is ineligible for annual kWh savings as the assumption is that these customers would have installed the device in the absence of the program. In addition, the device must have been installed in PY2 and not returned or removed.[26] For kWh eligible units, devices must have been installed but do not have to be available for DR events. For kW devices, the device must be enrolled in the DR program during the program year and be available for curtailment events.
- **Expected kW Savings** – This column contains the total expected DR kW savings = Expected kW/Unit Savings*Eligible Units.
- **Realized kW Savings** – This column contains the total DR kW savings = Realized kW/Unit Savings*Eligible Units. In PY2021, this value includes non-contributing households.
- **Expected kWh Savings** – This column contains the total expected annual kWh savings = Expected kWh/Unit Savings*Eligible Units.
- **Realized kWh Savings** – This column contains the total realized annual kWh savings = Realized kWh/Unit Savings*Eligible Units.

Table J-13 provides impact results for each BST demand response event called in 2021. In addition, Table J-14 provides demand response event savings versus weather during event hours.

[26] Evergy also removes devices returned or removed in PY2 that were available or installed in prior program years. The Eligible Unit counts reflect these annual adjustments.

Table J-13: BST DR Savings by Event Date

Jurisdiction	Event Date	Expected kW/Unit Savings	Realized kW/Unit Savings
MO West	6/10/2021	1.40	0.55
MO West	6/17/2021	1.40	0.87
MO West	6/18/2021	1.40	1.02
MO West	7/28/2021	1.40	0.71
MO West	7/29/2021	1.40	0.91
MO West	8/11/2021	1.40	0.80
MO West	8/25/2021	1.40	0.99
MO West	9/13/2021	1.40	0.41
MO Metro	6/10/2021	1.40	1.49
MO Metro	6/17/2021	1.40	1.57
MO Metro	6/18/2021	1.40	1.91
MO Metro	7/28/2021	1.40	0.23
MO Metro	7/29/2021	1.40	1.05
MO Metro	8/11/2021	1.40	1.08
MO Metro	8/25/2021	1.40	0.81
MO Metro	9/13/2021	1.40	0.90

Table J-14 shows the average percentage of devices that were non-contributing during the DR events.

Table J-14: Average % Non-Contributing Devices

Jurisdiction	% Non-Contributing Devices
MO West	11%
MO Metro	13%

Table J-15: BST DR Event Weather

Year	Event Date	Average Event Time Temperature (F)	Average Event Time CDH	Average Event Day Temperature (F)	Event Day CDD
2021	6/10/2021	91.49	1.104	83.03	18.03
	6/17/2021	95.99	1.291	84.85	19.85
	6/18/2021	95.99	1.291	87.43	22.43
	7/28/2021	96.08	1.295	84.79	19.79
	7/29/2021	96.53	1.314	86.75	21.75
	8/11/2021	95.54	1.273	87.78	22.78
	8/25/2021	92.48	1.145	83.96	18.96
	9/13/2021	84.47	0.811	76.03	11.03
Average		93.57	1.190	84.33	19.33

The figures below show BST demand response event savings and weather correlations. Both the Missouri West and Missouri Metro jurisdictions show a positive correlation between realized kW/Unit savings and CDD on the event day.

Figure J-5: BST DR Savings vs. Weather - Missouri West

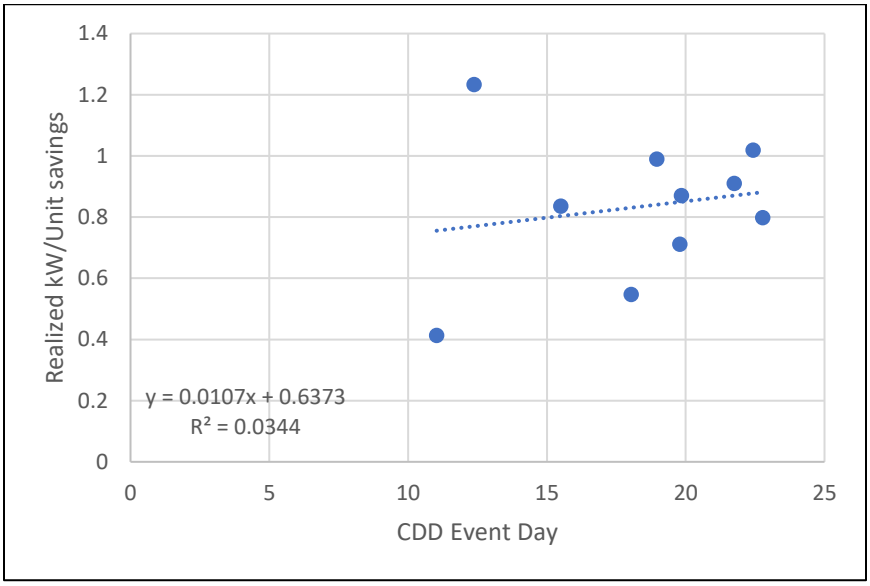
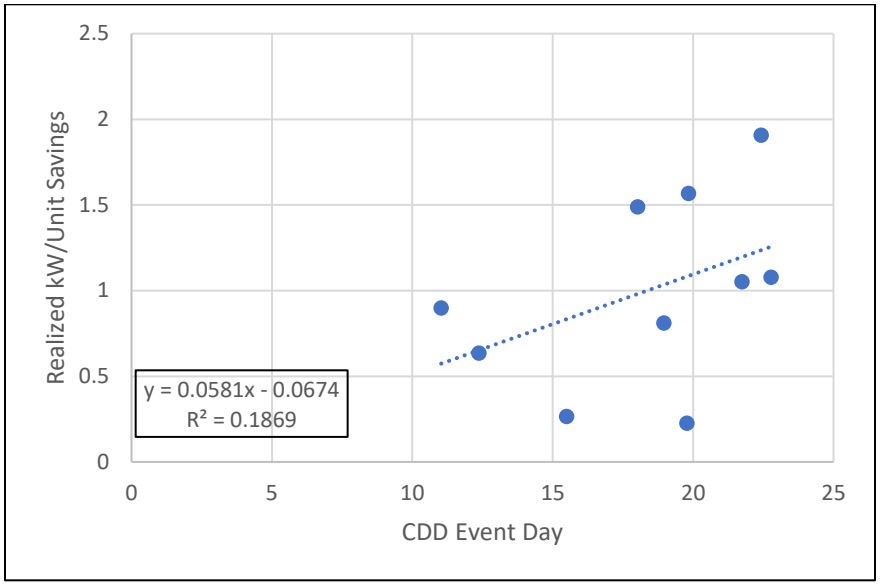


Figure J-6: BST DR Savings vs. Weather - Missouri Metro



Expected and realized kW savings for BST DR is shown in Table J-16 below. The realization rate for kW savings is 67 percent. Expected kW/Unit Savings were based on an estimate for residential customers. The realization rate is less than 100% because the Expected kW/Unit Savings was based on residential customers savings, and residential customers have consistently higher kW/Unit savings for this measure than business customers.

Table J-16: BST DR Savings

Jurisdiction	Expected kW/Unit Savings	Realized kW/Unit Savings	Eligible Units	Expected kW Savings	Realized kW Savings	RR
MO West	1.40	0.78	119	166.60	92.81	56%
MO Metro	1.40	1.11	115	161.00	127.11	79%
Total			**234**	**327.60**	**219.92**	**67%**

J.6.2 Annual Energy Savings (kWh)

ADM was successful in creating a matched cohort and the results of Propensity Score Matching (PSM) and the annual consumption estimate for BST are summarized below. ADM used nearest neighbor, 4 to 1 ratio matching with replacement for control customers and had a considerable pool of control customers to draw upon, as shown in Table J-17. Customers were matched on their average monthly pre-period usage.

Prior to matching, customers were required to have at least 6 months of post-period data. In addition, demand response event days were removed from the post-period to avoid creating bias.

Table J-17: PSM Customer Matches

Status	Control	Treated
All	712	43
Matched	133	38
Unmatched	579	5

Table J-18 presents the propensity score covariate summary of pre-period usage for treatment and control customers before and after matching. The standardized mean difference prior to matching is often over 0.1 for many covariates; however, after matching the absolute value of the standardized mean difference is less than 0.1, which is an ideal outcome.

Table J-18: PSM Covariate Summary

Variable	Before Matching			After Matching		
	Mean Treated	Mean Control	Standardized Mean Difference	Mean Treated	Mean Control	Standardized Mean Difference
Distance	0.117	0.053	0.360	0.059	0.059	0.000
Pre-period Jan	95.650	67.356	0.216	68.717	80.468	-0.090
Pre-period Feb	112.379	66.415	0.256	66.282	80.856	-0.081
Pre-period Mar	72.238	52.967	0.200	49.714	56.591	-0.071
Pre-period Apr	52.633	45.703	0.088	39.705	42.860	-0.040
Pre-period May	58.904	49.093	0.118	46.401	42.895	0.042
Pre-period June	100.000	75.139	0.203	81.054	67.984	0.107
Pre-period July	124.264	83.150	0.232	90.181	77.087	0.074
Pre-period Aug	113.377	76.517	0.235	81.455	70.076	0.072
Pre-period Sept	112.694	74.993	0.245	77.792	67.786	0.065
Pre-period Oct	72.998	57.892	0.145	51.480	53.827	-0.023
Pre-period Nov	80.689	61.559	0.166	58.343	67.072	-0.076
Pre-period Dec	87.733	63.047	0.197	62.098	72.666	-0.084

Table J-19 provides results for a t-test which helps determine the success of matching. The test measures whether there are statistically significant differences in average daily consumption used between the treatment and comparison groups in the pre-period by month. Statistically significant differences are defined as a p-value of less than 0.05 at

the 95 percent significance level. As shown below, the p-value is greater than 0.05 for each month tested. This result further indicates propensity score matching performed well because the differences between the treatment and comparison groups are not statistically significant.

Table J-19: Post Matching T-Test of Difference in Pre-Period Usage by Month

Month	Average Daily kWh Control	Average Daily kWh Treatment	T Stat	Std Error	P-Value	Reject Null?
Jan	76.236	68.717	0.406	18.535	0.686	No
Feb	77.650	66.282	0.623	18.253	0.535	No
Mar	53.533	49.714	0.300	12.718	0.765	No
Apr	40.999	39.705	0.109	11.902	0.914	No
May	40.970	46.401	-0.447	12.155	0.657	No
June	64.562	81.054	-0.922	17.890	0.361	No
July	73.541	90.181	-0.860	19.357	0.394	No
Aug	66.885	81.455	-0.829	17.571	0.410	No
Sept	64.384	77.792	-0.828	16.187	0.411	No
Oct	51.102	51.480	-0.031	12.369	0.976	No
Nov	63.569	58.343	0.345	15.140	0.731	No
Dec	68.664	62.098	0.400	16.436	0.691	No

Figure J-7 displays the density of seasonal pre-period usage, before conducting matching. Figure J-8 displays the density of seasonal pre-period usage, after conducting matching.

Figure J-7: Seasonal Pre-Period Usage Before Matching

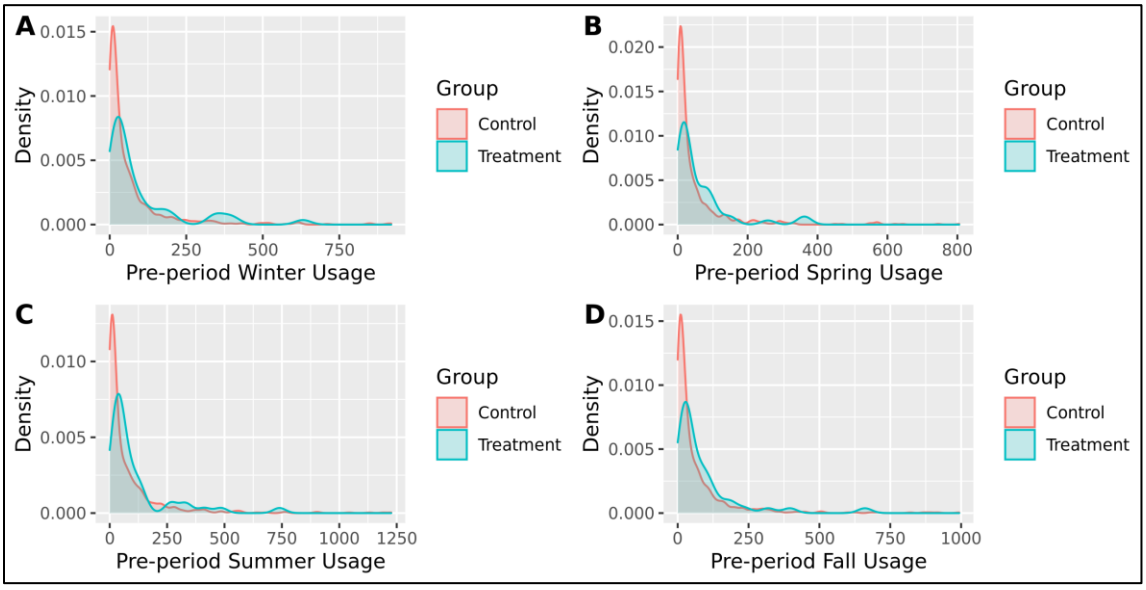
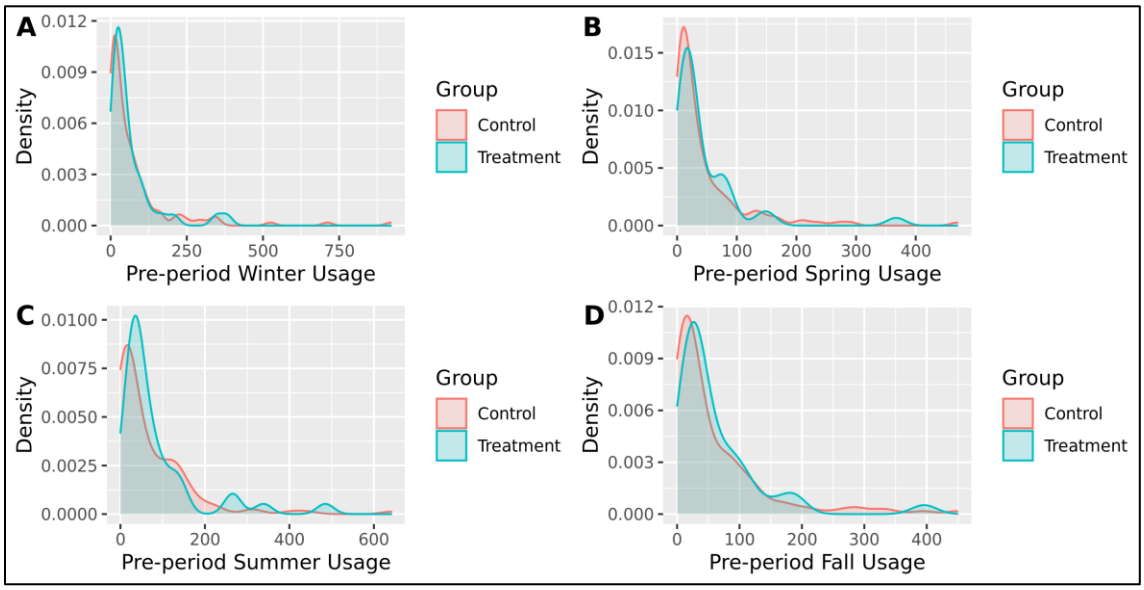


Figure J-8 Seasonal Pre-Period Usage After Matching



Lastly, the joint chi-square test for covariate balance had a p-value of 0.88, meaning we failed to reject the null hypothesis of covariate imbalance (i.e., the treatment and comparison group are similar).

Table J-20 provides regression results for annual energy savings (kWh) savings post matching. Interaction variables between pre-period usage and month have been omitted for the sake of brevity.

Table J-20: Annual Energy Savings (kWh) Regression Results

Variable	Estimate	Std Error	T-Statistic	P-Value	95% CI Lower	95% CI Upper
(Intercept)	8.478	72.203	0.117	0.907	-110.380	127.337
Pre-Period Usage Fall	0.276	0.156	1.776	0.076	0.020	0.532
Pre-Period Usage Winter	-0.109	0.063	-1.726	0.085	-0.213	-0.005
Pre-Period Usage Summer	0.809	0.077	10.498	0.000	0.682	0.936
July	36.290	11.897	3.050	0.002	16.706	55.874
Aug	37.342	14.382	2.596	0.010	13.666	61.018
Sept	-108.143	34.464	-3.138	0.002	-164.877	-51.410
Oct	-765.595	222.139	-3.446	0.001	-1131.275	-399.914
Nov	-1881.889	555.222	-3.389	0.001	-2795.883	-967.895
Dec	-2287.502	677.403	-3.377	0.001	-3402.628	-1172.376
Treatment	-6.106	9.859	-0.619	0.536	-22.336	10.124
CDD	-3.169	5.894	-0.538	0.591	-12.871	6.533
HDD	102.007	31.151	3.275	0.001	50.727	153.288
Treatment*CDD	0.257	0.846	0.304	0.761	-1.136	1.650
Treatment*HDD	0.215	0.551	0.390	0.696	-0.692	1.122
Adjusted R2 = 0.89, Sample Size = 38						

The kWh savings were derived using the following equation:

Equation J-5: Energy Savings (kWh) for BST Program

$$Annual\ kWh\ Savings = Treatment * 365.25 + Treatment{:}\,CDH * 1{,}461 + Treatment{:}\,HDH * 5{,}581$$

Where:

Treatment = *dummy variable*

= *1 if in the treatment group, and 0 otherwise*

HDH_{it} = *average heating degree hours for time interval t*

CDH_{it} = *average cooling degree hours for time interval t*

Despite obtaining a good matching control group and the PPR model providing a good fit for the data (Adj. R2 = 0.89), the estimated 388 kWh/Unit savings are not statistically significant at the 95 percent level (p-value=0.71) This outcome is due to the small number of participants and the small size of the expected treatment effect (1 percent to 2 percent of annual savings).

Table J-21 shows annual expected and realized energy savings for Business Smart Thermostats. Average annual pre-period usage for BST customers was 23,482 kWh and realized annual energy savings of 388 kWh/Unit represent 1.7 percent of annual usage. Expected annual energy savings were based on estimates for residential households which have lower usage on average compared to small business customers.

Table J-21: BST Annual kWh Savings

Jurisdiction	Expected kWh/Unit Savings	Realized kWh/Unit Savings	Eligible Units	Expected kWh Savings	Realized kWh Savings	RR
MO West	197	388	117	23,049	45,449	197%
MO Metro	197	388	98	19,306	38,068	197%
Total			**215**	**42,355**	**83,517**	**197%**

J.7 Impact Evaluation - Final Savings Tables

Based on the impact evaluation results, the total verified net energy savings for the Business Thermostat Program are 83,517 kWh, and the total verified net peak demand savings are 219.92 kW.

Table J-22 and Table J-23 summarize the verified net energy and demand savings for the Business Smart Thermostat Program.

Table J-22: BST Peak Reduction (kW)

Jurisdiction	Expected kW/Unit Savings	Realized kW/Unit Savings	Eligible Units	Expected kW Savings	Realized kW Savings	RR
MO West	1.40	0.78	119	166.60	92.81	56%
MO Metro	1.40	1.11	115	161.00	127.11	79%
Total			**234**	**327.60**	**219.92**	**67%**

Table J-23: BST Annual Energy Savings (kWh)

Jurisdiction	Expected kWh/Unit Savings	Realized kWh/Unit Savings	Eligible Units	Expected kWh Savings	Realized kWh Savings	RR
MO West	197	388	117	23,049	45.449	197%
MO Metro	197	388	98	19,306	38,068	197%
Total			**215**	**42,355**	**83,517**	**197%**

J.8 Process Evaluation

J.8.1 Program Operations

According to the program staff, the Residential Demand Response (RDR) and the Business Smart Thermostat (BST) programs operate identically but target two different customer groups: residential customers and small business customers. This section summarizes Johnson consulting's (a subcontractor to ADM) findings from the in-depth interviews conducted with Evergy program staff and its implementer, CLEAResult to gain a better understanding of the program design, operations, challenges, and future opportunities. The summary for the in-depth interview was included in the Residential Demand Response Program (see Section I.8).

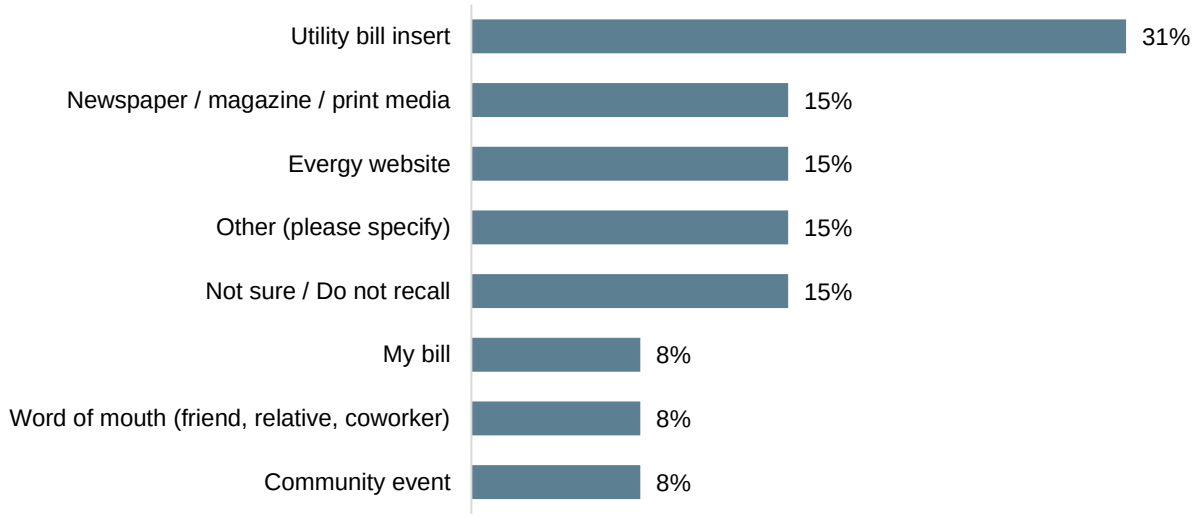
J.8.2 Participant Survey

Fourteen participants in Evergy's Business Smart Thermostat (BST) Program completed the online survey, which assessed the effectiveness of the program operations and participant satisfaction. Due to the small sample sizes, these findings should be viewed as providing qualitative or directional feedback regarding program operations. The key results are summarized next.

Sources of Awareness

Most program participants reported learning about this program directly from Evergy either through a bill insert (31 percent), the Evergy website (15 percent) or an email from Evergy staff (15 percent).

Figure J-9: Ways Program Participants Learned About the BST Program



Note: Percentages may exceed 100% due to respondents being able to select more than one response.

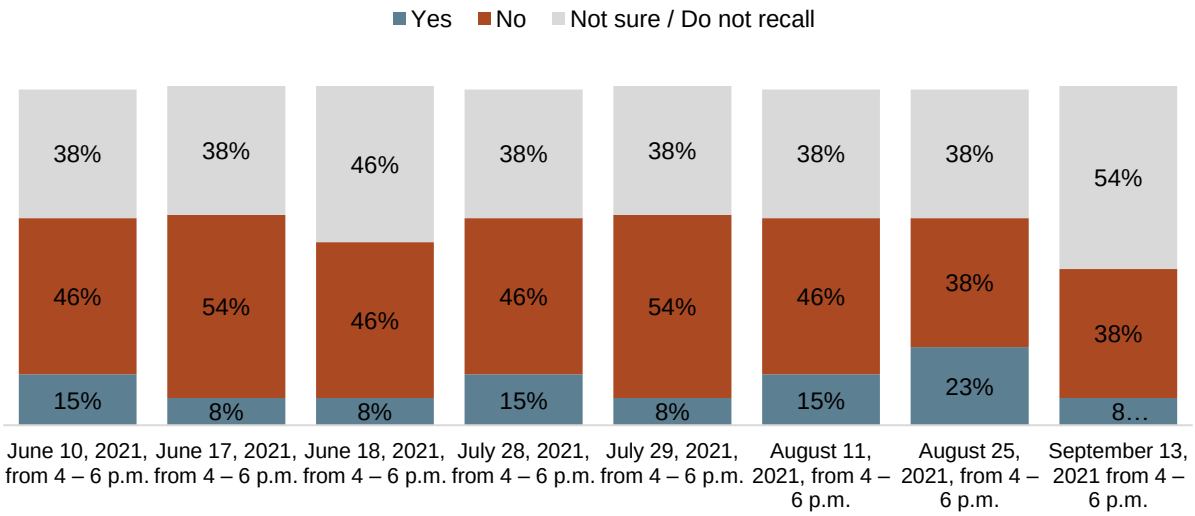
Reasons for Participating in the BST Program

Most program participants either wanted to receive the free programmable thermostat offered through the program (n = 3), reduce and conserve energy (n = 3) or save money on their energy bills (n = 3).

Participation in DR Events

Overall participation was relatively low for all DR events scheduled in the Summer of 2021. Participation rates varied from 8 percent for June 17, July 28, and September 13, while peaked at 23 percent for August 25. Of note, most respondents were unsure about their actual participation as the percentage of "Not sure" ranged from 38 percent to as high as 54 percent.

Figure J-10: Participation Rates in BST DR Event



Reasons for not Participating in DR Events

Respondents indicated they didn't participate in the DR events either because they had not yet received the smart thermostats, or they were unaware of a program event being called. These responses were consistent across all periods.

Only three respondents indicated that they had not received any notification of these DR events, which likely affected their overall satisfaction ratings summarized in the next section.

Satisfaction with the BST Program Components

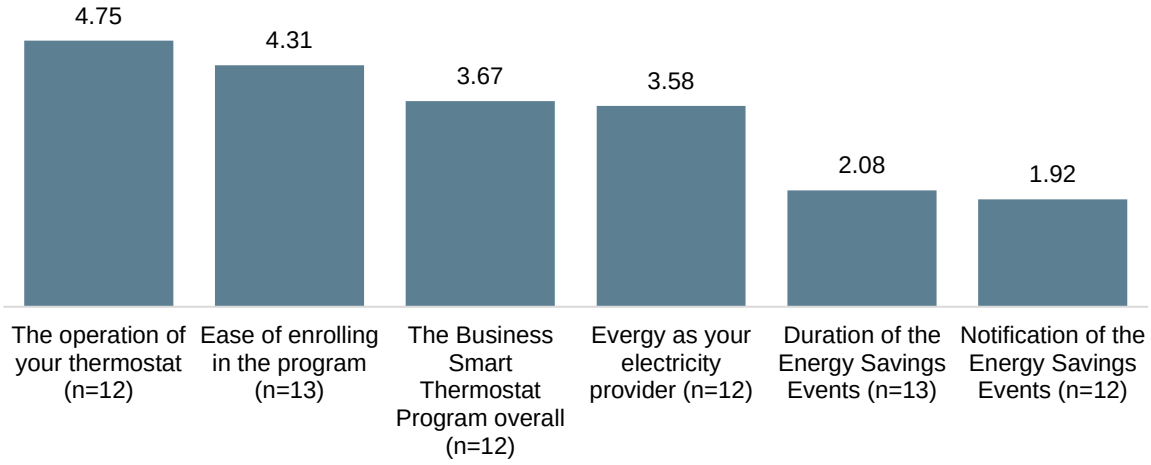
However, when the participants were asked to rate their overall satisfaction with the BST program on a five-point scale, where "1" meant "Very Dissatisfied" and "5" meant "Very Satisfied," event notification received the lowest satisfaction rating of all program components, with an average score of 4.04. These satisfaction ratings are summarized in Table J-24 and Figure J-11.

Table J-24: Satisfaction Ratings for the BST Program Components

Program Component	% "Very Dissatisfied" "1"	"2"	"3"	"4"	% "Very Satisfied" "5"
The operation of your thermostat (n=12)	0%	0%	0%	25%	75%
Ease of enrolling in the program (n=13)	0%	0%	15%	38%	46%
The Business Smart Thermostat Program overall (n=12)	8%	0%	8%	42%	33%
Evergy as your electricity provider (n=12)	0%	8%	17%	42%	25%
Duration of the Energy Savings Events (n=13)	8%	8%	15%	15%	15%
Notification of the Energy Savings Events (n=12)	8%	0%	25%	17%	8%

Figure J-11 displays the variances in satisfaction ratings across these program components and clearly illustrates the program components that were best and least liked. Participants strongly disliked both the duration of the DR events (2.08 average rating) and the notification of the DR events (1.92 average ratings). Although these responses are qualitative, they suggest that the BST program participants wanted more information about the actual timing of DR events.

Figure J-11: Average Satisfaction Ratings with BST DR Program Components



Five respondents indicated that the program was easy to participate in, and they reported good interactions with the Evergy team. However, two respondents were disappointed in the lower level of incentives compared to previous years. At the same time, three indicated that the curtailment events lasted too long or were difficult for them to participate in at 5 p.m. One respondent said the curtailment period made their work environment "uncomfortable."

COVID Impacts

More than three-quarters of these respondents (77 percent) indicated that the coronavirus pandemic had adversely affected their overall program operations. Using a five-point scale where "1" meant "Not Impacted" and "5" meant "Greatly Impacted," 64 percent of the participants provided a rating of "4" or "5," as Table 2 shows.

Table J-25: Level of COVID Impacts Regarding Energy Efficiency Operations

The impact of COVID on daily operations relating to energy efficiency		Percent of Responses (n = 48)
Not impacted	1	8%
	2	4%
	3	23%
	4	19%
Greatly Impacted	5	31%

The pandemic forced respondents to curtail business operations, such as not hosting large meetings or redirecting patients to receive visits curbside. One travel agency canceled all upcoming trips for their clients, while another respondent mentioned that their organization was short-staffed.

On a more positive note, the respondents indicated that the pandemic did not affect their ability to reduce energy usage through the same five-point scale, with 62 percent awarding a score of "1" on the five-point scale.

Table J-26: Level of COVID Impacts on Reducing Energy Usage

How has the coronavirus pandemic affected your ability to reduce energy usage during events?		Percent of Responses (n = 13)
Not impacted	1	62%
	2	8%
	3	0%
	4	0%
Greatly Impacted	5	15%
Not sure		15%

Business Firmographics

This section summarizes the characteristics of the business respondents. As Table J-27 shows, most work in office buildings (50 percent). Most businesses operate only one

location (82 percent), while one respondent had four areas and one respondent reported five separate business locations.

Table J-27: Summary of Organization Types

Type of Organization	Percent of Responses (n = 14)
Office	50%
Religious / House of Worship	14%
Other (please specify)	14%
Hospital	7%
Restaurant	7%
Prefer not to answer	7%

On average, these businesses have been in operation for 12.45 years. However, the number of years in business ranged from one to 35 years.

Majority of participants owned (58 percent) their buildings, while 25 percent leased and 17 percent were unsure. The average size of these facilities was 5,100 sq. ft.

These businesses employed, on average, 5 employees while the total number of staff ranged from one to 10 full-time employees. As Table J-28 shows, most respondents reported gross annual sales between $250,000 to $1 million (n = 4), while two respondents reported gross sales above $1 million annually.

Table J-28: Approximate Gross Annual Revenues in 2021

Approximate Gross Annual Revenue	Percent of Responses (n = 9)
Less than $50,000	11%
$250,001- $500,000	22%
$500,001- $1 million	22%
More than $1 million	22%
Prefer not to answer	22%

Appendix K Pay As You Save Program-Specific Methodologies

This chapter describes the evaluation activities that were performed by ADM to evaluate the Pay As You Save Program. The Pay As You Save Program is part of Evergy's products & services incubator programs.

K.1 Program Overview

The Pay As You Save (PAYS) pilot program supports the adoption of energy efficient equipment in residential homes by offsetting the upfront cost associated with major home improvements and upgrades. Through the PAYS program, customers can reduce their monthly electric bills while also making their home more energy efficient. Each project approved through the program is designed to be a cost-effective bundle of upgrades, meaning that the estimated savings on customer's monthly bills from the installation of the upgrades must be more than the cost to install the measures. Customers finance the upgrades through a fixed monthly PAYS charge added to their monthly bills.

In 2021, the PAYS program facilitated the installation of energy efficient air conditioners, smart thermostats, ceiling insulation, and air sealing measures. Program participants also received energy saving kit measures at no-cost that included a variety of light-emitting diode (LED) light bulbs, power strips, pipe insulation, faucet aerators, and low-flow shower heads.

The program was launched in September 2021. Over 800 customers applied to participate during the 2021 program year, of those approximately 8 percent (32) were approved to receive energy efficient upgrades through the program.

Table K-1 on the following page provides a summary of program metrics for the 2021 program year. Program costs were $77,595.53. Reported annual energy savings exceeded program projections. Overall, gross verified energy savings developed through ADM's impact evaluation were equal to reported savings and reported demand reduction, representing a gross realization rate of 100 percent for both. Actual savings for 2021 fell far below program expectations as a late launch of the program lead to only 7% of intended projects being completed.

Table K-1: Performance Metrics – Pay As You Save Program

Metric	PY2 Total	MO West	MO Metro
Number of Projects Completed	5	2	3
Energy Impacts (kWh)			
Targeted Energy Savings	311,709	155,855	155,855
Reported Energy Savings	17,199	7,179	10,020
Gross Verified Energy Savings	17,199	7,179	10,020
Net Verified Energy Savings	17,199	7,179	10,020
Peak Demand Impacts (kW)			
Targeted Peak Demand Savings	35.00	17.50	17.50
Reported Peak Demand Savings	3.86	2.31	1.56
Gross Verified Peak Demand Savings	3.86	2.31	1.56
Net Verified Peak Demand Savings	3.86	2.31	1.56
Benefit / Cost Ratios			
Total Resource Cost Test Ratio	-	-	-

K.2 EM&V Methodologies

The following section details the methodologies ADM used to verify retail sales, estimate energy and peak demand impacts, and assess the performance for the PAYS program.

K.2.1 Data Collection

For 2021, the primary data resource used for M&V review was program tracking data obtained from EEtility. This tracking data was used as the basis for quantifying participation and assessing program impacts. Tracking data contained the following information used for verification of program savings:

- Measure description
- Measure characteristics (square footage installed, wattage, quantity installed)
- Project date

To inform the process evaluation, ADM also conducted an in-depth interview with program staff at Evergy and the implementation contractor. This interview provided insight into various aspects of the program and its organization. Interviewees also discussed aspects of the program operations that they considered to be successful, and the challenges faced over the course of the program year. These results are presented in Section K.6.

K.2.2 Gross Impact Methodology

Since PAYS participants did not begin receiving program measures until September 2021, estimating energy savings via regression modeling was not yet feasible. Instead, ADM compared savings attributed to the retrofit measures installed through the PAYS program by validating savings according to the relevant unit energy savings methodology from the Evergy Technical Reference Manual (Evergy TRM). ADM's evaluation consisted of:

- Reviewing the assumptions and inputs associated with the deemed savings values
- Verifying that the deemed per-unit impacts were applied appropriately

Applied savings values were verified at the measure-level for each project completed through the PAYS program.

K.3 Gross Impact Findings

The tracking data compiled by the implementor and provided for the PAYS program identified a total of 140 energy efficient measures that were installed as a part of 5 projects during 2021. Table K-2 shows the reported quantities and impacts of each measure installed in Missouri Metro and Missouri West; Table K-3 provides additional details for LED lightbulbs.

Table K-2: Reported Quantities and Impacts

Jurisdiction	Measure	Quantity Installed	Reported kWh	Reported kW
MO West	Air Sealing	2	1,585.61	0.2825
	Air Conditioner	1	1,392.74	1.5423
	Ceiling Insulation	2	1,143.99	0.1910
	LED Light Bulbs	25	1,784.70	0.0880
	Pipe Wrap	6	738.98	0.0846
	Smart Power Strip	2	206.00	0.0230
	Smart Thermostat	1	326.65	0.0976
	Sub Total	**39**	**7,178.67**	**2.3090**
MO Metro	Air Sealing	3	2,479.28	0.4417
	Ceiling Insulation	3	1,753.46	0.2928
	Faucet Aerator	1	19.04	0.0299
	LED Light Bulbs	71	2,525.16	0.3040
	Low Flow Shower Head	1	207.43	0.0200
	Pipe Wrap	16	1,970.60	0.2256
	Smart Power Strip	4	412.00	0.0460
	Smart Thermostat	2	653.30	0.1952
	Sub Total	**101**	**10,020.27**	**1.5552**
Total		**140**	**17,198.94**	**3.8642**

Table K-3: Reported Quantities and Impacts: LED Light Bulbs

Jurisdiction	Measure Type	Classification	Quantity Installed	Reported kWh	Reported kW
MO West	Candle LED 4 Watt	Decorative	7	252.8274	0.0308
	Globe LED 5 Watt	Decorative	5	180.5910	0.0220
	Exterior Flood LED Par 38 14 Watt	Standard	5	1,062.3250	0.0000
	Standard 9W A19 LED T2	Standard	8	288.9456	0.0352
MO Metro	Candle LED 4 Watt	Decorative	20	722.3640	0.0880
	Globe LED 5 Watt	Decorative	15	541.7730	0.0660
	Can Retro Trim Kit LED 13 Watt	Directional	6	177.4776	0.0180
	Standard 9W A19 LED T2	Standard	30	1,083.5460	0.1320

K.3.1 Verification

To verify the types and quantities of installed measures, ADM reviewed the program tracking database to determine that the measures were claimed during the program year and that reported measure savings adhered to the Evergy TRM guidelines accurately. Since there was a lack of sufficient post-period data needed to complete a regression analysis to confirm measure savings, ADM calculated verified energy and demand impacts based on Evergy TRM deemed savings values.

ADM found that all reported impacts were calculated in accordance with the deemed savings algorithms, see Table K-4 for more details. The average energy savings per project was approximately 3,440 kWh[27] and the average demand reduction per project was approximately 0.77 kW.[28]

[27] Average per-project energy savings was 3,590 kWh for Missouri West and 3,340 kWh for Missouri Metro.
[28] Average per-project demand reduction was 1.15 kW for Missouri West and 0.52 kW for Missouri Metro.

Table K-4: Verified Measure Quantities and Gross Impacts

Jurisdiction	Measure	Reported kWh	Reported kW	Verified kWh	Verified kW
MO West	Air Sealing	1,585.61	0.2825	1,585.61	0.2825
	Air Conditioner	1,392.74	1.5423	1,392.74	1.5423
	Ceiling Insulation	1,143.99	0.1910	1,143.99	0.1910
	LED Light Bulbs	1,784.70	0.0880	1,784.70	0.0880
	Pipe Wrap	738.98	0.0846	738.98	0.0846
	Smart Power Strip	206.00	0.0230	206.00	0.0230
	Smart Thermostat	326.65	0.0976	326.65	0.0976
	Sub Total	**7,178.67**	**2.3090**	**7,178.67**	**2.3090**
MO Metro	Air Sealing	2,479.28	0.4417	2,479.28	0.4417
	Ceiling Insulation	1,753.46	0.2928	1,753.46	0.2928
	Faucet Aerator	19.04	0.0299	19.04	0.0299
	LED Light Bulbs	2,525.16	0.3040	2,525.16	0.3040
	Low Flow Shower Head	207.43	0.0200	207.43	0.0200
	Pipe Wrap	1,970.60	0.2256	1,970.60	0.2256
	Smart Power Strip	412.00	0.0460	412.00	0.0460
	Smart Thermostat	653.30	0.1952	653.30	0.1952
	Sub Total	**10,020.27**	**1.5552**	**10,020.27**	**1.5552**
Total		**17,198.94**	**3.8642**	**17,198.94**	**3.8642**

K.4 Net Savings Evaluation Findings

For 2021, ADM applied a designated NTG value of 1.0. Though the late launch of the program significantly limited customer surveying activities, this deemed value is supported by staff interviews and program design. For example, during conversations with program staff as a part of the program's process evaluation, staff reported that many of the customers who initially expressed interest in the program were ultimately not eligible to participate, as they had already installed cost-effective measures. This finding supports the program design strategy, which seeks to enroll customers who have a financial barrier to energy efficient product adoption and are therefore not typical early adopters (i.e., free riders). This design strategy coupled with the challenge of finding eligible customers supports a low level of free ridership in the program during 2021, therefore ADM chose to use a free ridership score of 0 (and correspondingly a NTG ratio of 1.0). The net savings for 2021 are summarized in Table K-5.

Table K-5: Net Verified Savings

Jurisdiction	Measure	Gross Verified kWh	Gross Verified kW	NTG Ratio	Net Verified kWh	Net Verified kW
MO West	Air Sealing	1,585.61	0.2825	1.00	1,585.61	0.2825
	Air Conditioner	1,392.74	1.5423	1.00	1,392.74	1.5423
	Ceiling Insulation	1,143.99	0.1910	1.00	1,143.99	0.1910
	LED Light Bulbs	1,784.70	0.0880	1.00	1,784.70	0.0880
	Pipe Wrap	738.98	0.0846	1.00	738.98	0.0846
	Smart Power Strip	206.00	0.0230	1.00	206.00	0.0230
	Smart Thermostat	326.65	0.0976	1.00	326.65	0.0976
	Sub Total	**7,178.67**	**2.3090**	**1.00**	**7,178.67**	**2.3090**
MO Metro	Air Sealing	2,479.28	0.4417	1.00	2,479.28	0.4417
	Ceiling Insulation	1,753.46	0.2928	1.00	1,753.46	0.2928
	Faucet Aerator	19.04	0.0299	1.00	19.04	0.0299
	LED Light Bulbs	2,525.16	0.3040	1.00	2,525.16	0.3040
	Low Flow Shower Head	207.43	0.0200	1.00	207.43	0.0200
	Pipe Wrap	1,970.60	0.2256	1.00	1,970.60	0.2256
	Smart Power Strip	412.00	0.0460	1.00	412.00	0.0460
	Smart Thermostat	653.30	0.1952	1.00	653.30	0.1952
	Sub Total	**10,020.27**	**1.5552**	**1.00**	**10,020.27**	**1.5552**
Total		**17,198.94**	**3.8642**	**1.00**	**17,198.94**	**3.8642**

K.5 Impact Evaluation - Final Savings Tables

Based on the impact evaluation results, the total verified gross energy savings for the PAYS Program are 17,199 kWh, and the total verified gross peak demand savings are 3.86 kW. Table K-6 below summarizes the verified gross energy and demand savings for the PAYS Program.

Table K-6: Program Gross Energy Savings (kWh) and Peak Demand Reduction (kW)

Jurisdiction	Reported Energy Savings (kWh)	Reported Demand Reduction (kW)	Gross Verified Energy Savings (kWh)	Gross Verified Demand Reduction (kW)	RR_{kWh}	RR_{kW}
MO West	7,179	2.31	7,179	2.31	100%	100%
MO Metro	10,020	1.56	10,020	1.56	100%	100%
Total	**17,199**	**3.86**	**17,199**	**3.86**	**100%**	**100%**

Table K-7 and Table K-8 summarize the verified net impacts of the PAYS program.

Table K-7: Verified Gross and Net Annual Energy Savings (kWh)

Jurisdiction	Free Ridership	NTG Ratio	Gross Verified Energy Savings (kWh)	Net Energy Savings (kWh)
MO West	0%	100%	7,179	7,179
MO Metro	0%	100%	10,020	10,020
Total	**0%**	**100%**	**17,199**	**17,199**

Table K-8: Verified Gross and Net Peak Demand Reduction (kW)

Jurisdiction	Free Ridership	NTG Ratio	Gross Verified Energy Savings (kW)	Net Energy Savings (kW)
MO West	0%	100%	2.31	2.31
MO Metro	0%	100%	1.56	1.56
Total	**0%**	**100%**	**3.86**	**3.86**

K.6 Process Evaluation

This section summarizes the results from the process evaluation of Evergy's Pay-As-You-Save (PAYS) program based on feedback from interviews with the program staff and third-party implementer as well as reviewing available program materials.

The Pay-As-You Save (PAYS) offers customers the ability to make needed energy efficiency improvements in their homes, while also lowering their overall energy bills. The

energy savings from these improvements are used to repay the costs of these improvements through a fixed monthly PAYS charge on customer's bill.[29]

Customers sign up for a free home energy assessment to identify upgrades that save energy. If the home is eligible for energy efficiency upgrades, customers receive a customized plan called The Easy Plan, which describes the recommended improvements available for funding. Evergy will fund up to 80% of the estimated annual bills savings for the eligible measures based on a 12-year term. The customer will repay the cost through a fixed monthly charge on their current Evergy bill. Since the new energy-efficient equipment saves money by using less energy, the customer's bill could be lower than before, even while paying off the upgrade each month.

A critical program element is that all eligible measures must be considered "cost-effective" to ensure that the estimated bill savings from these upgrades will cover the installation cost for no more than 12 years.

The PAYS program includes measures that are installed for free during the energy audit, as well as the funds to pay for more comprehensive upgrades, which includes:

- Low flow showerheads
- Faucet aerators
- Water heater wraps
- Standard LED lights
- Smart Power Strips

Additional measures that have been determined to be cost-effective and are eligible to be installed through the PAYS program include:

- HVAC upgrades
- Attic insulation
- Air sealing
- Duct sealing
- Heat pump water heaters

For several decades, the program model has been successfully implemented in both rural electric cooperatives and Investor-Owned-Utilities (IOUs).

Evergy launched the one-year pilot program from September 21 through September 30, 2022.

[29] Program information is available at the following websites: https://www.evergy.com/-/media/documents/ways-to-save/programs/pays-questions-and-answers.pdf?la=en

K.6.1 Program Staff Operations

This section summarizes the results from the process evaluation of the PAYS program based on a review of available program materials and feedback from in-depth interviews with the program staff and third-party implementer.

Roles and Responsibilities

The PAYS program is run by the Evergy Program manager and its implementer EEtility, a third-party firm that specializes in PAYS program delivery for utility clients. The current project manager spends about 50 percent of the time managing this program, while the other 50 percent is devoted to managing Evergy's residential heating and cooling programs.

Currently, the implementation contractor has eight employees assigned to the program. The primary responsibilities of the implementation contractor are to:

- Conduct the home energy analysis to determine the cost-effectiveness of potential measures. Three data collectors conduct the energy audits; however, EEtiliy is currently looking for an additional data collector.
- Back office and IT staff manage the enrollment process and provide customer support.

Initially, the program did not have enough qualified data collectors, which delayed the enrollment process for customers at the initial launch. Specifically, there was "friction" between the data collectors, who gather the inputs to create customer's "Easy Plan," a modeling document used to identify cost-effective measures. Due to "data collector negligence" in the early days of the program launch, the implementer had to increase the overall training of the data collection staff to ensure that they were capturing all relevant information during the initial energy audit. As the implementer explained, even though the data collectors were certified through the Building Performance Institute (BPI), they needed additional training to ensure they gathered all of the required information needed for the energy modeling.

"As of a couple of weeks, we've tightened everything up very well. I'm really happy with the direction we're going." (Program Implementer)

Program Performance

The overall participation goal was to complete 926 projects during the pilot year, which would finance up to $7 million in funding for these energy efficiency improvements, an estimate of $7,500 per home.

However, the participation goals are significantly lower than anticipated. Although the program has received 926[30] interest forms to date, the actual number of committed projects is considerably smaller with just nine completed projects and 32 in process.

"We are not as on track as we would like to be. The largest friction point is the data collection piece." (Program Implementer)

To increase the total number of program enrollments, the implementer has developed a data collection app that allows the utility to outsource the data collection activities. The implementer is also hiring another energy analyst to increase the cadence of completing the energy audits and sharing the results with the customers.

An unexpected challenge arose during the first few months of program operation. Initially, many customers who expressed interest in the program were ultimately not eligible to participate, as they had already installed cost-effective measures. As a result, many of the energy audits conducted early in the program did not lead to program participation.

Program Participation and Marketing

The PAYS program was launched on September 27, 2021. Evergy sent out marketing materials one week before the program launch.

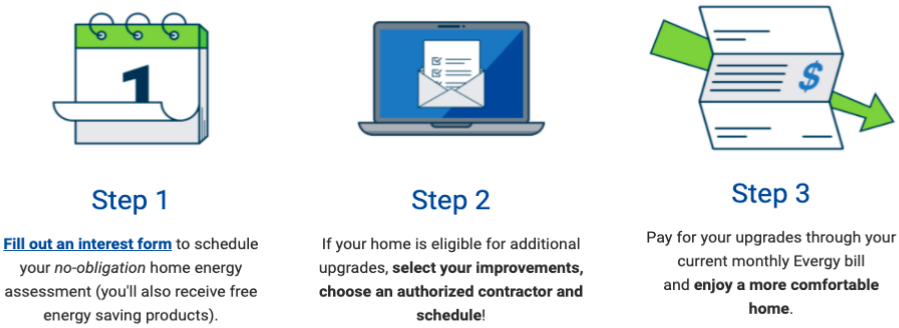
Working with its implementation contractor, Evergy identified 60,000 residential customers with higher-than-average energy usage based on building characteristics, including increased energy consumption per square foot and other building characteristics. The eligible customers received targeted emails explaining the program and directing them to the interest form on the program website.

Evergy staff also informed a selected group of participating trade allies about the PAYS program as another way to support program enrollment. These trade allies cover both the rural and urban portions of Evergy's service territory.

The program is open to all Missouri residential homeowners and renters who receive the landlord’s consent. Interested customers complete an online interest form, answer a few questions about their homes, and schedule an in-person energy audit. Figure K-1 illustrates the enrollment process for the customer.

[30] The majority (88%) were submitted in 2021 (n=808) while another 118 were submitted in January 2022.

Figure K-1: PAYS Enrollment Process



A higher than anticipated customer response, coupled with a staffing shortage, led to some delays in the initial scheduling of the energy audits. To manage the process, the program implementer created a waitlist for customers, as the marketing "outperformed the marketing projections."

More recently, the implementer resolved the staffing shortage, and the time between the initial request and the energy audit is within two to three business days.

The program implementer also developed some customer education materials that explain the "Easy Plan" energy audit. According to both the program implementer and program staff, the customer feedback has been very positive.

In addition to receiving the free measures, the most popular measures installed through the pilot have been smart thermostats, air sealing, lighting, HVAC units, and insulation. According to both the program staff and the implementer, these are also the most cost-effective measures for the participating customers and thus should result in energy savings and lower energy bills.

Challenges for Program

There have been some challenges in data tracking as well, as the database from the program implementer (EEtility) was not fully aligned with the third-party database managed by Resource Innovations.

"We had several growing pains, and it wasn't easy getting the data over to (Evergy) in 2021. We are working on automated data systems." (Program Implementer)

Data tracking for this program involves sending the enrollment information to the program implementer responsible for generating the monthly bills (Oracle), which matches program enrollment to the monthly customer billing system. The Oracle database creates the billing record of the total due and generates the monthly payment for each customer.

However, both program staff and the implementer explained that this process has made “a few hiccups," and some customer files have been rerun. The program manager's goal is to resolve these issues by February 2022.

K.6.2 Customer Survey

The program manager has fielded two customer surveys during this pilot period. The first survey was sent to program "dropouts," those who had an audit but did not follow through with the installations. The second survey was aimed at customers who have completed the installations, but there have been no customer responses for the questionnaire.

Overall, customer satisfaction was 7.9 on a ten-point scale regarding the energy assessment. Additional survey results are forthcoming.

K.6.3 Areas for Program Improvement

Both the utility and implementation staff identified several areas for program improvement, which included:

- Develop a procedure for handling "write-offs" should the need arise in the final months of the pilot. This documentation is especially valuable if the pilot program can mature into a full-fledged MEEIA program.
- Continue to explore co-delivery options with Spire, the natural gas utility in Evergy’s service territory. Joint delivery of this program will provide enhanced benefits for both gas and electric customers and expand the overall reach of the program.
- Refine the marketing materials to focus on eligible customers based on energy usage.
- Accelerate data collection activities through the app to move customers more quickly through the energy audit process.

K.7 Conclusions and Recommendations

The following summarizes the key findings from the evaluation of the Pay As You Save Program.

- A total of 5 projects were completed for 2021 through the PAYS program. These projects resulted in a total verified net annual energy savings of 17,199 kWh and a total net peak demand reduction of 3.86 kW.

- Initially, the program faced several obstacles to successful customer enrollment including:
  - A higher than anticipated customer response rate from customers who would ultimately not qualify for additional equipment upgrades. Neither the program staff nor the implementation team had anticipated the surge of interest among "early adopters".
  - Delays in collecting data to generate the Easy Plan due to a lack of training and availability of data collectors. Due to these delays, the program has fallen significantly short of its planned financing goals of $7 million, as only 9 projects have been completed within the program year.
- The Evergy program staff still faces challenges tracking the program data in the database run by Resource Innovations. Generating a new customer record is a complex process that has not been fully automated. However, the utility and implementation staff are addressing these issues, and program enrollment should increase in 2022.

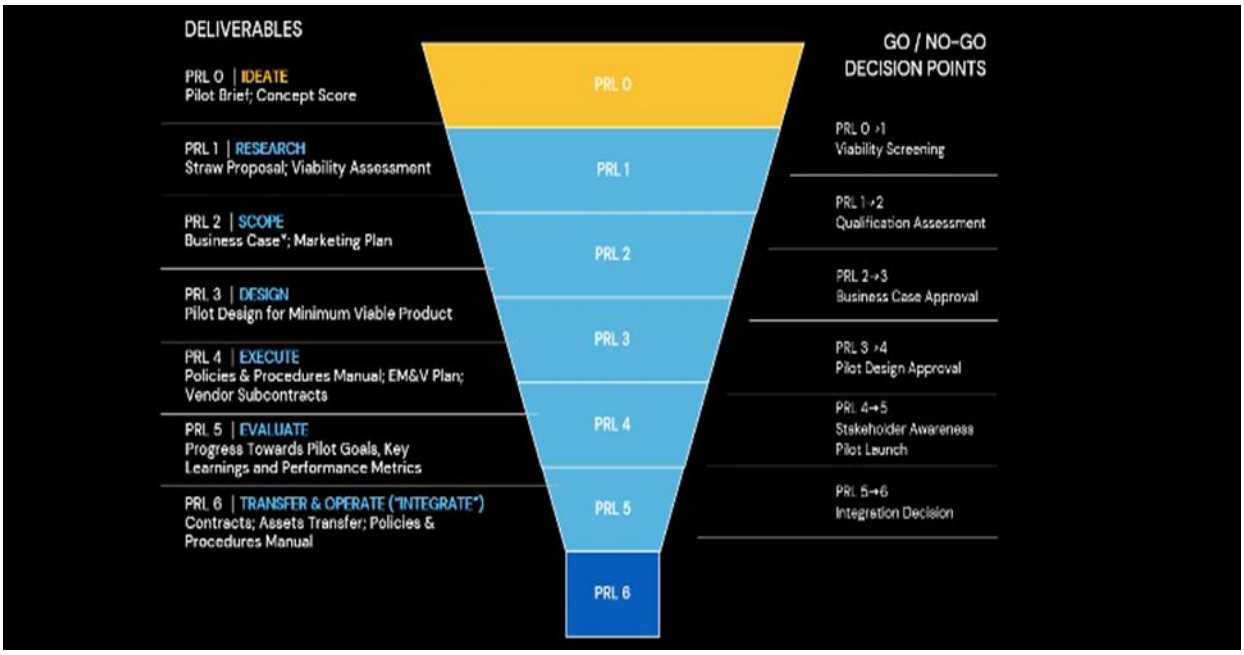
ADM recommends the following to support the continued improvement and development of Evergy's Pay As You Save Program:

- **Evergy and its third-party implementer should continue using "workarounds" regarding data collection, including deploying the data collection app to accelerate program enrollment.**
- **The program implementer should continue hiring and training qualified data collectors to augment the data collection process further.** ADM can support improvements to the program tracking data by recompleting quarterly data reviews and providing feedback to program staff.
- **Every program staff should work with the program implementer to fine-tune marketing activities to focus "on "high energy users as that will likely lead to more qualified participants.**
- **ADM should complete a follow-up evaluation to review the energy savings of PY2 projects as part of PY2022 M&V activities.** Such an evaluation would utilize monthly billing data and a regression model to confirm measure savings as originally proposed in the M&V Plan.

Appendix L Products & Services Incubator Program-Specific Methodologies

ADM completed processes analyses on three Evergy pilot programs. **Error! Reference s ource not found.** illustrates the Pilot Incubator Funnel that ICF used to vet pilot program concepts for Evergy. This figure highlights the various decision points used to determine if the pilot concept should proceed or stay at the current level. According to ICF staff, the goal is to launch between two and four pilots each year; however, this is not a "fixed goal," as the team explained.

Figure L-1: ICF Vetting Process for New Program Concepts



A significant goal in evaluating these pilot programs is to identify what, if any, energy savings are associated with them. The program design process also identifies the critical metrics needed to estimate the energy savings from the pilot programs. Hence, an essential element of the program pilot process is to gather crucial data in the first year of program operations.

L.1 Energy-Saving Trees

L.1.1 Program Overview

The Energy-Saving Trees (EST or Trees) program, started in 2019, is part of Evergy's products & services incubator programs. The program is a collaboration between Evergy,

The Arbor Day Foundation, and Bridging the Gap, and works to provide customers in the Missouri Metro jurisdiction with shade trees at no cost.

The goal of the program is to increase the overall tree canopy in the "urban core," reducing the heat island effect in urban areas and customer's energy usage. To accomplish these goals, Evergy provides eligible residential customers with trees to be planted in their yards, or at multi-family properties.

Participating Evergy customers are guided through an online dashboard where they can select the types of tree(s) that they would like to receive and select a planting location for the tree(s). The platform uses iTree, an established software system developed by the USDA Forest Service, to determine the expected savings based on the tree type and planting location. The system can also recommend the planting locations that will save the most energy. Once the participants place their order, they will either pick up their trees from designated pickup locations or receive a drop off at their requested location.

From 2019 to 2021, the Energy-Saving Trees Program provided 1,584 trees to customers in the Kansas City area, with reported savings of 186,388 kWh. Table L-1 shows the performance metrics for the Energy-Saving Trees program in 2021.

Table L-1: Performance Metrics – Energy-Saving Trees Program

Metric	PY2 Total	MO West	MO Metro
Number of Trees Provided	1,584	0	1,584
Energy Impacts (kWh)			
Targeted Energy Savings	-	-	-
Reported Energy Savings	186,388	0	186,388
Gross Verified Energy Savings	178,419	0	178,419
Net Verified Energy Savings	178,419	0	178,419
Peak Demand Impacts (kW)			
Targeted Peak Demand Savings	0	0	0
Reported Peak Demand Savings	0	0	0
Gross Verified Peak Demand Savings	0	0	0
Net Verified Peak Demand Savings	0	0	0
Benefit / Cost Ratios			
Total Resource Cost Test Ratio	-	-	-

L.1.2 EM&V Methodologies

The following section details the methodologies ADM used to verify savings from the Energy-Saving Trees Program.

Data Collection

For the 2021 evaluation, ADM used two primary data resource used for M&V review.

1. Program data provided by The Arbor Day Foundation, containing the quantity, species, and expected planting location of the trees provided through the program, as well as the annual and cumulative savings expected from the trees after 5, 10, 15, and 20 years. These future savings, calculated using iTree design methods, "use growth rates to estimate the changing size of the tree" when calculating the savings for future years[31].
2. Program survey to a representative sample of program participants to understand their perceptions of the program, whether participants planted the trees they received, the current health of the trees, and the final location where the trees were planted.

To inform the process evaluation, ADM also conducted an in-depth interview with program staff at Evergy and the implementation contractor. This interview provided insight into various aspects of the program and its organization. Respondents also discussed aspects of the program operations that they considered to be successful, and the challenges faced over the course of the program year. These results are presented in Section K.6.

Program Survey

The program survey was sent to a sample of randomly selected participants in the Energy-Saving Trees program. Each participant received a unique, single use link to the program survey, and were offered a small monetary incentive for completion of the survey. Using unique links allowed ADM tailor each respondent's questions based on their participation in the program, including the number and species of tree that they reportedly received, and the locations where they reportedly intended to plant their trees.

Of the 300 participants invited, 112 completed the program survey. The data collected provided insights into customers perceptions of the program and energy efficiency, the health of the trees they received, motivations, and satisfaction with the program.

[31] i-Tree Design Methods, September 23, 2014, available here: https://www.itreetools.org/documents/11/iTree_Design_methods.pdf

Gross Impact Methodology

This subsection summarizes the methods used to verify measure savings and calculate gross energy savings for the Energy Saving Trees Program.

Reported energy savings for the program were based on program averages calculated by The Arbor Day Foundation using the iTree Software.[32] ADM's evaluation consisted of: (1) reviewing savings estimates for a sample of trees to ensure that the reported savings did not differ dramatically from expected savings, (2) analyzing program survey results to determine that program attrition (trees that were not planted or did not survive), and (3) verifying that the final planting location for the trees aligned with the location that participants reported when they ordered their trees.

Program Planting Rate and Mortality Rate

Final program savings were calculated by adjusting the savings reported for each tree in the iTree report, based on the percentage of delivered trees that were planted (Planting Rate), and percentage of trees that survived from planting to the time of the program survey (Mortality Rate), as reported in the program survey.

The 112 respondents to the program survey received a total of 189 trees (an average of 1.7 trees per participant). Of these, 105 respondents (94 percent) reported planting all the trees they received, while 2 percent planted some of their trees, and 4 percent did not report planting any of their trees. Based on the participant responses, 179 of the 189 trees received were planted, for a planting rate of 95 percent.

Of those who reported planting their trees, 64 percent reported that prior to the winter of 2021, the tree was healthy and growing, and 10 percent reported that their tree died, with the remainder reporting that their tree was growing slowly, had few needles or leaves, or some other condition. Respondents reported that 26 trees had died as of the winter of 2021, resulting in a mortality rate of 14 percent relative to the number of trees delivered.

Using the results from the program survey, ADM calculated an attrition rate the ratio of the number of trees planted and alive, and the number of trees delivered. The overall attrition rate for the Energy-Saving Trees program was found to be of 81 percent, as shown in Table L-2.

[32] www.itreetools.org, accessed 3/19/2022

Table L-2: Planting and Mortality Rates for the Energy-Saving Trees Program

Metric	N Trees	Percentage
Received	189	95%
Planted	179	95%
Living	153	81%
Rate of Attrition	**-**	**81%**

Location Adjustments

When applying for the program, each participant selected a location where they were intending to plant their trees (Intended Location). To determine if the participants planted their trees at the intended location, the participant survey showed select participants the Intended Location, and asked the respondents to report whether this matched the actual location where the trees were planted (Actual Location). Due to limitations in the surveying methodology, ADM was only able to display the intended location to respondents who were completing the survey on personal computers, rather than mobile devices. Due to this constraint, only 19 respondents were able to view the intended planting location and report the actual planting location of the trees.

Of the 19 respondents who were able to view the intended planting location, 76 percent planted their trees at or near the location where they initially intended, while the remaining 24 percent planted their trees at another location. Participants changed their planting locations due to personal preference or physical constrains such as overhead power lines or underground gas lines. The other planting locations included other properties, an urban farm, or near the neighborhood sign (in the case of two trees provided to the neighborhood association).

Due to the small number of responses received to the location adjustment question, program savings were not adjusted due to planting locations. Further research will be necessary to determine a statistically significant adjustment rate based on the actual and intended planting location.

L.1.3 Gross Impact Findings

To determine gross reported savings, ADM compiled a program dataset using data received from the Arbor Day Foundation and information in the 2021 Evergy TRM. There were 15 species of trees provided through the program between 2019 and 2021, though only 5 species of tree were included in the 2021 Evergy TRM. In order to establish savings estimates for the remaining 11 species, ADM mapped each missing species to one of the 5 species in the TRM, based on mapping provided by Evergy and Bridging the Gap, as shown in Table L-3.

Table L-3: Mapping of Tree Species to TRM Values

Tree Species	TRM Mapping
American Sycamore	Tuliptree
Baldcypress	Tuliptree
Tulip Poplar	Tuliptree
Sugar Maple	Sugar Maple
American Linden (Basswood)	Sugar Maple
Red Maple	Sugar Maple
River Birch	Sugar Maple
Kentucky Coffeetree	Sugar Maple
Shumard Oak	Shumard Oak
Bur Oak	Shumard Oak
Northern Red Oak	Shumard Oak
Swamp White Oak	Shumard Oak
Short Leaf Pine	Short Leaf Pine
White Pine	Short Leaf Pine
Yellowwood	Black Gum

Verified savings were calculated based on the iTree savings estimates provided for each tree by The Arbor Day Foundation. Savings estimates were then adjusted based on the attrition rate calculated from the program survey. For Bur Oak, Red Maple, and River Birch, the savings reported by The Arbor Day Foundation differed significantly from the savings for the appropriate species in the Evergy TRM, resulting in wide discrepancies between the reported and verified savings. However, the overall program realization rate was 96 percent.

Total counts of delivered trees, reported and verified kWh savings, and realization rates, by species are shown in Table L-4. No demand reductions are claimed for this measure.

Table L-4: Quantities and Reported and Verified Impacts by Tree Species

Jurisdiction	Tree Species	Quantity Installed	Reported kWh	Verified kWh	RR
MO Metro	American Linden (Basswood)	63	4,233.47	4,688.15	111%
	American Sycamore	149	22,942.22	20,527.46	89%
	Baldcypress	150	23,096.19	20,306.88	88%
	Bur Oak	97	13,059.80	5,800.84	44%
	Kentucky Coffeetree	60	4,031.87	2,753.60	68%
	Northern Red Oak	120	16,156.45	13,809.15	85%
	Red Maple	40	2,687.92	5,257.27	196%
	River Birch	181	12,162.82	24,475.10	201%
	Short leaf Pine	31	7,075.21	6,687.64	95%
	Shumard Oak	127	17,098.91	13,842.17	81%
	Sugar Maple	151	10,146.88	12,665.55	125%
	Swamp White Oak	60	8,078.23	7,617.89	94%
	Tulip poplar	158	24,327.99	20,633.52	85%
	White Pine	50	11,411.63	10,737.77	94%
	Yellowwood	147	9,878.09	8,615.82	87%
Total		**1584**	**186,387.66**	**178,418.80**	**96%**

L.1.4 Net Savings Evaluation Findings

For PY2, ADM applied a designated NTG value of 1.0. The designation as pilot program and the small overall size of the Energy-Saving Trees Program did not justify the development of a net-to-gross ratio for this program.

L.1.5 Impact Evaluation - Final Savings Tables

Based on the impact evaluation results, the total verified gross energy savings for the Trees Program are 178,419 kWh. There are no demand savings claimed for the Trees program. Table L-5 below summarizes the verified gross energy and demand savings for the Energy-Saving Trees Program.

Table L-5: Program Gross Energy Savings (kWh) and Peak Demand Reduction (kW)

Jurisdiction	Reported Energy Savings (kWh)	Reported Demand Reduction (kW)	Gross Verified Energy Savings (kWh)	Gross Verified Demand Reduction (kW)	RR_{kWh}	RR_{kW}
MO West	-	-	-	-	-	-
MO Metro	186,388	0	178,419	0	96%	-
Total	**186,388**	**0**	**178,419**	**0**	**96%**	**-**

Table L-6 summarizes the verified net impacts of the Energy-Saving Trees Program.

Table L-6: Verified Gross and Net Annual Energy Savings (kWh)

Jurisdiction	Free Ridership	NTG Ratio	Gross Verified Energy Savings (kWh)	Net Energy Savings (kWh)
MO West	-	-	-	-
MO Metro	0%	100%	178,419	178,419
Total	**0%**	**100%**	**178,419**	**178,419**

L.1.6 Process Evaluation

This section summarizes the findings from the process evaluations for Evergy's Energy-Saving Trees pilot project.

Program Staff Operations

This section outlines the findings from in-depth interviews conducted with Evergy program staff and its program partners: Bridging the Gap and The Arbor Day Foundation. The program was launched in Spring 2019.

Roles and Responsibilities

The Evergy Program Manager oversees this program and other duties, which include managing the products and services incubator program. This is an interim position until Evergy hires a new program manager for this pilot.

For the past three years, Evergy staff has worked with The Arbor Day Foundation and Bridging the Gap (BTG) to design and deliver this program to Evergy's customers. The Arbor Day Foundation has two staff members that provide overall guidance and administrative support to their utility and nonprofit program partners. The Arbor Day Foundation developed the initial grant for the program funded through the U.S. Forest

Service. The Arbor Day Foundation also runs similar shade tree programs for utilities throughout the United States.

Bridging the Gap is a Kansas City-based non-profit organization that provides various environmental educational programs.[33] They handle the distribution of the selected trees to Evergy's customers in the Missouri Metro jurisdiction.

Program Design

The program design for this pilot differed from other short-term pilots in that the program had been operating for several years before the current MEEIA cycle.

"This pilot is a little bit different than others…the process and this setup were already completed in prior years, which is very nice." (Evergy Program Manager)

Eligible customers may select up to two trees for planting in their yards. The iTree software, linked to Google Maps, indicates the ideal location to plant each tree to maximize energy savings by providing increased shade.

The Arbor Day Foundation and Bridging the Gap organize two tree giveaway events each year, one in the Spring and one in the Fall. Bridging the Gap handles the logistics of distributing these trees while The Arbor Day Foundation identifies the best tree species to giveaway during each event.

Overall, the program design has been modified slightly since the program launch. These modifications were primarily improvements to the iTree software program.

Program Participation and Marketing

Given the unique nature of this pilot, there were no established participation goals as the number of available trees fluctuated seasonally.

"The goal was the education and getting these trees (planted). We did have priority areas set throughout Kansas City that we were trying to focus on, but there no specific participation goals." (Program Partner)

"I think that the program has been performing well…It has been very successful, and customers appreciate it." (Evergy's Program Manager)

The Arbor Day Foundation identifies the most viable tree species that will thrive in Evergy's service territory; however, the types of trees vary for each program period. Some species are also more popular than others, so not every participant may receive their first choice of a tree. Program participants may select up to two trees from a list provided by The Arbor Day Foundation.

[33] https://bridgingthegap.org/, accessed 3-17-2022

Evergy's Green Team assisted in distributing the trees at central locations throughout the service territory.

"We started utilizing them as an alternate delivery option for some of our customers…the delivery options were expanded to be available for delivery for customers who may not be able to pick up trees at a central location." (Every Program Manager)

The marketing and outreach activities focused on specific zip codes located in the urban core. The most common outreach activities included social media posts, press releases and articles in environmental publications.

"We promoted (the program) our website we in some of our other programming where we do go door-to-door." (Program Implementer)

Communication

Evergy and its partners have developed an effective communication strategy during the past three years. The team has established a regular meeting schedule which includes meeting virtually five to six times before each event. The team will also communicate more frequently via email and group chats.

"I think everyone feels comfortable, and we've got a great plan in place. [The Evergy team is] very, very detailed …I feel confident that these giveaways and distributions will be seamless on their end." (Program Partner)

Data Tracking and Quality Assurances and Controls (QA/QC)

Given the unique nature of this program, it is critical to provide support and guidance to ensure that the program participants plant and nurture the trees correctly. Both program partners provide educational materials to the participants when they receive their trees. This information supplements the guidance provided on the program website regarding the care of these trees.

"Whatever type of tree drop-off we do, whether they pick it up or drop it, we provide a 5-gallon bucket for watering [the tree, with] a branded sticker on it that talks about how often to water and sort of early young tree care tips to kind of help…The Arbor Day Foundation sends out a number of reminder emails and other things that include links on how to plant the tree properly and tips like that." (Program Partner).

However, the program partners do not monitor the trees' progress after they have been delivered. This means that if a tree dies, it will not be replaced during this event period; there is no excess inventory of available trees.

Program data are uploaded to The Arbor Day Foundation's portal. This portal tracks orders and monitors the tree inventory. It also provides information on identifying where the trees should be delivered and create maps to assist the Green Team in delivering

trees via the driveway drop-off. According to the program staff and partners, the database is valuable and practical.

Challenges for Program

The pandemic also affected the Energy-Saving Trees Program, as in-person events had to be canceled. Instead, the Bridging the Gap staff established private appointments so the participants could pick up their trees at an assigned time at th organization's offices.

The partners dropped trees off in the participants' driveways to minimize personal interactions. In addition, the program offered an outdoor public event in which the participants stayed in their cars, and the trees were loaded onto the vehicles.

"In the Spring of 2020…we also did have a public event…People would roll their window down. We were all fully masked, all volunteers. …it was an outdoor event, so we felt comfortable doing that." (Program Partner)

Both participants and the program partners viewed these distribution activities positively, as they could still safely deliver the trees.

Areas for Program Improvement

The program partners also suggested several strategies to increase the trees' overall planting and survival rate. These recommendations included:

- Having the Bridging the Gap volunteers plant the trees directly. However, this would require a release of liability from the homeowners as currently, the volunteers only plant trees on public property.
- Sending out additional email reminders to the participants to monitor and encourage them to plant and care for the trees.
- Continue to offer driveway drop-offs to ensure that the trees are delivered to the program participants, especially in the core urban areas.
- Expanding the program to renters, pending landlord approval for tree planting in these urban areas.

Evergy's Energy-Saving Trees Project Survey

To assess Evergy's Energy-Saving Trees program, the evaluation team gathered insights regarding the energy efficiency made by Evergy customers through a survey platform during 2021.

The team sent 300 individual survey links to project participants. The survey remained in the field from January 21, 2022, until January 31, 2022. Survey participants who completed the questionnaire received a monetary incentive for providing their feedback (see Table L-7).

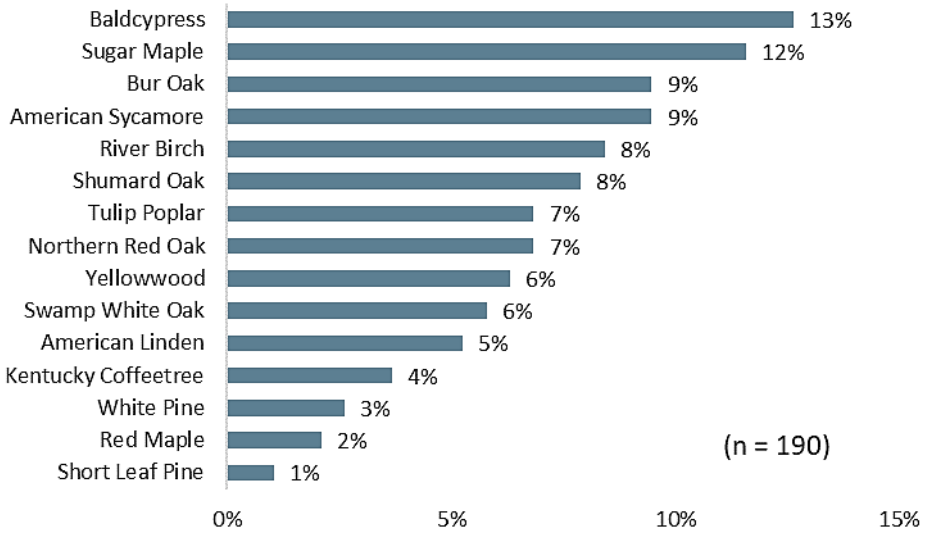
Table L-7: Summary of Email Survey Response

Metric	Result
Initially Contacted	300
Undeliverable	13
Completed	114
Response rate	38%

Overview of Pilot Program Participation

Survey participants who participated in the program ranged from time of participation, the number of trees planted, and the types of trees planted. The most common tree received by program participants was Baldcypress (13%), Sugar Maple (12%), Bur Oak (9%), and American Sycamore (9%) (see Figure L-2).

Figure L-2: Types of Trees Planted by Survey Participants



**n = number of trees total received*

Experience with Pilot Program

Of the participants who remember getting the trees from the pilot program (n = 112), 94 percent planted all the trees, 2 percent planted some trees, and 5 percent did not plant any trees (the percentage exceeds 100 percent due to rounding). Survey participants were also offered the opportunity to verify where they planted trees by clicking on a hyperlink that redirected them to a Google map location of where the trees were arranged to be planted. Of all survey respondents, 19 people were able to verify the tree(s) location(s). Of those, 58 percent verified they planted the trees where they had previously arranged the location, compared to 42 percent who stated they did not plant the tree(s) in the arranged location. The following are their answers verbatim:

"I had to plant the tree further south in the yard than planned. So it's more aligned to the center of the house now. I couldn't plant where I wanted because of the underground gas utility line (super sad)."

"The pins are pretty close, but Red Oak was planted about 20 ft. southwest of 3633 Woodland Ave, and the Kentucky Coffee Tree matches the pin that is about 20 ft. southeast of that same house."

"The locations indicated is where our mailing address is. We placed these trees two blocks to the North at our Blue Hills neighborhood marker location to [ensure] the best visibility."

"I planted the Oak at the other house I own at 4145 Highland Ave. The pine was planted at 4133 Highland Ave, in front of my urban farm."

"We planted the tree a few feet north and a tad west of where the pin was. Not very far. Maybe 50 feet."

"I couldn't put them in that location due to overhead power lines."

"They were moved a little (ten ft.)."

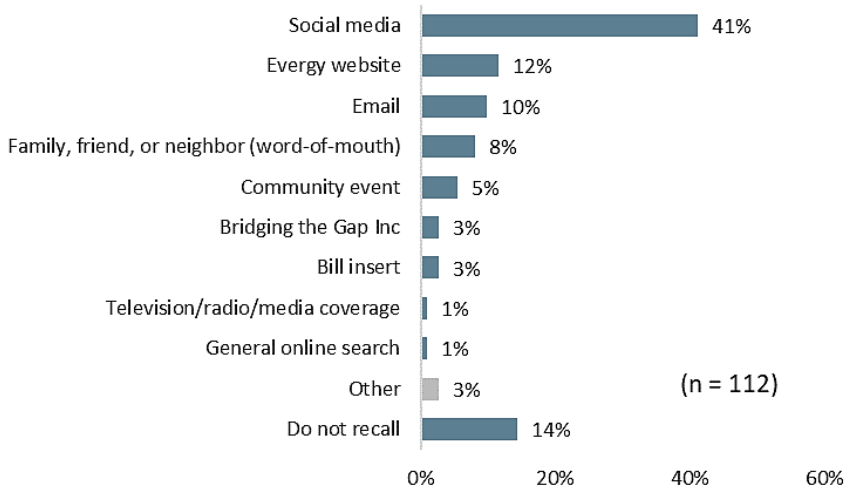
Participants provided information about the health of their tree(s). Most stated that their tree(s) were healthy and growing (64 percent), leafy with little growth (16 percent), or that their tree(s) had died (10 percent). Other participants had a combination of statuses (see Table L-8).

Table L-8: *Health Status of Tree(s)*

Tree Status	Responses (n = 107)
Healthy and growing	64%
Leafy but little growth	16%
The tree died	10%
One tree is healthy, and the other is having issues	7%
One tree is healthy, and the other one was affected by a deer	2%
No leaves or needles	2%

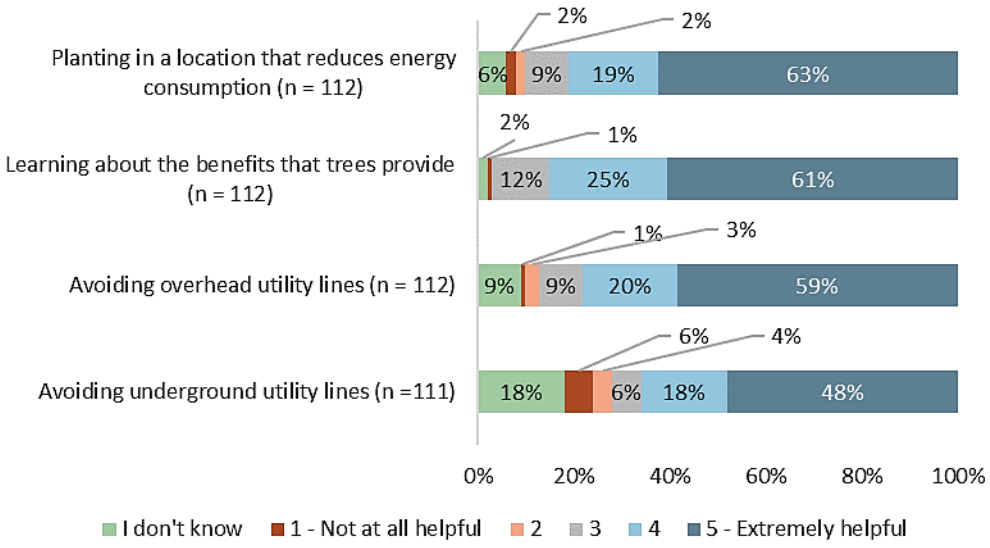
Survey participants shared how they became aware of the project. Forty-one percent indicated they learned about it through social media, 12 percent through Evergy's website, 10 percent through email, and eight percent through word-of-mouth. After participating in the pilot program and planting their trees, 91 percent indicated the pilot program met their expectations. The respondents' tree planting experience included having planted the tree(s) within a week of receiving it (91 percent), watering the tree(s) regularly (88 percent), mulching the tree's root zone (66 percent).

Figure L-3: Awareness of Evergy's Energy-Saving Trees Program



Many survey participants indicated they thought the system they used to choose their trees was helpful, specifically in the areas of planting the tree(s) in places that reduced overall energy consumption in the home and understanding the benefits that tree(s) provided for them (see Figure L-4).

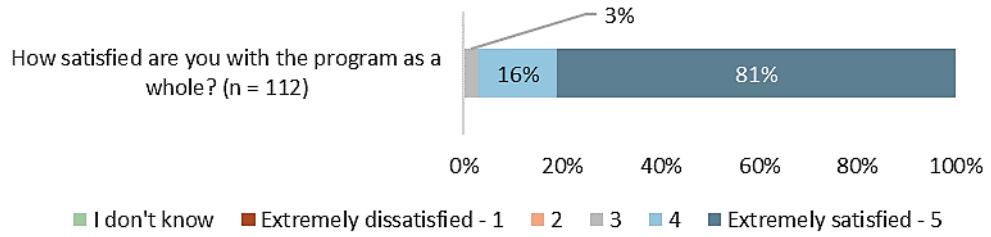
Figure L-4: Perception of System Support



Satisfaction with Pilot Program

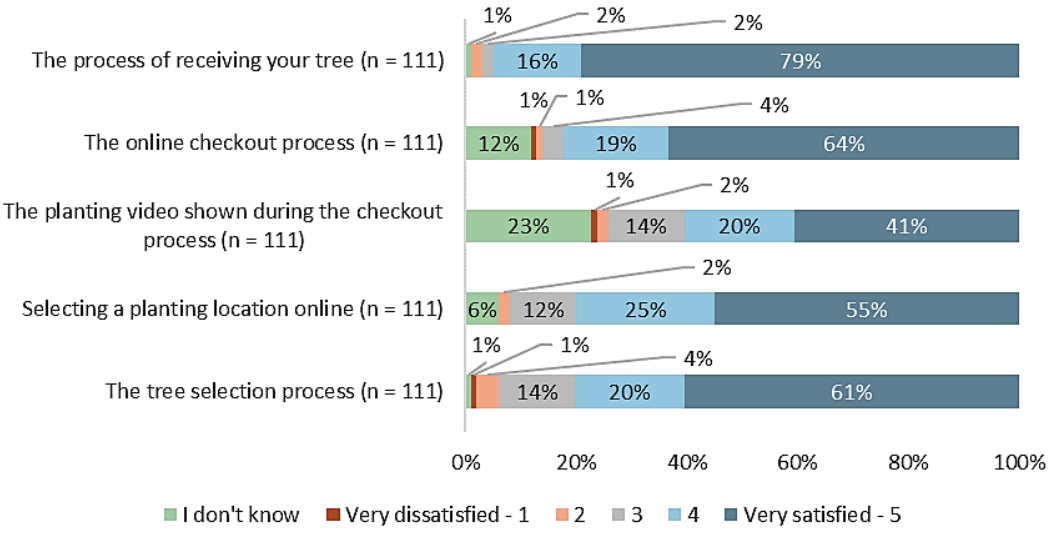
Overall, almost all survey respondents stated they were satisfied with the pilot program (see Figure L-5).

Figure L-5: Overall Pilot Program Satisfaction



Furthermore, the aspects people were most satisfied with were the process of receiving the tree (95 percent), the online checkout process (83 percent), and the tree selection process (81 percent) (see Figure L-6).

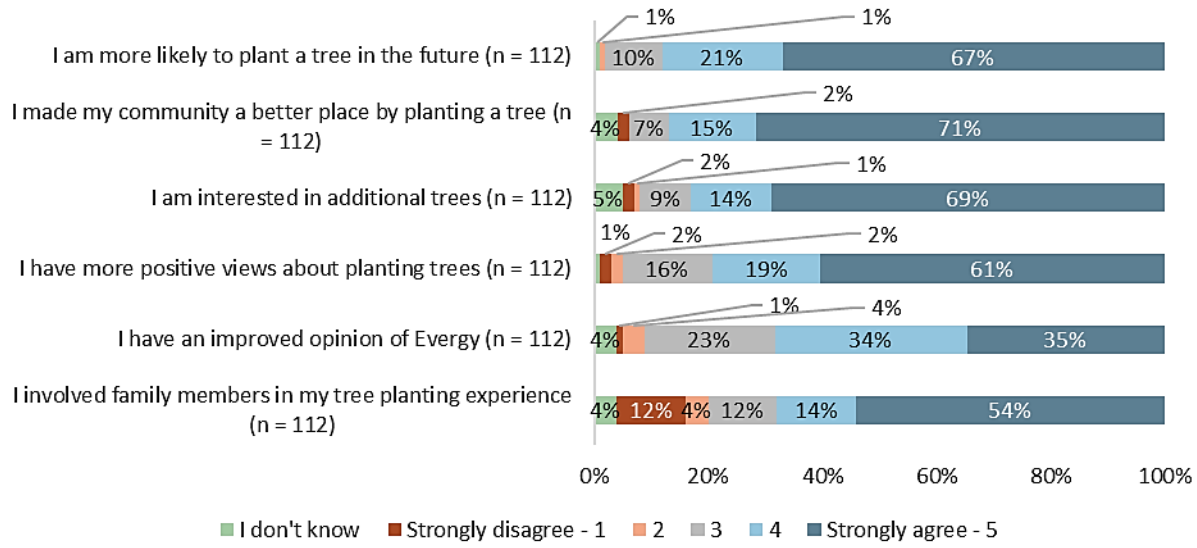
Figure L-6: Satisfaction with Other Aspects of Pilot Program



Future Participation

Respondents expressed they are more likely to plant a tree in the future after participating in this project (88 percent) and are likely to recommend this program to a friend (99 percent). Survey participants also shared they thought they made their community better by planting a tree (86 percent), are interested in planting other trees in the future (83 percent) and have more positive views on planting trees (80 percent) (see Figure L-7).

Figure L-7: Positive Perceptions after Participating in Pilot Program



Demographics

According to survey respondents, seventy percent of homes were built before 1960, and natural gas is the primary source of the fuel type used in the homes. A large majority reported owning their home, a single-family, detached unit (see Table L-9). Seventy-seven percent also reported their homes were just under 3,000 square feet. Regarding socio-economic factors, most survey respondents have a degree in higher education (75 percent) and earn $50,000 or more (60 percent) (see Table L-10).

Table L-9: *Home Characteristics*

Responses	Percent of Respondents
Home Ownership	**(n = 112)**
Own	92%
Rent	5%
Prefer not to answer	3%
Home Type	**(n = 112)**
Single-family home	96%
Duplex or townhome	2%
Prefer not to answer	2%
Home Size (Square Feet)	**(n = 112)**
Less than 1,000 square feet	6%
1,000-1,999 square feet	49%
2,000-2,999 square feet	22%

Responses	Percent of Respondents
3,000-3,999 square feet	8%
4,000-4,999 square feet	3%
5,000 or greater square feet	2%
Not sure	8%
Prefer not to answer	2%
Year Home Was Built	**(n = 112)**
Before 1960	70%
1960 to 1969	5%
1970 to 1979	3%
1980 to 1989	1%
1990 to 1999	5%
2000 to 2009	4%
2010 to 2019	7%
2020 or newer	0%
Not sure	3%
Prefer not to answer	2%
Primary Fuel Type	**(n = 112)**
Natural Gas	72%
Electricity	22%
Propane	1%
Solar	1%
Not sure	2%
Prefer not to answer	2%

Table L-10: Characteristics of Household

Responses	Percent of Respondents
Household Income	**(n = 112)**
Less than $10,000	2%
$10,000 to less than $20,000	4%
$20,000 to less than $30,000	4%
$30,000 to less than $40,000	3%
$40,000 to less than $50,000	4%
$50,000 to less than $75,000	23%
$75,000 to less than $100,000	10%
$100,000 to less than $150,000	14%
$150,000 to less than $200,000	9%
$200,000 or more	4%
Not sure	2%
Prefer not to answer	22%
Highest Level of Education	**(n = 112)**
Some high school	1%
High school graduate or GED equivalent	4%
Some college	15%
Associate degree	4%
Bachelor's degree	36%
Master's degree	23%
Professional degree (MD, JD, DDS, DDO)	9%
Doctorate (Ph.D., D.Sc.)	3%
Prefer not to answer	5%

L.1.7 Conclusions and Recommendations

The evaluation team at ADM performed a process evaluation that assessed program documentation and primary data collected from program stakeholders. The evaluation included in-depth interviews with Evergy program staff and its two program partners. It also included an online survey of 300 participants who have received at least one tree during the past three years; 114 respondents completed this survey.

The following summarizes the key findings of the process evaluation of the Energy-Saving Trees Program:

- Evergy has developed an effective collaborative working relationship with its program partners: The Arbor Day Foundation and Bridging the Gap. These

organizations also worked together to modify the delivery plan to limit in-person contact during the COVID pandemic in 2020.

- The social media outreach appeared to be the most effective market tactic, as it was mentioned as the primary source of awareness by 41 percent of the respondents.
- Overall, the participants are satisfied with the program. The participants reported the highest satisfaction scores regarding the process to receive the trees (95 percent), the online checkout system (83 percent) and the tree selection process (81 percent) as well as very high satisfaction regarding the program as a whole.
- The Energy-Saving Trees program led to positive improvements regarding participants' opinions regarding both planting trees (61 percent) and having a more positive attitude about planting trees in the future (80 percent). Of note, 88 percent said they would plant more trees in the future.
- Nearly all participants (94 percent) reported planting the trees, and 64 percent reported that their trees were alive and thriving.
- Most participants were upper-income homeowners living in the urban core (i.e., 27 percent earned $75,000 or more annually; 92 percent were homeowners).

These findings led to the following recommendations on ways to continue to improve the Energy-Saving Trees Program:

- **Send follow-up emails to monitor the tree delivery and follow-up care to ensure that all trees remain healthy and are planted promptly.**
- **Consider having the Bridging the Gap volunteers assist homeowners in planting the trees, assuming that an appropriate liability release could be developed.**
- **Continue to offer driveway drop-offs to ensure that the trees are delivered to the program participants.**
- **Explore strategies to increase program participation among low and moderate-income residents living in these urban areas. These approaches could include allowing tenants to plant trees or working with the landlords to plant trees in the areas managed by these multifamily buildings.**
- **Conduct additional surveying efforts to better understand where participants are planting their trees and the reasons some trees are not planted or die after planting.**

L.2 Energy Efficiency Nonprofits Program (EENP)

As part of the Stipulation Order from the Missouri Public Service Commission, Evergy identified and launched its Energy Efficiency Nonprofits Program (EENP). This pilot program targets organizations that provide transitional housing and emergency services to residential customers living in Evergy's service territory.

L.2.1 Program Overview

The Energy Efficiency Nonprofits Program (EENP) offered by Evergy targeted 501(c)(3) organizations that provide lodging and social services to low-income, homeless, or at-risk populations in the Evergy Missouri jurisdiction, so they can better serve these individuals and families. Lodging must be the facility's primary function. Satellite facilities associated with the headquarters organization are also eligible (EENP Application).

The program offers these organizations low- and no-cost energy efficiency measures and incentives and includes an energy audit and recommendations for energy efficiency improvements. Eligible measures include interior and exterior lighting upgrades, HVAC tune-ups, water conservation measures and power strips. In addition, the organizations may also qualify for additional rebates or incentives based on the results of the energy audit (EENP Application).

Initially, the pilot program targeted five to nine buildings in Evergy's service territory. Evergy exceeded this participation goal by serving 16 buildings, some of which were satellite facilities owned by the social service agency. Evergy allocated and spent its budget of $200,000 in providing the audit services and measure installations and rebates to these program participants.

Table L-11 provides a summary of program metrics for the PY2.

Table L-11: Performance Metrics – Energy Efficiency Nonprofits Pilot Program

Metric	PY2 Total	MO West	MO Metro
Number of Businesses	16		
Energy Impacts (kWh)			
Targeted Energy Savings	-	-	-
Reported Energy Savings	550,400	329,824	220,576
Gross Verified Energy Savings	550,400	329,824	220,576
Net Verified Energy Savings	550,400	329,824	220,576
Peak Demand Impacts (kW)			
Targeted Peak Demand Savings	-	-	-
Reported Peak Demand Savings	110.16	61.11	49.05
Gross Verified Peak Demand Savings	110.16	61.11	49.05
Net Verified Peak Demand Savings	110.16	61.11	49.05
Benefit / Cost Ratios			
Total Resource Cost Test Ratio	-	-	-

L.2.2 Gross Impact Methodology

The majority of program savings (87 percent) from the EENP program came from custom lighting projects completed at property common areas. In addition, the program provided low-flow faucet aerators, showerheads, AC tune-ups, and HVAC measures.

ADM compared savings attributed to the measures installed through the EENP program by validating savings according to the relevant unit energy savings methodology from the Evergy Technical Reference Manual (Evergy TRM). ADM's evaluation consisted of:

- Confirm that savings for measures that were part of the reference manual, such as water saving measures, tune-ups, HVAC, and some lighting measures, were calculated in accordance with the Evergy TRM.
- Verify that savings for non-lighting custom measures are reasonable and aligned with typical savings for the respective measure type.
- Selected a random sample of custom lighting measures representing approximately 30 percent of total savings for the category and verified that the measure specifications and claimed savings were appropriate.

An additional pilot program run at income eligible multifamily locations offered rebates for energy-efficient common area laundry machines. Only one measure was rebated through this pilot program. ADM verified that the savings claimed savings from the energy efficient

common area clothes washer were reasonable and aligned with guidance for similar measures.

Final Savings Tables

The total verified gross energy savings for the Energy Efficiency Nonprofits Program are 550,400 kWh and the demand savings are 110.16 kW. Table L-12 below summarizes the verified gross energy and demand savings for the EENP.

Table L-12: Program Gross Energy Savings (kWh) and Peak Demand Reduction (kW)

Jurisdiction	Reported Energy Savings (kWh)	Reported Demand Reduction (kW)	Gross Verified Energy Savings (kWh)	Gross Verified Demand Reduction (kW)	RR_{kWh}	RR_{kW}
MO West	329,824	61.11	329,824	61.11	100%	100%
MO Metro	220,576	49.05	220,576	49.05	100%	100%
Total	**550,400**	**110.16**	**550,400**	**110.16**	**100%**	**100%**

L.2.3 Process Evaluation

Program Operations

This section summarizes the findings from in-depth interviews conducted with program participants of the Efficiency for Nonprofits Program (EENP) offered by Evergy from September 2020 to December 2021.

The process evaluation focused on assessing the following components of the EENP:

- Document program awareness strategies used to engage program participants
- Assess the effectiveness of program operations, including on-site audit and measure installation
- Measure participant satisfaction
- Identify areas for program improvement

ADM staff interviewed six representatives from five participating organizations in October and November 2021 to capture their feedback regarding this pilot program as shown in the table below.

Table L-13: In-Depth Interviews Completed by Organization

Metric	Number of Respondents	Number of Community Organizations
Total Respondents	6	5
% of Total Participants	75%	83%

Respondent Characteristics

The EENP targets social service agencies that offer housing assistance combined with childcare, training, and addiction recovery programs. The participating organizations serve the most vulnerable residents in the Kansas City metropolitan area, including the homeless, unemployed veterans, women and children escaping domestic violence, and those facing issues regarding addiction and joblessness.

Several organizations operate various facilities, including traditional homeless shelters, small apartments, and single-family homes, which provide transitional housing to local residents. The EENP program's outreach included conducting energy audits and installing direct measures in the traditional shelters and multi-family housing units. The single-family housing units were ineligible to receive the free thermostats.

The respondents participating in these in-depth interviews served in several roles ranging from the Chief Executive Officer to the maintenance personnel directly involved with the on-site audit and measure installations. These respondents were directly involved in scheduling the initial on-site energy audits, coordinating with Evergy's third-party implementers to install the approved measures, and answering any questions or concerns that arose during this project.

Awareness

The participating organizations recalled learning about this pilot through multiple channels:

- Direct outreach: two respondents recalled that Evergy staff reached out to them directly based on their previous affiliations with these nonprofit organizations.
- An email followed by a telephone call: Two respondents remembered receiving an introductory email explaining the program, followed by a telephone call from an Evergy staff member.
- Brochure: One respondent received a program brochure.

The remaining respondents were referred to the program by their superiors and were not directly involved in the recruitment process.

However, the respondents indicated that the initial email followed up by a telephone call was a practical approach, especially since some nonprofits have been victims of solicitation scams in the past.

"Emails or a phone call are best. We are just so busy."

Enrollment Process

Program enrollment began in September 2020. Most participants indicated that the on-site audit was completed shortly after program sign-up. Of note, two participants signed up for the program in 2020. Still, the on-site audits were delayed due to difficulties in finding local contractors to complete the installations or delays due to supply chain shortages.

Effectiveness of Program Operations

Most program participants reported that the energy audit and measure installation process were completed relatively quickly. A few indicated that the overall process "didn't take that much time," and "it was easy" for their organization to complete the audit and receive the approved measures.

The majority of the respondents were pleased with the amount of information provided in the audit reports and the new equipment's speed.

However, one respondent was frustrated with the program delays and the lack of communication regarding the program status.

"There seemed to be long breaks in time to when the work actually happened. (There were) several months didn't hear anything with the HVAC cleaning and tune-ups. It was that they had some issues finding a vendor (to complete the project), which didn't happen until the summer. The project was delayed by six months or more. It was a lot more drawn out than it needed to be."

Another participant indicated that there were delays with the installation. However, these delays were due to supply chain issues associated with the pandemic. This participant also indicated that the Evergy team kept him informed about the project's progress and "did a good job keeping in touch with them."

Types of Measures Installed

All participating organizations received new LED lighting for their buildings' interior and exterior portions. A few respondents reported receiving new air conditioning filters, power strips and HVAC tune-ups.

Several participants reported receiving insulation and air sealing in the attics and receiving sink and faucet aerators in the facility's bathrooms.

One organization also received rebates to install a new HVAC unit in addition to receiving the other direct install measures.

In addition, one participant noted that Evergy worked with Spire, the natural gas utility, to provide rebates for new tankless water heaters.

Two respondents explored other rebate opportunities for new energy-efficient appliances and heating equipment. However, these organizations have not yet made these equipment upgrades.

Overall, the participants were pleased with the new measures they received through the program and the information from the on-site audit.

"The program opened us up to the opportunity of what we could do,"

However, one participant complained that the installation contractors were "messy" and created safety concerns regarding their disposal of the previous lightbulbs. The respondent had to speak with the contractors several times before they understood the safety issues and cleaned up the broken lighting and wire clippings.

Benefits from Installed Measures

A few respondents mentioned increased visibility and brighter hallways and library areas due to the new lighting measures.

"The lighting is wonderful…there is now increased safety and better visibility."

"The assessment made us more aware of the deficiencies in other ways, like not cleaning out our vents…it taught us how to be more proactive and think it is healthier for us now."

But none of the participants had noticed any savings in their energy bills as most of the measures have not been in place long enough to notice energy savings.

Program Satisfaction

Overall, the respondents were pleased with the EENP pilot and the Evergy team that worked with them to complete these installations. All but one of the respondents provided a satisfaction rating of "5" out of "5" with the program, while one respondent awarded a score of "4."

"We are dumbfounded as to how convenient it was."

"It was a tremendous blessing for us… I'm glad I answered the email."

Areas for Program Improvement

Overall, the participants were pleased with the current program operation. However, one respondent suggested that Evergy review the rules for installing smart thermostats in rental buildings. His organization owns several residential buildings, including rental properties. However, those residents could not receive smart thermostats due to the current program requirements. He suggested modifying the requirement to allow the building landlord or owner to sign the agreement to install smart thermostats in these rental properties.

Several participants indicated that the energy audit identified additional areas for future savings, specifically in replacing the aging HVAC equipment. Although the EENP has ended, the energy audit recommendations are still important to consider going forward.

L.2.4 Conclusions and Recommendations

The following summarizes the key findings from the evaluation of the Energy Efficiency Nonprofits Program.

- The EENP surpassed its initial participation goals by serving 16 buildings rather than the projected nine in the MO Metro and MO West regions.
- Overall, the program participants were pleased with the EENP program, as it offered nonprofit organizations easy ways to reduce energy use.
- The participation process was relatively quick and easy for most organizations; only one reported significant delays in completing the installations due to supply chain shortages.
- The email letter followed up a personal telephone call was an effective way to recruit program participants. A few participants were initially unsure about the program, and the follow-up call with the Evergy representatives addressed their concerns.
- The installed measures, particularly the interior and exterior lighting upgrades, have not been in place long enough for the organizations to notice significant differences in their energy usage. However, the participants noted that the new exterior and interior lighting increased visibility and security outside and created a warmer and more welcoming atmosphere in the common areas, such as the libraries and cafeterias for the buildings' residents.
- Only one participating organization installed additional energy savings measures due to the program. This organization purchased and installed two tankless water heaters, which qualified for incentives from Spire Energy. To date, none of these organizations have installed additional electric measures.
- The EENP program did not account for the differences in the building types operated by these organizations. Although the pilot primarily targeted homeless shelters, a few organizations also operate smaller properties. Due to the current requirements, residents living in those smaller properties were not allowed to receive smart thermostats as they are short-term occupants.

ADM recommends the following are considered to support the continued improvement and development of Evergy's Energy Efficiency Nonprofits Program:

- **Evergy should consider revising its current smart thermostat installations requirements to include those living in short-term rental properties.** The

building owner can sign the installation agreement to ensure that the smart thermostats are installed in these premises and remain in place. This modification will provide additional value to both the organizations and Evergy.

- **Evergy should follow up with program participants in six months after measure installation.** This follow-up will help remind these participants of the available energy savings opportunities, particularly the recommendations identified through the energy audit. Checking in with these past program participants will also provide additional information needed to help them replace aging HVAC equipment before equipment failure.

L.3 HVAC Quality Installation (QI) Program

This report summarizes the impact analysis of the Quality Installation (QI) pilot program. The QI Program aimed to test HVAC contractor acceptance of using a wireless HVAC testing tool as part of the Quality Assurance/Quality Control (QA/QC) of HVAC installations.

L.3.1 Program Overview

The Quality Install (QI) pilot program operated for one year, and all of the savings were claimed in 2021. The program was designed to help HVAC contractors perform additional QA/QC tests to ensure that the equipment was correctly installed.

The pilot did not claim the energy savings from past Heating, Cooling, and Home Comfort Program projects. A requirement of the pilot is that systems that receive a QI must have a qualifying Heating, Cooling, and Home Comfort Program project from within the last year. It was important to note that there was one QI project that had a matching Heating, Cooling, and Home Comfort Program project from 2019 (MEEIA 2). Although this falls outside of the eligibility of the pilot, it was approved to be included in the final savings.

Table L-14 provides a summary of program metrics for the PY2.

Table L-14: Performance Metrics – Quality Install Pilot Program

Metric	PY2 Total	MO West	MO Metro
Number of Projects	28	10	18
Energy Impacts (kWh)			
Targeted Energy Savings	-	-	-
Reported Energy Savings	5,398.50	1,952.00	3,446.50
Gross Verified Energy Savings	5,268.18	1,723.61	3,544.57
Net Verified Energy Savings	5,268.18	1,723.61	3,544.57
Peak Demand Impacts (kW)			
Targeted Peak Demand Savings	-	-	-
Reported Peak Demand Savings	6.20	2.24	3.96
Gross Verified Peak Demand Savings	5.75	1.79	3.96
Net Verified Peak Demand Savings	5.75	1.79	3.96
Benefit / Cost Ratios			
Total Resource Cost Test Ratio	-	-	-

L.3.2 Gross Impact Methodology

For the Quality Install Program, sources of data to inform the impact evaluation were a census of program tracking data from the program implementor's tracking and reporting system. Program tracking data included customer contact information and descriptions of the HVAC units installed.

There were a total of 28 QI projects in the Quality Install Program with reported savings. The HVAC units in the program were either a SEER 16 or SEER 17 central air conditioner (early replacement). See Table L-15 for a breakdown of the quantity and type of units in the program per jurisdiction.

Table L-15: Quality Install Measure Quantities

Jurisdiction	Unit SEER	Quantity
MO West	16	4
	17	6
MO Metro	16	11
	17	7
Total	**-**	**28**

Verified savings were calculated using the savings algorithms found in the Evergy TRM and were based on the efficiency and size of each unit. All central air conditioners in the Quality Install Program applied a derating cooling (efficient) factor of 0% compared to the units in the Heating, Cooling, and Home Comfort Program which applied a 10% derating cooling (efficient) factor. The kWh savings and kW demand reductions were determined using Equation N-19 through Equation N-22. The energy and demand savings for each project were compared to the corresponding project in the Heating, Cooling, and Home Comfort Program. To ensure savings for the Quality Install Program were not being double-counted, the energy and demand savings for each corresponding Heating, Cooling, and Home Comfort Program project were subtracted from each QI project. The difference in savings were then totaled to get final verified gross savings for the Quality Install Program.

Impact Evaluation - Final Savings Tables

Based on the impact evaluation results, the total verified gross savings for the Quality Install Program are 5,268.50 kWh, which resulted in a realization rate of 98 percent and 5.75 kW, which resulted in a realization rate of 93 percent. Table L-16 below summarizes the verified gross energy and demand savings for the QI Program.

Table L-16: Program Gross Energy Savings (kWh) and Peak Demand Reduction (kW)

Jurisdiction	Reported Energy Savings (kWh)	Reported Demand Reduction (kW)	Gross Verified Energy Savings (kWh)	Gross Verified Demand Reduction (kW)	RR_{kWh}	RR_{kW}
MO West	1,952.00	2.24	1,723.61	1.79	88%	80%
MO Metro	3,446.50	3.96	3,544.57	3.96	103%	100%
Total	**5,398.50**	**6.20**	**5,268.18**	**5.75**	**98%**	**93%**

L.3.3 Process Evaluation

This report summarizes the in-depth interviews conducted with the utility and implementation staff members.

Program Operations

Evergy's Residential DSM program lead manages the program and oversees the Products and Services Incubator program. The third-party program implementer manages all of Evergy's pilot programs.

Program Design

The program design did not fully address the challenges with program operations, which negatively affected the program deployment. First, the program design assumed that the installation and the QI check could be conducted simultaneously. However, the technicians had to schedule follow-up visits to complete the QI process, which generated additional costs and inconvenience to the participating customers and contractors.

The program design assumed that the HVAC installers would complete these QI checks; however, the economics of the HVAC industry make it challenging to have contractors spend additional time on a job site without sufficient compensation.

"We assumed the installer would use the technology, and it only adds an extra 10-15 minutes." (Program Implementation Staff)

The pilot revealed that the less-skilled technicians rather than the HVAC installers would complete the QI checks because the HVAC companies are not interested in training the installers on this technology.

"Because the installers' time is so valuable, none of the trade allies were interested in training those installers on doing the QI because it's just they, they every moment they're on a job site that they're not installing something is a waste of money. It costs them more than the $50.00 they'd get for doing the QI…The business model did not line up effectively with the design." (Program Implementation Staff)

Overall, the program implementation staff described this pilot as "a program that needs further development" to reflect better how HVAC trade allies operate in Evergy's market.

Program Performance

Program participation fell significantly short of the projected goal. Only 29 projects were completed; 14.5 percent of the original intent of 200 completed projects.

Program Participation and Marketing

The program implementer recruited four high-volume trade allies who already used Measure Quick as part of their installation process. Since it was a pilot program, the staff wanted to recruit only a few participating trade allies. The customer had to submit a rebate for an HVAC installation to be eligible. But as the pilot progressed, it also became evident that the participating customers also had to be willing to have an HVAC technician conduct a follow-up visit, which meant that the customer had to be ready to have a contractor visit their home twice during the installation period.

Given its limited scope, there was no active outreach or marketing for this pilot program. Instead, the outreach team reached out to four well-known trade allies already using the Measure Quick software. Trade ally recruitment was relatively easy as the implementer reported no difficulties engaging these four trade allies. However, staff believes it would have been more difficult to recruit other trade allies since they already had the Measure Quick technology onboard.

> *"We would have had to convince them to buy more equipment, but this is not a permanent program."* (Program Implementation Staff)

Communication

Evergy staff had "good communications" with the program implementer. The team had bi-weekly check-in meetings and weekly emails that provided updates about program activities. The program implementation staff also included weekly updates regarding the progress of this pilot program into the overall weekly Portfolio meeting held with Evergy staff.

Contractor feedback regarding this program was primarily negative as they explained that they would need to have more significant incentives to participate in this program going forward. The implementer would also have to offer more free training to the installers and streamline the training process for this pilot program to gain traction in the market.

A few trade allies also preferred submitting the QI data using existing methods rather than the digital format used for MeasureQuick.

Data Tracking and Quality Assurance/Quality Control (QA/QC)

Each application received a digital and manual QA/QC check, given the relatively small number of projects. Most technicians completed the project applications correctly. The

few errors were due to either a lack of understanding from the technicians or weather-related events, making it more challenging to report the findings accurately.

L.3.4 Conclusions and Recommendations

The following summarizes the key findings from the evaluation of the Quality Install Program.

- The pilot program faced several obstacles that limited its overall success. A "disconnect" between the program design and the trade ally market, which included:
  - Targeting HVAC contractors rather than the HVAC technicians, who have invested in the MeasureQuick technology and can provide these services at a lower cost.
  - Did not account for the level of additional training required to train contractors to use MeasureQuick. The trades did not view MeasureQuick, which requires different technology, as a cost-effective investment for their contractors.
  - The incentives did not adequately compensate the HVAC contractors, and therefore, the program was not cost-effective for either the trade allies or Evergy to continue.
- The COVID-19 pandemic created additional challenges in program delivery, as the QI required a separate meeting with the residential customers. Naturally, some customers were reluctant to have a contractor in their home multiple times during the pandemic.
- Conversely, the pandemic did create a notable increase in demand for HVAC installations, which also made it more challenging to focus on the less-profitable QI pilot over the more profitable HVAC installations.

ADM recommends the following are considered to support the continued improvement and development of Evergy's Quality Install Program:

- **Evergy should consider treating the QI pilot program like a traditional "Tune-Up" program rather than a Commissioning program.** Trade allies expressed interest in wanting this change for future program years if the pilot persists.
- **Targeting HVAC technicians rather than the HVAC contractor may be beneficial in order to boost participation in performing QI HVAC projects in the future.** HVAC technicians are more likely to have invested in the MeasureQuick technology and may be more willing to participate in the program.

Appendix M Survey Instruments

M.1 Heating, Cooling and Home Comfort Participant Survey

Client: Evergy
Program: Heating, Cooling, and Home Comfort Program
Program Year: 2021
Group: Participants
Mode: Email

PREDEFINED VARIABLES

Prepopulated variables are shown in all caps enclosed in brackets, e.g., [PREDEFINED VARIABLE]

VARIABLE	DEFINITION
JURISDICTION	1 = Missouri Metro, 0 = Missouri West
EMAIL	Customer email
DI KIT	1 = measure installed, 0 = measure not installed
LED QUANTITY	1 = measure installed, 0 = measure not installed
FAUCET AERATOR QUANTITY	1 = measure installed, 0 = measure not installed
SHOWERHEAD QUANTITY	1 = measure installed, 0 = measure not installed
SPS QUANTITY	1 = measure installed, 0 = measure not installed
PIPE INSULATION	1 = measure installed, 0 = measure not installed
AIR SEALING	1 = measure installed, 0 = measure not installed
CEILING/ATTIC INSULATION	1 = measure installed, 0 = measure not installed
CENTRAL AC	1 = measure installed, 0 = measure not installed
AS_HEATPUMP	1 = measure installed, 0 = measure not installed
GS_HEATPUMP	1 = measure installed, 0 = measure not installed
DUCTLESS MINI-SPLIT HEATPUMP	1 = measure installed, 0 = measure not installed

EMAIL SURVEY MESSAGE

Subject: [PROGRAM NAME] Feedback
Reply To: survey2026@surveys.admenergy.com
From Name: Evergy

Dear [CUSTOMER NAME],

Thank you for participating in Evergy's program. Our records indicate that you received a rebate/discount for purchasing and installing energy-efficient equipment/upgrades for your home and/or received an energy savings kit from Evergy. We are conducting a customer survey and would value your input. Your answers will be anonymous and confidential, and your feedback will help us improve the program. The survey will not affect your energy-efficiency project, rebates, or service. Upon completion of the entire survey, we will send you a **$10 electronic gift card** of your choice.

Click here to go to the survey

If you have questions or require technical assistance, please email us at adm-surveys@admenergy.com. If you wish to no longer receive emails about this survey, please click on the "Unsubscribe" link below. Thank you in advance for your time!

Kind Regards,
Katelan Scherer
ADM Associates / Program Evaluation Contractor to Evergy

QUALIFICATION QUESTIONS

[SHOW Q1 IF AIR SEALING OR CEILING/ATTIC INSULATION OR CENTRAL AC OR AS_HEATPUMP OR GS_HEATPUMP OR DUCTLESS MINI-SPLIT HEATPUMP = 1 AND DI KIT ≠ 0]

1. According to program records, you received a rebate/discount from Evergy for purchasing energy-efficient equipment/upgrades for your home in 2021. Is that correct?

    1. Yes
    2. No **[TERMINATE]**
    98. Do not recall **[TERMINATE]**

[SHOW Q2 IF DI KIT = 1 AND AIR SEALING OR CEILING/ATTIC INSULATION OR CENTRAL AC OR AS_HEATPUMP OR GS_HEATPUMP OR DUCTLESS MINI-SPLIT HEATPUMP ≠ 0]

2. According to program records, you received an energy savings kit from Evergy in 2021. Is that correct?

1. Yes
2. No **[TERMINATE]**
98. Do not recall **[TERMINATE]**

[SHOW Q3 IF AIR SEALING OR CEILING/ATTIC INSULATION OR CENTRAL AC OR AS_HEATPUMP OR GS_HEATPUMP OR DUCTLESS MINI-SPLIT HEATPUMP = 1 AND DI KIT = 1]

3. According to program records, you received a rebate/discount from Evergy for purchasing energy-efficient equipment/upgrades for your home and received an energy savings kit from Evergy in 2021. Is that correct?

1. Yes
2. No **[TERMINATE]**
98. Do not recall **[TERMINATE]**

4. Did you have the following energy-efficient equipment/upgrades installed in your home through Evergy's program? **[INSERT OPTIONS DEFINED AS 1 = YES, 2 = NO, AND 98 = DO NOT RECALL]**

1. **[SHOW IF DI KIT = 1]** Energy savings kit (can include LED lightbulbs, faucet aerators, low-flow shower heads, hot water pipe insulation, and smart power strips)
2. **[SHOW IF AIR SEALING = 1]** Air sealing (sealing air leaks in the home, weather sealing)
3. **[SHOW IF CEILING/ATTIC INSULATION = 1]** Attic/ceiling insulation
4. **[SHOW IF CENTRAL AC = 1]** Central air conditioner
5. **[SHOW IF AS_HEATPUMP = 1]** Heat pump
6. **[SHOW IF GS_HEATPUMP = 1]** Ground source heat pump
7. **[SHOW IF DUCTLESS MINI-SPLIT HEATPUMP = 1]** Ductless mini-split heat pump

5. Did you receive an energy savings kit and/or a rebate/discount from Evergy for any additional energy-efficient equipment/upgrades for your home in 2021 that was not previously mentioned?

1. Yes
2. No
98. Do not recall

[SHOW Q6 IF Q5 = 1]

6. Which additional energy-efficient equipment/upgrades did you receive? (Please select all that apply) [MULTI-SELECT]

1. **[SHOW IF DI KIT = 0]** Energy savings kit (can include LED lightbulbs, faucet aerators, low-flow shower heads, hot water pipe insulation, and smart power strips)
2. **[SHOW IF AIR SEALING = 0]** Air sealing (sealing air leaks in the home, weather sealing)
3. **[SHOW IF CEILING/ATTIC INSULATION = 0]** Attic/ceiling insulation
4. **[SHOW IF CENTRAL AC = 0]** Central air conditioner
5. **[SHOW IF AS_HEATPUMP = 0]** Heat pump
6. **[SHOW IF GS_HEATPUMP = 0]** Ground source heat pump
7. **[SHOW IF DUCTLESS MINI-SPLIT HEATPUMP = 0]** Ductless mini-split heat pump
96. Other (Please specify) **[OPEN-ENDED]**

7. How did you <u>first</u> hear about the Evergy rebates/discounts for the energy-efficient equipment and upgrades?

1. Contractor/Energy Auditor
2. Community event
3. General online search
4. Evergy website
5. Spire website
6. Bill insert
7. Email
8. Television/radio/media coverage
9. Evergy call center referral
10. Connect center referral
11. Social media or other online ad (i.e., Facebook)
12. Family, friend, or neighbor (word-of-mouth)
96. Other source **[OPEN-ENDED]**
98. Do not recall

MEASURE INSTALLATION RATE (ISR)

DIRECT INSTALL (DI) KIT MEASURES

[SHOW Q8 – Q23 IF DI KIT = 1 AND Q4(1) = 1 OR Q6 = 1]

8. Which of the following energy-efficient equipment was included in your energy savings kit? (Please select all that apply) [MULTI-SELECT]

1. LED lightbulbs
2. Faucet aerators
3. Low-flow shower heads
4. Water heater pipe insulation

5. Smart power strips
98. Do not recall

[SHOW Q9 IF Q8 = 1]

9. Are all [LED QUANTITY] LED lightbulbs that you received currently installed in your home?

1. Yes, all of them are currently installed
2. No, none or only some of them are currently installed
3. Received a different quantity of LED lightbulbs (Please specify)
98. Do not recall

[SHOW Q10 IF Q9 = 2 OR 3]

10. How many of the LED lightbulbs that you received are currently installed in your home?

1. [OPEN-ENDED; NUMERIC VALUE] _____
2. None of them are currently installed
98. Do not recall

[SHOW Q11 IF Q9 = 2]

11. Why aren't all of the LED lightbulbs installed? (Please select all that apply) [MULTI-SELECT]

1. Waiting for old lightbulbs to burn out
2. Not the correct wattage for my needs
3. Too bright
4. Not bright enough
5. Do not fit into any fixtures
96. Other (Please specify)
98. Do not recall

[SHOW Q12 IF Q8 = 2]

12. Are all of the [FAUCET AERATOR QUANTITY] faucet aerator(s) that you received currently installed in your home?

1. Yes, all of them are currently installed
2. No, none or only some of them are currently installed
3. Received a different quantity of faucet aerators (Please specify)
98. Do not recall

[SHOW Q13 IF Q12 = 2 OR 3]

13. How many of the faucet aerator(s) that you received are currently installed in your home?

1. [OPEN-ENDED; NUMERIC VALUE] _____
2. None of them are currently installed
98. Do not recall

[SHOW Q14Error! Reference source not found. IF Q12 = 2]

14. Why aren't all of the faucet aerators installed? (Please select all that apply) [MULTI-SELECT]

1. Do not fit any faucets
2. Unable to install them myself
3. Not enough water pressure
4. Faucet aerators were removed
96. Other (Please specify)
98. Do not recall

[SHOW Q15 IF Q8Error! Reference source not found. = 3]

15. Are all of the [SHOWERHEAD QUANTITY] low-flow shower head (s) that you received currently installed in your home?

1. Yes, all of them are currently installed
2. No, none or only some of them are currently installed
3. Received a different quantity of shower heads (Please specify)
98. Do not recall

[SHOW Q16 IF Q15 = 2 OR 3]

16. How many of the low-flow shower head(s) that you received are currently installed in your home?

1. [OPEN-ENDED; NUMERIC VALUE] _____
2. None of them are currently installed
98. Do not recall

[SHOW Q17 IF Q15 = 2]

17. Why aren't all of the low-flow shower heads installed? (Please select all that apply) [MULTI-SELECT]

1. Do not fit any shower head fixture
2. Unable to install them myself
3. Not enough water pressure

4. Low-flow shower heads were removed
96. Other (Please specify)
98. Do not recall

[SHOW Q18 IF Q8 = 4]

18. Is the hot water pipe insulation that you received currently installed in your home?

1. Yes
2. No
98. Do not recall

[SHOW Q19 IF Q18 = 2]

19. Why isn't the hot water pipe insulation installed? (Please select all that apply) [MULTI-SELECT]

1. Waiting for someone to install it
2. Did not fit water heater pipes
3. Hot water pipes were not accessible
96. Other (Please specify)
98. Do not recall

[SHOW Q20 IF Q8 = 5]

20. Are the [SPS QUANTITY] smart power strip(s) that you received currently setup in your home?

1. Yes, all of them are currently setup
2. No, none or only some of them are currently setup
3. Received a different quantity of smart power strips (Please specify)
98. Do not recall

[SHOW Q21 IF Q20 = 2 OR 3]

21. How many of the smart power strip(s) that you received are currently installed in your home?

1. [OPEN-ENDED; NUMERIC VALUE] _____
2. None of them are currently installed
98. Do not recall

[SHOW Q22 IF Q20 = 1 OR 3 OR Q21Error! Reference source not found. = 1]

22. What is currently plugged into the smart power strips that are currently setup in your home? (Please select all that apply) [MULTI-SELECT]

1. Television
2. DVD/Blu-ray player
3. Gaming console
4. Sound bar
5. Kitchen appliances (such as refrigerator, microwave, toaster, coffee maker, etc.)
6. Computer
7. Computer monitor
8. Internet modem
9. Computer keyboard or mouse
10. Room/portable fan
11. Floor/desk lamp
96. Other (Please specify)
98. Do not recall

[SHOW Q23 IF Q20 = 2]

23. Why aren't the smart power strip(s) setup? (Please select all that apply) [MULTI-SELECT]

1. Already have other power strips setup
2. Did not understand how to set it up
3. Did not like the look of it
4. I have no appropriate use for it
96. Other (Please specify)
98. Do not recall

FREE-RIDERSHIP

DIRECT INSTALL (DI) KIT MEASURES

[SHOW Q24Error! Reference source not found. – Q27 IF DI KIT = 1 AND Q4(1) = 1 OR Q6 = 1]

24. Before receiving an energy savings kit from Evergy, were you planning to purchase and install any of the following energy-efficient equipment? **[INSERT OPTIONS DEFINED AS 1 = YES, 2 = NO, AND 98 = NOT SURE]**

1. LED lightbulbs
2. Faucet aerators
3. Low-flow shower heads

4. Water heater pipe insulation
5. Smart power strips

[SHOW Q25 IF ANY QError! Reference source not found. = 1]

25. How likely is it that you would have purchased and installed the following energy-efficient equipment if you had not received an energy savings kit from Evergy? **[INSERT 1-5 SCALE; 1 = NOT AT ALL LIKELY, 5 = VERY LIKELY, WITH 98 = NOT SURE]**

1. **[SHOW IF Q24 = 1]** LED lightbulbs
2. **[SHOW IF Q24**Error! Reference source not found. **= 2]** Faucet aerators
3. **[SHOW IF Q24 = 3]** Low-flow shower heads
4. **[SHOW IF Q24**Error! Reference source not found. **= 4]** Water heater pipe i nsulation
5. **[SHOW IF Q24 = 5]** Smart power strips

[SHOW Q26 IF ANY Q24 = 1]

26. If you had not received the energy savings kit, when might have you purchased and installed the following energy-efficient equipment? **[INSERT 1 – 6 SCALE; 1 = I WOULD HAVE PURCHASED IT AROUND THE SAME TIME, 2 = I WOULD HAVE PURCHASED IT WITHIN 6 MONTHS, 3 = I WOULD HAVE PURCHASED IT BETWEEN 6 MONTHS AND 1 YEAR, 4 = I WOULD HAVE PURCHASED IT IN 1 TO 2 YEARS, 5 = I WOULD HAVE PURCHASED IT IN 2 TO 3 YEARS, 6 = I WOULD HAVE PURCHASED IT IN MORE THAN 3 YEARS, AND 98 = NOT SURE]**

1. **[SHOW IF Q24 = 1]** LED lightbulbs
2. **[SHOW IF Q24 = 2]** Faucet aerators
3. **[SHOW IF Q24 = 3]** Low-flow shower heads
4. **[SHOW IF Q24 = 4]** Water heater pipe insulation
5. **[SHOW IF Q24 = 5]** Smart power strips

27. Before you received an energy savings kit from Evergy, had you ever had any of the following energy-efficient equipment installed in your home? **[INSERT OPTIONS DEFINED AS 1 = YES, 2 = NO, AND 98 = DO NOT RECALL]**

1. LED lightbulbs
2. Faucet aerators
3. Low-flow shower heads
4. Water heater pipe insulation
5. Smart power strips

HVAC, AIR SEALING, AND INSULATION MEASURES

[SHOW Q28 – Q44 IF AIR SEALING = 1 OR CEILING/ATTIC INSULATION = 1 OR CENTRAL AC = 1 OR AS_HEATPUMP = 1 OR GS_HEATPUMP = 1 OR DUCTLESS MINI-SPLIT HEATPUMP = 1]

[SHOW Q28 IF AIR SEALING = 1 AND Q4(2) = 1 OR Q6 = 2]

28. Did you know you had air leaks in your home before you participated in Evergy's rebate/discount program?

1. Yes
2. No

[SHOW Q29 IF CEILING/ATTIC INSULATION = 1 AND Q4(3) = 1 OR Q6 = 3]

29. Did you know you needed more attic insulation, before you participated in Evergy's rebate/discount program?

1. Yes
2. No

[SHOW Q30 IF (CENTRAL AC = 1 AND Q4(4) = 1 OR Q6 = 4) OR (AS_HEATPUMP = 1 AND Q4(5) = 1 OR Q6 = 5) OR (GS_HEATPUMP = 1 AND Q Q4(6) = 1 OR Q6 = 6) OR (DUCTLESS MINI-SPLIT HEATPUMP = 1 AND Q Q4(7) = 1 OR Q6 = 7)]

30. Which of the following best describes the condition of your outdoor HVAC system before you participated in Evergy's rebate/discount program?

1. Worked and was in good physical condition
2. Worked but needed minor repair
3. Worked but needed major repair
4. It did not work at all
99. Not applicable

31. Did you plan to purchase the following energy-efficient equipment/upgrades before learning about the discounts/rebates offered by Evergy? **[INSERT OPTIONS DEFINED AS 1 = YES, 2 = NO, AND 98 = NOT SURE]**

1. **[SHOW IF AIR SEALING = 1 AND Q4(2) = 1 OR Q6 = 2]** Sealing cracks in your home to reduce air leakage
2. **[SHOW IF CEILING/ATTIC INSULATION = 1 AND Q4(3) = 1 OR Q6 = 3]** Improve your home's efficiency by adding attic/ceiling insulation
3. **[SHOW IF CENTRAL AC = 1 AND Q4(4) = 1 OR Q6 = 4 AND Q30**Error! Reference source not found. **= 1, 2, OR 3]** Install a central air conditioning system
4. **[SHOW IF AS_HEATPUMP = 1 AND Q4(5) = 1 OR Q6 = 5 AND Q30 = 1, 2, OR 3]** Install a heat pump

5. **[SHOW IF GS_HEATPUMP = 1 AND Q4(6) = 1 OR Q6 = 6 AND Q30 = 1, 2, OR 3]** Install a ground source heat pump
6. **[SHOW IF DUCTLESS MINI-SPLIT HEATPUMP = 1 AND Q4(7) = 1 OR Q6 = 7 AND Q30 = 1, 2, OR 3]** Install a ductless mini-split heat pump

[SHOW Q32 IF AIR SEALING = 1 AND Q4(2) = 1 OR Q6 = 2]

32. Did you seal more areas in your home to reduce air leakage because of the Evergy discount/rebate?

1. Yes
2. No
98. Do not recall

[SHOW Q33 IF CEILING/ATTIC INSULATION = 1 AND Q4(3) = 1 OR Q6 = 3]

33. Did you install a higher R value of attic insulation, install a different type of attic insulation (i.e., loose fill, spray foam), or insulate more square footage of your attic because of the Evergy discount/rebate? (Please select all that apply) **[MULTI-SELECT]**

1. Installed higher R value of attic insulation
2. Installed different type of attic insulation (i.e., loose fill, spray foam)
3. Insulated more square footage of attic
4. Would have installed same attic insulation without Evergy rebate

[EXCLUSIVE]

98. Do not recall

[SHOW Q34 IF CENTRAL AC = 1 AND Q4(4) = 1 OR Q6 = 4]

34. Did you purchase a more energy-efficient (higher SEER rating) air conditioner because of the Evergy discount/rebate?

1. Yes
2. No
98. Do not recall

[SHOW Q35 IF AS_HEATPUMP = 1 AND Q4(5) = 1 OR Q6 = 5]

35. Did you purchase a more energy-efficient heat pump because of the Evergy discount/rebate?

1. Yes
2. No
98. Do not recall

[SHOW Q36 IF GS_HEATPUMP = 1 AND Q4(6) = 1 OR Q6 = 6]

36. Did you purchase a more energy-efficient ground source heat pump because of the Evergy discount/rebate?

1. Yes
2. No
98. Do not recall

[SHOW Q37 IF DUCTLESS MINI-SPLIT HEATPUMP = 1 AND Q4(7) = 1 OR Q6 = 7]

37. Did you purchase a more energy-efficient ductless mini-split heat pump because of the Evergy discount/rebate?

1. Yes
2. No
98. Do not recall

38. Would you have still purchased the following without the Evergy discount/rebate? **[INSERT OPTIONS DEFINED AS 1 = YES, 2 = NO, AND 98 = NOT SURE]**

1. **[SHOW IF AIR SEALING = 1 AND Q4(2) = 1 OR Q6 = 2]** Air sealing (sealing air leaks in the home, weather sealing)
2. **[SHOW IF CEILING/ATTIC INSULATION = 1 AND Q4(3) = 1 OR Q6 = 3]** Attic/ceiling insulation
3. **[SHOW IF CENTRAL AC = 1 AND Q4(4) = 1 OR Q6 = 4]** Central air conditioner
4. **[SHOW IF AS_HEATPUMP = 1 AND Q4(5) = 1 OR Q6 = 5]** Heat pump
5. **[SHOW IF GS_HEATPUMP = 1 AND Q4(6) = 1 OR Q6 = 6]** Ground source heat pump
6. **[SHOW IF DUCTLESS MINI-SPLIT HEATPUMP = 1 AND Q4(7) = 1 OR Q6 = 7]** Ductless mini-split heat pump

39. How likely is it that you would have purchased the following without the Evergy discount/rebate? **[INSERT 1-5 SCALE; 1 = NOT AT ALL LIKELY, 5 = VERY LIKELY, WITH 98 = NOT SURE]**

1. **[SHOW IF AIR SEALING = 1 AND Q4(2) = 1 OR Q6 = 2]** Air sealing (sealing air leaks in the home, weather sealing)
2. **[SHOW IF CEILING/ATTIC INSULATION = 1 Q4(3) = 1 OR Q6 = 3]** Attic/ceiling insulation
3. **[SHOW IF CENTRAL AC = 1 AND Q4(4) = 1 OR Q6 = 4]** Central air conditioner
4. **[SHOW IF AS_HEATPUMP = 1 AND Q4(5) = 1 OR Q6 = 5]** Heat pump
5. **[SHOW IF GS_HEATPUMP = 1 AND Q4(6) = 1 OR Q6 = 6]** Ground source heat pump

6. **[SHOW IF DUCTLESS MINI-SPLIT HEATPUMP = 1 AND Q4(7) = 1 OR Q6 = 7]** Ductless mini-split heat pump

40. Were any of the following energy-efficient equipment/upgrades recommended by your contractor/energy auditor during an initial visit to your home? **[INSERT OPTIONS DEFINED AS 1 = YES, 2 = NO, WITH 98 = DO NOT RECALL AND 99 = NOT APPLICABLE]**

1. **[SHOW IF AIR SEALING = 1 AND Q4(2) = 1 OR Q6 = 2]** Air sealing (sealing air leaks in the home, weather sealing)
2. **[SHOW IF CEILING/ATTIC INSULATION = 1 AND Q4(3) = 1 OR Q6 = 3]** Attic/ceiling insulation
3. **[SHOW IF CENTRAL AC = 1 AND Q4(4) = 1 OR Q6 = 4]** Central air conditioner
4. **[SHOW IF AS_HEATPUMP = 1 AND Q4(5) = 1 OR Q6 = 5]** Heat pump
5. **[SHOW IF GS_HEATPUMP = 1 AND Q4(6) = 1 OR Q6 = 6]** Ground source heat pump
6. **[SHOW IF DUCTLESS MINI-SPLIT HEATPUMP = 1 AND Q4(7) = 1 OR Q6 = 7]** Ductless mini-split heat pump

[SHOW Q41 IF ANY IN Q40 = 1]

41. How likely is it that you would have purchased the following energy-efficient equipment/upgrades if your contractor/energy auditor had not recommended them? **[INSERT 1-5 SCALE; 1 = NOT AT ALL LIKELY, 5 = VERY LIKELY, WITH 98 = NOT SURE]**

1. **[SHOW IF Q**Error! Reference source not found.**(1) = 1]** Air sealing (sealing air leaks in the home, weather sealing)
2. **[SHOW IF Q**Error! Reference source not found.**(2) = 1]** Attic/ceiling i nsulation
3. **[SHOW IF Q**Error! Reference source not found.**(3) = 1]** Central air c onditioner
4. **[SHOW IF Q**Error! Reference source not found.**(4) = 1]** Heat pump
5. **[SHOW IF Q**Error! Reference source not found.**(5) = 1]** Ground source h eat pump
6. **[SHOW IF Q**Error! Reference source not found.**(6) = 1]** Ductless mini-split h eat pump

[SHOW Q42 IF ANY IN Q Error! Reference source not found. **= 1]**

42. If you had not received the Evergy discount/rebate, when might have you purchased and installed the following energy-efficient equipment/upgrades? **[INSERT 1 – 6 SCALE; 1 = I WOULD HAVE COMPLETED IT AROUND THE SAME TIME, 2 = I WOULD HAVE COMPLETED IT WITHIN 6 MONTHS, 3 = I WOULD HAVE**

COMPLETED IT BETWEEN 6 MONTHS AND 1 YEAR, 4 = I WOULD HAVE COMPLETED IN 1 TO 2 YEARS, 5 = I WOULD HAVE COMPLETED IT IN 2 TO 3 YEARS, 6 = I WOULD HAVE COMPLETED IT IN MORE THAN 3 YEARS, AND 98 = NOT SURE]

1. **[SHOW IF AIR SEALING = 1 AND Q4(2) = 1 OR Q6 = 2]** Air sealing (sealing air leaks in the home, weather sealing)
2. **[SHOW IF CEILING/ATTIC INSULATION = 1 AND Q4(3) = 1 OR Q6 = 3]** Attic/ceiling insulation
3. **[SHOW IF CENTRAL AC = 1 AND Q4(4) = 1 OR Q6 = 4]** Central air conditioner
4. **[SHOW IF AS_HEATPUMP = 1 AND Q4(5) = 1 OR Q6 = 5]** Heat pump
5. **[SHOW IF GS_HEATPUMP = 1 AND Q4(6) = 1 OR Q6 = 6]** Ground source heat pump
6. **[SHOW IF DUCTLESS MINI-SPLIT HEATPUMP = 1 AND Q4(7) = 1 OR Q6 = 7]** Ductless mini-split heat pump

43. Have any of the energy-efficient equipment/upgrades that you received a discount/rebate for been removed? **[INSERT OPTIONS DEFINED AS 1 = STILL INSTALLED AND 2 = REMOVED]**

1. **[SHOW IF AIR SEALING = 1 AND Q4(2) = 1 OR Q6 = 2]** Air sealing (sealing air leaks in the home, weather sealing)
2. **[SHOW IF CEILING/ATTIC INSULATION = 1 AND Q4(3) = 1 OR Q6 = 3]** Attic/ceiling insulation
3. **[SHOW IF CENTRAL AC = 1 AND Q4(4) = 1 OR Q6 = 4]** Central air conditioner
4. **[SHOW IF AS_HEATPUMP = 1 AND Q4(5) = 1 OR Q6 = 5]** Heat pump
5. **[SHOW IF GS_HEATPUMP = 1 AND Q4(6) = 1 OR Q6 = 6]** Ground source heat pump
6. **[SHOW IF DUCTLESS MINI-SPLIT HEATPUMP = 1 AND Q4(7) = 1 OR Q6 = 7]** Ductless mini-split heat pump

[SHOW Q44 IF ANY Q43 = 2]

44. Why were the energy-efficient equipment/upgrade removed?

1. **[OPEN-ENDED]**

CAPTURING POTENTIAL SPILLOVER EFFECTS

[SHOW Q45 AND Q46 IF DI KIT = 1 AND Q4(1) = 1 OR Q6 = 1]

45. How likely are you to implement any of the next steps that were recommended in your custom energy savings kit summary report? **[INSERT 1-10 SCALE; 1 = NOT AT ALL LIKELY, 10 = VERY LIKELY, WITH 98 = NOT SURE]**

[SHOW Q46 IF Q45 >5]

46. Which next steps from the energy savings kit summary report are you most likely to implement? (Please select all that apply) **[MULTI-SELECT]**

1. Upgrading your existing HVAC unit
2. Adding air sealing to your home
3. Adding attic insulation to your home
4. Income-qualified services
96. Other (Please specify)
97. None of the energy-efficient equipment listed **[EXCLUSIVE]**
98. Not sure

47. Were any additional energy-efficient equipment/upgrades recommended by your contractor/energy-efficiency professional or during your home energy assessment?

1. Yes
2. No
98. Do not recall
3. Did not work with a contractor/energy-efficiency professional or receive a home energy assessment

[SHOW Q48 IF Q47 = 1]

48. What additional energy-efficient equipment/upgrades did they recommend? (Please select all that apply) [MULTI-SELECT]

1. **[SHOW IF DI KIT = 0 AND Q6 ≠ 1]** An energy savings kit (can include LED lightbulbs, faucet aerators, low-flow shower heads, hot water pipe insulation, and smart power strips)
2. **[SHOW IF AIR SEALING = 0 AND Q6 ≠ 2]** Air sealing (sealing air leaks in the home, weather sealing)
3. **[SHOW IF CEILING/ATTIC INSULATION= 0 AND Q6 ≠ 3]** Attic/ceiling insulation
4. **[SHOW IF CENTRAL AC = 0 AND Q6 ≠ 4]** Central air conditioner
5. **[SHOW IF AS_HEATPUMP = 0 AND Q6 ≠ 5]** Heat pump
6. **[SHOW IF GS_HEATPUMP = 0 AND Q6 ≠ 6]** Ground source heat pump
7. **[SHOW IF DUCTLESS MINI-SPLIT HEATPUMP = 0 AND Q6 ≠ 7]** Ductless mini-split heat pump
96. Other (Please specify) **[OPEN-ENDED]**
98. Do not recall

[SHOW Q49 IF Q48 = 1 – 7 OR 96]

49. Which of the recommended energy-efficient equipment/upgrades did you complete? (Please select all that apply) **[MULTI-SELECT]**

1. **[SHOW IF Q48 = 1]** Energy saving kits (can include LED lightbulbs, faucet aerators, low-flow shower heads, hot water pipe insulation, and smart power strips)
2. **[SHOW IF Q48 = 2]** Air sealing (sealing air leaks in the home, weather sealing)
3. **[SHOW IF Q48 = 3]** Attic/ceiling insulation
4. **[SHOW IF Q48 = 4]** Central air conditioner
5. **[SHOW IF Q48 = 5]** Heat pump
6. **[SHOW IF Q48 = 6]** Ground source heat pump
7. **[SHOW IF QError! Reference source not found. = 7]** Ductless mini-split h eat pump
8. **[SHOW IF Q48 = 96]** Other energy-efficient upgrade(s)
9. None of them **[EXCLUSIVE]**
10. Do not recall

[SHOW Q50 IF Q49 Error! Reference source not found. **= 10]**

50. How likely are you to complete any of the additional energy-efficient equipment/upgrades that were recommended by your contractor/energy-efficiency professional in the future? **[INSERT 1-5 SCALE; 1 = NOT AT ALL LIKELY, 5 = VERY LIKELY, WITH 98 = NOT SURE]**

[SHOW Q51 IF Q49 = 1 – 8]

51. How influential was your contractor/energy-efficiency professional's recommendation or information you learned during your home energy assessment in your decision to install the additional energy-efficient equipment/upgrades in your home? **[INSERT 1-5 SCALE; 1 = NOT AT ALL INFLUENTIAL, 5 = VERY INFLUENTIAL, WITH 98 = DO NOT RECALL]**

52. Have you installed any additional energy-efficient equipment or home improvements in 2021, <u>without</u> receiving a discount or rebate? (This includes lightbulbs, home improvements, water heater, etc.)

1. Yes
2. No
98. Do not recall

[SHOW Q53 IF Q52 = 1]

53. What additional equipment or home improvements have you purchased in 2021? (Please select all that apply) **[MULTI-SELECT]**

1. LED lightbulbs
2. Faucet aerators

3. Low-flow shower heads
4. Water heater pipe insulation **[SHOW IF PIPE INSULATION = 0]**
5. Smart power strips
6. **[SHOW IF AIR SEALING = 0 AND Q6 ≠ 2]** Air sealing (sealing air leaks in the home, weather sealing)
7. **[SHOW IF CEILING/ATTIC INSULATION= 0 AND Q6 ≠ 3]** Attic/ceiling insulation
8. **[SHOW IF AC_REPLACEMENT = 0 AND Q6 ≠ 4]** Central air conditioner
9. **[SHOW IF AS_HEATPUMP = 0 AND Q6 ≠ 5]** Heat pump
10. **[SHOW IF GS_HEATPUMP = 0 AND OR Q6 ≠ 6]** Ground source heat pump
11. **[SHOW IF DUCTLESS MINI-SPLIT HEATPUMP = 0 AND Q6 ≠ 7]** Ductless mini-split heat pump

96. Other energy-efficient equipment/upgrade (Please specify) [**OPEN-ENDED**]
98. Do not recall

[SHOW Q54 IF Q53 = 1, 2, 3, OR 5]

54. How many of each energy-efficient equipment listed did you purchase AND install in your home? **[OPEN-ENDED; NUMERIC VALUE 1 – 97]**

1. LED lightbulbs: _____ **[SHOW IF Q53 = 1]**
2. Faucet aerators: _____ **[SHOW IF Q53 = 2]**
3. Low-flow shower heads: _____ **[SHOW IF Q53 = 3]**
4. Smart power strips: _____ **[SHOW IF Q53 = 5]**

[SHOW Q55 AND Q56 IF Q53 = 1 – 11 OR 96]

55. How would you rate the importance of the discount/rebate and/or energy savings kit from Evergy in your decision to install those additional energy-efficient equipment or home improvements? **[INSERT 0-10 SCALE; 0 = NOT AT ALL IMPORTANT, 10 = VERY IMPORTANT, WITH 99 = NOT APPLICABLE]**

1. LED lightbulbs **[SHOW IF Q53 = 1]**
2. Faucet aerators **[SHOW IF Q53 = 2]**
3. Low-flow shower heads **[SHOW IF Q53 = 3]**
4. Water heater pipe insulation **[SHOW IF Q53 = 4]**
5. Smart power strips **[SHOW IF Q53 = 5]**
6. Air sealing (sealing air leaks in the home, weather sealing) **[SHOW IF Q53 = 6]**
7. Attic/ceiling insulation **[SHOW IF Q53 = 7]**
8. Central air conditioner **[SHOW IF Q53 = 8]**
9. Heat pump **[SHOW IF Q53 = 9]**
10. Ground source heat pump **[SHOW IF Q53 = 10]**

11. Ductless mini-split heat pump **[SHOW IF Q53**Error! Reference source not found. **= 11]**
12. Other energy-efficient equipment/upgrade **[SHOW IF Q53 = 96]**

56. How likely would you have been to install those additional energy-efficient equipment or home improvements if you had not received a discount/rebate and/or energy savings kit from Evergy? **[INSERT 1-5 SCALE; 1 = NOT AT ALL LIKELY, 5 = VERY LIKELY, WITH 99 = NOT APPLICABLE]**

1. LED lightbulbs **[SHOW IF Q53 = 1]**
2. Faucet aerators **[SHOW IF Q53 = 2]**
3. Low-flow shower heads **[SHOW IF Q53 = 3]**
4. Water heater pipe insulation **[SHOW IF Q53 = 4]**
5. Smart power strips **[SHOW IF Q53 = 5]**
6. Air sealing (sealing air leaks in the home, weather sealing**) [SHOW IF Q53 = 6]**
7. Attic/ceiling insulation **[SHOW IF Q53 = 7]**
8. Central air conditioner **[SHOW IF Q53 = 8]**
9. Heat pump **[SHOW IF Q53 = 9]**
10. Ground source heat pump **[SHOW IF Q53 = 10]**
11. Ductless mini-split heat pump **[SHOW IF Q53 = 11]**
12. Other energy-efficient equipment/upgrade **[SHOW IF Q53 = 96]**

EXPERIENCE WITH PROGRAM/PROJECT

HVAC MEASURES

[SHOW Q57 AND Q58 IF (CENTRAL AC = 1 Q4(4) = 1 OR Q6 = 4) OR (AS_HEATPUMP = 1 AND Q4(5) = 1 OR Q6 = 5) OR (GS_HEATPUMP = 1 AND Q4(6) = 1 OR Q6 = 6) OR (DUCTLESS MINI-SPLIT HEATPUMP=1 AND Q4(7) = 1 OR Q6 = 7)]

57. How did you select your heating and cooling contractor?

1. Evergy.com (Find an authorized contractor)
2. General online search
3. Friend/Relative recommended
4. Contractor previously used
5. Neighbor recommended
96. Other (Please specify)
98. Do not recall

58. What is the name of the contractor that installed your new heating/cooling equipment?

1. **[OPEN-ENDED]**
98. Do not recall

HVAC, INSULATION, AND ATTIC INSULATION MEASURES

[SHOW Q59 AND Q60 IF (AIR SEALING = 1 AND Q4(2) = 1 OR Q6 = 2) OR (ATTIC/CEILING INSULATION = 1 AND Q4(3) = 1 OR Q6 = 3) OR (CENTRAL AC = 1 AND Q4(4) = 1 OR Q6 = 4) OR (AS_HEATPUMP = 1 AND Q4(5) = 1 OR Q6 = 5) OR (GS_HEATPUMP = 1 AND Q4(6) = 1 OR Q6 = 6) OR (DUCTLESS MINI-SPLIT HEATPUMP=1 AND Q4(7) = 1 OR Q6 = 7)]

59. How did you select your energy auditor that conducted your Comprehensive Home Energy Audit?

1. Evergy.com (Find an authorized contractor)
2. General online search
3. Friend / Relative recommended
4. Contractor previously used
96. Other (Please specify)
98. Do not recall
99. Not applicable; did not have a Comprehensive Home Energy Audit performed

60. Who was the energy auditor that conducted your Comprehensive Home Energy Audit? [INSERT DROPDOWN]

1. Affordable Energy Solutions
2. Central Energy Audits
3. Community Services, Inc. Dba/Homesealers
4. Green CAT Services
5. Green Improvement Consulting
6. Midwest Energy Rating and Auditing
7. Star Companies
8. Star Energy Consultants
9. Streamline Energy Solutions
10. The Hayes Company
96. Other (Please specify)
100. Do not recall

AIR SEALING AND ATTIC INSULATION MEASURES

[SHOW Q61 AND Q62 IF (AIR SEALING = 1 AND Q4(2) = 1 OR Q6 = 2) OR (ATTIC/CEILING INSULATION = 1 AND Q4(3) = 1 OR Q6 = 3)]

61. Occasionally, the energy auditor is the same person who actually does the air sealing or installs your new insulation. Who completed the air sealing and/or installed new insulation in your home?

1. Energy auditor
2. Different contractor

3. Installed myself
98. Do not recall

[SHOW Q62 IF Q61 = 2]

62. What is the name of the contractor that performed your air sealing, or installed your new insulation?

1. **OPEN-ENDED**
98. Do not recall

EVERGY SATISFACTION

DIRECT INSTALL (DI) KIT

[SHOW Q63 - Q69 IF DI KIT = 1 AND Q4(1) = 1 OR Q6 = 1]

63. Was your home energy assessment/energy savings kit conducted virtually or in-person?

1. Virtually
2. In-person
98. Do not recall

[SHOW Q64 IF Q63 = 2]

64. Who was the Energy-Efficiency Professional that conducted your energy savings kit/home energy assessment? **[INSERT DROPDOWN]**

1. Sandi Garrison
2. Deron Rosenberg
99. Other (Please provide name, if you recall)
98. Do not recall

[SHOW Q65 IF Q63 = 2]

65. How satisfied are you with the following aspects of receiving your energy savings kit? **[INSERT 1-10 SCALE; 1 = VERY DISSATISFIED, 10 = VERY SATISFIED, WITH 98 = DO NOT RECALL AND 99 = NOT APPLICABLE]**

99. Scheduling your appointment
100. The Energy-Efficiency Professional that conducted your energy savings kit/home energy assessment
101. Energy-Efficiency Professional arriving on time
102. Energy-Efficiency Professional notifying you of their ETA in advance of arriving
103. Appearance (ID badge, uniform, etc.)
104. Courtesy of the energy-efficiency professional

105. Energy-efficiency professional's knowledge of the program
106. Installation of energy savings kit items
107. Length of appointment
108. The explanation of your "next steps" to improve efficiency in your home?
109. The condition in which your home was left

[SHOW Q66 IF ANY Q65 < 5]

66. Why were you dissatisfied?

1. **[OPEN-ENDED]**

[SHOW Q67 IF Q63 = 2]

67. What would you consider to be the "ideal appointment length" for the energy savings kit/home energy assessment?

1. Less than 30 minutes
2. Between 30-45 minutes
3. Between 46-60 minutes
4. Between 61-75 minutes
5. Over 75 minutes
2. Not sure

68. Were you dissatisfied with any of the items in your energy savings kit?

1. Yes (Please specify)
2. No
2. Do not recall

69. How would you rate the usefulness of your custom energy savings kit summary report? **[INSERT 1-10 SCALE; 1 = NOT AT ALL USEFUL, 10 = EXTREMELY USEFUL, WITH 99 = NOT APPLICABLE]**

HVAC MEASURES

[SHOW Q70 AND Q71 IF (CENTRAL AC = 1 AND Q4(4) = 1 OR Q6 = 4) OR (AS_HEATPUMP = 1 AND Q4(5) = 1 OR Q6 = 5) OR (GS_HEATPUMP = 1 AND Q4(6) = 1 OR Q6 = 6) OR (DUCTLESS MINI-SPLIT HEATPUMP=1 AND Q4(7) = 1 OR Q6 = 7)]

70. How knowledgeable was your contractor about the value/benefits of energy-efficient equipment? **[INSERT 1-10 SCALE; 1 = NOT AT ALL KNOWLEDGEABLE, 10 = EXTREMELY KNOWLEDGEABLE, WITH 98 = DO NOT RECALL AND 99 = NOT APPLICABLE]**

71. How satisfied are you with the contractor who installed your heating/cooling equipment in regards to…? **[INSERT 1-10 SCALE; 1 = VERY DISSATISFIED, 10 = VERY SATISFIED, WITH 98 = DO NOT RECALL AND 99 = NOT APPLICABLE]**

1. Scheduling the installation of your new heating/cooling equipment
2. Arriving on time
3. Notifying you ahead of time that they are going to be running late
4. Condition in which your home was left
5. The installation/quality of work done
6. The contractor overall

HVAC, AIR SEALING, AND ATTIC INSULATION MEASURES

[SHOW Q72 – Q75 IF (AIR SEALING = 1 AND Q4(2) = 1 OR Q6 = 2) OR (ATTIC/CEILING INSULATION = 1 AND Q4(3) = 1 OR Q6 = 3) OR (CENTRAL AC = 1 AND Q4(4) = 1 OR Q6 = 4) OR (AS_HEATPUMP = 1 AND Q4(5) = 1 OR Q6 = 5) OR (GS_HEATPUMP = 1 AND Q4(6) = 1 OR Q6 = 6) OR (DUCTLESS MINI-SPLIT HEATPUMP=1 AND Q4(7) = 1 OR Q6 = 7)]

72. How satisfied are you with the following aspects of your comprehensive energy audit? **[INSERT 1-10 SCALE; 1 = VERY DISSATISFIED, 10 = VERY SATISFIED, WITH 98 = DO NOT RECALL AND 99 = NOT APPLICABLE; DID NOT RECEIVE A COMPREHENSIVE AUDIT]**

1. The scheduling of your comprehensive energy audit
2. The amount of time it took to complete the comprehensive energy audit
3. The overall value of the comprehensive energy audit and report in terms of what you received vs. what you expected

73. How satisfied are you with the Energy Auditor in regards to…? **[INSERT 1-10 SCALE; 1 = VERY DISSATISFIED, 10 = VERY SATISFIED, WITH 98 = DO NOT RECALL AND 99 = NOT APPLICABLE]**

1. Arriving on time
2. Notifying you ahead of time that they are going to be running late
3. Overall appearance
4. Courtesy of auditor
5. Knowledge of Evergy's Heating and Cooling Rebate program
6. Sharing energy saving tips
7. Communicating how Evergy's Heating and Cooling Rebate program works
8. Condition in which your home was left
9. The Energy Auditor overall

74. How satisfied were you with the following aspects of receiving a discount/rebate through Evergy? **[INSERT 1-10 SCALE; 1 = VERY DISSATISFIED, 10 = VERY**

SATISFIED, WITH 98 = DO NOT RECALL AND 99 = NOT APPLICABLE; MY DISCOUNT WAS APPLIED AS AN INSTANT REBATE]

1. The timeliness in receiving the discount/rebate
2. The discount/rebate amount

[SHOW Q75 IF ANY Q74 <5]

75. Why were you dissatisfied?

[OPEN-ENDED]

DIRECT INSTALL (DI) KIT, AIR SEALING, AND ATTIC INSULATION MEASURES

[SHOW Q76 – Q78 IF (DI KIT = 1 AND Q4(1) = 1 OR Q6 = 1) OR (AIR SEALING = 1 AND Q4(2) = 1 OR Q6 = 2) OR (ATTIC/CEILING INSULATION = 1 AND Q4(3) = 1 OR Q6 = 3)]

76. Are you a Spire (formerly Missouri Gas Energy) customer?

1. Yes
2. No
4. Not sure

[SHOW Q77 AND Q78 IF Q76 = 1]

77. Were you aware that Spire and Evergy are partnering together to deliver this program?

1. Yes
2. No

78. How likely are you to participate in the other customer programs offered by Spire? **[INSERT 1-10 SCALE WHERE 1 = NOT AT ALL LIKELY, 10 = EXTREMELY LIKELY, WITH 99 = NOT APPLICABLE]**

79. How has your participation in this program impacted your impression of Evergy? **[INSERT SCALE, 1 = MUCH LESS FAVORABLE, 2 = SOMEWHAT LESS FAVORABLE, 3 = NO CHANGE, 4 = SOMEWHAT MORE FAVORABLE, 5 = MUCH MORE FAVORABLE]**

80. How likely are you to participate in other Evergy programs? **[INSERT 1-10 SCALE WHERE 1 = NOT AT ALL LIKELY, 10 = EXTREMELY LIKELY, WITH 99 = NOT APPLICABLE]**

81. Please indicate your level of satisfaction with your overall experience with Evergy's program. **[INSERT 1-10 SCALE; 1 = VERY DISSATISFIED, 10 = VERY SATISFIED, WITH 99 = NOT APPLICABLE]**

[SHOW Q Error! Reference source not found. **IF Q81 <5]**

82. Why were you dissatisfied with your overall experience with Evergy's program?

[OPEN-ENDED]

[SHOW Q15 IF Q81 = 99]

83. You indicated that your level of satisfaction with your overall experience with Evergy's program was "Not applicable"? Please explain.

[OPEN-ENDED]

84. Did you or someone in your household contact Evergy or ICF (program management company) program staff with questions or concerns regarding installation of energy-efficient equipment/upgrades, the rebate/discount, or any other reason?

1. Yes
2. No
98. Do not recall

[SHOW Q85 IF Q84 = 1]

85. Please indicate your level of satisfaction with your interactions with Evergy or ICF staff. **[INSERT 1-10 SCALE; 1 = VERY DISSATISFIED, 10 = VERY SATISFIED, WITH 99 = NOT APPLICABLE]**

[SHOW Q86 IF Q85 <5]

86. Why were you dissatisfied with Evergy or ICF staff?

[OPEN-ENDED]

87. Do you have any other comments about the program, energy efficiency in residences, or about Evergy's services in general?

1. Yes (Please specify) **[OPEN-ENDED]**
2. No comments

DEMOGRAPHICS

The final questions in this survey are regarding your household and residence. Your responses will remain anonymous and are used to assess how well participants in this program resemble Evergy's customer population. Please select "Prefer not to answer" if you do not wish to answer any of the following questions.

88. Do you rent or own your household?

1. Rent
2. Own

99. Prefer not to answer

89. How many people, including you, live in your household?

1. Number of people: [**OPEN-ENDED**]
99. Prefer not to answer

90. Which of the following best describes your home?

1. Single Family Home, detached from any other house
2. Single-family house attached to one or more other houses (e.g., duplex, row house, or townhome)
96. Other (Please Specify) **[OPEN-ENDED]**
98. Not sure
99. Prefer not to answer

91. Approximately when was your home built?

1. Before 1960
2. 1960 - 1969
3. 1970 - 1979
4. 1980 - 1989
5. 1990 - 1999
6. 2000 - 2009
7. 2010 – 2019
8. 2020 or newer
98. Not sure
99. Prefer not to answer

92. About how many square feet is your home? If you are unsure, an estimate is okay.

1. Less than 1,000 square feet
2. 1,000-1,999 square feet
3. 2,000-2,999 square feet
4. 3,000-3,999 square feet
5. 4,000-4,999 square feet
6. 5,000 or greater square feet
98. Not sure
99. Prefer not to answer

93. What is the primary fuel type used to heat your home?

1. Electricity
2. Natural Gas
3. Propane
96. Other (Please Specify) **[OPEN-ENDED]**
98. Not sure

99. Prefer not to answer

94. What was your total household income before taxes in 2020?

1. Less than $10,000
2. $10,000 to less than $20,000
3. $20,000 to less than $30,000
4. $30,000 to less than $40,000
5. $40,000 to less than $50,000
6. $50,000 to less than $75,000
7. $75,000 to less than $100,000
8. $100,000 to less than $150,000
9. $150,000 to less than $200,000
10. $200,000 or more
98. Not sure
99. Prefer not to answer

95. What is your highest level of education?

1. Up to 8th grade
2. Some high school
3. High school graduate or GED equivalent
4. Some college
5. Associate degree
6. Bachelor's degree
7. Master's degree
8. Professional degree (MD, JD, DDS, DDO)
9. Doctorate degree (Ph.D., D.Sc.)
10. Not sure
99. Prefer not to answer

GIFT CARD INFORMATION

We appreciate you completing this survey on behalf of Evergy's program. We would like to send you a $10 electronic gift card to thank you for your time. We will be sending it to [EMAIL]. If you would like us to send your gift card to a different e-mail address, please enter the alternate e-mail address below. You should receive an email with the link to your gift card within 5 to 10 business days.

96. Please send my electronic gift card to the following email address:

1. **[EMAIL]**
2. **[OPEN-ENDED]**
99. I do not wish to receive a gift card

If you have questions regarding this survey or would like to know the status of your gift card, you can send an email to adm-surveys@admenergy.com. On behalf of Evergy, thank you for participating and have a great day!

M.2 Heating, Cooling and Home Comfort Trade Ally Survey

Client: Evergy
Program: Heating, Cooling, and Home Comfort
Program Year: 2021
Group: Trade allies
Mode: Email

PREDEFINED VARIABLES

Prepopulated variables are shown in all caps enclosed in brackets, e.g., [PREDEFINED VARIABLE]

VARIABLE	DEFINITION
NAME	Trade ally first and last name
BUSINESS NAME	Name of trade ally's business
EMAIL	Trade ally's email
QI PROGRAM	1 = IDI TRADE ALLY; 0 = NOT IDI TRADE ALLY

EMAIL SURVEY MESSAGE

Subject: [PROGRAM NAME] Feedback
Reply To: adm-surveys@admenergy.com
From Name: Evergy

Dear [NAME],

ADM Associates is the official contractor hired by Evergy to evaluate their energy-efficiency rebate/discount program. Evergy is interested in collecting feedback from registered trade allies who participated in the program in 2021. We are conducting a survey to gather information regarding your decision to participate in the program as a trade ally, as well as your overall experience with the program. If you would like to participate in this survey online, please click on the link below. If you would prefer to take the survey over the phone, you can call 775-238-7733 and a representative will be happy to help you.

[Click here to complete survey]

Kind Regards,
Krista McGee
ADM Associates / Contractor to Evergy

TRADE ALLY COMPANY INFORMATION

1. What services do you offer? Please select all that apply. **[MULTI-SELECT]**
    1. Heating and air conditioning equipment
    2. Air sealing
    3. Insulation
    4. Water heating equipment
    5. Geothermal equipment
    6. Energy Auditing

    98. Other (Please specify) **[OPEN-ENDED]**

[SHOW Q2 IF Q1 = 1, 2, 3, 4, OR 5]

2. Are you knowledgeable of your company's sales of [ANSWER(S) FROM Q1]?
    1. Yes
    2. No **[SKIP TO SURVEY END 2]**

3. How many people does your company employ?
    1. 1 - 5
    2. 6 - 10
    3. 11 - 15
    4. 16 - 20
    5. More than 21 staff (Please specify) **[OPEN-ENDED]**

4. How many years of experience does your organization have working with utility funded energy-efficiency programs?
    1. 0 - 5 years
    2. 6 - 10 years
    3. 11 - 15 years
    4. 16 - 20 years
    5. 21 - 25 years
    6. More than 25 years
    98. Do not recall

5. What percent of your home energy-efficiency improvement projects are at residential single-family homes and what percent are at multi-family homes?
    1. Residential, single-family homes? **[NUMERIC VALUE; OPEN-ENDED]**
    2. Residential, multi-family homes? **[NUMERIC VALUE; OPEN-ENDED]**

PROGRAM AWARENESS & INVOLVEMENT

6. How many years have you been participating in Evergy's energy-efficiency rebate/discount programs?
    1. **[OPEN-ENDED]**

98. Do not recall

7. Why did you decide to participate in the program? Please select all that apply. **[MULTI-SELECT]**
   1. Suggestion from ICF and/or Evergy representative
   2. To improve home efficiency for customers
   2. To be able to pass discounts/rebates onto customers
   3. To improve sales
   4. To benefit from recognition as a qualified trade ally
   96. Other (Please specify) [**OPEN-ENDED**]
   98. Do not recall

8. How professional would you say the ICF program staff are? [**INSERT 1-5 SCALE AS 1 = NOT AT ALL PROFESSIONAL TO 5 = VERY PROFESSIONAL, WITH 99 = NOT APPLICABLE**]

9. How easy is it to reach ICF staff with questions? [**INSERT 1-5 SCALE AS 1 = NOT AT ALL EASY TO 5 = VERY EASY, WITH 99 = NOT APPLICABLE**]

10. How well does the ICF staff keep you informed about the program? [**INSERT 1-5 SCALE AS 1 = NOT AT ALL INFORMED TO 5 = VERY INFORMED, WITH 99 = NOT APPLICABLE**]

11. When trying to communicate with ICF, how quickly do they respond to your emails/phone calls? [**INSERT 1-5 SCALE AS 1 = NOT AT ALL QUICKLY TO 5 = VERY QUICKLY, WITH 99 = NOT APPLICABLE**]

[SHOW Q12 IF Q9, Q10, OR Q11 <4]

12. What could be improved about communication between you and ICF program staff?
   1. [OPEN-ENDED]

PROGRAM PROCEDURES

13. How satisfied have you been with the following aspects of the program in 2021? **[INSERT 1-5 SCALE AS 1 = VERY DISSATISFIED TO 5 = VERY SATISFIED, WITH 99 = NOT APPLICABLE]**
   1. The program paperwork
   2. The program measures and/or discounted/rebated equipment offered through Evergy's energy-efficiency rebate/discount program
   3. The rebate/discount payment process and/or application
   4. The Evergy energy-efficiency website

[SHOW Q14 IF ANY OF Q13 <4]

14. What has been less than satisfactory?

1. [OPEN-ENDED]

[SHOW Q15 IF ANY OF Q13 = 99]

15. You indicated that your level of satisfaction with some of the aspects of the program were “Not applicable”? Please explain.
    1. [OPEN-ENDED]

16. Did you receive any program training in 2021?
    1. Yes
    2. No
    3. Do not recall

[SHOW Q17 IF Q16 = 1]

17. How helpful was the training? **[INSERT 1-5 SCALE AS 1 = NOT AT ALL HELPFUL TO 5 = VERY HELPFUL, WITH 99 = NOT APPLICABLE]**

[SHOW Q18 IF Q17 <3]

18. Can you tell me a bit more about why you gave that rating?
    1. [OPEN-ENDED]

CENTRAL AIR CONDITIONERs AND HEAT PUMPS

[SHOW Q19 - Q28 IF Q1 = 1]

19. About what percentage of the high-efficiency (SEER 15 or above) residential central air conditioners that your company sold during 2021 in the Evergy Missouri service area did **not** receive a rebate?
    1. [OPEN-ENDED; PERCENT (0 – 100)]
    98. Do not recall

[SHOW Q20 IF Q19 >0]

20. Why did some of the high-efficiency central air conditioners that you installed not receive an Evergy rebate?
    1. [OPEN-ENDED]
    98. Do not recall

21. On average, would you say that the central air conditioners you installed that did **not** receive a rebate were smaller in size, larger in size, or about the same size as units that did receive a rebate?
    1. Smaller
    2. Larger
    3. About the same
    98. Do not recall

[SHOW Q22 IF Q19>0]

22. Did Evergy's rebate/discount program have an influence on your company's sales of high-efficiency central air conditioners that did **not** receive a rebate?
    1. Yes
    2. No
    98. Do not recall

[SHOW Q23 IF Q21 = 1]

23. How influential were the rebates offered through the program, program marketing, education, training, and/or advertising on your company's sales of high-efficiency central air conditioners that did **not** receive a rebate? [**INSERT 0 -10 SCALE AS 0 = NOT AT ALL INFLUENCIAL TO 10 = VERY INFLUENCIAL**]

24. About what percentage of the high-efficiency (SEER 15 or above) residential heat pumps that your company sold during 2021 in the Evergy Missouri service area did **not** receive a rebate?
    1. [OPEN-ENDED; PERCENT (0 – 100)]
    2. Do not recall

[SHOW Q25 IF Q24>0]

25. Why did some of the high-efficiency heat pumps that you installed not receive an Evergy rebate?
    1. [OPEN-ENDED]
    2. Do not recall

26. On average, would you say that the heat pumps you installed that did **not** receive a rebate were smaller in size, larger in size, or about the same size as units that did receive a rebate?
    1. Smaller
    2. Larger
    3. About the same
    4. Do not recall

[SHOW Q27 IF Q24>0]

27. Did Evergy's rebate/discount program have an influence on your company's sales of high-efficiency heat pumps that did **not** receive a rebate?
    1. Yes
    2. No
    3. Do not recall

[SHOW Q28 IF Q31 = 1]

28. How influential were the rebates offered through the program, program marketing, education, training, and/or advertising on your company's sales of high-

efficiency heat pumps that did **not** receive a rebate? [**INSERT 0 -10 SCALE AS 0 = NOT AT ALL INFLUENCIAL TO 10 = VERY INFLUENCIAL**]

AIR SEALING

[SHOW Q29 - Q33 IF Q1 = 2]

29. Did all of your company's sales of air sealing projects in Evergy's Missouri service area receive an Evergy rebate?
    1. Yes
    2. No
    3. Do not recall

[SHOW Q30 IF Q29 = 2]

30. About what percent of your company's sales of air sealing projects in Evergy's Missouri service area did **not** receive a rebate?
    1. [OPEN-ENDED; PERCENT (0 – 100)]
    98. Do not recall

[SHOW Q31 IF Q29 = 2]

31. Why did some of the air sealing projects you completed not receive an Evergy rebate?
    1. [OPEN-ENDED]
    98. Do not recall

[SHOW Q32 IF Q29 = 2]

32. Did Evergy's rebate/discount program have an influence on your company's sales of air sealing projects that did **not** receive a rebate?
    1. Yes
    2. No
    98. Do not recall

[SHOW Q33 IF Q32 = 1]

33. How influential were the rebates offered through the program, program marketing, education, training, and advertising on your company's sales air sealing projects that did **not** receive a rebate? [**INSERT 0 -10 SCALE AS 0 = NOT AT ALL INFLUENCIAL TO 10 = VERY INFLUENCIAL**]

ATTIC/CEILING INSULATION

[SHOW Q34 - Q38 IF Q1 = 3]

34. Did all of your company's sales of those attic/ceiling insulation projects in Evergy's Missouri service area receive an Evergy rebate?
    1. Yes
    2. No
    98. Do not recall

[SHOW Q35 IF Q34 = 2]

35. About what percent of your company's sales of attic/ceiling insulation projects did **not** receive a rebate?
    1. [OPEN-ENDED; PERCENT (0 – 100)]
    98. Do not recall

[SHOW Q36 IF Q34 = 2]

36. Why did some of the attic/ceiling insulation projects you completed not receive an Evergy rebate?
    1. [OPEN-ENDED]
    98. Do not recall

[SHOW Q37 IF Q34 = 2]

37. Did Evergy's rebate/discount program have an influence on your company's sales of attic/ceiling insulation projects that did **not** receive a rebate?
    1. Yes
    2. No
    98. Do not recall

[SHOW Q38 IF Q38 = 1]

38. How influential were the rebates offered through the program, program marketing, education, training, and advertising on your company's sales of attic/ceiling insulation projects that did **not** receive a rebate? [**INSERT 0 -10 SCALE AS 0 = NOT AT ALL INFLUENCIAL TO 10 = VERY INFLUENCIAL**]

QUALITY INSTALL (QI) PROGRAM

[SHOW Q39 – Q43 IF QI PROGRAM = 1]

39. What is the main benefit of using Measure Quick or QI technology?
    1. More accessible
    2. Less difficult to use
    3. Helps minimize additional tracking and reporting requirements
    4. Other (Please specify) **[OPEN-ENDED]**

98. Not sure

40. What do you think the biggest challenge would be of using Measure Quick or QI technology?
    1. The initial time it would take to invest in QI installations
    2. Training employees on how to use Measure Quick/QI technology
    3. Investing money into the testing equipment
    4. The return cost of investing in Measure Quick/QI technology
    5. Getting enough customers to utilize the Measure Quick/QI technology
    6. Other (Please specify) **[OPEN-ENDED]**
    7. Not sure

41. Would you be willing to invest in and use the new wireless technology required to complete the QI installations?
    1. Yes
    2. No
    3. Depends (Please specify) **[OPEN-ENDED]**

[SHOW Q42 IF Q41 = 2]

42. Why would you not be willing to invest in and use the new wireless technology required to complete the QI installations?
    1. [OPEN-ENDED]

43. In your opinion, how beneficial would it be for your company to invest in Measure Quick or QI technology? **[INSERT 1-5 SCALE AS 1 = NOT BENEFICIAL AT ALL AND 5 = VERY BENEFICIAL, WITH 98 = NOT SURE]**

CUSTOMER INTERACTION

44. Overall, what percent of your customers in 2021 who qualified for Evergy's energy-efficiency rebate/discount program did not want to participate in the program?
    1. [OPEN-ENDED; PERCENT (0 – 100)]
    2. Do not recall

[SHOW Q45 IF Q44(1) >0]

45. What is the primary reason customers typically give for not wanting to participate in the program?
    1. Cost of equipment
    2. Return on investment timeline
    3. Discount/rebate amount
    4. Requirement to use a trade ally to install the equipment
    96. Other (Please specify) **[OPEN-ENDED]**
    97. Do not recall

46. When do you initially present high efficiency options and equipment to customers?
    1. When we first interact with a customer
    2. Only when the customer requests high efficiency options
    3. We never present high efficiency options
    4. Depends on the situation (Please explain) [**OPEN-ENDED**]
    5. Do not recall

47. What do you think is the main benefit your customers receive by participating in the program?
    1. Higher efficiency equipment
    2. Home comfort
    3. Savings on equipment
    4. Lower utility bills
    96. Other (Please specify) **[OPEN-ENDED]**
    97. Not sure

PROGRAM INFLUENCE

48. How important was Evergy's energy-efficiency rebate/discount program, including the discounts/rebates and information provided through the program, in influencing your level of marketing and selling of the energy-efficient measures to Evergy customers during 2021? [**INSERT 0 -10 SCALE AS 0 = NOT AT ALL IMPORTANT TO 10 = VERY IMPORTANT, WITH 99 = NOT APPLICABLE**]

[SHOW Q49 IF Q48 = 99]

49. You indicated that the influence of Evergy's energy-efficiency rebate/discount program was "Not applicable" on your level of marketing and selling of the energy-efficient measures to Evergy customers during 2021? Please explain.
    1. [OPEN-ENDED]

50. Would you have recommended different equipment types, quantities, or efficiency levels to customers if the program were not available?
    1. Yes
    2. No
    3. Depends (Please specify) **[OPEN-ENDED]**
    4. Not sure

MARKET

51. Has Evergy's energy-efficiency rebate/discount program affected the number of home energy-efficiency projects you complete? **[INSERT 1-5 SCALE AS 1 = DECREASED GREATLY, 2 = DECREASED SOMEWHAT, 3 = NEITHER**

INCREASED NOR DECREASED, 4 = INCREASED SOMEWHAT, 5 = INCREASEED GREATLY, WITH 99 = NOT APPLICABLE]

52. Do you expect your total number of Evergy's energy-efficiency rebate/discount program projects to increase, decrease, or stay the same in the next 12 months?
    1. Increase
    2. Decrease
    3. Stay the same
    4. Not sure

[SHOW Q53 IF Q52 = 1 OR 2]

53. Why do you think that is?
    1. [OPEN ENDED]

CLOSING

54. What has been the biggest challenge for you as a participating trade ally in Evergy's energy-efficiency rebate/discount program?
    1. Communication with program staff
    2. Understanding the discount/rebate process and/or application
    3. Qualifying customers
    4. Qualifying equipment
    96. Other (Please specify) **[OPEN ENDED]**
    97. Not sure

[SHOW Q55 IF Q54 = 1, 2, 3, 4, OR 96]

55. Do you have any suggestions for overcoming these challenges?
    1. [OPEN-ENDED]
    2. Not sure

56. How would you rate your overall satisfaction with Evergy's energy-efficiency rebate/discount program? **[INSERT 1-5 SCALE AS 1 = VERY DISSATISFIED AND 5 = VERY SATISFIED, WITH 99 = NOT APPLICABLE]**

[SHOW Q57 IF Q56 <4]

57. Why do you give it that rating?
    1. [OPEN-ENDED]

[SHOW Q58 IF Q56 = 99]

58. You indicated that your level of overall satisfaction with Evergy's energy-efficiency rebate/discount program was "Not applicable"? Please explain.
    1. [OPEN-ENDED]

59. Do you have anything else you want to mention regarding the program?
    1. [OPEN-ENDED]
    2. No additional comments

SURVEY END 1

You have now completed the survey. Thank you for your time in answering questions on behalf of Evergy's energy-efficiency rebate/discount program, have a great day!

SURVEY END 2

Please forward this survey to the person in your company who would have knowledge of your company's sales. On behalf of Evergy's energy-efficiency rebate/discount program, thank you for your time. Have a great day!

M.3 Energy Saving Products General Population Survey

Client: Evergy
Program: Evergy's 2021 General Population Survey
Group: General Customer Population
Mode: Email

INTRODUCTORY MESSAGE

Evergy (formerly Kansas City Power and Light Company) is conducting a survey regarding their customers' energy efficient product purchases. To thank you for your time and thoughts we'll send you a $10 online gift card from your choice of a variety of stores.

We would greatly appreciate you taking a few minutes to provide your feedback. If you have questions or require technical assistance, please reach out to us at adm-surveys@admenergy.com. If you are ready to get started, please click "next" below.

Thank you in advance for your time!

SCREENING

1. Who is your current electricity service provider?

   1. Evergy
   2. Ameren [**TERMINATE SURVEY]**
   96. Other [OPEN ENDED] [**TERMINATE SURVEY]**
   98. Do not recall [**TERMINATE SURVEY]**

2. Did you purchase ENERGY STAR® certified LED light bulbs in 2021? **We have included an example image of an LED light bulb and the ENERGY STAR® logo below to help you remember what this item would look like.**

   1. Yes
   2. No [**SKIP TO Q36]**
   98. Do not recall [**SKIP TO Q36**

[SHOW Q3 AND Q4 IF Q1=1]

3. What type of LED light bulbs did you purchase? We have included an example image of standard and specialty LED light bulbs below to help you remember what they would look like. Please select all that apply. **[MULTI-SELECT]**

1. Standard LED bulb(s)
2. Specialty LED bulb(s)
96. Other [OPEN ENDED]
98. Do not recall

Standard LED bulb example

Specialty LED bulbs examples

4. Where did you buy LED lightbulbs in 2021? [**MULTI-SELECT]**

1. Ace Hardware
2. Batteries Plus
3. Costco
4. Do It Best
5. Dollar Tree
6. Goodwill
7. Habitat Restore
8. Lowe's
9. Sam's Club
10. Target
11. The Home Depot
12. True Value
13. Walmart
96. Other **[OPEN-ENDED]**
98. Do not recall

[SHOW Q5 THRU Q35 IF Q4 = 1 – 96]

STANDARD BULBS MEASURE QUESTIONS

[SHOW Q5 THRU Q17 IF Q3 = 1]

5. In total, about how many standard LED light bulbs did you purchase in 2021?

1. Purchased [**NUMERIC OPEN-ENDED**]:

[SHOW Q6 THRU Q0 IF Q5 = 1]

6. How many of the [Q5 Response] standard LED light bulbs you purchased in 2021 are currently installed in the following areas?

1. Indoor - Residential [**NUMERIC OPEN-ENDED]**
2. Indoor - Multifamily **[NUMERIC OPEN-ENDED]**
3. Outdoor – Residential or Multifamily **[NUMERIC OPEN-ENDED]**
4. Commercial Space **[NUMERIC OPEN-ENDED]**
5. Not Installed/In Storage **[NUMERIC OPEN-ENDED]**
6. Do not recall **[NUMERIC OPEN-ENDED]**

[INCLUDE VALIDATION-TOTAL MUST EQUAL Q5 RESPONSE]

[SHOW Q0 IF SUM(Q6[1-4]) > 0]

7. How many of each of the following types of light bulbs did you replace with new standard LED light bulbs?

1. Traditional incandescent/halogen [**OPEN-ENDED**]
2. CFLs [**OPEN-ENDED**]
3. LED [**OPEN-ENDED**]
4. I installed bulbs in fixture or socket where there was none before [**OPEN-ENDED]**
98. Do not recall **[NUMERIC OPEN-ENDED]**

[**INCLUDE VALIDATION-TOTAL MUST EQUAL Q6[1-4] RESPONSE]**

8. Why did you buy the standard LED light bulbs? (Please select all that apply) [**MULTI-SELECT**]

1. Replace burned out bulbs
2. Replace old, inefficient bulbs
3. Replace working bulbs with a different color or brightness
4. Install new light fixture or lamp socket
5. To have spare bulbs on hand
96. Other (please specify) [**OPEN-ENDED**]

9. Which is the most important characteristic you consider when purchasing standard light bulbs? **[RANDOMIZE 1-8]**

1. Price
2. Energy efficiency
3. ENERGY STAR® certification
4. Brightness of the bulb
5. How long the bulb lasts
6. The ability to dim the bulb
7. Color of the light

96. Other (please specify) [**OPEN-ENDED**]
98. Do not recall

AWARENESS OF EE INCENTIVE / PROGRAM AWARENESS

10. Were any of the standard LED light bulbs you bought in 2021 discounted from their normal pricing?

1. Yes
2. No
98. Do not recall

[SHOW Q11 IF Q10 = 1]

11. Were any of the standard LED light bulbs you bought in 2021 discounted by Evergy?

1. Yes
2. No
98. Do not recall

[SHOW Q12 IF Q11 = 1]

12. Using the scale below, how important was the discount in your decision to buy standard LED light bulbs instead of another type of standard light bulb? **[INSERT 1-5 SCALE WITH 1 = NOT AT ALL IMPORTANT AND 5 = EXTREMELY IMPORTANT, WITH 98 = NOT SURE, 99 = PREFER NOT TO ANSWER]**

COST SENSITIVITY

13. Would you have bought the standard LED light bulbs instead of less efficient standard light bulb if they had cost $1.00 more per bulb?

1. Definitely would not have purchased
2. Probably would not have purchased
3. Not sure if you would have purchased
4. Probably would have purchased
5. Definitely would have purchased

[SHOW Q14 IF Q13 = 2, 3, 4, OR 5]

14. If the standard LED light bulbs had cost $1.00 more per bulb would you have bought the same number of bulbs?

1. I would have bought fewer LED light bulbs
2. I would have bought the same quantity

98. Not sure

[SHOW Q15 IF Q14 = 1 AND Q5 = 1]

15. About how many fewer standard LED light bulbs might you have bought if they had cost $1.00 more per bulb?

[**OPEN-ENDED**] **[INCLUDE VALIDATION-CANNOT BE MORE THAN Q5 RESPONSE]**

16. Had you ever bought standard LED light bulbs before 2021?

1. Yes
2. No
98. Do not recall

[SHOW Q17 IF Q16 = 1]

17. Were the standard LED light bulbs you bought before 2021 discounted from the normal pricing by Evergy/KCP&L?

1. Yes
2. No
98. Do not recall

SPECIALTY BULBS MEASURE QUESTIONS

[SHOW Q18 THRU Q31 IF Q3 = 2]

18. In total, how many specialty LED light bulbs did you purchase in 2021?

1. Purchased [**NUMERIC OPEN-ENDED**]

[SHOW Q19 THRU Q20 IF Q18 = 1]

19. How many of the [Q18 RESPONSE] specialty LED light bulbs you purchased in 2021 are currently installed in the following areas?

1. Indoor - Residential [**NUMERIC OPEN-ENDED]**
2. Indoor - Multifamily **[NUMERIC OPEN-ENDED]**
3. Outdoor – Residential or Multifamily **[NUMERIC OPEN-ENDED]**
4. Commercial Space **[NUMERIC OPEN-ENDED]**
5. Not Installed/In Storage **[NUMERIC OPEN-ENDED]**
98. Do not recall **[NUMERIC OPEN-ENDED]**

[INCLUDE VALIDATION-TOTAL MUST EQUAL Q18 RESPONSE]

20. How many of each of the following types of light bulbs did you replace with new specialty LED light bulbs?

1. Traditional incandescent/halogen [**OPEN-ENDED**]
2. CFLs [**OPEN-ENDED**]
3. LED [**OPEN-ENDED**]
4. I installed bulbs in fixture or socket where there was none before [**OPEN-ENDED**]
98. Do not recall **[NUMERIC OPEN-ENDED]**

[INCLUDE VALIDATION-TOTAL MUST EQUAL SUM OF Q19[1-4] RESPONSE]

21. Why did you buy the specialty LED light bulbs? (Please select all that apply) [**MULTI-SELECT**]

1. Replace burned out bulbs
2. Replace old, inefficient bulbs
3. Replace working bulbs with a different color or brightness
4. Install new light fixture or lamp socket
5. Stock up
96. Other (please specify) [**OPEN-ENDED**]

22. Which is the most important characteristic you consider when purchasing specialty light bulbs? **[RANDOMIZE 1-8]**

1. Price
2. Energy efficiency
3. ENERGY STAR® certification
4. Brightness of the bulb
5. How long the bulb lasts
6. The ability to dim the bulb
7. Color of the light
97. Other (please specify) [**OPEN-ENDED**]
98. Not sure

AWARENESS OF EE INCENTIVE / PROGRAM AWARENESS

23. Were any of the specialty LED light bulbs you bought in 2021 discounted from their normal pricing?

1. Yes
2. No
98. Do not recall

[SHOW Q24 IF Q23 = 1]

24. Were any of the specialty LED light bulbs you bought in 2021 discounted by Evergy?

1. Yes
2. No
98. Do not recall

[SHOW Q25 IF Q24 = 1]

25. Using the scale below, how important was the discount in your decision to buy specialty LED light bulbs instead of another type of specialty light bulb?

26. **[INSERT 1-5 SCALE WITH 1 = NOT AT ALL IMPORTANT AND 5 = EXTREMELY IMPORTANT, WITH 98 = NOT SURE, 99 = PREFER NOT TO ANSWER]**

COST SENSITIVITY

27. Would you have bought the specialty LED light bulbs instead of a less efficient type of specialty light bulb if they had cost $1.50 more per bulb?

1. Definitely would not have purchased
2. Probably would not have purchased
3. Not sure if you would have purchased
4. Probably would have purchased
5. Definitely would have purchased

[SHOW Q28 IF Q27 = 2, 3, 4, OR 5]

28. If the specialty LED light bulbs had cost $1.50 more per bulb would have bought the same number of LED light bulbs?

1. I would have bought fewer LED light bulbs
2. I would have bought the same quantity
98. Not sure

[SHOW Q29 IF Q28 = 1]

29. About how many fewer of the specialty LED light bulbs might you have bought if they had cost $1.50 more per bulb?

[**OPEN-ENDED**] **[INCLUDE VALIDATION-CANNOT BE MORE THAN Q18 RESPONSE]**

30. Had you ever bought specialty LED light bulbs before 2021?

1. Yes
2. No
98. Do not recall

[SHOW Q31 IF Q30 = 1]

31. Were the specialty LED light bulbs you bought before 2021 discounted from the normal pricing by Evergy/KCP&L?

1. Yes
2. No
98. Do not recall

[SHOW Q32 IF Q31 = 1 OR Q17 = 1]

32. How did you first learn about Evergy's lighting discounts? **[RANDOMIZE 1-13]**

1. Newspaper/magazine/print media
2. In-store SHOW
3. Bill inserts
4. Message printed on your bill
5. Evergy website
6. Friend or relative (word-of-mouth)
7. TV ad
8. Evergy representative
9. Evergy newsletter
10. Community event
11. Social media (such as Facebook or Twitter)
12. Home Energy Report
13. Salesperson
14. I wasn't aware that Evergy provided lighting discounts
96. Other (please specify) **[OPEN-ENDED]**
98. Do not recall

LEAKAGE EVALUATION

33. Please indicate how long you would be willing to drive (in minutes) to reach each of the following retail location types to purchase light bulbs. **[GRID SHOW]**

1. DIY store (e.g., Home Depot, Lowe's)
2. Big box retailer (e.g., Walmart, Target)
3. Wholesale membership club (e.g., Costco, Sam's Club)

1. 0-4 minutes
2. 5-9 minutes
3. 10-14 minutes
4. 15-19 minutes
5. 20-24 minutes
6. 25-29 minutes
7. 30-39 minutes
8. 40-49 minutes
9. 50-59 minutes
10. 60 minutes or more
97. Not applicable
98. Not sure

34. Using the scale below, please rate how satisfied or dissatisfied are you with each of the following? **[INSERT SCALE AS DEFINED AS 1=VERY DISSATISFIED TO 5=VERY SATISFIED, WITH 98 = NOT SURE]**

1. The savings on your electricity bills since installing the LED light bulbs
2. Quality of LED light bulbs you purchased
3. The discount amount on the LED light bulbs you purchased

[SHOW Q35 IF ANY IN Q34 <3]

35. Why were you dissatisfied with this aspect or aspects of your purchase?

[**OPEN-ENDED**]

SPILLOVER

36. Did you purchase any of the following energy-efficient equipment/upgrades in 2021? **[MULTI-SELECT]**

3. Energy-efficient central air conditioner
4. Energy-efficient air source heat pump
5. Energy-efficient ground source heat pump
6. Energy-efficient ductless mini-split heat pump
7. Attic insulation
8. Air sealing (e.g., weather stripping for doors/windows, door sweeps)
9. LED bulbs (without discounts)
10. Faucet aerators
11. Low-flow shower heads
12. Smart power strips
13. Hot water pipe insulation
98. Do not recall
99. None of the energy efficient equipment/upgrades listed above

[SHOW Q37 IF Q36 = 1 – 6, 8 - 11]

37. Did you receive a discount or rebate from Evergy for any of the energy-efficient equipment/upgrades that you purchased?

1. Yes
2. No
98. Do not recall

[SHOW Q38 IF Q36 = 2]

38. What is the main reason you did **not** receive an Evergy incentive, rebate, or discount for the energy-efficient equipment/upgrades you purchased?

1. Was not aware there was a rebate available
2. Did not have the time to complete rebate application
3. Found out about rebate too late
4. Contractor I worked with did not offer Evergy rebates/discounts
5. Submitted a rebate application that was rejected
96. For some other reason (please describe) **[OPEN-ENDED]**
98. Do not recall

[SHOW Q39 IF Q36 = 5]

39. Approximately what size (in square feet) is the attic where the insulation is installed?

1. Square feet **[NUMERIC OPEN-ENDED]**
98. Not sure

[SHOW Q40 IF Q36 = 6]

40. What type of air sealing measures did you install?

[OPEN-ENDED]

[SHOW Q41 IF Q36 = 7]

41. How many LED light bulbs did you purchase and install without a discount?

[OPEN-ENDED]

[SHOW Q41 IF Q36 = 8]

42. How many faucet aerators did you purchase and install?

[OPEN-ENDED]

[SHOW Q41 IF Q36 = 9]

43. How many low-flow shower heads did you purchase and install?

[OPEN-ENDED]

[SHOW Q41 IF Q36 = 10]

44. How many smart power strips did you purchase and install?

[OPEN-ENDED]

[SHOW Q45 IF Q2 = 1 AND Q36 = 7 AND (Q11 = 1 OR Q24 = 1)]

45. Using the scale below, how important were the LED lighting discounts from Evergy in your decision to purchase the additional non-discounted LED bulbs?[SCALE: 1 - (Not at all important), 2 = 2, 3 = 3, 4 = 4, 5 - (Extremely important), 98 = Not sure]

[IF Q2 = 2 OR 98, REDIRECT TO GIFT CARD PAGE]

DEMOGRAPHICS

Please answer the following questions about your household and residence. Your responses will be used to assess how well participants in this program resemble Evergy's customer population. It is okay to not answer any of these questions.

46. Do you rent or own your home?

1. Rent
2. Own
99. Prefer not to answer

47. Which of the following best describes your home?

1. Single-family home
2. Manufactured or mobile home
3. Duplex or townhome
4. Apartment or condominium
96. Other (please specify) [**OPEN-ENDED**]
98. Not sure
99. Prefer not to answer

48. Approximately when was your home built?

1. Before 1960
2. 1960 to 1979
3. 1980 to 1999
4. 2000 to 2009
5. 2010 or later
98. Not sure

99. Prefer not to answer

49. About how many square feet is your home? If you are unsure, an estimate is okay.

1. Less than 1,000 square feet
2. 1,000-1,999 square feet
3. 2,000-2,999 square feet
4. 3,000-3,999 square feet
5. 4,000 square feet or great
98. Not sure
99. Prefer not to answer

GIFT CARD INFORMATION

We appreciate your time and would like to send you a $5 electronic gift card to thank you. Please provide an email below where we can send you the gift card. You should receive the electronic gift card within 5-10 business days.

Email: [OPEN-ENDED]

THANK YOU MESSAGE

You should be receiving an email with the link to your gift card in 10 days or less. If you have any questions regarding this survey or would like to know the status of your gift card, please send an email to survey2026@surveys.admenergy.com. On behalf of Evergy, thank you for participating. Have a great day!

DISQUALIFICATION MESSAGE

Disqualification Message: Sorry, but you do not qualify to take this survey. Thank you for your time. This survey is for Evergy customers who purchased qualifying energy efficient products in 2021.

M.4 Income-Eligible Multi-Family Decisionmaker Survey

Client: Evergy
Program: Income-Eligible MultiFamily (IEMF)
Group: Participating MF decisionmakers
Mode: Online

PREDEFINED VARIABLES

Prepopulated variables are shown in all caps enclosed in brackets, e.g., [PREDEFINED VARIABLE]

VARIABLE	DESCRIPTION
CUSTOMER_NAME	Customer name
EMAIL	Customer email
MEASURES_ALL	Description of all measures installed
DATE	Approximate date of measure installation
PROPERTY_NAME	Name of the company that owns or manages the property
LED_QTY	Quantity installed
APS_QTY	Quantity installed
AERATOR_QTY	Quantity installed
SHOWERHEAD_QTY	Quantity installed
ASHP_QTY	Quantity installed
TSTAT_QTY	Quantity installed
FAN_QTY	Quantity installed
DRYER_QTY	Quantity installed
CLOTHES_WASHER_QTY	Quantity installed
DISHWASHER_QTY	Quantity installed
OTHER_QTY	Quantity of other measures installed
OTHER_DESC	Description of any other prescriptive and/or custom measures

EMAIL SURVEY INVITE

Subject: [PROGRAM NAME] Feedback
Reply To: adm-surveys@admenergy.com
From Name: Evergy

Thank you for participating in Evergy's (formerly Kansas City Power and Light Company) Income-Eligible Multifamily program to install energy efficient products at [PROPERTY_NAME].

We are conducting a survey of decision makers like you to get feedback on the program. To thank you for your time for completing the survey, we'll send you a $10 gift card that you will be able to use at one of dozens of online stores.

Start Survey Now

Thank you in advance for your time!

Kind Regards,

ADM Associates / Contractor to Evergy

Contact us about the survey

Unsubscribe

SCREENING

1. Our records SHOW that **[MEASURES_ALL]** were installed at **[PROPERTY_NAME]** property through the Evergy's Income-Eligible Multifamily program around **[DATE]** Is this correct?
    1. Yes **[SKIP TO Q4]**
    2. Yes, but some of the information is incorrect
    3. Yes, but I was not involved in the project
    4. No, we did not participate in the program **[THANK AND TERMINATE]**

[SHOW Q2 IF Q1 =2]

2. We'd like to correct our records then! What did we get wrong?
    1. [OPEN-ENDED]

[SHOW Q3 IF Q1 = 3]

3. Who can we contact that knows about the energy-efficient products installed at **[PROPERTY_NAME]** property through the program?
    1. Name: [OPEN-ENDED]
    2. Phone: [OPEN-ENDED]
    3. Email: [OPEN-ENDED]
    4. Not sure

[AFTER Q3 ALL RESPONSES - THANK AND TERMINATE]

4. Are you the person who authorized participating in the program at [PROPERTY_NAME]?

1. Yes
2. No

5. What is your role at [PROPERTY_NAME]?

1. Property owner
2. Property manager
3. General manager of multiple properties
4. Facilities or maintenance manager
5. Financial manager
6. Other (Please specify) [OPEN-ENDED]

6. Does the owner of [PROPERTY_NAME] own other multifamily properties?

1. Yes
2. No
3. Not sure

7. How many tenant units are at [PROPERTY_NAME]?

1. Number of tenant units: [NUMERIC OPEN-ENDED]
2. Not sure

8. To the best of your knowledge, how many tenant units received improvements from the program?

1. Number of improved tenant units: [NUMERIC OPEN-ENDED]
2. Not sure

[SHOW Q9 rows for all measures with Qty>0]

9. Our records indicate that the following products were installed in tenant units at the [PROPERY_NAME] property. To the best of your knowledge, is this correct?

	Yes	No	Not sure
[LED_QTY] LEDs			
[APS_QTY] Advanced Power Strips			
[AERATOR_QTY] Aerators			
[SHOWERHEAD_QTY] Showerheads			
[ASHP_QTY] Air Source Heat Pumps			
[TSTAT_QTY] Thermostats			
[FAN_QTY] Bathroom Fans			
[DRYER_QTY] Clothes Dryers			

[CLOTHES_WASHER_QTY] Clothes Washers			
[DISHWASHER_QTY] Dishwashers			

[SHOW Q10 rows for all measures for which Q9 = No]

10. To the best of your knowledge, how many of the following products *were* installed in tenant units?

	Correct Qty
LEDs	
Advanced Power Strips	
Aerators	
Showerheads	
Air Source Heat Pumps	
Thermostats	
Bathroom Fans	
Clothes Dryers	
Clothes Washers	
Dishwashers	

[SHOW Q11 rows for all measures with Measures with Qty>0]

11. To the best of your knowledge, are all the installed products still installed and operational in tenant units?

	Yes	No	Not sure
LEDs			
Advanced Power Strips			
Aerators			
Showerheads			
Air Source Heat Pumps			
Thermostats			
Bathroom Fans			
Clothes Dryers			
Clothes Washers			
Dishwashers			

[SHOW Q12 for measures for which Q11=No]

12. To the best of your knowledge, how many of the following products are no longer installed or are no longer operational in tenant units?

	Qty
LEDs	
Advanced Power Strips	
Aerators	
Showerheads	
Air Source Heat Pumps	
Thermostats	
Bathroom Fans	
Clothes Dryers	
Clothes Washers	
Dishwashers	

[SHOW Q13 if Q11.LEDs=No]

13. Why are some LEDs no longer installed in tenant units?

    1. [OPEN-ENDED]

[SHOW Q14 if Q11.Advanced Power Strips=No]

14. Why are some advanced power strips no longer installed in tenant units?

    1. [OPEN-ENDED]

[SHOW Q15 if Q11.Aerators=No]

15. Why are some aerators no longer installed in tenant units?

    1. [OPEN-ENDED]

[SHOW Q16 if Q11.Showerheads=No]

16. Why are some showerheads no longer installed in tenant units?

    1. [OPEN-ENDED]

[SHOW Q17 if Q11.Air Source Heat Pumps=No]

17. Why are some air source heat pumps no longer operational in tenant units?

    1. [OPEN-ENDED]

[SHOW Q18 if Q11.Smart Thermostats=No]

18. Why are some thermostats no longer operational in tenant units?

1. [OPEN-ENDED]

[SHOW Q19 if Q11.Bathroom Fans=No]

19. Why are some bathroom fans no longer operational in tenant units?

1. [OPEN-ENDED]

[SHOW Q20 if Q11.Clothes Dryers=No]

20. Why are some clothes dryers no longer operational in tenant units?

1. [OPEN-ENDED]

[SHOW Q21 if Q11.Clothes Washers=No]

21. Why are some clothes washers no longer operational in tenant units?

1. [OPEN-ENDED]

[SHOW Q22 if Q11.Dishwashers=No]

22. Why are some dishwashers no longer operational in tenant units?

1. [OPEN-ENDED]

[SHOW Q23 IF OTHER_QTY > 0]

23. According to program records, [OTHER_QTY] [OTHER_DESC] were installed in tenant units. To the best of your knowledge, is this correct?

1. Yes
2. No
3. Not sure

[SHOW Q24 IF Q23 = 2]

24. Thanks for letting us know. What did we get wrong about the [OTHER DESC] installed in tenant units?

1. [OPEN-ENDED]

[SHOW Q25 IF OTHER_QTY > 0]

25. To the best of your knowledge, are all of the [OTHER_DESC] still operational?

1. Yes
2. No
3. Not sure

[SHOW Q26 IF Q25=2]

26. How many of the **[OTHER DESC]** are not operational and why?

1. [OPEN-ENDED]

27. Were any improvements made in common areas at **[PROPERTY_NAME]**?

1. Yes (Please describe) **[OPEN-ENDED]**
2. No
3. Not sure

[SHOW Q28 IF Q27 = 1]

28. Have any of the measures installed in the common areas been removed?

1. Yes (Please describe what and why) **[OPEN ENDED]**
2. No
3. Not sure

29. Were any other measures installed in tenant units or common areas at [PROPERTY_NAME] that we haven't mentioned?

1. Yes (Please describe) **[OPEN ENDED]**
2. No
3. Not sure

PROGRAM AWARENESS AND MARKETING

30. How did you first learn about the energy efficiency improvements available through Evergy's Income-Eligible Multifamily program?

1. Information that came in the mail
2. Evergy Email
3. Newspaper or magazine article or ad
4. Contractor
5. Word of mouth from friends, relatives, or others
6. Radio ad
7. Information included with Evergy bill
8. Evergy's website
9. Evergy program staff
10. Other (Please specify) **[OPEN-ENDED]**
11. Not sure

31. Who completed your program application or paperwork for this project?

1. I completed the program application
2. Someone else at my company
3. An Evergy representative
4. A contractor or vendor
5. Other (Please specify) **[OPEN-ENDED]**
6. Not sure

32. Why did [PROPERTY_NAME] decided to participate in the program? Please select all that apply. [**MULTI-SELECT**]

1. Improve tenant comfort and satisfaction
2. Reduce tenant utility bills
3. Reduce property utility bills
4. Take advantage of rebates/no-cost efficiency improvements
5. Replace old or non-functioning equipment
6. Make the units more attractive to prospective tenants
7. Other (Please specify) [**OPEN-ENDED**]
8. Not sure

PROGRAM FEEDBACK

33. What are the best ways for Evergy to keep you informed about additional energy efficiency equipment and improvements that you can make to your property? [**MULTI-SELECT**]

1. Email from Evergy
2. Evergy's website
3. Bill inserts
4. Telephone call
5. Community events
6. Other (Please specify**) [OPEN-ENDED]**
7. I prefer not to receive information
8. Not sure

34. How has the COVID-19 pandemic impacted your company?

1. [OPEN-ENDED]

35. How has the COVID-19 pandemic affected your company's ability to participate in Evergy services and incentives?

1. [OPEN-ENDED]

SATISFACTION

36. How satisfied are you with each of the following aspects of the program? **[RANDOMIZE 1-7] [INSERT 1-5 SCALE DEFINED AS 1 = VERY DISSATISFIED TO 5 = VERY SATISFIED, WITH 97 = NOT APPLICABLE]**

1. Interactions you had with Evergy staff
2. The application process
3. The quality of installation work
4. The product installation process

5. The quality of installed products
6. The wait-time to receive services
7. Overall program experience
8. Evergy as your utility company

[SHOW Q37 IF Q36.1 < 3]

37. We're sorry to hear that. Why were you dissatisfied with your interactions with Every staff? **[OPEN ENDED]**

[SHOW Q37 IF Q36.2 < 3]

38. How can we improve the application process?

1. [OPEN-ENDED]

[SHOW Q37 IF Q36.3 < 3]

39. Please tell us how the installation quality could have been improved.

1. [OPEN-ENDED]

[SHOW Q37 IF Q36.4 < 3]

40. Please tell us how the installation process could have gone better.

1. [OPEN-ENDED]

[SHOW Q37 IF Q36.5 < 3]

41. Please tell us how the product quality could have been improved.

1. [OPEN-ENDED]

[SHOW Q37 IF Q36.6 < 3]

42. Please tell us about your wait time and how it can be improved in the future.

1. [OPEN-ENDED]

[SHOW Q37 IF Q36.7 < 3]

43. We're sorry to hear that you were dissatisfied with the program overall. Please tell us how the program can be improved.

1. [OPEN-ENDED]

[SHOW Q37 IF Q36.8 < 3]

44. Why aren't you satisfied with Evergy as your utility company?

1. [OPEN-ENDED]

PROPERTY CHARACTERISTICS

45. Do tenants pay their own electric bills, or are electricity costs included in the rent?

1. Tenants pay their own utility bills
2. Electricity costs are included in the rent
3. Other (Please describe) [**OPEN-ENDED**]
4. Not sure

46. What percentage of tenant units at the [PROPERTY_NAME] receive housing assistance?

1. Percentage of units **[OPEN-ENDED]**
2. Not sure

47. Do you have any other questions or feedback to share with Evergy to improve programs and services?

1. [OPEN-ENDED]

48. Thank you for completing the survey. We value your feedback! What email address would you like us to send your gift card to?

1. **[EMAIL]**
2. Another email address **[OPEN-ENDED]**
3. I do not wish to receive a gift card

M.5 Business Demand Response Survey

Client: Evergy
Program(s): Business Demand Response
Group: Participants in the Business Demand Response Program
Mode: Fast Feedback (mixed mode- online/phone)

PREDEFINED VARIABLES

CONTACT NAME	DEFINITION
BUSINESS NAME	Name of business
ADDRESS	Business address
TELEPHONE NUMBER	Contact's telephone number
EMAIL	Contact's email address

EMAIL INVITE

Subject: [PROGRAM NAME] Feedback
Reply To: survey2026@surveys.admenergy.com
From Name: Evergy

Hello [CONTACT_NAME],

Thank you for participating in Evergy's Business Demand Response Program. Participants like you help control power costs and reduce greenhouse gas emissions through your actions during peak demand events. Evergy is interested in your feedback about the program and invites you to take an online survey to let us know how we can improve it.

Click here to start the survey {SURVEY LINK}

If you have questions or require technical assistance, please contact [CONTACT] at [CONTACT INFO].

Thank you so much for your time.

SCREENING

1. QS1. Our records indicate that your organization participated in Evergy's Business Demand Response (BDR) Program. Is this correct?
    1. Yes
    2. No [TERMINATE]

98. Not sure [TERMINATE]

2. QS2.Who is your electricity provider?

1. Evergy
2. Ameren MO [TERMINATE]
98. Not sure [TERMINATE]

AWARENESS

3. QA1. How did you hear about the Evergy Business Demand Response Program? (Please select all that apply) **[MULTI-SELECT]**

1. Evergy representative
2. Newspaper / magazine / print media
3. Utility bill insert
4. My bill
5. Evergy website
6. Word of mouth (friend, relative, coworker)
7. HVAC contractor / plumber
8. TV ad
9. Retailer / store
10. Community event
11. Social media such as Facebook or Twitter
96. Other (please specify)
98. Not sure

PARTICIPATION

We have just a few questions about your participation in this program.

4. QP1: Why did you decide to participate in the Business Demand Response Program? (Please select all that apply) **[MULTI-SELECT]**

1. Low-risk: There are no financial penalties.
2. Customized: Evergy offers a curtailment plan specific to your site.
3. Support: There is a BDR team available for technical assistance and event success.
4. Insight: Participation will offer more insight into your actual electrical usage.
5. Awareness: Your customers and employees will have more awareness into how your organization is taking measures to lower impact on the local environment.
6. Savings: Your organization can use incentives to fund other energy efficiency projects.
7. Environmental Concerns

96. Other (please specify)

99. Not sure

5. QP2. Did Evergy provide you with a curtailment plan tailored to your organization?

1. Yes
2. No
98. Not sure

6. QP3. What type of actions did you take to reduce or curtail your energy load during peak demand events? (Please select all that apply) **[MULTI-SELECT]**

1. Reschedule shifts to off-peak times
2. Temporarily shut down equipment, production lines and perform routine maintenance
3. Reduce motor loads in elevators, compressors, conveyers, etc.
4. Dim lights in non-critical areas
5. Reduce cooling loads with small temperature adjustments
6. Utilize certified self-generation
7. Something else (please specify)
100. Not sure / Do not recall

7. QP4. Did your organization participate in any of the following Demand Response events? **[INSERT MATRIX WITH 1 = YES, 2 = NO, 98 = NOT SURE/ DO NOT RECALL]**

1. May 26, 2021, from 3-4 p.m.
2. June 17, 2021, from 2-6 p.m.
3. July 29, 2021, from 2-6 p.m.
4. August 11, 2021, from 2-6 p.m.
5. August 25, 2021, from 2-6 p.m.

[SHOW QP4a IF QP4 (1) = 3]

8. QP4a: Why did you decide not to participate in the event on May 26, 2021, from 3-4 p.m.?

1. [OPEN-ENDED]

[SHOW QP4B IF QP4 (2) = 3]

9. QP4b: Why did you decide not to participate in the event on June 17, 2021, from 2-6 p.m.?

1. [OPEN-ENDED]

[SHOW QP4C IF QP4 (3) = 3]

10. QP4c: Why did you decide not to participate in the event on July 29, 2021, from 2-6 p.m.?

1. [OPEN-ENDED]

[SHOW QP4D IF QP4 (4) = 3]

11. QP4d: Why did you decide not to participate in the event on August 11, 2021, from 2-6 p.m.?

1. [OPEN-ENDED]

[SHOW QP4E IF QP4 (5) = 3]

12. QP4e: Why did you decide not to participate in the event on August 25, 2021, from 2-6 p.m.?

1. [OPEN-ENDED]

[SHOW QP5 IF QP4 = 1-5]

13. QP5. Prior to these events, do you recall receiving a notification for these Demand Response events via email, text, or phone call?

1. Yes
2. No
98. Not sure / Do not recall

SATISFACTION

We'd like to ask you a few questions about your satisfaction with the Business Demand Response Program.

14. QS1. Using the scale below, how would you rate your satisfaction with the following aspects of the Business Demand Response Program? **[INSERT 1-5 SCALE, WHERE 1 = VERY DISSATISFIED AND 5 = VERY SATISFIED, WITH 98= NOT SURE]**

1. The curtailment plan developed by Evergy
2. Ease of enrolling in the Program
3. Notification of the Demand Response events
4. Duration of the Demand Response events
5. Amount of incentive received for participation
6. The Business Demand Response Program overall
7. Evergy as your electricity provider

[SHOW QS2 if any in QS1 = 1 or 5]

15. QS2. Can you elaborate on why you chose that response?

1. [OPEN-ENDED]

16. QS3. How likely is your organization to participate in the Business Demand Response Program again in 2022?

1. “Not at all likely”
2. [Scaled Selection]
3. [Scaled Selection]
4. [Scaled Selection]
5. “Very likely
98. Not sure

EFFECTS OF CORONAVIRUS PANDEMIC

The following set of questions inquire over how the coronavirus pandemic may have affected aspects of your daily operations as it pertained to energy efficiency. As a reminder, your responses will remain confidential.

17. QV1. Was your organization affected by the coronavirus pandemic?

1. Yes
2. No
98. Not sure

18. QV2. To what extent was your organization impacted? [INSERT 1-5 SCALE, WHERE 1 = NOT IMPACTED AND 5 = GREATLY IMPACTED, WITH 98= NOT SURE]

1. “Not impacted”
2. [Scaled Selection]
3. [Scaled Selection]
4. [Scaled Selection]
5. “Greatly impacted”
98. Not sure
99. Prefer not to answer

[SHOW QV3 if QV2 = 2, 3, 4 or 5]

19. QV3. In what ways has your organization been affected by the coronavirus pandemic that you wish to share?

1. [OPEN-ENDED]

20. QV4. How has the coronavirus pandemic affected your ability to reduce energy usage during events?

1. “Has not affected my ability”
2. [Scaled Selection]
3. [Scaled Selection]

4. [Scaled Selection]
5. “Has greatly affected my ability”
98. Not sure
99. Prefer not to answer

[SHOW QV5 if QV4 = 2, 3, 4 or 5]

21. QV5. Please describe the way the coronavirus pandemic affected your ability to reduce energy.

1. [OPEN-ENDED]

BUSINESS DEMOGRAPHICS

We’re almost done- I just need to ask you a few final questions for classification purposes only.

22. QD1. What type of organization is this?

1. Retail store
2. Office
3. Hotel / Motel
4. Laundromat
5. Bank / Credit Union / Financial center
6. Hospital
7. School / College / University
8. Automobile dealership
9. Repair shop
10. Construction / Building
11. Warehouse
12. Grocery
13. Convenience store
14. Shopping center
15. Restaurant
16. Religious / House of Worship
96. Other (please specify)
99. Prefer not to answer

23. QD2. How many locations does your business have?

1. _____number of locations
98. Not sure

24. QD3. How many years have you been at this location?

1. _____years

98. Not sure

25. QD4. Do you own or lease the building you are located in?

1. Own
2. Rent / Lease
98. Not sure

26. QD5. What is the approximate square footage of this location?

1. _____estimated square footage
98. Not sure

27. QD6. Approximately how many full-time employees are at this location?

1. _____number of full-time employees
98. Not sure

[SHOW QD7 if QD1 = 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 15, 96 or 99]

28. QD7. What are your approximate gross annual sales at this location?

1. Less than $50,000
2. $50,000 - $100,000
3. $100,001 - $250,000
4. $250,001 - $500,000
5. $500,001 - $1 million
6. More than $1 million
99. Prefer not to answer

Those are all the questions we have for you. On behalf of Evergy, we thank you for your time. Have a great day!

M.6 Residential Demand Response Survey

Client: Evergy
Program(s): Residential Demand Response
Group: Participants in the Residential Demand Response Program
Mode: Fast Feedback (mixed mode- online/phone)

PREDEFINED VARIABLES

CONTACT NAME	DEFINITION
ADDRESS	Business address
TELEPHONE NUMBER	Contact's telephone number
EMAIL	Contact's email address

EMAIL

Subject: [PROGRAM NAME] Feedback
Reply To: survey2026@surveys.admenergy.com
From Name: Evergy

Hello [CONTACT_NAME],

Thank you for participating in Evergy's Thermostat Program. Participants like you help control power costs and reduce greenhouse gas emissions through your actions during Energy Savings Events. Evergy is interested in your feedback about the program and invites you to take an online survey to let us know how we can improve it.

Click here to start the survey {SURVEY LINK}

If you have questions or require technical assistance, please contact [CONTACT] at [CONTACT INFO].

Thank you so much for your time.

SCREENING

1. QS1. Our records indicate that your household participated in Evergy's Thermostat Program. Is this correct?
   1. Yes
   2. No [TERMINATE]
   98. Not sure [TERMINATE]
2. QS2. Who is your electricity provider?
   1. Evergy
   2. Ameren MO [TERMINATE]

98. Not sure [TERMINATE]

AWARENESS

3. QA1. How did you hear about Evergy's Thermostat Program?(Please select all that apply) **[MULTI-SELECT]**

1. Newspaper / Magazine / Print media
2. Utility bill insert
3. My bill
4. Evergy website
5. Word of mouth (friend, relative, coworker)
6. HVAC contractor / plumber
7. TV ad
8. Evergy representative
9. Retailer / Store
10. Community event
11. Social media such as Facebook or Twitter
12. Home Energy Report
96. Other (please specify)
98. Not sure

PARTICIPATION

We have just a few questions about your participation in this program.

4. QP1. When did you enroll in the program? Your best guess is fine.

1. Before June 2021
2. Between June 2021 and July 2021
3. Between July 2021 and August 2021
4. Between August and September 2021
98. Not sure / Do not recall

5. QP2. Who installed your thermostat?

1. Myself / Family member (Self-installed / Bring Your Own)
2. An installation contractor
98. Not sure / Do not recall

6. QP3: Why did you decide to participate in the Thermostat Program?

1. **[OPEN-ENDED]**
101. Not sure

7. QP4.Did your organization participate in any of the following Energy Savings Events?[INSERT MATRIX 1 = YES, 2 = NO, 98 = NOT SURE/DO NOT RECALL]

1. June 10, 2021, from 4 – 6 p.m.
2. June 17, 2021, from 4 – 6 p.m.
3. June 18, 2021, from 4 – 6 p.m.
4. July 28, 2021, from 4 – 6 p.m.
5. July 29, 2021, from 4 – 6 p.m.
6. August 11, 2021, from 4 – 6 p.m.
7. August 25, 2021, from 4 – 6 p.m.
8. September 13, 2021, from 4 – 6 p.m.

[SHOW QP4a if qp4(1) = 2]

8. QP4a: Why did you decide not to participate in the event on June 10, 2021, from 4 – 6 p.m.?

1. [OPEN-ENDED]

[SHOW QP4B if qp4(2) = 2 Error! Reference source not found.**]**

9. QP4b: Why did you decide not to participate in the event on June 17, 2021, from 4 – 6 p.m.

1. [OPEN-ENDED]

[SHOW QP4C if qp4(3) = 2 Error! Reference source not found.**]**

10. QP4c: Why did you decide not to participate in the event on June 18, 2021, from 4 – 6 p.m.?

1. [OPEN-ENDED]

[SHOW QP4D if qp4(4) = 2]

11. QP4d: Why did you decide not to participate in the event on July 28, 2021, from 4 – 6 p.m.?

1. [OPEN-ENDED]

[SHOW QP4E if qp4(5) = 2]

12. QP4e: Why did you decide not to participate in the event on July 29, 2021, from 4 – 6 p.m.?

1. [OPEN-ENDED]

[SHOW QP4F if qp4(6) = 2 Error! Reference source not found.**]**

13. QP4f: Why did you decide not to participate in the event on August 11, 2021, from 4 – 6 p.m.?

1. [OPEN-ENDED]

[SHOW QP4G if qp4(7) = 2]

14. QP4g: Why did you decide not to participate in the event on August 25, 2021, from 4 – 6 p.m.?

1. [OPEN-ENDED]

[SHOW QP4H if qp4(8) = Error! Reference source not found.**]**

15. QP4h: Why did you decide not to participate in the event on September 13, 2021, from 4 – 6 p.m.?

1. [OPEN-ENDED]

[SHOW QP5 if qp4 = 1-8]

16. QP5. Prior to these events, do you recall receiving a notification for these Demand Response events via email, text, or phone call?

1. Yes
2. No
98. Not sure / Do not recall

SATISFACTION

We'd like to ask you a few questions about your satisfaction with the Thermostat Program.

17. QS1. Using the scale below, how would you rate your satisfaction with the following aspects of the Thermostat Program? **[INSERT 1-5 SCALE, WHERE 1 = VERY DISSATISFIED AND 5 = VERY SATISFIED, WITH 98= NOT SURE]**

1. The operation of your thermostat
2. Ease of enrolling in the program
3. Notification of the Energy Savings Events
4. Duration of the Energy Savings Events
5. The Thermostat Program overall
6. Evergy as your electricity provider

[SHOW QS2 IF ANY IN QS1 = 1 or 5]

18. QS2. Can you elaborate on why you chose that response?

1. [OPEN-ENDED]

EFFECTS OF CORONAVIRUS PANDEMIC

The following set of questions inquire over how the coronavirus pandemic may have affected aspects of your daily operations as it pertained to energy efficiency. As a reminder, your responses will remain confidential.

19. QV1. Was your household affected by the coronavirus pandemic?

1. Yes
2. No
98. Not sure

20. QV2. To what extent was your household impacted? **[INSERT 1-5 SCALE, WHERE 1 = NOT IMPACTED AND 5 = GREATLY IMPACTED, WITH 98= NOT SURE]**

1. "Not impacted"
2. [Scaled Selection]
3. [Scaled Selection]
4. [Scaled Selection]
5. "Greatly impacted"
98. Not sure
99. Prefer not to answer

[SHOW QV3 if QV2 = 2, 3, 4 or 5]

21. QV3. In what ways has your household been affected by the coronavirus pandemic that you wish to share?

1. [OPEN-ENDED]

22. QV4. How has the coronavirus pandemic affected your ability to participate in Energy Savings Events?

1. "Has not affected my ability"
2. [Scaled Selection]
3. [Scaled Selection]
4. [Scaled Selection]
5. "Has greatly affected my ability"
98. Not sure
99. Prefer not to answer

[SHOW QV5 if QV4 = 2, 3, 4 or 5]

23. QV5. Please describe the way the coronavirus pandemic affected your ability to participate in Energy Savings Events.

1. [OPEN-ENDED]

HOME DEMOGRAPHICS

24. QD1. Which of the following best describes your home?

    1. Manufactured or mobile home
    2. Single-family home
    3. Duplex or townhouse
    4. Apartment or condominium
    96. Other (please specify)
    98. Not sure

25. QD2. When was your home built?

    1. Before 1960
    2. 1960 - 1979
    3. 1980 - 1999
    4. 2000 - 2009
    5. 2010 or later
    98. Not sure

26. QD3. Do you own or rent your home?

    1. Own
    2. Rent
    99. Prefer not to answer

27. QD4. What is the main fuel used to heat your home?

    1. Electricity
    2. Natural gas
    3. Propane
    4. Oil
    96. Other (please specify)
    98. Not sure

28. QD5. Including yourself, how many people are living in your household?

    1. (NUMBER OF PEOPLE IN THE HOME): _____

29. QD6. Is your annual household income over or under [CUTOFF]?

    1. If Q = D6(1) CUTOFF = $25,500
    2. If Q = D6(2) CUTOFF = $34,500
    3. If Q = D6(3) CUTOFF = $43,400
    4. If Q = D6(4) CUTOFF = $52,400
    5. If Q = 28(5) CUTOFF = $61,400
    6. If Q = 28(6) CUTOFF = $70,300
    7. If Q = 28(7) CUTOFF = $79,300

8. If Q = D6(8) CUTOFF = $88,200
9. If Q = 28(9) CUTOFF = $97,200
10. If Q = 28(10) CUTOFF = $106,200
11. If Q = 28(11) CUTOFF = $115,100
12. If Q = D6(12) CUTOFF = $124,000
13. If Q = 28(13) CUTOFF = $133,000
1. Over
2. Under
98. Not sure
99. Prefer not to answer

30. Thank you for participating in this survey. That's all the questions we have. On behalf of Evergy, have a great day!

M.7 Business Smart Thermostats Survey

Client: Evergy
Program(s): Business Smart Thermostat
Group: Participants in the Business Smart Thermostat Program
Mode: Fast Feedback (mixed mode- online/phone)

PREDEFINED VARIABLES

CONTACT NAME	DEFINITION
BUSINESS NAME	Name of business
ADDRESS	Business address
TELEPHONE NUMBER	Contact's telephone number
EMAIL	Contact's email address

EMAIL INVITE

Subject: Invitation to Help Improve Evergy's Business Smart Thermostat Program

Hello [CONTACT_NAME],

Thank you for participating in Evergy's Business Smart Thermostat Program. Participants like you help control power costs and reduce greenhouse gas emissions through your actions during Energy Savings Events. Evergy is interested in your feedback about the program and invites you to take an online survey to let us know how we can improve it.

Click here to start the survey {SURVEY LINK}

If you have questions or require technical assistance, please contact [CONTACT] at [CONTACT INFO].

Thank you so much for your time

SCREENING

1. QN1. Our records indicate that your organization participated in Evergy's Business Smart Thermostat Program. Is this correct?
   1. Yes
   2. No [TERMINATE]
   98. Not sure [TERMINATE]
2. QN2.Who is your electricity provider?
   1. Evergy
   2. Ameren MO [TERMINATE]

98. Not sure [TERMINATE]

AWARENESS

3. QA1. How did you hear about the Evergy's Business Smart Thermostat Program? (Please select all that apply) **[MULTI-SELECT]**

1. Evergy representative
2. Newspaper / Magazine / Print media
3. Utility bill insert
4. My bill
5. Evergy website
6. Word of mouth (friend, relative, coworker)
7. HVAC contractor / Plumber
8. TV ad
9. Retailer / Store
10. Community event
11. Social media such as Facebook or Twitter
96. Other (please specify)
98. Not sure / Do not recall

PARTICIPATION

We have just a few questions about your participation in this program.

4. QP1. When did you or your organization enroll in the program? Your best guess is fine.

1. Before August 31, 2021
2. Between August 31, 2021, and September 30,2021
98. Not sure / Do not recall

5. QP2. Who installed your smart thermostat?

1. Myself / Someone from my organization (Self-installed / Bring Your Own)
2. An installation contractor
98. Not sure / Do not recall

6. QP3: Why did you decide to participate in the Business Smart Thermostat Program?

1. **[OPEN-ENDED]**

7. QP4. Did your organization participate in any of the following Energy Savings Events? [INSERT MATRIX 1 = YES, 2 = NO, 98 = NOT SURE/DO NOT RECALL]

1. June 10, 2021, from 4 – 6 p.m.

2. June 17, 2021, from 4 – 6 p.m.
3. June 18, 2021, from 4 – 6 p.m.
4. July 28, 2021, from 4 – 6 p.m.
5. July 29, 2021, from 4 – 6 p.m.
6. August 11, 2021, from 4 – 6 p.m.
7. August 25, 2021, from 4 – 6 p.m.
8. September 13, 2021, from 4 – 6 p.m.

[SHOW QP4a if qp4(1) = 2]

8. QP4a: Why did you decide not to participate in the event on June 10, 2021, from 4 – 6 p.m.?

1. [OPEN-ENDED]

[SHOW QP4B if qp4(2) = 2]

9. QP4b: Why did you decide not to participate in the event on June 17, 2021, from 4 – 6 p.m.

1. [OPEN-ENDED]

[SHOW QP4C if qp4(3) = 2]

10. QP4c: Why did you decide not to participate in the event on June 18, 2021, from 4 – 6 p.m.?

1. [OPEN-ENDED]

[SHOW QP4D if qp4(4) = 2]

11. QP4d: Why did you decide not to participate in the event on July 28, 2021, from 4 – 6 p.m.?

1. [OPEN-ENDED]

[SHOW QP4E if qp4(5) = 2]

12. QP4e: Why did you decide not to participate in the event on July 29, 2021, from 4 – 6 p.m.?

1. [OPEN-ENDED]

[SHOW QP4F if qp4(6) = 2]

13. QP4f: Why did you decide not to participate in the event on August 11, 2021, from 4 – 6 p.m.?

1. [OPEN-ENDED]

[SHOW QP4G if qp4(7) = 2 Error! Reference source not found.**]**

14. QP4g: Why did you decide not to participate in the event on August 25, 2021, from 4 – 6 p.m.?

1. [OPEN-ENDED]

[SHOW QP4H if qp4(8) = 2]

15. QP4h: Why did you decide not to participate in the event on September 13, 2021, from 4 – 6 p.m.?

1. [OPEN-ENDED]

[SHOW QP5 if qp4 = 1-8]

16. QP5. Prior to these events, do you recall receiving a notification for these Demand Response events via email, text, or phone call?

1. Yes
2. No
98. Not sure / Do not recall

SATISFACTION

We'd like to ask you a few questions about your satisfaction with the Business Smart Thermostat Program.

17. QS1. Using the scale below, how would you rate your satisfaction with the following aspects of the Business Smart Thermostat Program? **[INSERT 1-5 SCALE, WHERE 1 = VERY DISSATISFIED AND 5 = VERY SATISFIED, WITH 98= NOT SURE]**

1. The operation of your thermostat
2. Ease of enrolling in the program
3. Notification of the Energy Savings Events
4. Duration of the Energy Savings Events
5. The Business Smart Thermostat Program overall
6. Evergy as your electricity provider

[SHOW QS2 IF ANY IN QS1 = 1 or 5]

18. QS2. Can you elaborate on why you chose that response?

1. [OPEN-ENDED]

EFFECTS OF CORONAVIRUS PANDEMIC

The following set of questions inquire over how the coronavirus pandemic may have affected aspects of your daily operations as it pertained to energy efficiency. As a reminder, your responses will remain confidential.

19. QV1. Was your organization affected by the coronavirus pandemic?

1. Yes
2. No
98. Not sure

20. QV2. To what extent was your organization impacted? **[INSERT 1-5 SCALE, WHERE 1 = NOT IMPACTED AND 5 = GREATLY IMPACTED, WITH 98= NOT SURE]**

1. "Not impacted"
2. [Scaled Selection]
3. [Scaled Selection]
4. [Scaled Selection]
5. "Greatly impacted"
98. Not sure
99. Prefer not to answer

[SHOW QV3 if QV2 = 2, 3, 4 or 5]

21. QV3. In what ways has your organization been affected by the coronavirus pandemic that you wish to share?

1. [OPEN-ENDED]

22. QV4. How has the coronavirus pandemic affected your ability to reduce energy usage during events?

1. "Has not affected my ability"
2. [Scaled Selection]
3. [Scaled Selection]
4. [Scaled Selection]
5. "Has greatly affected my ability"
98. Not sure
99. Prefer not to answer

[SHOW QV5 if QV4 = 2, 3, 4 or 5]

23. QV5. Please describe the way the coronavirus pandemic affected your ability to participate in Energy Savings Events.

1. [OPEN-ENDED]

BUSINESS DEMOGRAPHICS

We're almost done- I just need to ask you a few final questions for classification purposes only.

24. QD1. What type of organization is this?

    1. Retail store
    2. Office
    3. Hotel / Motel
    4. Laundromat
    5. Bank / Credit Union / Financial center
    6. Hospital
    7. School / College / University
    8. Automobile dealership
    9. Repair shop
    10. Construction / Building
    11. Warehouse
    12. Grocery
    13. Convenience store
    14. Restaurant
    15. Religious / House of Worship
    96. Other (please specify)
    99. Prefer not to answer

25. QD2. How many locations does your organization have?

    1. _____number of locations
    98. Not sure

26. QD3. How many years have you been at this location?

    1. _____years
    98. Not sure

27. QD4. Do you own or lease the building you are located in?

    1. Own
    2. Rent / Lease
    98. Not sure

28. QD5. What is the approximate square footage of this location?

    1. _____estimated square footage
    98. Not sure

29. QD6. Approximately how many full-time employees are at this location?

    1. _____number of full-time employees

98. Not sure

[SHOW QD7 if QD1 = 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 15, 96 or 99]

30. QD7. What are your approximate gross annual sales at this location?

1. Less than $50,000
2. $50,000 - $100,000
3. $100,001 - $250,000
4. $250,001 - $500,000
5. $500,001 - $1 million
6. More than $1 million
99. Prefer not to answer

Those are all the questions we have for you. On behalf of Evergy, we thank you for your time. Have a great day!

M.8 Business Smart Thermostats Survey

Client: Evergy
Program: Energy Saving Trees
Program Year: 2021
Group: Participants
Mode: Email

PREDEFINED VARIABLES

Prepopulated variables are SHOWn in all caps enclosed in brackets, e.g., [PREDEFINED VARIABLE]

VARIABLE	DEFINITION
PARTICIPATION DATE TREE QUANTITY	Date customer participated in the program Number of trees purchased by participant
EMAIL	Customer email
TREE TYPES	Types of trees purchased by participant
TREE LOCATIONS	Map link of the locations where trees were reportedly installed

EMAIL SURVEY MESSAGE

Subject: [PROGRAM NAME] Feedback
Reply To: survey2026@surveys.admenergy.com
From Name: Evergy

Dear [CUSTOMER NAME],

According to our records you received one or more shade trees through the Evergy Shade Trees project, in partnership with the Arbor Day foundation.

We are conducting a survey regarding your participation in this program. We would greatly appreciate you taking a few minutes to provide your feedback. To thank you for your time and participation, we are offering a $5 electronic gift card upon completion of the survey.

Your answers will be kept confidential, and your feedback will help us improve the program.

If you have questions or require technical assistance, please reach out to us at adm-surveys@admenergy.com. If you are ready to get started, please click "next" below.

Thank you in advance for your time!

QUALIFICATION QUESTIONS

1. According to program records, you received **[TREE QUANTITY]** tree(s) through the Energy Saving Trees Program around **[PARTICIPATION DATE]**. Is this correct?

    1. Yes
    2. No
    98. Do not recall [TERMINATE]

[SHOW Q2 IF Q1 = 2]

2. What do we have wrong? Select all that apply

    1. I don't remember participating in the program [EXCLUSIVE, TERMINATE]
    2. The number of trees is incorrect
    3. The date is incorrect

[SHOW Q3 IF Q2 = 2]

3. How many trees did you receive through the program?

    1. [NUMERIC OPEN-ENDED]

4. According to program records, you received **[TREE TYPE]** through the program. Is this correct?

    1. Yes
    2. No
    98. Do not recall

[SHOW Q5 IF Q4 = 2]

5. What type of trees did you receive through the program?

    1. [OPEN-ENDED]

VERIFICATION QUESTIONS

6. Did you plant the tree(s) that you received through the program?

    1. I planted all the trees I received
    2. I planted some of the trees I received
    3. I didn't plant any of the trees I received
    98. I can't recall

[SHOW Q7 IF Q6 = 2]

7. How many of the trees you received did you plant?

    1. [NUMERIC] [MAX = TREE QUANTITY OR AMOUNT IN Q3]

[SHOW Q8 IF Q6 = 2 OR 3]

8. Why didn’t you plant your tree(s)?

    1. [OPEN-ENDED]

LOCATION AND HEALTH

[SHOW Q0 IF Q6 = 1 OR 2]

The following questions are about the location where the trees were planted.

9. When you participated in the program the tree(s), you selected a location where the tree(s) would be planted. You can see the location(s) by following the link below.

    [LOCATION LINK, as hyperlink]

10. If the link above doesn't work, copy and paste the following into your browser:

    [LOCATION LINK]

11. Were you able to follow the link and view the location pins?

    1. Yes
    2. No

[SHOW Q12 IF Q0 = 1]

12. Do the locations marked in the link match the locations where the trees were actually planted?

    1. Yes
    2. No
    3. I can’t recall

[SHOW Q13 IF Q12 = 2]

13. How does the location(s) marked differ from where the trees were actually planted? Please be as descriptive as possible.

    1. [OPEN-ENDED]

[SHOW Q Error! Reference source not found. **IF Q6 = 1 OR 2]**

14. How healthy was your tree(s) before winter began?

    1. Healthy and growing
    2. Leafy but little growth

3. No leaves or needles
4. The tree died
96. Other [OPEN-ENDED]

SATISFACTION

15. How did you **first** hear about the Energy Saving Trees program?

1. Community event
2. General online search
3. Evergy website
4. Bill insert
5. Email
6. Television/radio/media coverage
7. Evergy call center referral
8. Connect center referral
9. Social media or other online ad (i.e., Facebook)
10. Family, friend, or neighbor (word-of-mouth)
96. Other source [OPEN-ENDED]
98. Do not recall

16. Did the tree(s) you received meet your expectations when you first received it?

1. Yes
2. No
98. I can't recall

[SHOW Q17 IF Q16 = 2]

17. Please tell us why your tree(s) didn't meet your expectations

1. [OPEN-ENDED]

18. Please rate how helpful the system for selecting a tree and choosing a planting location was for each of the following: **[INSERT 1-5 SCALE WHERE 1 = NOT AT ALL HELPFUL, 5 = EXTREMELY HELPFUL, AND 98 = I DON'T KNOW]**

1. Avoiding overhead utility lines
2. Avoiding underground utility lines
3. Planting in a location that reduces energy consumption
4. Learning about the benefits that trees provide

[SHOW Q19 IF Q6 = 1 OR 2]

19. Which of the following describes your tree planting experience? (Check all that apply)

1. I planted my tree(s) within a week of receiving it

2. I mulched my tree's root zone
3. I watered my tree(s) regularly
4. I didn't plant my tree(s) [EXCLUSIVE]
98. I don't know [EXCLUSIVE]

20. Please tell us how much you agree with the following statements **[INSERT 1-5 SCALE WHERE 1 = STRONGLY DISAGREE, 5 = STRONGLY AGREE, AND 98 = I DON'T KNOW]**

1. I have more positive views about planting trees
2. I have an improved opinion of Evergy
3. I am more likely to plant a tree in the future
4. I made my community a better place by planting a tree
5. I involved family members in my tree planting experience
6. I am interested in purchasing additional trees

21. How satisfied are you with the following elements of the program? **[INSERT 1-5 SCALE WHERE 1 = VERY DISSATISFIED, 5 = VERY SATISFIED, AND 98 = I DON'T KNOW]**

1. The tree selection process
2. Selecting a planting location online
3. The planting video shown during the checkout process
4. The online checkout process
5. The process of receiving your tree

22. How satisfied are you with the program as a whole? **[INSERT 1-5 SCALE WHERE 1 = EXTREMELY DISSATISFIED, 5 = EXTREMELY SATISFIED, AND 98 = I DON'T KNOW]**

23. Do you have any additional comments that you would like to share with us regarding your experience with the program?

1. [OPEN-ENDED]

24. How likely is it that you would recommend this program to a friend or colleague? **[INSERT 1-5 SCALE WITH 1 = NOT AT ALL LIKELY AND 5 = EXTREMELY LIKELY, WITH 98 = I DON'T KNOW, 99 = PREFER NOT TO ANSWER]**

[SHOW Q25 IF Q1 > 3]

25. Why would you be likely to recommend this program?

1. [OPEN-ENDED]

[SHOW Q26 IF Q1 < 3]

26. Why would you be unlikely to recommend this program?

    1. [OPEN-ENDED]

27. Would you like someone to contact you about your experience with the program?

    1. Yes
    2. No

[SHOW Q28 IF Q27 = 1]

28. What is the best phone number to reach you?

    1. [OPEN-ENDED, NUMERIC]

DEMOGRAPHICS

The final questions in this survey are regarding your household and residence. Your responses will remain anonymous and are used to assess how well participants in this program resemble Evergy's customer population. Please select "Prefer not to answer" if you do not wish to answer any of the following questions.

29. Do you rent or own your household?

    1. Rent
    2. Own
    99. Prefer not to answer

30. Which of the following best describes your home?

    1. Single Family Home, detached from any other house
    2. Single-family house attached to one or more other houses (e.g., duplex, row house, or townhome)
    96. Other (Please specify) [OPEN-ENDED]
    98. Not sure
    99. Prefer not to answer

31. Approximately when was your home built?

    1. Before 1960
    2. 1960 - 1969
    3. 1970 - 1979
    4. 1980 - 1989
    5. 1990 - 1999
    6. 2000 - 2009
    7. 2010 – 2019
    8. 2020 or newer

98. Not sure
99. Prefer not to answer

32. About how many square feet is your home? If you are unsure, an estimate is okay.

1. Less than 1,000 square feet
2. 1,000-1,999 square feet
3. 2,000-2,999 square feet
4. 3,000-3,999 square feet
5. 4,000-4,999 square feet
6. 5,000 or greater square feet
98. Not sure
99. Prefer not to answer

33. What is the primary fuel type used to heat your home?

1. Electricity
2. Natural Gas
3. Propane
96. Other (Please Specify) [OPEN-ENDED]
98. Not sure
99. Prefer not to answer

34. What was your total household income before taxes in 2020?

1. Less than $10,000
2. $10,000 to less than $20,000
3. $20,000 to less than $30,000
4. $30,000 to less than $40,000
5. $40,000 to less than $50,000
6. $50,000 to less than $75,000
7. $75,000 to less than $100,000
8. $100,000 to less than $150,000
9. $150,000 to less than $200,000
10. $200,000 or more
98. Not sure
99. Prefer not to answer

35. What is your highest level of education?

1. Up to 8th grade
2. Some high school
3. High school graduate or GED equivalent
4. Some college
5. Associate degree

6. Bachelor's degree
7. Master's degree
8. Professional degree (MD, JD, DDS, DDO)
9. Doctorate degree (Ph.D., D.Sc.)
98. Not sure
99. Prefer not to answer

GIFT CARD INFORMATION

We appreciate your time and would like to send you a $5 electronic gift card to thank you. You should receive the electronic gift card within 5-10 business days. Where would you like us to send your electronic gift card?

1. **[EMAIL]**
2. Another email address: [OPEN ENDED]
99. I don't want a gift card.

THANK YOU MESSAGE

If you chose to receive a gift card, you should be receiving an email with the link to your gift card in 10 days or less. If you have any questions regarding this survey or would like to know the status of your gift card, please send an email to survey2026@surveys.admenergy.com. On behalf of Evergy, thank you for participating. Have a great day!

DISQUALIFICATION MESSAGE

Disqualification Message: Sorry, but you do not qualify to take this survey. Thank you for your time. This survey is for Evergy customers who participated in the Energy Saving Trees Program in 2021.

Appendix N Deemed Savings and Algorithms

N.1 Heating, Cooling and Home Comfort Program

N.1.1 Gross Impact Calculation Algorithms

Energy savings and demand reductions for all measures in the Heating, Cooling, and Home Comfort Program were calculated as specified in the Evergy Technical Reference Manual (Evergy TRM). The gross energy savings and demand impacts algorithms as listed in the Illinois Technical Reference Manual (IL TRM) are outlined in the sections below.

LED Lightbulbs

ADM calculated energy savings and demand reductions using prescriptive algorithms from the Evergy TRM, IL TRM, and other relevant program sources, as necessary, with adjusted baseline hours of use. Additionally, HVAC interactive effects were accounted for using algorithms from the Evergy TRM dependent upon heating and cooling systems serving areas where lighting systems were installed. Savings algorithms for omni-directional LED lightbulbs were taken from the Evergy TRM. The kWh savings and kW demand reductions from the installation of LED bulbs were determined using Equation N-1 through Equation N-2 below:

Equation N-1: kWh Energy Savings from LED Bulbs

$$\Delta kWh = (W\_base - W\_ee)/1000 \times HOU \times 〖WHF〗\_e \times ISR$$

Equation N-2: kW Peak Demand Reduction from LED Bulbs

$$\Delta kW = (W\_base - W\_ee)/1000 \times CF \times 〖WHF〗\_d \times ISR$$

Where:

Wbase	*= Input wattage of the existing or baseline system*
Wee	*= Actual wattage of LED purchased/installed*
HOU	*= Hours of use*
WFHe	*= Waste heat factor for energy to account for cooling energy savings from efficient lighting*
WFHd	*= Waste heat factor for demand to account for cooling savings from efficient lighting*

ISR = *Installation rate*

CF = *Summer Peak Coincidence Factor for measure*

Faucet Aerators

ADM utilized savings algorithms found in the Evergy TRM for all faucet aerators (kitchen and bathroom) in the program. Final savings were based on the number of faucet aerators per household, the number of faucet aerators retrofitted, and the type of water heating unit in the home. The kWh savings and kW demand reductions from the installation of faucet aerators were determined using Equation N-3 through Equation N-4 below:

Equation N-3: kWh Energy Savings for Faucet Aerators

$$\Delta kWh = \%ElectricDHW * ((GPM\_base * L\_base - GPM\_low * L\_low) * Household * 365.25 * DF / FPH) * EPG\_electric * ISR$$

Where:

%ElectricDHW = *proportion of water heating supplied by electric resistance heating*

GPM_base = *Average flow rate, in gallons per minute, of the baseline faucet "as used." This includes the effect of existing low flow fixtures and therefore the free ridership rate for this measure should be 0.*

= *Measured full throttle flow * 0.83 throttling factor*

GPM_low = *Average flow rate, in gallons per minute, of the low-flow faucet aerator "as-used"*

= *Rated full throttle flow * 0.95 throttling factor*

L_base = *Average baseline daily length faucet use per capita for faucet of interest in minutes*

L_low = *Average retrofit daily length faucet use per capita for faucet of interest in minutes*

Household = *Average number of people per household*

DF = *Drain Factor*

FPH = *Faucets Per Household*

EPG_electric = *Energy per gallon of water used by faucet supplied by electric water heater*

= *0.0795 kWh/gal (Bath), 0.0969 kWh/gal (Kitchen), 0.0919 kWh/gal (Unknown)*

WaterTemp = *Assumed temperature of mixed water*

= *86ºF for Bath, 93ºF for Kitchen, 91ºF for Unknown*

SupplyTemp = *Assumed temperature of water entering house*

= *54.1ºF*

RE_electric = *Recovery efficiency of electric water heater*

= *98%*

ISR = *In service rate of faucet aerators dependent on install method*

= *0.95 (direct install – single family)*

Equation N-4: kW Peak Demand Reduction for Faucet Aerators

$$\Delta kW = \Delta kWh / Hours * CF$$

Where:

ΔkWh = *kWh savings from faucet aerators*

Hours = *Annual electric DHW recovery hours for faucet use per faucet*

= *((GPM_base * L_base) * Household/FPH * 365.25 * DF) * 0.545 / GPH*

GPH = *Gallons per hour recovery of electric water heater calculated for 70.9ºF temp rise (125-54.1), 98% recovery efficiency, and typical 4.5kW electric resistance storage tank*

= *27.4*

CF = *Coincidence Factor for electric load reduction*

= *0.022*

Low Flow Showerheads

ADM utilized savings algorithms found in the Evergy TRM all low flow showerheads in the program. Final savings were based on the number of showerheads per household, the number of showerheads retrofitted, and the type of water heating unit in the home. The kWh savings and kW demand reductions from the installation of faucet aerators were determined using Equation N-5 through Equation N-6 below:

Equation N-5: kWh Energy Savings for Low Flow Showerheads

$$\Delta kWh = \%ElectricDHW * ((GPM\_base * L\_base - GPM\_low * L\_low) * Household * SPCD * 365.25 / SPH) * EPG\_electric * ISR$$

Where:

%ElectricDHW	*= proportion of water heating supplied by electric resistance heating*
GPM_base	*= Flow rate of the baseline showerhead*
	= 2.24
GPM_low	*= As-used flow rate of the low-flow showerhead*
L_base	*= Shower length in minutes with baseline showerhead*
	= 7.8 min
L_low	*= Shower length in minutes with low-flow showerhead*
	= 7.8 min
Household	*= Average number of people per household*
SPCD	*= Showers Per Capita Per Day*
	= 0.6
SPH	*= Showerheads per household so that per-showerhead savings fractions can be determined*
EPG_electric	*= Energy per gallon of hot water supplied by electric*
	= 0.117 kWh/gal
ShowerTemp	*= Assumed temperature of water*
	= 101ºF
SupplyTemp	*= Assumed temperature of water entering house*
	= 54.1ºF
RE_electric	*= Recovery efficiency of electric water heater*
	= 98%
ISR	*= In service rate of showerhead*

Equation N-6: kW Peak Demand Reduction for Low Flow Showerheads

$$\Delta kW = \Delta kWh/Hours * CF$$

Where:

ΔkWh	*= kWh savings from low flow showerheads*
Hours	*= Annual electric DHW recovery hours for showerhead use*
GPH	*= Gallons per hour recovery of electric water heater calculated for 65.9F temp rise (120-54.1), 98% recovery efficiency, and typical 4.5 kW electric resistance storage tank*
	= 27.4
CF	*= Coincidence Factor for electric load reduction*
	= 0.0278

Pipe Insulation

ADM utilized savings algorithms found in the Evergy TRM for all pipe insulation in the program. Final savings were based on the length of pipe that the pipe wrap insulation covers. Default savings were provided per 3ft length and were appropriate up to 6ft of the hot water pipe and 3ft of the cold. The baseline is an un-insulated hot water pipe. The kWh savings and kW demand reductions from the installation of pipe insulation were determined using Equation N-7 through Equation N-8 below:

Equation N-7: kWh Energy Savings for Pipe Insulation

$$\Delta kWh = ((C_{exist}/R_{exist} - C_{new}/R_{new}) * L * \Delta T * 8{,}766)/ \eta DHW / 3412$$

Where:

R_{exist}	*= Pipe heat loss coefficient of uninsulated pipe (existing) [(hr-°F-ft)/Btu]*
	= 1.0
R_{new}	*= Pipe heat loss coefficient of insulated pipe (new) [(hr-°F-ft)/Btu]*
	= 1.0 + R value of insulation
L	*= Length of pipe from water heating source covered by pipe wrap (ft)*
C_{exist}	*= Circumference of pipe (ft) (Diameter (in) * π/12)*
	= Actual (0.5" pipe = 0.131ft, 0.75" pipe = 0.196ft)
C_{new}	*= Circumference of pipe (ft) (Diameter (in) * π/12)*
	*= Actual (0.5" pipe and 3/8" foam ((0.5 + 3/8 + 3/8) * π/12) = .327 ft)*

ΔT = *Average temperature difference between supplied water and outside air temperature (°F)*

= *60°F*

ηDHW = *Recovery efficiency of electric hot water heater*

= *0.98*

Equation N-8: kW Peak Demand Reduction for Pipe Insulation

$$\Delta kW = \Delta kWh / 8766$$

Where:

ΔkWh = *kWh savings from pipe wrap installation*

Advanced Power Strips

ADM utilized savings algorithms found in the Evergy TRM for all advanced power strips in the program. This measure characterization provided savings for a 7-plug strip. The assumed baseline was a standard power strip that does not control connected loads. The kWh savings and kW demand reductions from the installation of advanced power strips were determined using Equation N-9 through Equation N-10 below:

Equation N-9: kWh Energy Savings for Advanced Power Strips

$$\Delta kWh_{7\text{-}Plug} = 103\ kWh$$

Equation N-10: kW Peak Demand Reduction for Advanced Power Strips

$$\Delta kW = \Delta kWh / Hours * CF$$

Where:

Hours = *Annual number of hours during which the controlled standby loads are turned off by the advanced power strip*

= *7,129*

CF = *Summer Peak Coincidence Factor for measure*

= *0.8*

ΔkW7-Plug = *0.0116 kW*

Air Sealing

Thermal shell air leaks were sealed through strategic use and location of air-tight materials. Leaks were detected and leakage rates measured with the assistance of a blower-door test. The initial and final tested leakage rates were performed in such a manner that the identified reductions can be properly discerned, particularly in situations wherein multiple building envelope measures may have been implemented simultaneously. ADM utilized savings algorithms found in the Evergy TRM for all air sealing in the program. The kWh savings and kW demand reductions from the air sealing were determined using Equation N-11 through Equation N-15:

Equation N-11: kWh Energy Savings for Air Sealing

$$\Delta kWh = \Delta kWh\_cooling + \Delta kWh\_heating$$

Where:

ΔkWh_cooling = *If central cooling, reduction in annual cooling requirement due to air sealing*

ΔkWh_heating = *If electric heat (resistance or heat pump), reduction in annual electric heating due to air sealing OR*

= *If gas furnace heat, kWh savings for reduction in fan run time*

Equation N-12: kWh Savings for Reduction in Annual Cooling Requirement Due to Air Sealing

$$\Delta kWh\_cooling = [(((CFM50\_existing - CFM50\_new)/N\_cool) * 60 * 24 * CDD * DUA * 0.018) / (1000 * \eta Cool)] * LM\ ADJ_{AirSealingCool}$$

Where:

CFM50_existing = *Infiltration at 50 Pascals as measured by blower door before air sealing*

CFM50_new = *Infiltration at 50 Pascals as measured by blower door after air sealing*

N_cool = *Conversion factor from leakage at 50 Pascal to leakage at natural conditions*

CDD = *Cooling Degree Days*

DUA = *Discretionary Use Adjustment (reflects the fact that people do not always operate their air conditioner when conditions may call for it)*

ηCool = *Efficiency (SEER) of air conditioning equipment (kBtu/kWh)*

LM = *Latent multiplier to account for latent cooling demand*

$ADJ_{AirSealingCool}$ = *Adjustment for cooling savings to account for inaccuracies in engineering algorithms*

Equation N-13: kWh Savings for Reduction in Annual Electric Heating Due to Air Sealing

$$\Delta kWh\_heating = (((CFM50\_existing - CFM50\_new)/N\_heat) * 60 * 24 * HDD * 0.018) / (\eta Heat * 3{,}412)$$

Where:

N_heat = *Conversion factor from leakage at 50 Pascal to leakage at natural conditions*

HDD = *Heating Degree Days*

ηHeat = *Efficiency of heating system*

Equation N-14: kWh Savings for Reduction in Fan Run Time (Gas Furnace Heat) Due to Air Sealing

$$\Delta kWh\_heating = \Delta Therms * Fe * 29.3$$

Where:

Fe = *Furnace fan energy consumption as a percentage of annual fuel consumption*

= *3.14%*

Equation N-15: kW Peak Demand Reduction for Air Sealing

$$\Delta kW = (\Delta kWh\_cooling / FLH\_cooling) * CF$$

Where:

FLH_cooling = *Full load hours of air conditioning*

CF = *Summer System Peak Coincidence Factor (during system peak hour)*

= *68% (for Central A/Cs)*

= 72% (for Heat Pumps)

Ceiling/Attic Insulation

Insulation was added to a home's ceiling/attic. This measure required a member of the implementation staff evaluating the pre and post R-values and measure surface areas. The existing condition was evaluated by implementation staff and was likely to be little or no attic insulation. ADM utilized savings algorithms found in the Evergy TRM for all ceiling/attic insulation in the program. The kWh savings and kW demand reductions from the installation of ceiling/attic insulation were determined using Equation N-16 through Equation N-18:

Equation N-16: kWh Energy Savings for Ceiling/Attic Insulation

$$\Delta kWh = \Delta kWh\_cooling + \Delta kWh\_heating$$

Where:

ΔkWh_cooling *= If central cooling, reduction in annual cooling requirement due to insulation*

ΔkWh_heating *= If electric heat (resistance or heat pump), reduction in annual electric heating due to insulation*

= If gas furnace heat, kWh savings for reduction in fan run time

Equation N-17: kWh Savings for Reduction in Annual Cooling Requirement Due to Ceiling/Attic Insulation

$$\Delta kWh\_cooling = ((((1/R\_old - 1/R\_attic) * A\_attic * (1-Framing\_factor\_attic)) * 24 * CDD * DUA) / (1000 * \eta Cool)) * ADJ_{WallAtticCool}$$

Where:

R_attic *= R-value of new attic assembly (including all layers between inside air and outside air)*

R_old *= R-value value of existing assemble and any existing insulation (Minimum of R-5 for uninsulated assemblies)*

A_attic *= Total area of insulated ceiling/attic (ft2)*

Framing_factor_attic = Adjustment to account for area of framing

= 7%

CDD *= Cooling Degree Days*

DUA = *Discretionary Use Adjustment (reflects the fact that people do not always operate their air conditioner when conditions may call for it)*

= 0.75

ηCool = *Seasonal Energy Efficiency Ratio of cooling system (kBtu/kWh)*

$ADJ_{WallAtticCool}$ = *Adjustment for cooling savings from basement wall insulation to account for prescriptive engineering algorithms overclaiming savings*

= 121%

Equation N-18: kWh Savings for Reduction in Annual Electric Heating (Resistance or Heat Pump) Due to Ceiling/Attic Insulation

$$\Delta kWh\_heating = ((((1/R\_old - 1/R\_attic) * A\_attic * (1-Framing\_factor\_attic)) * 24 * HDD] / (\eta Heat * 3412)) * ADJ_{WallAtticHeat}$$

Where:

HDD = *Heating Degree Days*

ηHeat = *Efficiency of heating system*

$ADJ_{WallAtticHeat}$ = *Adjustment for wall and attic insulation to account for prescriptive engineering algorithms overclaiming savings*

= 60%

Central Air Conditioners

This measure characterizes time of sale and early replacement central air conditioners following the Evergy TRM. ADM utilized savings algorithms found in the Evergy TRM for all central air conditioners in the program. The kWh savings and kW demand reductions from the installation of central air conditioners were determined using Equation N-19 through Equation N-22 below:

Equation N-19: kWh Energy Savings for Central Air Conditioners (Time of Sale)

$$\Delta kWH = (FLHcool * Capacity * (1/(SEER\_base * (1 - DeratingCool\_Base)) - 1/(SEER\_ee * SEER\_adj * (1 - DeratingCool\_Eff))))/1000$$

Equation N-20: kWh Energy Savings for Central Air Conditioners (Early Replacement)

$$\Delta kWH \text{ for remaining life of existing unit (first 6 years)} = (FLHcool * Capacity * (1/(SEER\_exist * (1 - DeratingCool\_Base)) - 1/(SEER\_ee * SEER\_adj * (1 - DeratingCool\_Eff))))/1000$$

$$\Delta kWH \text{ for remaining measure life (next 12 years)} = (FLHcool * Capacity * (1/(SEER\_base * (1 - DeratingCool\_Base)) - 1/(SEER\_ee * SEER\_adj * (1 - DeratingCool\_Eff))))/1000$$

Where:

FLHcool	*= Full load cooling hours*
Capacity	*= Size of new equipment in Btu/hr (note 1 ton = 12,000Btu/hr)*
SEERbase	*= Seasonal energy-efficiency ratio of baseline unit (kBtu/kWh)*
	= 13
SEERexist	*= Seasonal energy-efficiency ratio of existing unit (kBtu/kWh)*
SEERee	*= Rated seasonal energy-efficiency ratio of ENERGY STAR unit (kBtu/kWh)*
SEERadj	*= Adjustment percentage to account for in-situ performance of the unit*
	= [0.805 × (〖EER〗_ee/〖SEER〗_ee)+0.367]
DeratingCoolEff	*= Efficient central air conditioner cooling derating*
	= 0% if Quality Installation is performed
	= 10% if Quality Installation is not performed or unknown
DeratingCoolBase	*= Baseline central air conditioner cooling derating*
	= 10%

Equation N-21: kW Peak Demand Reduction for Central Air Conditioners (Time of Sale)

$$\Delta kW = (Capacity * (1/(EER\_base * (1 - DeratingCool\_Base)) - 1/(EER\_ee * (1 - DeratingCool\_Eff))))/1000 * CF$$

Equation N-22: kW Peak Demand Reduction for Central Air Conditioners (Early Replacement)

$$\Delta kW \text{ for remaining life of existing unit (first 6 years)} = (Capacity * (1/(EER_{exist} * (1 - DeratingCool_{Base})) - 1/(EER_{ee} * (1 - DeratingCool_{Eff}))))/1000 * CF$$

$$\Delta kW \text{ for remaining measure life (next 12 years)} = (Capacity * (1/(EER_{base} * (1 - DeratingCool_{Base})) - 1/(EER_{ee} * (1 - DeratingCool_{Eff}))))/1000 * CF$$

Where:

EERbase = *EER Efficiency of baseline unit*
= *10.5*

EERexist = *EER Efficiency of existing unit*

EERee = *EER Efficiency of ENERGY STAR unit*

CF = *Coincidence Factor for Central A/Cs (during system peak hour)*
= *68%*

Other variables as defined above.

Air Source Heat Pumps

This measure characterizes time of sale and early replacement air source heat pumps following the Evergy TRM. ADM utilized savings algorithms found in the Evergy TRM for all air source heat pumps in the program. The kWh savings and kW demand reductions from the installation of air source heat pumps were determined using Equation N-23 through Equation N-26:

Equation N-23: kWh Energy Savings for Air Source Heat Pumps (Time of Sale)

$$\Delta kWh = ((FLH_{cooling} * Capacity_{cooling} * (1/(SEER_{base} * (1 - DeratingCool_{Base})) - 1/(SEER_{ee} * SEER_{adj} * (1 - DeratingCool_{Eff})))) / 1000) + ((FLH_{heat} * Capacity_{heating} * (1/(HSPF_{base} * (1 - DeratingHeat_{Base})) - 1/(HSPF_{ee} * HSPF_{adj} * (1 - DeratingHeat_{Eff})))) / 1000)$$

Equation N-24: kWh Energy Savings for Air Source Heat Pumps (Early Replacement)

$$\Delta kWH \text{ for remaining life of existing unit (first 6 years)} = ((FLH_{cooling} * Capacity_{cooling} * (1/(SEER_{exist} * (1 - DeratingCool_{Base})) - 1/(SEER_{ee} * SEER_{adj} * (1 - DeratingCool_{Eff}))))$$

*/ 1000) + ((FLH_heat * Capacity_heating * (1/(HSPF_exist * (1 – DeratingHeat_Base)) - 1/(HSPF_ee * HSPF_adj * (1 –〖DeratingHeat〗_Eff)))) / 1000)*

*ΔkWH for remaining measure life (next 12 years) = ((FLH_cooling * Capacity_cooling * (1/(SEER_base * (1 – DeratingCool_Base)) - 1/(SEER_ee * SEER_adj * (1 – DeratingCool_Eff)))) / 1000) + ((FLH_heat * Capacity_heating * (1/(HSPF_base * (1 – DeratingHeat_Base)) - 1/(HSPF_ee * HSPF_adj * (1 – DeratingHeat_Eff)))) / 1000)*

Where:

FLH_cooling	*= Full load hours of air conditioning*
Capacity_cooling	*= Cooling Capacity of Air Source Heat Pump (Btu/hr)*
SEERexist	*= Seasonal Energy Efficiency Ratio of existing cooling system (kBtu/kWh)*
SEERbase	*= Seasonal Energy Efficiency Ratio of baseline Air Source Heat Pump (kBtu/kWh)*
	= 14
SEERee	*= Rated Seasonal Energy Efficiency Ratio of ENERGY STAR unit (kBtu/kWh)*
SEERadj	*= Adjustment percentage to account for in-situ performance of the unit*
	= [0.805 × (〖EER〗_ee/〖SEER〗_ee)+0.367]
DeratingCoolEff	*= Efficient air source heat pump cooling derating*
	= 0% if Quality Installation is performed
	= 10% if Quality Installation is not performed or unknown
DeratingCoolBase	*= Baseline Cooling derating*
	= 10%
FLH_heat	*= Full load hours of heating*

Equation N-25: kW Peak Demand Reduction for Air Source Heat Pumps (Time of Sale)

*ΔkW = (Capacity_cooling * (1/(EER_base * (1 – DeratingCool_Base)) - 1/(EER_ee * (1 – DeratingCool_Eff)))) / 1000 * CF*

Equation N-26: kW Peak Demand Reduction for Air Source Heat Pumps (Early Replacement)

$$\Delta kW \text{ for remaining life of existing unit (first 6 years)} = (Capacity\_cooling * (1/(EER\_exist * (1 - DeratingCool\_Base)) - 1/(EER\_ee * (1 - DeratingCool\_Eff)))) / 1000 * CF$$

$$\Delta kW \text{ for remaining measure life (next 12 years)} = (Capacity\_cooling * (1/(EER\_base * (1 - DeratingCool\_Base)) - 1/(EER\_ee * (1 - DeratingCool\_Eff)))) / 1000 * CF$$

Where:

EERexist	*= Energy Efficiency Ratio of existing cooling system (kBtu/hr / kW)*
EERbase	*= Energy Efficiency Ratio of baseline air source heat pump (kBtu/hr / kW)*
	= 11
EERee	*= Energy Efficiency Ratio of efficient air source heat pump (kBtu/hr / kW)*
CF	*= Coincidence Factor for heat pumps (during system peak hour)*
	= 72%

Other variables as defined above.

Ground Source Heat Pumps

This measure characterizes time of sale and early replacement ground source heat pumps (non-fuel switch) following the Evergy TRM. ADM utilized savings algorithms found in the Evergy TRM for all ground source heat pumps in the program. The kWh savings and kW demand reductions from the installation of ground source heat pumps were determined using Equation N-27 through Equation N-30 below:

Equation N-27: kWh Energy Savings for Ground Source Heat Pumps (Time of Sale)

$$\Delta kWh = [FLHcool * Capacity\_cooling * (1/SEER\_base - 1/EER\_PL)/1000] + [FLHheat * Capacity\_heating * (1/HSPF\_ASHP - 1/(COP\_PL * 3.412))/1000] + [ElecDHW * \%DHWDisplaced * ((1/EF\_ELEC * GPD * Household * 365.25 * \gamma Water * (T\_OUT - T\_IN) * 1.0) / 3412)]$$

Equation N-28: kWh Energy Savings for Ground Source Heat Pumps (Early Replacement)

$$\Delta kWH \text{ for remaining life of existing unit (first 8 years)} = [FLHcool * Capacity\_cooling * (1/SEER\_exist - 1/EER\_PL)/1000] + [ElecHeat * FLHheat * Capacity\_heating * (1/HSPF\_exist - 1/(COP\_PL * 3.412))/1000] + [ElecDHW * \%DHWDisplaced * ((1/ EF\_ELEC * GPD * Household * 365.25 * \gamma Water * (T\_OUT - T\_IN) * 1.0) / 3412)]$$

$$\Delta kWH \text{ for remaining measure life (next 17 years)} = [FLHcool * Capacity\_cooling * (1/SEER\_base - 1/EER\_PL)/1000] + [ElecHeat * FLHheat * Capacity\_heating * (1/HSPF\_base - (1/(COP\_PL * 3.412))/1000] + [ElecDHW * \%DHWDisplaced * ((1/ EF\_ELEC * GPD * Household * 365.25 * \gamma Water * (T\_OUT - T\_IN) * 1.0) / 3412)]$$

Where:

FLHcool	*= Full load cooling hours*
Capacity_cooling	*= Cooling Capacity of ground source heat pump (Btu/hr)*
SEERbase	*= SEER Efficiency of new replacement baseline unit*
SEERexist	*= SEER Efficiency of existing cooling unit*
EERPL	*= Part Load EER Efficiency of efficient ground source heat pump unit*
ElecHeat	*= 1 if existing building is electrically heated*
	= 0 if existing building is not electrically heated
FLHheat	*= Full load heating hours*
Capacity_heating	*= Heating Capacity of ground source heat pump (Btu/hr)*
HSPFbase	*= Heating System Performance Factor of new replacement baseline heating system (kBtu/kWh)*
HSPFexist	*= Heating System Performance Factor of existing heating system (kBtu/kWh)*
COPPL	*= Part Load Coefficient of Performance of efficient unit*
ElecDHW	*= 1 if existing DHW is electrically heated*
	= 0 if existing DHW is not electrically heated
%DHWDisplaced	*= Percentage of total DHW load that the ground source heat pump will provide*

EFELEC = *Energy Factor (efficiency) of electric water heater*

GPD = *Gallons Per Day of hot water use per person*

Household = *Average number of people per household*

γWater = *Specific weight of water*

TOUT = *Tank temperature*

= *125°F*

TIN = *Incoming water temperature from well or municipal system*

= *54°F*

Equation N-29: kW Peak Demand Reduction for Ground Source Heat Pumps (Time of Sale)

$$\Delta kW = (Capacity\_cooling * (1/EER\_base - 1/EER\_FL))/1000 * CF$$

Equation N-30: kW Peak Demand Reduction for Ground Source Heat Pumps (Early Replacement)

$$\Delta kW \text{ for remaining life of existing unit (first 8 years)} = (Capacity\_cooling * (1/EER\_exist - 1/EER\_FL))/1000 * CF$$

$$\Delta kW \text{ for remaining measure life (next 17 years)} = (Capacity\_cooling * (1/EER\_base - 1/EER\_FL))/1000 * CF$$

Where:

EERbase = *Energy Efficiency Ratio of new replacement baseline unit*

EERexist = *Energy Efficiency Ratio of existing cooling unit (kBtu/hr / kW)*

EERFL = *Full Load Energy Efficiency Ratio of ENERGY STAR ground source heat pump unit*

CF = *Coincidence Factor for heat pumps (during system peak hour)*

= *72%*

Other variables as defined above.

Ductless Mini-Split Heat Pumps

This measure characterizes time of sale and early replacement ductless mini-split heat pumps (non-fuel switch) following the Evergy TRM. ADM utilized savings algorithms found in the Evergy TRM for all ductless mini-split heat pumps in the program. The kWh savings and kW demand reductions from the installation of ground source heat pumps were determined using Equation N-31 through Equation N-34 below:

Equation N-31: kWh Energy Savings for Ductless Mini-Spilt Heat Pumps (Time of Sale)

$$\Delta kWh = [(Elecheat * Capacity\_heat * EFLH\_heat * (1/HSPF\_Base - 1/HSPF\_ee)) / 1000] + [(Capacity\_cool * EFLH\_cool * (1/SEER\_Base - 1/SEER\_ee)) / 1000]$$

Equation N-32: kWh Energy Savings for Ductless Mini-Spilt Heat Pumps (Early Replacement)

$$\Delta kWH \text{ for remaining life of existing unit (first 6 years)} = [(Elecheat * Capacity\_heat * EFLH\_heat * (1/HSPF\_exist - 1/HSPF\_ee)) / 1000] + [(Capacity\_cool * EFLH\_cool * (1/SEER\_exist - 1/SEER\_ee)) / 1000]$$

$$\Delta kWH \text{ for remaining measure life (next 12 years)} = [(Elecheat * Capacity\_heat * EFLH\_heat * (1/HSPF\_base - 1/HSPF\_ee)) / 1000] + [(Capacity\_cool * EFLH\_cool * (1/SEER\_base - 1/SEER\_ee)) / 1000]$$

Where:

ElecHeat	*= 1 if existing building is electrically heated*
	= 0 if existing building is not electrically heated
Capacityheat	*= Heating capacity of the ductless heat pump unit in Btu/hr*
EFLHheat	*= Equivalent Full Load Hours for heating*
HSPFbase	*= Heating System Performance Factor of new replacement baseline heating system (kBtu/kWh)*
HSPFexist	*= HSPF rating of existing equipment (kbtu/kwh)*
HSPFee	*= HSPF rating of new equipment (kbtu/kwh)*
Capacitycool	*= the cooling capacity of the ductless heat pump unit in Btu/hr*
SEERbase	*= SEER rating of new replacement baseline unit*
SEERee	*= SEER rating of new equipment (kbtu/kwh)*

SEERexist = *SEER rating of existing equipment (kbtu/kwh)*

EFLHcool = *Equivalent Full Load Hours for cooling*

Equation N-33: kW Peak Demand Reduction for Ductless Mini-Split Heat Pumps (Time of Sale)

$$\Delta kW = (Capacitycool * (1/EERbase - 1/EERee)) / 1000) * CF$$

Equation N-34: kW Peak Demand Reduction for Ductless Mini-Split Heat Pumps (Early Replacement)

$$\Delta kW \text{ for remaining life of existing unit (first 6 years)} = (Capacitycool * (1/EER\_exist - 1/EER\_ee)) / 1000) * CF$$

$$\Delta kW \text{ for remaining measure life (next 12 years)} = (Capacitycool * (1/EER\_base - 1/EER\_ee)) / 1000) * CF$$

Where:

EERbase = *Energy Efficiency Ratio of new replacement unit*

EERexist = *Energy Efficiency Ratio of existing cooling system (kBtu/hr/kW)*

EERee = *Energy Efficiency Ratio of new ductless mini-split heat pumps (kBtu/hr/kW)*

CF = *Summer System Peak Coincidence Factor for heat pumps (during utility peak hour)*

= *72%*

N.2 Energy Saving Products (ESP) Program

Gross energy savings and demand reductions for lighting measures in the Energy Saving Products Program were calculated using the algorithms as listed in Equation N-1 and Equation N-2.

Base wattages were calculated based on the bulb type and lumen range, as established in the IL TRM. Measure wattage was taken from program tracking data and confirmed using the ENERGY STAR database. Hours of use, waste heat factors, coincident factors, and in-service rates were estimated based on responses to the general population survey.

N.3 Income-Eligible Multi-Family (IEMF) Program

N.3.1 Gross Impact Calculation Algorithms

Energy savings and demand reductions for all measures in the Income-Eligible Multi-Family Program were calculated as specified in the Evergy TRM. The gross energy savings and demand impacts algorithms as listed in the IL TRM are outlined in the sections below.

Energy-Efficient Lighting

Energy-efficient lighting is part of the direct install measures offered through the IEMF program. Lighting measures include retrofits of existing fixtures, screw-in LED lamps in units and common areas, linear fluorescent bulbs and fixtures, and outdoor lighting. These types of measures reduce energy demand, though operating hours for fixtures are generally the same before and after retrofit.

ADM checked that LED model numbers listed in the program tracking data appear in the ENERGY STAR® databases to verify that each model distributed was ENERGY STAR® certified. ADM then analyzed the savings from verified lighting measures using data for new/retrofitted fixtures on wattages before and after retrofit. The energy savings and demand reductions were calculated using prescriptive algorithms from the Evergy TRM and other relevant program sources, as necessary. If needed, ADM adjusted the baseline hours of use. HVAC interactive effects were accounted for using deemed algorithms from the Evergy TRM, dependent upon heating and cooling systems serving areas where lighting measures were installed.

The Evergy TRM specifies the use of savings algorithms from the IL TRM Total kWh savings and kW demand reductions from the installation of LED and Fluorescent bulbs will be determined using Equation N-35 and Equation N-36 below:

Equation N-35: kWh Energy Savings from Efficient Lighting

$$kWh = \frac{W_{base} - W_{ee}}{1000} * HOU * WHF_e * ISR$$

Equation N-36: kW Peak Demand Reduction from Efficient Lighting

$$kW = \frac{W_{base} - W_{ee}}{1000} * CF * WHF_d * ISR$$

Where:

W_{base} = *Input wattage of the existing or baseline system*

W_{ee} = *Actual wattage of the lighting measure installed*

HOU = *Average hours of use per year*

WHF_e = *Waste heat factor for energy to account for cooling energy savings from efficient lighting*

= *1.04 (interior), 1.00 (exterior)*[34]

WHF_d = *Waste heat factor for demand to account for cooling savings from efficient lighting*

= *1.07 (interior), 1.00 (exterior)*[35]

CF = *Summer peak coincidence factor*

= *0.128 (interior), 0.273 (exterior)*[36]

ISR = *Measure in-service rate, determined from program surveys*

Low-Flow Faucet Aerator

Faucet aerators are part of the direct install measures offered through the IEMF program. The Evergy TRM specifies the use of savings algorithms from the IL TRM. Energy savings and peak demand reduction for low-flow faucet aerators will be calculated using Equation N-37 and Equation N-38 below. Savings and demand reductions are dependent on the installation location (kitchen or bathroom), as specified in the program tracking data.

Equation N-37: Electric Energy Savings for Faucet Aerator

$$\Delta kWh = ((GPM\_base * L\_base - GPM\_low * L\_low) * Household * 365.25 * DF / FPH) * EPG\_electric * ISR$$

Where:

GPM_base = *Average flow rate, in gallons per minute, of the baseline faucet*

L_base = *Average baseline daily length faucet use per capita for faucet of interest in minutes*

GPM_low = *Average flow rate, in gallons per minute, of the low-flow faucet aerator "as-used"*

L_low = *Average retrofit daily length faucet use per capita for faucet of interest in minutes*

Household = *Average number of people per household*

[34] As stipulated by the Evergy TRM, 2020-05-01
[35] Ibid.
[36] Ibid.

DF = *Drain Factor*

FPH = *Faucets Per Household*

EPG_electric = *Energy per gallon of water used by faucet supplied by electric water heater*

= *(8.33 * 1.0 * (WaterTemp - SupplyTemp)) / (RE_electric * 3,412)*

= *(8.33 * 1.0 * (86 – 54.1)) / (0.98 * 3,412)*

= *0.0795 kWh/gal (Bath), 0.0969 kWh/gal (Kitchen)*

ISR = *In service rate of faucet aerators dependent on install method*

= *Direct Install for Multifamily Kitchen value 0.91*

= *Direct Install –Multifamily Bathroom value 0.95*

Equation N-38: Summer Coincident Peak Demand Savings for Faucet Aerator

$$\Delta kW = \Delta kWh \,/\, Hours * CF$$

Where:

Hours = *Annual electric DHW recovery hours for faucet use per faucet*

= *((GPM_base * L_base) * Household/FPH * 365.25 * DF) * 0.545 / GPH*

GPH = *Gallons per hour recovery of electric water heater calculated for 70.9F temp rise, 98% recovery efficiency, and typical 4.5kW electric resistance storage tank*

= *27.4*

CF = *Coincidence Factor for electric load reduction*

= *0.022*

Low-Flow Showerhead

Showerheads are part of the direct install and custom measures offered through the IEMF program. The Evergy TRM specifies the use of savings algorithms from the IL TRM. Energy savings, and peak demand reduction for low-flow showerheads will be calculated using Equation N-39 and Equation N-40 below.

Equation N-39: Electric Energy Savings for Showerhead

$$\Delta kWh = ((GPM\_base * L\_base - GPM\_low * L\_low) * Household * SPCD * 365.25 / SPH) * EPG\_electric * ISR$$

Where:

GPM_base = *Average flow rate, in gallons per minute, of the baseline faucet*

GPM_low = *As-used flow rate of the low-flow showerhead*

L_base = *Shower length in minutes with baseline showerhead*

= *7.8 min*

L_low = *Shower length in minutes with low-flow showerhead*

= *7.8 min*

Household = *Average number of people per household*

SPCD = *Showers Per Capita Per Day*

= *0.6*

SPH = *Showerheads Per Household*

EPG_electric = *Energy per gallon of hot water supplied by electric*

= *(8.33 * 1.0 * (ShowerTemp - SupplyTemp)) / (RE_electric * 3,412)*

= *(8.33 * 1.0 * (101 – 54.1)) / (0.98 * 3,412)*

= *0.117 kWh/gal*

Equation N-40: Summer Coincident Peak Demand Savings for Showerhead

$$\Delta kW = \Delta kWh/Hours * CF$$

Where:

GPH = *Gallons per hour recovery of electric water heater calculated for 65.9F temp rise, 98% recovery efficiency, and typical 4.5kW electric resistance storage tank*

= *27.4*

CF = *Coincidence Factor for electric load reduction*

= *0.0278*

Smart Power Strip

Smart power strips are part of the direct install measures offered through the IEMF program. The Evergy TRM provides specified deemed savings values for 7-plug power strips, shown below. Demand savings for smart strip power strips will be determined per the Evergy TRM using Equation N-41 and Equation N-42.

Equation N-41: Electric Energy Savings for Smart Power Strip

$$\Delta kWh = kWh$$

Where:

kWh = *Assumed annual kWh savings per unit*

= *103 kWh for 7-plug units*

Equation N-42: Summer Coincident Peak Demand Savings for Faucet Aerator

$$\Delta kW = \Delta kWh / Hours * CF$$

Where:

Hours = *Annual number of hours during which the controlled standby loads are turned off by the Tier 1 Advanced power Strip*

= *7,129*

CF = *Summer Peak Coincidence Factor for measure*

= *0.8*

Air Source Heat Pump

Air source heat pumps are part of the prescriptive and custom measures offered through the IEMF program.

Equation N-43: Electric Energy Savings for Air Source Heat Pump

$$\Delta kWh = ((FLH\_cooling * Capacity\_cooling * (1/(SEER\_base * (1 - DeratingCool_{Base})) - 1/(SEER\_ee * SEERadj * (1 - DeratingCool_{Eff})))) / 1000) + ((FLH\_heat * Capacity\_heating * (1/(HSPF\_base * (1 - DeratingHeat_{Base})) - 1/(HSPF\_ee * HSPFadj * (1 - DeratingHeat_{Eff})))) / 1000)$$

Where:

FLH_cooling = *Full load hours of air conditioning*

= *dependent on location*

Capacity_cooling = *Cooling Capacity of Air Source Heat Pump (Btu/hr)*

= *Actual (1 ton = 12,000 Btu/hr)*

SEER_base = *Seasonal Energy Efficiency Ratio of baseline unit (kBtu/kWh). For early replacement measures, the actual SEER rating where it is possible to measure or reasonably estimate should be used for the remaining useful life of the existing equipment (6 years for ASHP and Central AC)*

SEER_ee = *Rated Seasonal Energy Efficiency Ratio of ENERGY STAR unit (kBtu/kWh)*

= *Actual, or 15 if unknown*

SEERadj = *Adjustment percentage to account for in-situ performance of the unit*

= *[(0.805 × (EERee / SEERee) + 0.367]*

$DeratingCool_{Eff}$ = *Efficient ASHP Cooling derating*

= *0% if Quality Installation is performed*

= *10% if Quality Installation is not performed or unknown*

$DeratingCool_{Base}$ = *Baseline Cooling derating*

= *10%*

FLH_heat = *Full load hours of heating*

= *Dependent on location and home type*

Capacity_heating = *Heating Capacity of Air Source Heat Pump (Btu/hr)*

= *Actual (1 ton = 12,000 Btu/hr)*

HSPF_base = *Heating System Performance Factor of baseline heating system (kBtu/kWh). For early replacement measures, use actual HSPF rating where it is possible to measure or reasonably estimate for the remaining useful life of the existing equipment (6 years for ASHP, 16 years for electric resistance)*

HSPF_ee = *Heating System Performance Factor of efficient Air Source Heat Pump (kBtu/kWh)*

= *Actual or 8.5 if unknown*

HSPFadj = *Adjustment percentage to account for the heating capacity ratio of the efficient unit*

= *[(17 °F Capacity / 47 °F Capacity) × 0.158 + 0.899]*

= *Actual using AHRI lookup values for efficient unit heating capacities rated at 17°F and 47°F. If not available assume 1.*

$DeratingHeat_{Eff}$ = *Efficient ASHP Heating derating*

= *0% if Quality Installation is performed*

= *10% if Quality Installation is not performed*

$DeratingHeat_{Base}$ = *Baseline Heating derating*

= *10%*

Equation N-44: Summer Coincident Peak Demand Savings for Air Source Heat Pump

$$\Delta kW = (Capacity\_cooling * (1/(EER\_base * (1 - DeratingCool_{Base})) - 1/(EER\_ee * (1 - DeratingCool_{Eff})))) / 1000 * CF$$

Where:

EER_base = *Energy Efficiency Ratio of baseline unit (kBtu/kWh). For early replacment measures, the actual EER rating where it is possible to measure or reasonably estimate should be used for the remaining useful life of the existing equipment (6 years for ASHP and Central AC). If using rated efficiencies, derate efficiency value by 1% per year to account for degradation over time.*

EER_ee = *Energy Efficiency Ratio of efficient Air Source Heat Pump (kBtu/hr / kW)*

= *Actual. If unknown, assume 12.5 EER*

$CF_{SSP\ SF}$ = *Summer System Peak Coincidence Factor for Heat Pumps in single-family homes (during system peak hour)*

= *72%%*

$CF_{PJM\ SF}$ = *PJM Summer Peak Coincidence Factor for Heat Pumps in single-family homes (average during peak period)*

= *46.6%*

$CF_{SSP,\ MF}$ = *Summer System Peak Coincidence Factor for Heat Pumps in multi-family homes (during system peak hour)*

= *67%*

$CF_{PJM, MF}$ = *PJM Summer Peak Coincidence Factor for Heat Pumps in multi-family homes (average during peak period)*

= *28.5%*

High Efficiency Bathroom Exhaust Fan

High efficiency bathroom exhaust fans are part of the prescriptive measures offered through the IEMF program.

Equation N-45: kWh Energy Savings for High Efficiency Bathroom Exhaust Fan

$$\Delta kWh = (CFM * (1/\eta_{,BASELINE} - 1/\eta_{EFFICIENT})/1000) * Hours$$

Where:

CFM = *Nominal Capacity of the exhaust fan*

= *Actual or use defaults provided below*

= *Assume 50CFM for continuous ventilation*

$\eta_{BASELINE}$ = *Average efficacy for baseline fan (CFM/watts)*

$\eta_{EFFICIENT}$ = *Average efficacy for efficient fan (CFM/watts)*

= *Actual or use defaults provided below*

Hours = *assumed annual run hours*

= *1,089 for standard usage*

= *8,766 for continuous ventilation*

Equation N-46: Summer Coincident Peak Demand Savings for High Efficiency Bathroom Exhaust Fan

$$\Delta kW = (CFM * (1/\eta_{BASELINE} - 1/_{EFFICIENT})/1000) * CF$$

Where:

CF = *Summer Peak Coincidence Factor*

= *0.135 for standard usage*

= *1.0 for continuous operation*

Dishwasher

Dishwashers are part of the prescriptive measures offered through the IEMF program.

Equation N-47: Electric Energy Savings for Dishwasher

$$\Delta kWh = ((kWh_{Base} - kWh_{ESTAR}) * (\%kWh\_op + (\%kWh\_heat * \%Electric\_DHW)))$$

Where:

kWh_{BASE}	*= Baseline kWh consumption per year*
kWh_{ESTAR}	*= ENERGY STAR kWh annual consumption*
Standard	*= 307 kWh/year*
Compact	*= 222 kWh/year*
%kWh_op	*= Percentage of dishwasher energy consumption used for unit operation*
	= 1% - 56%
	= 44%
%kWh_heat	*= Percentage of dishwasher energy consumption used for water heating*
	= 56%
%Electric_DHW	*= Percentage of DHW savings assumed to be electric*

Equation N-48: Summer Coincident Peak Demand Savings

$$\Delta kW = \Delta kWh/Hours * CF$$

Where:

ΔkWh	*= Annual kWh savings from measure as calculated above. Note do not include the secondary savings in this calculation.*
Hours	*= Annual operating hours*
	= 353 hours
CF	*= Summer Peak Coincidence Factor*
	= 2.6%

Refrigerator

Refrigerators are part of the prescriptive and custom measures offered through the IEMF program.

Equation N-49: Electric Energy Savings

$$\Delta kWh = UEC_{BASE} - UE_{CEE} \text{ (Time of Sale)}$$

Early Replacement

ΔkWh *for remaining life of existing unit (1st 6 years)* $= UEC_{EXIST} - UEC_{EE}$

ΔkWh *for remaining measure life (next 11 years)* $= UEC_{BASE} - UEC_{EE}$

Where:

UEC_{EXIST} = *Annual Unit Energy Consumption of existing unit*

UEC_{BASE} = *Annual Unit Energy Consumption of baseline unit*

UEC_{EE} = *Annual Unit Energy Consumption of ENERGY STAR unit*

Equation N-50: Summer Coincident Peak Demand Savings

$$\Delta kW = (\Delta kWh/8{,}766) * TAF * LSAF$$

Where:

TAF = *Temperature Adjustment Factor*

= *1.25*

LSAF = *Load Shape Adjustment Factor*

= *1.057*

Programmable Thermostat

Programmable thermostats are part of the prescriptive measures offered through the IEMF program.

Equation N-51: Electric Energy Savings for Programmable Thermostat

$$\Delta kWh = \%ElectricHeat * Elec\_Heating\_Consumption * Heating\_Reduction * HF * Eff\_ISR$$

Where:

%ElectricHeat = *Percentage of heating savings assumed to be electric*

Elec_Heating_Consumption = *Estimate of annual household heating consumption for electrically heated homes*

Heating_Reduction = *Assumed percentage reduction in total household heating energy consumption due to programmable thermostat*

= *6.2%*

HF = *Household factor, to adjust heating consumption for non-single-family households*

Eff_ISR = *Effective In-Service Rate, the percentage of thermostats installed and programmed effectively*

Washing Machine

Washing machines are part of the prescriptive measures offered through the IEMF program.

Equation N-52: Electric Energy Savings for Washing Machine

$$IMEFsavings = Capacity * (1/IMEFbase - 1/IMEFeff) * Ncycles$$

Where:

Capacity = *Clothes Washer capacity (cubic feet)*

= *Actual. If capacity is unknown assume 3.50 cubic feet*

IMEFbase = *Integrated Modified Energy Factor of baseline unit*

= *1.75*

IMEFeff = *Integrated Modified Energy Factor of efficient unit*

= *Actual. If unknown assume average values provided below*

Ncycles = *Number of Cycles per year*

= *295*

Equation N-53: Coincident Peak Demand Savings

$$\Delta kW = \Delta kWh/Hours * CF$$

Where:

ΔkWh = *Energy Savings as calculated above*

Hours = *Assumed Run hours of Clothes Washer*

= *295 hours*

CF = *Summer Peak Coincidence Factor for measure*

= *0.038*

Chiller

Elevators are part of the custom measures offered through the IEMF program.

Equation N-54: Energy Efficiency Savings for Chillers

$$\Delta kWH = Tons * ((Baseline\ System\ Efficiency) - (Proposed\ System\ Efficiency)) * Run\ Hours$$

Where:

Tons = *total system chiller nominal cooling capacity being replaced in tons (note: 1 ton is 12,000 Btu/hr)*

= *Actual installed*

Baseline System Efficiency = *efficiency of baseline system*

Proposed System Efficiency = *efficiency of proposed system*

Run Hours = *run hours for cooling*

= *Actual, if known*

Elevator

Elevators are part of the custom measures offered through the IEMF program. The measure savings were calculated through a desk review of submitted savings.

Smart Thermostat

Smart thermostats are part of the custom measures offered through the IEMF program.

Equation N-55: Electric Energy Savings for Smart Thermostats

$$\Delta kWh = \Delta kWh_{heating} + \Delta kWh_{cooling}$$

$$\Delta kWh_{heating} = \%ElectricHeat * Elec\_Heating\_Consumption * Heating\_Reduction * HF * Eff\_ISR$$

$$\Delta kWh_{cool} = \%AC * ((FLH * Capacity * 1/SEER)/1000) * Cooling\_Reduction * Eff\_ISR$$

Where:

%ElectricHeat = *Percentage of heating savings assumed to be electric*

Elec_Heating_Consumption = *Estimate of annual household heating consumption for electrically heated homes*

Heating_Reduction = *Assumed percentage reduction in total household heating energy consumption due to advanced thermostat including accounting for Thermostat*

HF = *Household factor, to adjust heating consumption for non-single-family households*

Eff_ISR = *Effective In-Service Rate*

%AC = *Fraction of customers with thermostat-controlled air-conditioning*

FLH = *Estimate of annual household full load cooling hours for air conditioning equipment based on location and home type*

Capacity = *Size of AC unit*

= *Use actual when program delivery allows size of AC unit to be known*

SEER = *the cooling equipment's Seasonal Energy Efficiency Ratio rating (kBtu/kWh)*

= *Use actual SEER rating where it is possible to measure or reasonably estimate*

Cooling_Reduction = *Assumed average percentage reduction in total household cooling energy consumption due to installation of advanced thermostat including accounting for Thermostat Optimization*

= *8.4%*

Equation N-56: Summer Coincident Peak Demand Savings

$$\Delta kW = \%AC * (Cooling\_DemandReduction * Btu/hr * (1/EER)/1000) * EFF\_ISR * CF$$

Where:

Cooling_DemandReduction = *Assumed average percentage reduction in total household cooling demand due to installation of advanced thermostat including accounting for Thermostat Optimization services*

= *16.4%*

EER = *Energy Efficiency Ratio of existing cooling system (kBtu/hr/kW)*

= *Use actual EER rating where it is possible to measure or reasonably estimate*

CF_{SSP} = *Summer System Peak Coincidence Factor for Central A/C (during system peak hour)*

= *34%*

CF_{PJM} = *PJM Summer Peak Coincidence Factor for Central A/C (average during PJM peak period)*

= *23.3%*