CADMUS

Home Energy Report Program Impact and Process Evaluation

PROGRAM YEAR 2018

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Ameren Missouri

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Executive Summary

Ameren Missouri engaged Cadmus to perform annual process and impact evaluations of the Home Energy Reports program (HER program) for a three-year period, starting in program year 2016 (PY16) through program year 2018 (PY18). This annual report covers the impact and process evaluation findings for PY18, the period from March 1, 2018, through February 28, 2019—the final year of the three-year program cycle.

Program Description

The program objective is to provide mailed and electronic home energy reports (HER reports) that encourage customers to reduce their energy consumption through behavioral changes. Ameren Missouri designed the program so that a sample of residential customers received HER reports using a randomized control trial (RCT) experimental design. ICF is the program implementer, responsible for designing and deploying the HER program.

In PY16, Cadmus sampled and randomized customers into Wave 1 treatment and control groups. During that period, a number of customer accounts were closed (or "finaled"), and a small number of treatment group customers opted out of receiving HER reports. To replace customers no longer in the Wave 1 treatment and control groups, and in anticipation of additional accounts being closed during PY17, Ameren Missouri and ICF selected eligible residential customers as replacements and Cadmus randomized these customers into Wave 2 treatment and control groups.

Similarly, to replace customers no longer in Wave 1 or Wave 2 for the PY18 program year, Ameren Missouri and ICF selected additional customers for Wave 3, and Cadmus randomized them into treatment and control groups. In addition, customers with valid email addresses who had not previously been assigned to a treatment group were selected to receive emailed HER (eHER) reports as a fourth wave (Wave eHER). Cadmus also randomized these customers into treatment and control groups.

In PY18, the program included 319,641 treatment group and 115,315 control group customers total across waves. Wave 3 and Wave eHER treatment group customers began receiving reports during the last week of March and the first week of April 2018.

ICF produced and mailed six paper HER reports and emailed six eHER reports in PY18. The reports contained information about customers' home energy consumption and provided encouragement to adopt energy-saving home improvements and behaviors. ICF forecasted and tracked savings throughout the program year. Cadmus analyzed savings after the third quarter and again after the end of the program year.

Key Impact Evaluation Findings

Cadmus summarized the following key findings for the PY18 evaluation period.

Net Impacts and Savings

Table 1 summarizes the HER program's PY18 participation and savings. The total *ex post* net savings values reflect total estimated PY18 savings. The HER program was established as an experimental design, utilizing a control group in the regression, and thus the savings estimate is considered "net" and a separate net-to-gross estimation was not necessary. Overall, the program saved 26,773 MWh (56% realization rate).

The total *ex post* net savings, adjusted for uplift, reflects estimated savings after subtracting savings resulting from increased participation in other programs due to the HER program (uplift). Overall, net savings adjusted for uplift were 26,376 MWh (55% realization rate).

Table 1. PY18 HER Program Summary: *Ex Post* Program Net Savings

Measure	PY18 Participation	Per-Unit *Ex Post* Savings (kWh/ customer/ day)	Number Verified Participants	Total *Ex Post* Net Savings (MWh/yr)	Realization Rate	Total *Ex Post* Net Savings (MWh/yr) Adjusted for Uplift	Realization Rate Adjusted for Uplift	Relative Precision at 90% Confidence
Wave 1	195,573	0.28	195,573	19,097	65%	19,213	65%	±22%
Wave 2	18,580	0.17	18,580	1,101	40%	972	35%	±105%
Wave 3	83,930	0.22	83,930	5,988	48%	5,556	44%	±40%
eHER Wave	21,558	0.09	21,558	587	18%	634	20%	±159%
Total	**319,641**	**0.25**	**319,641**	**26,773**	**56%**	26,376	55%	±19%

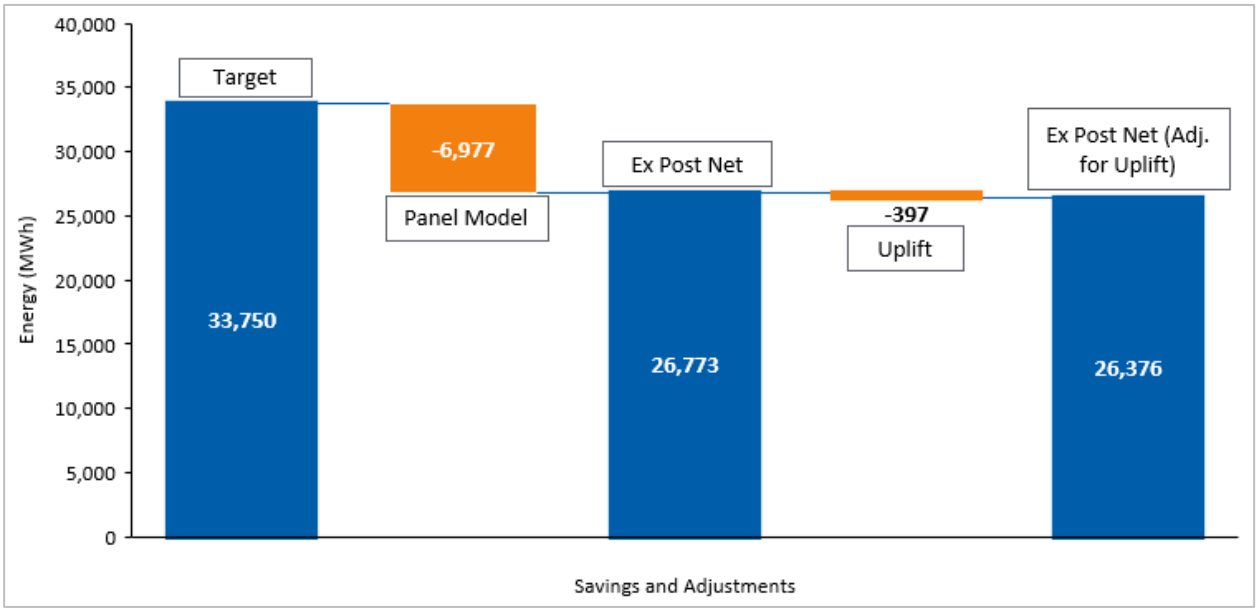
As shown in Table 2, the PY18 annual net energy and demand savings targets were 33,750 MWh and 15,774 kW, respectively, as specified in Ameren Missouri's residential tariff. The technical reference manual (TRM) assumed that the program would result in average savings of 150 kWh per year per customer. Appendix A presents the coincidence factors used to calculate demand savings for this program.

Table 2. PY18 HER Program Savings Targets

Metric	MPSC-Approved Target	*Ex Post* Net Savings Determined by EM&V	*Ex Post* Net Savings Determined by EM&V Adjusted for Uplift	Percent of Goal Achieved
Energy (MWh)	33,750	26,773	26,376	78%
Demand (kW)	15,774	12,478	12,293	78%

Figure 1 illustrates the program's energy impacts—from the target to the *ex post* net savings. The blue bars represent total savings (targets, *ex post* net determined by EM&V, etc.) and orange bars represent factors that decreased savings.

Figure 1. Waterfall Chart of PY18 HER Program Energy Savings



CSR Impact Evaluation Requirements

According to the Missouri Code of State Regulations (CSR), demand-side programs operating as part of a utility's preferred resource plan are subject to ongoing process and impact evaluations that meet certain criteria. Specifically, the CSR requires that impact evaluations satisfy the requirements listed in Table 3, which includes the appropriate method to be used. We provide a summary of process-related CSR requirements in Table 4, below.

Table 3. Summary Responses to CSR Impact Evaluation Requirements

CSR Requirement[1]	Method Used	Description of Program Method
Approach: The evaluation must use one or both of the following comparisons to determine the program impact:		
Comparisons of pre-adoption and post-adoption loads of program participants, corrected for the effects of weather and other intertemporal differences	✓	Regression analysis controlling for customer heating and cooling degree days.
Comparisons between loads for program participants and an appropriate control group over the same period	✓	Regression analysis of customers assigned to RCT.
Data: The evaluation must use one or more of the following types of data to assess program impact:		
Monthly billing data	✓	Regression analysis modeled monthly billing data.
Hourly load data		
Load research data		
End-use load metered data		
Building and equipment simulation models		
Survey responses		
Audit and survey data on the following:		
Equipment type/size efficiency	✓	Used for uplift estimates
Household or business characteristics		
Energy-related building characteristics		

[1] State of Missouri. "Administrative Rules: Missouri Code of State Regulations." Missouri 4 CSR 240-22.070(8)(B). Revised May 2011. Available online: https://www.sos.mo.gov/cmsimages/adrules/csr/current/4csr/4c240-22.pdf

Key Process Evaluation Findings

In this section, Cadmus summarizes key findings for the PY18 evaluation period.

Marketing and Outreach

In PY18, Ameren Missouri added the email channel and stopped sending reports to customers with low electricity usage prior to the HER program. Ameren Missouri and ICF reported that the open rate for emailed eHER reports was high (35-40% throughout the year) and that customer engagement with the interactive tips webpage resulted in customer engagement. In PY18, Ameren Missouri and ICF did not include cross-program marketing in the HER reports, similar to the end of PY17.

Customer feedback indicated that personalization of the information in the HER reports continues to be a challenge for the HER program. Some customers believed the HER reports did not recognize significant events, equipment, and previous energy efficient upgrades in their households them. For example, some customers indicated that recent electric vehicle purchases caused increased electricity consumption and wished the HER report had reflected this information while others suspected that the HER report did not account for them working from home all day.

Providing better digital interactions, with more connections to customer accounts, efficiency purchases, and behavior tracking is a future challenge and priority for the HER program.

HER Report Frequency and Timing

In PY18, Ameren Missouri mailed six HER reports and emailed six eHER reports to treatment group customers. These were sent throughout the year, with two of each sent during the summer peak cooling energy-usage season.

HER Participant Feedback

As in PY16 and PY17, Cadmus found high customer satisfaction with both Ameren Missouri and the HER reports. Over 90% of customers were satisfied with both.

Surveys show report readership decreased from 57% in PY17 to 47% in PY18. Fewer customers recalled the similar home comparison and fewer customers agreed that the similar home comparison was accurate in PY18 than in PY17. Similarly, fewer customers recalled the customer-specific tracker in PY18 than in PY17 although a similar percentage agreed it was accurate.

CSR Process Evaluation Requirements

As discussed, the Missouri CSR requires that demand-side programs, functioning as part of a utility's preferred resource plan, be subject to ongoing process and impact evaluations that meet certain criteria. At a minimum, process evaluations must address the five questions listed in Table 4, which includes a summary response for each specified requirement.

Table 4. Summary Responses to CSR Process Evaluation Requirements

CSR Requirement Number[1]	CSR Requirement Description	Summary Response
1	What are the primary market imperfections common to the target market segment?	In PY17, Cadmus found that nonparticipant Ameren Missouri customers reduced energy consumption at a similar rate as HER participants. Therefore, additional savings potential of energy education and behavior changes may be limited. The program is designed to address the market imperfection through education and motivation towards behavior change to save energy.
2	Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?	Yes. To improve the program cost-effectiveness, we recommend Ameren Missouri continue to seek opportunities to improve its messaging and offerings towards increasing savings.
3	Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?	Yes. This program does not incent end-use measures directly but does use tips in the HER reports to promote energy saving behaviors and measure installations for a diverse set of end-uses. The tips target energy savings that could result from behaviors including changing settings on clothes washers, water heaters, and thermostats, as well as replacing existing lighting with more efficient LED lighting, installing smart or programmable thermostats, and installing air sealing or insulation.
4	Are the communication channels and delivery mechanisms appropriate for the target market segment?	Yes. The communication channel for HER reports includes mailing paper reports and emailing electronic reports (eHER reports were added in PY18). Other similar utility programs combine these channels as well as supplementing with web portals to engage customers more often and in more depth, which may result in deeper savings. Ameren Missouri plans to send mailed HER and emailed eHER reports to all customers in the program and to launch a web portal in PY19 for the HER program.
5	What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation of each end-use measure included in the program?	In contrast to PY17, in PY18 Cadmus found that HER treatment group customers with lower energy consumption were able to save as much as customers with higher energy consumption (in absolute value and/or relative percentages, depending on the wave). Therefore, Cadmus recommends Ameren Missouri try to identify what changes could be driving the expanded participation and continue those messages or approaches.

[1] State of Missouri. "Administrative Rules: Missouri Code of State Regulations." Missouri 4 CSR 240-22.070(8)(A) requirements 1 through 5. Revised May 2011. Available online: https://www.sos.mo.gov/cmsimages/adrules/csr/current/4csr/4c240-22.pdf

Key Conclusions and Recommendations

Cadmus offers the following conclusions and recommendations for improving the program.

Conclusion 1. Customers who received only HER reports or eHER and HER reports saved more than customers who received eHER reports only. Customers who received the HER reports (separately or in combination with eHER reports) in PY18, saved between 0.4% and 0.7% kWh per day. Customers who only received the eHER reports in PY18 saved 0.2% kWh per day.

Recommendation 1. Ameren Missouri should expand the eHER delivery channel to email reports to all customers in the HER program. Cadmus recommends that Ameren Missouri proceed with its plan to deliver eHER reports to all customers (with email available in their customer data) assigned to a PY19 treatment group to increase savings across all participants.

Conclusion 2. In contrast to PY16 and PY17, customers with lowest energy use saved as much or more than those in the highest energy usage group. Customers with pre-HER program energy consumption in the top 50th percentile of energy usage saved 0.1% to 0.9%, or 0.049 to 0.579 kWh per customer per day, whereas customers in the bottom 50th percentile saved 0.3% to 1.6%, or 0.059 to 0.343 kWh per customer per day.

Recommendation 2. Continue to monitor savings by energy use quartile to determine if the trend continues. If so, Cadmus recommends Ameren Missouri expand eligibility to include customers regardless of pre-program usage.

Conclusion 3. HER program savings have increased during the three year period from PY16 to PY18. Savings have increase linearly, increasing from 0.040 kWh per customer per day, or 0.11%, in PY16 to 0.115 kWh, or 0.32%, in PY17 and to 0.246 kWh, or 0.58%, in PY18. Savings could continue to increase if Ameren Missouri expands eHER reports to all HER customers.

Recommendation 3. Revise HER program savings targets and TRM savings in future program years. Ameren Missouri should continue to monitor HER program savings, especially with the addition of the web portal. It should update its savings targets and TRM savings according to PY16-PY18 results.

Conclusion 4. Renters had more commitment to energy conservation than home owners and more frequently said they had already done as much as possible.

Recommendation 4. Ameren Missouri should include actions and behaviors specific to renters in future HER reports to illuminate additional opportunities for energy savings for this part of the customer population.

Conclusion 5: Most customers identified the following barriers to saving energy: unwillingness to replace working equipment, lack of bill savings from prior energy improvements, and/or prioritization of home renovations not related to saving energy. Few customers were not interested in energy savings at all and many reported that energy-using equipment or appliances in their household were in need of repair.

Recommendation 5: Ameren Missouri should increase its cross-program marketing to educate customers about the benefits of equipment retrofits or upgrades via the HER program in the future.

Conclusion 6: Customers want to know the characteristics of similar homes included in the comparison. They wanted to know if the other homes used electric or gas for heating, if they included residents that were home all day or away during business hours, the number of residents in similar homes, and whether similar homes also supported the energy consumption of electric vehicles (EVs) or pools.

Recommendation 6: To the extent possible, Ameren Missouri should include additional detail in each customer's HER report about the homes included in its similar home comparison or add context about the type of information available.

PY17 Recommendation Tracking

Cadmus followed up on Ameren Missouri's response to the PY17 evaluation's recommendations, tracking recommendations that had and had not been implemented.

Table 5 presents these actions, as reported by Ameren Missouri.

Table 5. PY17 Recommendation Tracking

PY17 Recommendation	Recommendation Status	Ameren Missouri Explanation
Recommendation 1. Ameren Missouri should continue to deliver the HER reports every other month in PY18 to continue to increase savings. Recognizing that this recommendation has already been implemented, starting in January 2018, Cadmus recommends that Ameren Missouri proceed with its plan to deliver HER reports in March, May, July, September, and November in 2018 and in January 2019 to further increase savings.	Complete	Increased cadence to six reports in 2018
Recommendation 2. Launch an email channel to deliver HER reports in addition to the mailed version. Recognizing that the first emailed HER (eHER reports) reports were delivered in March 2018, Cadmus recommends Ameren Missouri continue to deliver HER reports via email to all Wave 1 and Wave 2 treatment customers as well as to a new wave of customers that will receive only eHER reports in PY18.	Complete	eHER channel launched in March 2018
Recommendation 3. Stop sending HER reports to customers with low usage. Recognizing that Ameren Missouri removed low-usage customers from the Wave 1 and Wave 2 treatment groups in March 2018, Cadmus recommends it follow through with its plan to stop sending HER reports to customers with low energy usage and to identify eligible customers as those with high usage for the PY18 HER reports backfill and PY18 eHER reports treatment group. Through limited benchmarking occurred in 2017, Cadmus identified that KCP&L targeted high users for one wave of customer participants in its program. Due to a robust RCT framework, this change and future analyses can omit customers in the lower quartiles to result in an unbiased savings estimate.	Complete	Backfilled with high users in Wave 3, March 2018
Recommendation 4. Revise HER program savings targets and TRM savings in future program years. Cadmus expects HER program savings to increase from the program total of 0.3% to between 0.4% and 0.5%, or between 0.15 to 0.22 kWh per customer per day in future HER program years, provided Ameren Missouri only targets high-usage customers and continues with plans to implement the email reports. Ameren Missouri should continue to monitor HER program savings, especially with the addition of the eHER delivery channel in PY18, and should update its savings targets and TRM savings according to PY16–PY18 results.	Complete	Updated TRM for next cycle of programs

Introduction

Ameren Missouri engaged Cadmus to perform annual process and impact evaluations of the Home Energy Report program (HER program) for a three-year period, from PY16 through PY18. This annual report covers impact and process evaluation findings for PY18: the period from March 1, 2018, through February 28, 2019, the final year of a three-year program cycle.

Program Description

The HER program sought to encourage customers, via mailed and emailed home energy reports (HER and eHER reports), to reduce their energy consumption through behavioral changes.

The program used a randomized control trial (RCT) experimental design that randomly assigned customers to a treatment group (i.e., recipients of HER reports) or a control group (i.e., non-recipients). The randomization process served to identify two equivalent groups that could be compared to estimate differences in energy use (following receipt of HER reports) resulting from the program's intervention.

The program implementer, ICF, and Ameren Missouri selected customers eligible for the program. ICF produced and distributed the HER reports to treatment group customers and took responsibility for forecasting and tracking savings.

Program Activity

As shown in Table 6, the HER program's population at the start of PY18 contained 434,956 treatment and control group customers within all waves. Mailed HER and eHER reports informed treatment group customers about their home energy consumption and encouraged them to adopt energy-saving home improvements and behaviors. The program sent its first HER report at the end of March 2018, followed by reports sent in May, July, September, and November 2018. The last report was sent at the end of January/beginning of February 2019.

Table 6. PY18 HER Program Activity

.	Measure	Delivery Frequency	PY18 Total Number of Customers
Wave 1	Treatment Group	Six paper HER reports Six eHER reports	195,573
	Control Group	–	65,191
Wave 2	Treatment Group	Six paper HER reports Six eHER reports	18,580
	Control Group	–	6,531
Wave 3	Treatment Group	Six paper HER reports Six eHER reports	83,930
	Control Group	–	22,685
Wave 3	Treatment Group	Six paper HER reports Six eHER reports	21,558
	Control Group	–	20,908
Total			434,956

Program Accomplishments

The HER program focuses on influencing energy consumption behaviors to reduce electricity use. Table 7 shows HER program achievements against PY18 program goals. During that period, annual savings targets were 33,750 MWh and 15.774 MW. The three-year cycle target was 101,250 MWh and 47.322 MW.[1]

Table 7. PY18 HER Program Goals and Achievements

Metric	PY18 Target	PY18 Verified*	Difference from Target
Participation	225,000	319,641	94,641
MWh Savings	33,750	26,376	-7,374
MW Savings	15.8	12.3	3.5

* PY18 *ex post* net savings adjusted for uplift.

[1] State of Missouri. "In the Matter of Union Electric Company d/b/a Ameren Missouri's 2nd Filing to Implement Regulatory Changes in Furtherance of Energy Efficiency as Allowed by MEEIA." File No. EO-2015-0055. February 5, 2016.

Evaluation Methodology

In evaluating Ameren Missouri's HER program, Cadmus designed the evaluation methodology to meet the objectives below. In addition, at the independent auditor's request, Cadmus conducted an additional task to verify that customers assigned to the HER treatment and control groups participated in other Ameren Missouri programs at equal rates and saved similar amounts of electricity prior to the start of their wave(s).

Impact Evaluation Objectives

- Estimate net energy savings
- Estimate the program's effect on participation in other Ameren Missouri programs
- Assess coincident peak net demand savings using Ameren Missouri's load shapes and estimation method

Process Evaluation Objectives

- Assess program design and implementation as well as opportunities for improvements
- Determine participants' readership of the HER reports
- Identify specific energy-saving improvements and actions taken by customers
- Evaluate customer satisfaction with the HER reports and with Ameren Missouri
- Track changes in key progress indicators
- Meet evaluation requirements of the Missouri Code[2]

Table 8 lists evaluation activities and briefly explains the purpose of each. A check mark indicates whether the activity took place as part of the process or impact evaluation. Additional details about each activity follow.

[2] State of Missouri. "Administrative Rules: Missouri Code of State Regulations." 4 CSR 240-22.070(8)(A) and (B). Revised May 2011. Available online: https://www.sos.mo.gov/cmsimages/adrules/csr/current/4csr/4c240-22.pdf

Table 8. PY18 HER Program Process and Impact Evaluation Activities and Rationale

Evaluation Activity	Process	Impact	Description
Program Material and Marketing Review	✓		Review program materials to understand the program's structure and implementation. The HER program does not include additional marketing materials apart from the HER reports themselves, which were reviewed as part of the program material review.
Benchmarking Research	✓		Compare evaluated savings to previously benchmarked savings from other similar programs.
Program Manager and Implementer Interviews	✓		Conduct interviews with the Ameren Missouri's HER program manager and implementer to gather insights into the program's design, challenges, and expectations.
Randomization and Equivalency Analysis		✓	Use randomization to assign customers to treatment and control groups. Verify that average energy consumption in the year preceding the program is equivalent in treatment and control groups. Verify that customer participation prior to HER program participation is equivalent in the treatment and control groups.
Customer Surveys	✓		Survey customers in the treatment group to collect data on perceptions about recent behavior changes, energy efficiency awareness, attitudes towards energy efficiency, customer satisfaction, and satisfaction with both the HER reports and Ameren Missouri.
Energy and Demand Savings Calculations		✓	Determine energy savings using regression analysis of monthly billing data.
Uplift Analysis		✓	Use uplift analysis to estimate the HER program's influence on participation in Ameren Missouri's other efficiency programs, based on program data for treatment and control group customers.
Key Progress Indicators	✓		Update the key progress indicators to track progress compared to PY16 and PY17.
Cost-Effectiveness Analysis		✓	Measure the program's cost-effectiveness using five standard perspectives: total resource cost, utility cost, societal cost test, participant cost test, and ratepayer impact test.

Program Material and Marketing Review

Cadmus reviewed program materials to better understand the program's structure and implementation. As noted, the HER program does not use additional marketing materials apart from the HER reports themselves.

Benchmarking Research

As part of the PY16 evaluation, Cadmus completed benchmarking research to compare the Ameren Missouri HER program with six behavior programs offered by other utilities. The evaluation team examined the HER reports' content and frequency, delivery channels, and participants' satisfaction with each program. In the PY17 evaluation, the team included two additional programs in the benchmarking review, both offered by utilities in similar climate regions as Ameren Missouri. In PY18, Cadmus compared PY18 evaluated savings with the previous benchmarking results.

Program Manager and Implementer Interviews

In March 2018, Cadmus interviewed Ameren Missouri's HER program stakeholders, designing the interviews to achieve the following:

- Gather information on program design and delivery
- Identify challenges that program staff or implementers have encountered
- Determine appropriate solutions

As shown in Table 9, Cadmus spoke with one program stakeholder from Ameren Missouri and one from ICF. Appendix C and Appendix D provide the full interview guides.

Table 9. PY18 HER Program Completed Stakeholder Interviews

Stakeholder Group	Interviews Conducted
Ameren Missouri Program Management	1
ICF Program Management	1
Total	**2**

Randomization and Equivalency Analysis

Ameren Missouri used a RCT study design and analysis to enable non-biased estimation of the HER program's impacts. In PY18, Ameren Missouri added two additional RCT waves: Wave 3 replaced customers from the PY16 (Wave 1) and PY17 (Wave 2) RCT with closed accounts that would not receive HER reports in PY18. Customers assigned to Wave 1, 2, or 3 treatment groups that also had email addresses received eHER reports in addition to mailed HER reports. A fourth wave was added in PY18, including customers that received eHER reports only (eHER Wave).

As in PY16 and PY17, Ameren Missouri and the implementer determined which customers were eligible for program participation. Additionally, in PY18, customers in Waves 1, 2, and 3 did not receive HER reports if they had energy consumption in the bottom two quartiles of annual energy use before participating in the HER program. All residential customers with email data in Ameren Missouri's database that had not previously been included in another wave were eligible for the eHER Wave.

For PY18, the Cadmus team randomly selected eligible customers and assigned them to the Wave 3 and eHER treatment and control groups. The team used Ameren Missouri customer and billing data for randomization. Only customers with 12 months of historic billing data were randomized, and, as in PY16 and PY17, the team removed solar customers. After randomizing customers into treatment and control groups, the team verified the equivalence of pre-program electricity consumption in the treatment and control groups and provided the randomized customer list to Ameren Missouri and ICF.

In PY18, at the request of the independent auditor, Cadmus conducted an additional equivalency analysis that compared rates that treatment and control customers participated in other Ameren Missouri energy efficiency programs prior to the start of the HER program and subsequent energy savings. Given the program's design as a randomized control trial, we did not expect significant

differences between these groups. Cadmus received program tracking data (2014 through 2018) from Ameren Missouri that included measures installed, installation dates, and program names. We conducted the analysis using the same methodology as for the pre-program energy usage equivalency analysis, which is based on cumulative savings and participation during each year prior to each HER wave beginning. For example, Wave 1 savings and participation were calculated based on program data starting in January 1, 2014 through August 1, 2016, when Wave 1 started receiving HER reports.

Customer Surveys

As shown in Table 10, Cadmus completed 287 online surveys in PY18. Appendix E provides the survey instrument.

Table 10. Survey Targets and Completes

Population	Survey Mode	PY18 Target Surveys	PY18 Completed Survey
Treatment Group Customers	Online	180	287

Cadmus asked customers a series of questions regarding familiarity with energy efficiency and with Ameren Missouri's other efficiency programs. Cadmus also asked customers about energy-saving improvements made, energy-saving actions taken, attitudes and barriers surrounding energy efficiency, satisfaction with Ameren Missouri, and satisfaction with the HER reports and their contents.

Cadmus summarized survey frequencies for PY18, as well as within each wave, and determined if significant differences exist between waves. We also compared rates of efficient installations, behaviors, and attitudes between different demographic groups to determine if trends varied by group and, if so, whether those trends could be used to enhance future implementation of the HER program.

Energy and Demand Savings Calculations

For each wave in PY18, Cadmus estimated cumulative electricity savings using a panel regression analysis of treatment and control customer energy consumption, collected from billing data. The full methodology and complete regression results are found in Appendix G. This analysis conformed to IPMVP Option C, whole facility methods,[3] and the approaches described in the Uniform Methods Project protocols.[4] Because the HER program had been established using an RCT experimental design,

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[3] Efficiency Valuation Organization. *International Performance Measurement and Verification Protocol, Concepts and Options for Determining Energy and Water* Savings, Volume 1. Page 25. (EVO 10000–1:2012). January 2012. Available online: http://www.evo-world.org/

[4] Agnew, Ken, and M. Goldberg. *Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures, Chapter 8: Whole-Building Retrofit with Consumption Data Analysis Evaluation Protocol*. U.S. Department of Energy, National Renewable Energy Laboratory. April 2013. (NREL/SR-7A30-53827). Available online: http://www1.eere.energy.gov/office_eere/de_ump_protocols.html.

regression analysis provided an unbiased savings estimate of net savings, rendering a separate net-to-gross (NTG) analysis unnecessary. These are the same methods Cadmus used to estimate savings in previous years.

Uplift Analysis

HER program savings estimates reflect behavioral changes due to customers receiving HERs and from other investments in energy-efficient products. Some customers invest in and install efficient products through other efficiency programs, from which they receive rebates from Ameren Missouri. In such cases, HER program savings and savings from other rebate programs are confounded. To disambiguate HER program-related savings from other programs' savings, Cadmus conducted an uplift analysis that compared cross-program participation among treatment group customers to participation among control group customers, and subtracted cross-program savings from the HER program's total savings. Cadmus reported total estimated savings and total HER savings net of uplift.

Key Progress Indicators

In PY16, Cadmus began tracking the following key progress indicators for the HER program across the three-year program cycle: program year electric savings, number of HER recipients, number of opt-outs, HER readership, uplift, and customer satisfaction with HER reports and with Ameren Missouri. In PY18, Cadmus reported on progress since PY16 and PY17.

Stewart, James, and A. Todd. *Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures, Chapter 17: Residential Behavior Protocol*. U.S. Department of Energy, National Renewable Energy Laboratory. August 2014. (NREL/SR-7A40-62497) Available online: http://www1.eere.energy.gov/office_eere/de_ump_protocols.html

Cost-Effectiveness Analysis

Using final PY18 HER program participation and implementation data as well as *ex post* gross and net savings estimates presented in this report, Cadmus and Apex Analytics determined the program's cost effectiveness using DSMore (a financial analysis tool designed to evaluate the costs, benefits, and risks of demand-side management [DSM] programs and services). As shown in the Cost-Effectiveness section, the Cadmus team assessed cost-effectiveness using all five standard perspectives produced by DSMore:

- Total Resource Cost
- Utility Cost Test
- Societal Cost Test
- Participant Cost Test
- Ratepayer Impact Test

Process Evaluation Findings

This section describes the PY18 process evaluation findings for Ameren Missouri's HER program.

Program Design

In PY18, Ameren Missouri implemented the HER program to inform customers about their home energy consumption and to encourage adoption of energy-saving home improvements and behaviors. The seasonally focused HER reports contained the information described in Table 11. Not all Ameren Missouri customers received HER reports. Rather, the program used an experimental RCT design to randomly assign customers to treatment or control groups. Although enrollment in the treatment group was automatic, customers could contact Ameren Missouri to opt out of receiving the HER reports.

Program Delivery

In PY18, the program sent a total of six HER and eHER reports each. Table 11 lists the report schedule and delivery dates in PY16, PY17, and PY18, along with details on each report's seasonal focus.

Table 11. PY16-PY18 HER Report Schedule

Program Year and Quarter	HER Report		
	HER Report	Delivery Month and Year	Seasonal Focus
PY16 Q1	-	-	-
PY16 Q2	HER 1	August 2016	Summer
PY16 Q3	HER 2	November 2016	Fall
PY16 Q4	HER 3	February 2017	Winter
PY17 Q1	HER 4	May 2017	Spring
PY17 Q2	HER 5	July 2017	Summer
	HER 6	August 2017	Late Summer
PY17 Q3	HER 7	November 2017	Fall
PY17 Q4	HER 8	January 2018	Winter
PY18 Q1	HER 9/eHER 1	March/ April 2018	Spring
	HER 10/eHER 2	May/ June 2018	Summer
PY18 Q2	HER 11/eHER 3	July 2018	Summer
	HER 12/eHER 4	September 2018	Fall
PY18 Q3	HER 13/eHER 5	November 2018	Winter
PY18 Q4	HER 14/eHER 6	January/February 2019	Spring

Table 12 describes RCT waves in PY16 through PY18. In PY18, customers with energy consumption below the median pre-program energy consumption were removed the Wave 1 and 2 treatment and control groups. Customers with higher pre-program energy consumption were assigned to the Wave 3 treatment group in PY18. All customers in the Wave 3, and those remaining in the Wave 1 and 2 treatment groups, received mailed HER reports; customers in the treatment group with email addresses

received emailed eHER reports in addition to mailed HER reports. Customers assigned to the eHER wave only received eHER reports in PY18.

Table 12. Customer Waves in PY16–PY18

Program Year	Wave	Group Description
PY16	1	Residential customers were randomly selected from the customer population and assigned to treatment and control groups. Customers with energy consumption below the median pre-program energy consumption were removed from the treatment and control groups in PY18. All customers remaining in the treatment group received mailed HER reports; customers in the treatment group with email addresses received emailed eHER reports in addition to mailed HER reports.
PY17	2	Residential customers were randomly selected from the customer population and assigned to treatment and control groups to replace customers with closed accounts in PY16 and accounts anticipated to close in PY17. Customers with energy consumption below the median pre-program energy consumption were removed from the treatment and control groups in PY18. All customers remaining in the treatment group received mailed HER reports; customers in the treatment group with email addresses received emailed eHER reports in addition to mailed HER reports.
PY18	3	Residential customers in the customer population with energy consumption above the median pre-program energy consumption were randomly selected and assigned to treatment and control groups to replace customers with closed accounts in PY17 and those anticipated to close in PY18. All customers in the treatment group received mailed HER reports; customers in the treatment group with email addresses received emailed eHER reports in addition to mailed HER reports.
	eHER	Residential customers with email addresses who had not previously been assigned to Wave 1 or Wave 2 treatment or control groups were randomly selected and assigned to the eHER Wave treatment or control group. Customers in the treatment group received emailed eHER reports only.

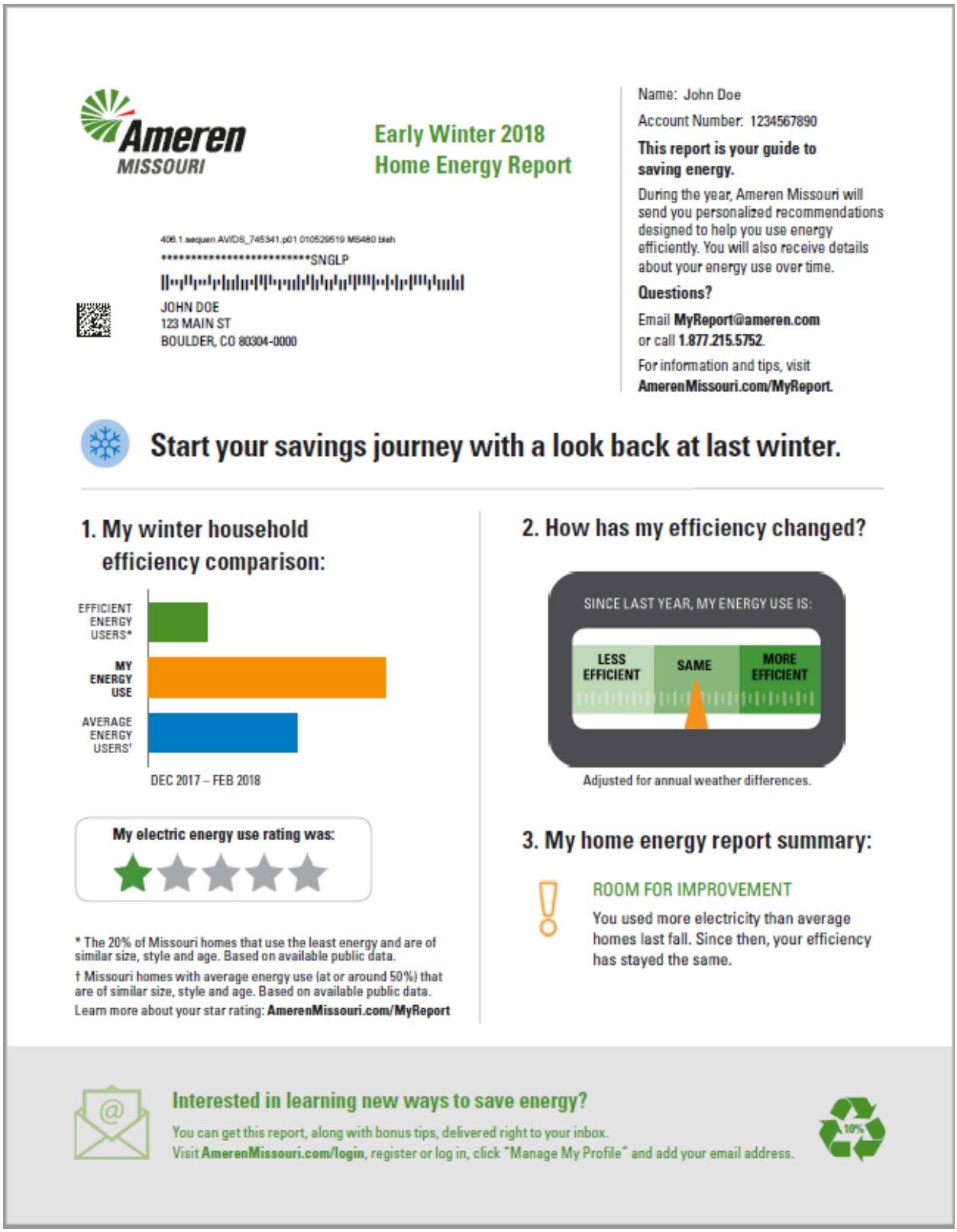
PY18 HER Report Design

Throughout PY17, Ameren Missouri and ICF made substantial updates, which were incorporated into the PY18 HER reports. These additional updates included the following:

- Added content to the bottom of the first page, alternating between:
  - Link to newly created webpage that offered interactive videos and tips to provide more ways for customers to learn how to implement recommendations in the HER reports
  - Fun facts or short tips (social proof component)
- Added content to the top of the second page, alternating, depending on the season:
  - Data-driven module in summer and winter HER reports to disaggregate heating and cooling energy and normative comparisons to other homes
  - Myth busters and expanded behavioral tips
- Replaced savings percentages in some tips to reflect dollar amounts

Figure 2 shows the layout of PY18 HER and eHER reports with a winter seasonal focus.

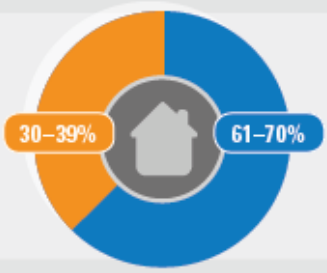
Figure 2. PY2018 HER and eHER Report Layout



Get ready for winter by learning about your energy use.

This estimate is based on an analysis of your home's electric energy use and local environmental factors over the last 24 months. Reduce your winter heating costs with the tips below, and find more at **AmerenMissouri.com/WaysToSave.**

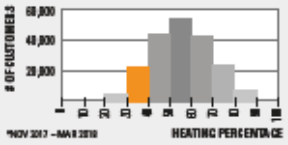
YOUR HEATING USE



USE OF LIGHTING, APPLIANCES, REFRIGERATION & ELECTRONICS

YOUR HEATING USE AND HOW IT COMPARES WITH OTHERS

See how your heating percentage compared to other Ameren Missouri customers last winter.*



Energy-saving tips for your home this winter:

ANNUAL SAVINGS:

UP TO **$120** OF HEATING COSTS

Program your thermostat to heat a little less this winter.

HOW TO – For each degree you lower the heat setting, you'll save 1–3% on your home's total energy use.

ANNUAL SAVINGS:

UP TO **$65** OF HEATING COSTS

Set ceiling fans to turn clockwise to push warm air down.

HOW TO – Locate your fan's direction switch, change to reverse/clockwise and reduce your thermostat temperature to save energy.

ANNUAL SAVINGS:

UP TO **10%** OF HEATING & COOLING COSTS

Seal air leaks on windows and doors with weatherstripping.

BONUS BENEFITS – Reduce uncomfortable drafts on windy winter days and improve home value for resale.

- More tips: **AmerenMissouri.com/WaysToSave**
- FAQs: **AmerenMissouri.com/MyReport**
- Email: **MyReport@ameren.com**
- Call: **1.877.215.5752**

ASK ABOUT ENERGY STAR

Successes and Program Achievements

Stakeholders reported that the following program aspects worked particularly well in PY18:

- **Open rate for emailed eHER reports met or exceeded ICF's expectations.** The implementer reported that the eHER reports' open rate started at around 40% and dropped to 35% at the end of PY18.
- **Customer engagements.** The implementer reported that the interactive tips webpage resulted in customer engagement that met ICF's expectations, based on the number of clicks and time that customers spent with the webpage.
- **Low Attrition.** Reported opt-out rates were again very low in PY18 (59 HER and 343 eHER customers).
- **Energy savings.** Savings continued to trend upward in PY18, compared to PY16 and PY17.

Program Implementation Challenges

Program stakeholders identified the following, remaining challenges for the HER program:

- **Personalization.** Customer survey feedback indicated that 28% (n=40) of customers believed Ameren Missouri did not recognize significant events in their households and did not know or account for significant sources of energy consumption in their home. For example, some customers indicated that recent electric vehicle purchases caused increased electricity consumption and wished the HER reports reflected this.
- **Enhancing digital customer experience.** Ameren Missouri and the implementer recognized that providing better digital platforms where customers could connect the information in the HER reports to their customer accounts, enter information about efficient equipment purchases, and track behavior is a future priority for the HER program.

PY19 HER Planning

As part of the PY18 interviews, Cadmus learned about HER program planning currently underway. Ameren Missouri is working with a new implementer to deliver a substantially different HER program to customers in PY19. This will include the following:

- **Online HER portal** that offers an enhanced digital experience to customers
- **Increased personalization** via data-driven algorithms that provide additional disaggregation of energy use
- **Real-time customer specific comparisons** based on energy consumption in prior months versus prior years
- **Updated cadence** based on customers' responsiveness to seasonal alerts
- **Expanding delivery channels** so that all treatment group customers receive both mailed HER and emailed eHER reports, removing the stand-alone eHER wave

Process Evaluation

Cadmus surveyed customers in all four waves in PY18. Cadmus used two-sided t-tests to make the following comparisons.

- **Delivery mechanism comparison:** We compared responses between customers that received emailed eHER reports only (eHER Wave) and customers that received mailed HER reports with or without emailed eHER reports (Waves 1, 2, and 3).
- **Comparison over time:** Cadmus compared PY18 responses with PY17 responses.
- **Demographic comparison:** Cadmus compared rates of efficient installations, behaviors, and attitudes between different demographic groups to determine if results varied by group.

In this section, we report results corresponding to significant differences that were greater than 5% and were significant at 90% confidence (p-value ≤ 0.10) but provide results for all questions in Appendix F.

Customer Experience

Cadmus asked treatment group customers about their awareness of Ameren Missouri programs, satisfaction with the utility, and their use of bill statement options.

Awareness of Ameren Missouri Programs

There were no significant differences between the eHER wave and the other waves, or between PY17 and PY18 regarding awareness of Ameren Missouri programs.

Satisfaction with Ameren Missouri

Cadmus found that, similar to PY16 (95%, n=435) and PY17 (90%, n=229), the majority of treatment group customers were very or somewhat satisfied with Ameren Missouri in PY18 (95% , n=197). All eHER Wave respondents indicated they were very or somewhat satisfied (n=75), while 91% of Wave 1, 2, and 3 (n=127) customers did.

Utility Bill Statement Access

Cadmus asked customers how often they checked their utility bill statements via mail, email, or text message. There were a number of significant differences:

- Mailed utility bill statements
  - As in PY17, in PY18 the majority of customers checked statements sent by mail (65%, n=193).
  - More Wave 1, 2, and 3 customers (77%, n=122) checked mailed statements than Wave eHER customers (68%, n=71).
  - More older respondents aged 35 and over (67%, n=154) checked mailed statements than younger respondents (54%, n=26).
- Emailed utility bill statements

  - Fewer customers overall checked emailed statements in PY18 (55%, n=193) compared to PY17 (70%, n=174).
- Text message utility bill statements
  - More respondents with middle income between $75,000 and $150,000 (31%, n=55) checked text message statements, compared with respondents with income less than $75,000 (15%, n=53) or higher than $150,000 (4%, n=23).

Attitudes Toward Energy Efficiency

Cadmus asked treatment group customers about their attitudes toward energy efficiency. Table 13 shows the comparisons between PY17 and PY18 and between eHER and the other waves. In general, there were decreases in the importance of energy conservation and in awareness in PY17 compared to PY18. Customers in the eHER Wave placed higher importance on energy conservation but had lower awareness of opportunities.

Table 13. Attitudes Toward Efficiency

Statement	Comparisons Over Time			Delivery Channel Comparisons		
	Difference	PY17	PY18	Difference	Waves 1, 2, 3	eHER
Importance of Energy Conservation						
It is important to conserve energy as much as possible	6%	97% (n=239)	91% (n=202)	8%	88% (n=127)	96% (n=75)
I am committed to actions that help the environment	6%	95% (n=231)	89% (n=202)	9%	73% (n=127)	83% (n=75)
Using energy to keep the home comfortable is my top priority	*	*	*	9%	73% (n=127)	83% (n=75)
Awareness of Opportunities for Energy Savings						
I would like to save more energy but do not know where to start	11%	48% (n=223)	37% (n=202)	*	*	*
I have already done as much as possible to save energy in my home	8%	68% (n=231)	59% (n=202)	*	*	*
Energy-efficient products are too expensive	8%	67% (n=231)	59% (n=202)	9%	60% (n=127)	51% (n=75)

* Non-significant difference.

Table 14 shows comparisons between demographic groups. In general, renters had more commitment to energy conservation but also felt they had already done as much as possible, indicating that the HER program could focus on potential renter actions and behaviors in future HER reports. Rates with which customers felt they had done as much as possible increased with respondent ages, and rates with which respondent felt energy efficient products are too expensive decreased with income.

Table 14. Attitudes Toward Efficiency—Demographic Comparisons

Statement	Own or Rent		Respondent Age			Income		
	Own	Rent	<35	35-64	65+	<$75,000	$75,000-$150,000	>$150,000
Importance of Energy Conservation								
I am committed to actions that help the environment	88% (n=176)	100% (n=14)	*	*	*	*	*	*
Awareness of Opportunities for Energy Savings								
I have already done as much as possible to save energy in my home	59% (n=176)	79% (n=14)	42% (n=26)	55% (n=110)	75% (n=44)	*	*	*
Energy-efficient products are too expensive	*	*	*	*	*	60% (n=53)	56% (n=55)	26% (n=23)

* Non-significant difference.

In PY18, Cadmus asked additional questions to collect information on potential barriers to energy-saving. The results indicated that most customers identified the following barriers: unwillingness to replace working equipment, lack of bill savings from prior energy improvements, and/or prioritization of home renovations not related to saving energy. Few customers were not interested in energy savings at all, and many reported that energy-using equipment or appliances in their household were in need of repair.

Table 15. Other Potential Barriers to Energy Savings (n=202)

Statement	Percentage
I am not willing to replace things that are working just fine	72%
I have tried a few things to save energy but have not seen any real savings on my utility bills	62%
My highest-priority home renovations are not related to saving energy	54%
Health or comfort issues in my household require higher energy use	49%
I have an older, leaky, or non-efficient home	42%
I cannot control energy use by other household members	40%
I need energy for a home business or hobby in my household	38%
Energy-using equipment or appliances in my household are in need of repair	19%
I am not interested in energy savings	13%
There are no challenges to saving energy in my home	30%

Participant Experience

Cadmus asked treatment group customers about HER program satisfaction, HER report readership, and HER report content.

HER Program Satisfaction

Similar to PY17, customer satisfaction with HER reports was high in PY18, with 91% strongly or somewhat agreeing that they were satisfied with the HER reports (n=197).

In PY18, Cadmus asked customers to provide suggestions for improving the HER reports. The most frequent suggestion was to clarify the characteristics of homes that are included in the similar home comparison. Some examples of what customers suggested include:

- Make it clear if the similar homes in the comparison include electric versus gas heating
- Make a distinction between residents that are home all day versus out during business hours
- Make it clear how many residents are represented in the comparison homes
- Account for the presence of EV(s), pools, etc. in the comparison homes

Other frequent suggestions included offering more or better discounts or rebates, removing the paper mail option to decrease costs, and to describe how weather is factored into the comparisons and ratings. Table 17 provides the frequency of all responses.

Table 16. Recommendations for Improving the HER Reports (n=40)

Recommendation	Frequency*	Percentage*
Clarify characteristics of similar homes in comparison	11	28%
Offer (more or better) discounts or rebates	6	15%
Remove paper/mail option	4	10%
Describe how weather is factored into the ratings	3	8%
Add an online portal	2	5%
Decrease costs/taxes	2	5%
Disaggregate energy usage into end-uses and/or time of day	2	5%
Easier or cheaper tips (e.g. DIY)	2	5%
Love customer specific comparison	2	5%
Include more tips	2	5%
Update the HER report to account for upgrades I have made	2	5%
Use more (recent) data for customer specific comparison	2	5%
Improve Ameren Missouri infrastructure	1	3%
Include detailed energy usage	1	3%
Increase HER report accuracy	1	3%
Peak pricing messaging	1	3%
Project future costs	1	3%
Recommend contractors for upgrades	1	3%
Include energy usage data in HER report	1	3%

* Multiple responses allowed.

Readership of HER Reports

In PY18, customers responded with similarly high rates of agreement as in PY17 to the following statements:

- The HER reports are useful
- The HER reports are easy to understand
- HER reports get others in their households involved in saving energy

In PY18, readership decreased slightly, from 80% in PY17 (n=249) to 72% in PY18 (n=287) of customers reading some or all of the HER report. There were no differences between the eHER Wave and Wave 1, 2, and 3.

Influence of HER reports

Cadmus asked customers to indicate the importance of HER reports in prompting them to make energy-saving improvements. The results were similar in PY18 (92%, n=37) as in PY17 and for Wave eHER and Waves 1, 2, and 3.

Customers that indicated the HER reports were not important provided information about why. As summarized in Table 17, the most frequent responses cited costs of implementing the tips and the perception that the HER report was not providing tips specific to their homes.

These results are similar to previous years and suggest that Ameren Missouri should collect data from customers on equipment and home specifications, as well as previous energy efficiency actions, and incorporate them into the HER report comparisons and tips.

Table 17. Reasons the HER Reports Were not Important to Making Energy-Saving Improvements

Response	Percentage (n=46)
Costs (e.g., cannot afford to make changes suggested in HER reports)	26%
HER report is not specific to home	24%
Do not believe the report is accurate/do not see value in the suggestions	17%
Comfort is a higher priority	13%
Have not had the opportunity to complete the suggestions	7%
New to home/moving soon	7%
Believe my household is pretty efficient as it is	4%
I do not have control over the suggested actions or others in my home	4%
I will not replace equipment that is working just fine	2%
Inconvenient	2%
Suggestions did not seem feasible	2%

Personalized Tips

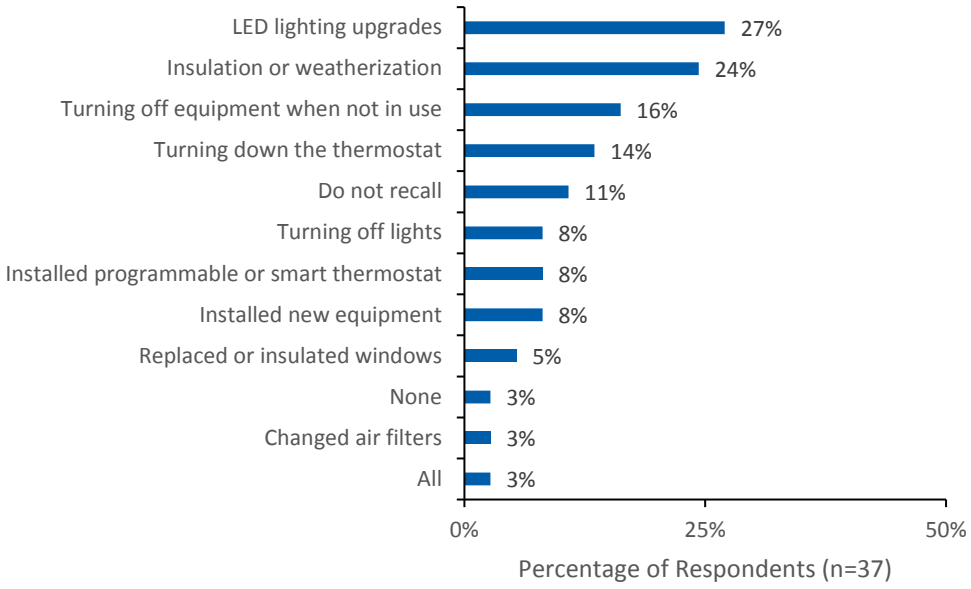
In PY18, tip recall and applicability increased compared to PY17, although there was no change in the number of respondents who completed the personalized tips.

- **Recalled personalized recommendations (tips):** 59% (n=226) in PY18 and 53% (n=218) in PY17
- **Tips made sense for their household:** 84% (n=131) in PY18 compared to 75% (n=148) in PY17
- **Tips were easy for their households to complete:** 78% (n=131) in PY18 compared to 72% (n=143) in PY17
- **Tips provided sufficient information to take action:** 85% (n=131) in PY18 compared to 76% (n=141) in PY17

There were no significant differences in these responses between Wave eHER and Waves 1, 2, and 3, although significantly fewer eHER respondents (24%, n=37) reported completing any of the tips, compared to Waves 1, 2, and 3 (47%, n=62).

In PY18, Cadmus asked customers to indicate which tips they completed. As shown in Figure 4, customers most frequently completed LED lighting upgrades, installing insulation or improving weatherization, turning off equipment when not in use, and turning down the thermostat.

Figure 3. Personalized Tips Completed



Participant Survey: C15. "Which of the personalized tips did you complete? LED lighting (n=10), Insulation or weatherization (n=9), turning off equipment when not in use (n=6), turning down the thermostat (n=5), turning off lights (n=3), programmable or smart thermostat (n=3), installed new equipment (n=3), windows (n=2), changed air filters (n=1), all (n=1), none (n=1). Multiple responses allowed.

Energy Saving Improvements and Behaviors

Overall, fewer customers made energy-saving improvements in PY18 than in PY17, as shown in Table 18. These results indicate that the HER program has not increased the rate at which customers made energy-saving improvements over time. However, as described below, customers are changing their behaviors more than in PY17. More home owners than renters reported having completed a subset of the improvements, indicated in the table. There were no significant differences between customers of different ages or income levels. Results were similar for Wave eHER and Waves 1, 2, and 3.

Table 18. Energy Saving Improvements

Energy Saving Improvement	Difference	PY17	PY18	Owners	Renters
Installed a water/energy-saving showerhead, faucet head or aerator	↓14%	30% (n=233)	16% (n=218)	20% (n=151)	0% (n=11)
Installed a programmable or smart thermostat	↓11%	33% (n=235)	22% (n=218)	27% (n=151)	0% (n=11)
Purchased and installed LEDs	↓7%	81% (n=237)	74% (n=218)	39% (n=151)	18% (n=11)
Added caulking, spray foam, weather stripping, or plastic sheeting	↓6%*	38% (n=233)	32% (n=218)	**	**
Installed extra insulation to ceiling, ducts, walls, attic or basement	↓6%*	20% (n=234)	14% (n=218)	19% (n=151)	0% (n=11)
Purchased and installed ENERGY STAR or high-efficiency appliances	↓4%*	36% (n=230)	32% (n=218)	**	**
Purchased and installed new heating or cooling equipment	↓3% *	21% (n=236)	18% (n=218)	**	**
Installed high-efficiency doors or windows	↓2%*	19% (n=233)	17% (n=218)	**	**

* Difference between PY17 and PY18 is not significant at 90% confidence.
** Difference between owners and renters is not significant at 90% confidence.

Cadmus asked customers if they completed a number of energy-saving behaviors in PY18. More customers responded that they always completed many of the behaviors (rather than sometimes or never) in PY18 compared to PY17, as shown in Table 19. Washing laundry in cold water and taking shorter showers had the largest increases.

Table 19. Significant Changes in Energy Saving Behaviors

Behavior	Difference	PY17	PY18
Washing laundry in cold water	↑25%	35% (n=235)	60% (n=216)
Taking shorter showers	↑16%	20% (n=235)	36% (n=213)
Unplugging electronic equipment or appliances when not in use	↑9%	19% (n=234)	28% (n=216)
Turning down your water heater temperature	↑9%	18% (n=218)	27% (n=210)
Adjusting thermostat settings when leaving or sleeping	↑8%	63% (n=236)	71% (n=215)
Turning off lights in rooms that are unoccupied	↑7%	83% (n=241)	91% (n=217)
Replacing air filters for your air conditioners and heating system	↓1%*	82% (n=237)	77% (n=214)
Using energy savings or “sleep” features of your computer	↓1%*	68% (n=221)	67% (n=207)

*Difference is not significant at 90% confidence.

There were no significant differences between owner and renter responses, but we observed the following differences depending on age and income level.

- Younger respondents tended to wash clothes in cold water and adjusted their thermostat settings more than older respondents
  - 100% of respondents under 35 (n=26) reported always or sometimes washing clothes in cold water compared to 88% age 35-64 (n=110) and 86% 65 and older (n=44)
  - 85% of respondents under 35 (n=26) and 94% of respondent 35-64 (n=110) always kept their thermostat settings lowered when leaving or sleeping, compared to 78% of respondents 65 and over (n=44)
- Older respondents tended to lower their water heater temperature compared with younger respondents
  - 36% of respondents 65 and over (n=44) always lowered their water heater temperature, compared to 4% of respondents under 35 (n=26) and 28% of respondents 35-64 (n=110)
- Fewer respondents with higher incomes set their water heater temperature lower than those with lower incomes
  - 26% of respondents with income greater than $150,000 (n=23) lowered their water heater temperature compared to 45% of respondents $75,000-$150,000 (n=55) or 49% of respondents less than $75,000 (n=53)

In PY18, Cadmus asked customers follow-up questions about the biggest challenges they faced in completing the energy-saving behavior tips. As shown in Table 20, the top challenges included concerns about comfort, convenience, safety or health concerns, and not having control of other people's behaviors.

Table 20. Challenges to Energy-Saving Behaviors

What is the biggest challenge to…	Most Frequent Response
Replacing air filters for your air conditioners and heating system?	I don't have control over this (100%, n=3)
Turning off lights in rooms that are unoccupied?	I don't have control over this (100%, n=1)
Washing laundry in cold water?	I have safety or health concerns (72%, n=25)
Unplugging electronic equipment or appliances when not in use?	It is too inconvenient (70%, n=73)
Adjusting thermostat settings when leaving or sleeping?	I am concerned about comfort (40%, n=20) It is too inconvenient (35%, n=20)
Taking shorter showers?	I am concerned about comfort (45%, n=55)
Turning down your water heater temperature?	I am concerned about comfort (35%, n=99)
Using energy savings or "sleep" features of your computer?	It is too inconvenient (46%, n=35)

Similar Home Comparison

Cadmus asked customers about the similar home comparison in the HER reports. In PY18, customer recall and confidence in the comparison decreased compared to PY17. Wave eHER and Waves 1, 2, and 3 responded similarly.

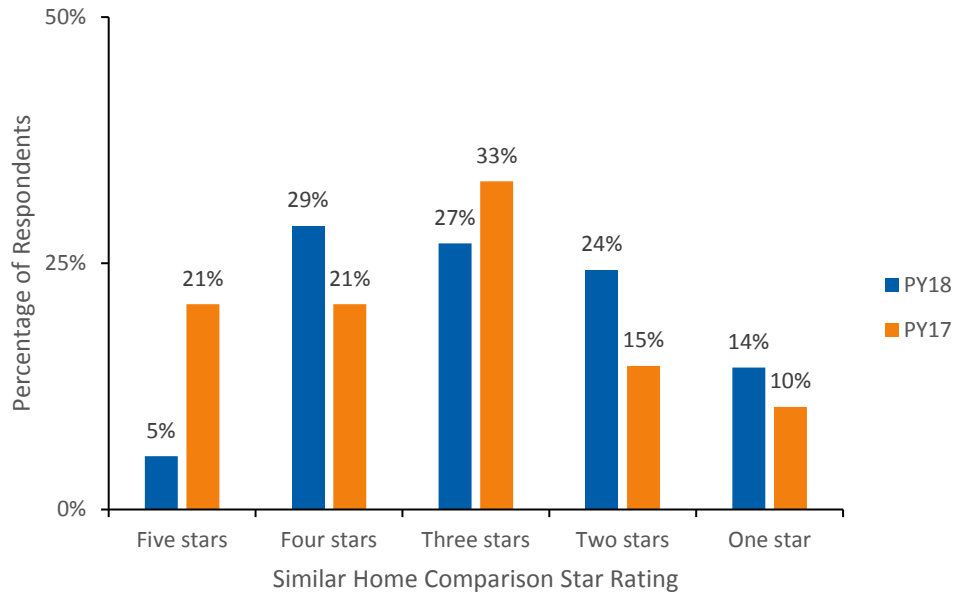
- 84% in PY18 (n=247) remembered the similar home comparison, compared to 92% in PY17 (n=238)
- 71% in PY18 (n=203) agreed that the comparison was accurate, compared to 76% in PY17 (n=184)

As shown in Figure 4, the distribution of star ratings decreased in PY18 compared to PY17

- In PY18, 61% (n=111) received three or more stars, compared with 75% in PY17 (n=48)
- Wave 1, 2, and 3 ratings were similar to PY18 scores, with 55% (n=71) receiving three or more stars. Wave eHER ratings were more similar to PY17, with 73% (n=40) receiving those ratings

Similar to PY17, majority of customers in all waves found the rating helpful in PY18.

Figure 4. Similar Home Comparison Star Rating



Participant Survey: C3. "Below the similar home comparison, the newest Home Energy Report includes an energy use rating of between one and five stars that show how your energy use rates, compared to average (1 star = much more than average, 2 stars = more than average, 3 stars = average, 4 stars = less than average, and 5 stars= much less than average). What rating did you receive?" (n=111) One star (n=16), two stars (n=27), three stars (n=30), four stars (n=32), five stars (n=6).

Customer Specific Tracker

Cadmus asked customers about the customer specific tracker that compared their recent energy use to their energy use last year. Fewer customers remembered the customer specific tracker in PY18 (86%,

n=241) compared to PY17 (92%, n=232). Customers agreed that their energy use differed from what they expected, believed the comparison was accurate, and thought it was helpful in PY18, similar to PY17.

More Wave eHER customers tended to agree that the customer specific comparison was accurate (95%, n=78) compared to Waves 1, 2, and 3 (85%, n=125).

Home Health Checklist

Cadmus asked customers about the home health checklist. The majority of customers recalled it and agreed that the recommendations made sense for their household, were easy for their household to do, and included sufficient information to take action. However, less than a third of customers completed any home health recommendations in PY18, similar to PY17. There were no differences between Wave eHER and Waves 1, 2, and 3.

Key Progress Indicators

Cadmus tracked the following key progress indicators for the HER program across the three-year program cycle:

- Program year electric savings
- Number of HER report recipients
- Number of opt-outs
- Readership
- Uplift of Ameren Missouri programs
- Recipient satisfaction with HER reports and with Ameren Missouri

Table 21 shows the baseline key metrics.

Table 21. PY16-PY18 HER Program Key Progress Indicators

Key Metric	PY16	PY17	PY18
Electric savings	220.5 MWh/month	754.5 MWh/month	2,231.1 MWh/month
Number of HER report recipients	225,000	231,509	319,641
Number verified HER report recipients	215,278	230,962	319,641
Number of opt-outs*	9	47	59 mailed HER 343 eHER
HER reports readership	89% (n=461)	90% (n=249)**	72% (n=287)***
Awareness of energy efficiency programs	48% (n=465)	57% (n=219)	52% (n=216)
Uplift programs	Efficient Products Heating and Cooling Multifamily Low Income	Efficient Products Heating and Cooling Multifamily Low Income	Efficient Products Heating and Cooling Multifamily Low Income
Agreement with following statement "Overall, I am satisfied with the Home Energy Reports."	95% agree (n=435)	91% (n=232)	90% (n=197)
Satisfaction with Ameren Missouri	95% (n=453)	90% (n=243)	95% (n=202)

* At the time of the stakeholder interviews.

** Indicates a significant difference in PY17 compared to PY16 at 90% confidence.

*** Indicates a significant difference in PY18 compared to PY17 at 90% confidence.

Net Impact Evaluation Results

Cadmus assessed the HER program's electric energy savings and demand reduction through the following activities:

- Database review
- Equivalency analysis
- *Ex post* savings estimation using a billing analysis
- Demand reduction estimation using a load-shape coincidence factor
- Uplift analysis
- Realization rate estimation to compare *ex post* to *ex ante* savings

Cadmus performed the impact evaluation to estimate HER program cumulative savings over the course of its implementation. The team used the SAS macro developed in PY16 to process customer and billing data, estimate regression models, and evaluate savings for the program to date. This section provides details on savings over time and customer-specific results.

Total Ex Ante Savings

Per Attachment A of the 2018 Ameren Missouri TRM Appendix, the HER program's total *ex ante,* per-household, annual electric savings and demand reduction were 150 kWh and 0.07 kW, respectively,[5] as shown in Table 22.

Table 22. Behavior Measures for MEEIA Cycle 2016–2018*

Measure Reference No.	Start Date	End Date	Incremental Cost	Cost Unit	Gross Annual Demand Reduction (kW)	Gross Annual Electric Savings (kWh)	Savings Unit	Measure Life
1223	1/1/16	-	0	Per Home	0.0669	150	Per Home	1

*2018 Ameren Missouri TRM Appendix: Attachment A. Cadmus used average daily savings of 0.41095890 kWh per day per customer to calculate *ex ante* savings.

To calculate total *ex ante* savings for the program in PY18, Cadmus multiplied TRM total annual savings (150 kWh per customer) by the number of customers in the Wave 1 and Wave 2 treatment groups, and multiplied an adjusted TRM value by the number of Wave 3 and eHER Wave treatment customers. Cadmus adjusted the TRM value for Wave 3 and eHER because both waves received their first HER reports at the end of March or beginning of April 2018 (i.e., receiving treatment for 11 months rather than a full year). Table 23 provides the results of these calculations.

[5] Measure reference number 1223, start date January 1, 2016. Gross annual demand reduction listed in the TRM spreadsheet was 0.0669 kW per home.

Table 23. PY18 HER Program *Ex Ante* Savings

Wave	*Ex Ante* Number Treatment *Days*	*Ex Ante* Participation	*Ex Ante* TRM Energy Savings per Customer (kWh/year)	*Ex Ante* TRM Energy Savings Total (MWh/year)	*Ex Ante* TRM Demand Savings per Customer (kW/year)	*Ex Ante* TRM Demand Savings Total (kW/year)
Wave 1	365	195,573	150	29,336	0.0699	13,673
Wave 2	365	18,580	150	2,787	0.0699	1,299
Wave 3*	334	83,930	137	11,520	0.0640	5,369
Wave eHER*	334	21,558	137	2,959	0.0640	1,379
Total	**-**	**319,641**	**-**	**46,602**	**-**	**21,720**

* Wave 3 and eHER *ex ante* calculations account for these treatment groups receiving their first HER reports at the end of March/beginning of April 2018 (i.e., receiving treatment for 11 months rather than the full program year).

Database Review

Program data for the HER program evaluation consisted of customer and billing data, including the following variables relevant to the evaluation:

- Customer data: customer account numbers, premise numbers, premise zip codes
- Billing data: customer account numbers, premise numbers, monthly usage, read dates, and days in period

ICF provided data sets that Cadmus used to randomize customers into treatment and control groups. Out of 328,134 customers originally randomized in Wave 1 and 2, approximately 4% were missing from the customer and billing data used in this analysis. Data for all originally randomized Wave 3 and eHER customers were present.

Equivalency

As in PY17, Cadmus verified the integrity of the program's experimental design in PY18 by conducting an equivalency analysis for each wave. We compared average, pre-program daily energy consumption between treatment and control group customers to ensure that groups were balanced, using a t-test for the difference in means. In the analysis, all p-values were greater than 0.10, indicating the groups were well balanced and adequately randomized.

In PY18, Cadmus conducted an additional equivalency analysis that compared the rates at which treatment and control customers participated in other Ameren Missouri programs prior to the start of their HER wave. Table 24 shows participation rates, differences, t-statistics for differences in means, and p-values. The p-value for each wave is greater than 0.10, indicating treatment and control groups were well balanced with respect to participation in other Ameren Missouri energy efficiency programs.

Table 24. Pre-HER Program Participation Equivalency

Wave	Participation Rates Prior to HER Program		Difference	t-Statistic	P-value
	Treatment	Control			
Wave 1	10.7%	10.7%	-0.1%	-0.38	0.70
Wave 2	10.5%	10.9%	-0.5%	-1.11	0.27
Wave 3	15.4%	15.4%	0.0%	0.08	0.94
Wave eHER	13.9%	13.5%	0.4%	1.24	0.22

Table 25 shows the average annual pre-program savings for customers in each wave, differences between treatment and control group savings, t-statistics for the differences in means, and p-values. All of the p-values are greater than 0.10, indicating the treatment and control groups were well balanced with respect to pre-program energy savings from other Ameren Missouri programs.

Table 25. Pre-HER Program Savings Equivalency

Wave	Average Annual Savings (kWh) per Customer Prior to HER Program		Difference	t-Statistic	P-value
	Treatment	Control			
Wave 1	55.4	55.1	0.3	0.23	0.82
Wave 2	62.6	68.2	-5.7	-1.08	0.28
Wave 3	155.3	154.1	1.2	0.20	0.84
Wave eHER	112.7	107.0	5.7	0.89	0.37

Energy Savings Estimation

Cadmus estimated savings for all waves in PY18 to provide an estimate of program total savings to-date. We estimated *ex post* energy savings using a panel regression analysis of monthly billing data from customers in the treatment and control groups. This section presents findings from the analysis.[6]

Cadmus estimated that Ameren Missouri's HER program saved a total of 26,773 MWh[7] during PY18, which represents a 56% realization rate. Average daily kWh and percent savings were estimated for each wave as follows:

- Wave 1 saved 0.28 or 0.71% kWh/day
- Wave 2 saved 0.17 or 0.43% kWh/day
- Wave 3 saved 0.22 or 0.43% kWh/day
- Wave eHER saved 0.09 or 0.19% kWh/day

[6] The HER program was established as an experimental design, utilizing a control group in the regression; thus, the savings estimate was considered "net." Therefore, separate NTG estimation was unnecessary.

[7] The gross savings was estimated with 19% precision at 90% confidence.

Wave 1 and Wave 3 savings estimates were significant at a 90% confidence level. All waves combined saved on average 0.25 kWh, or 0.58%, per day in PY18.

Cadmus estimated total program savings by multiplying average daily savings per customer by the total number of treatment days in the treatment period to estimate the cumulative total savings-to-date. The results differed, depending on whether we included all customers originally assigned to Wave 1 and 2 treatment groups in the analysis, or subset to include only customers that received HER reports. The HER program has saved a total of 31,274 MWh since the start of the program in August 2016 when all customers are included in the analysis. The cumulative total is 24,759 MWh when only those customers who received reports in PY18 are included. Figure 5 and Figure 6 show the cumulative savings since the first HER reports were sent—program total savings have been steadily increasing over time.

Figure 5. HER Program Cumulative Savings (All Customers)

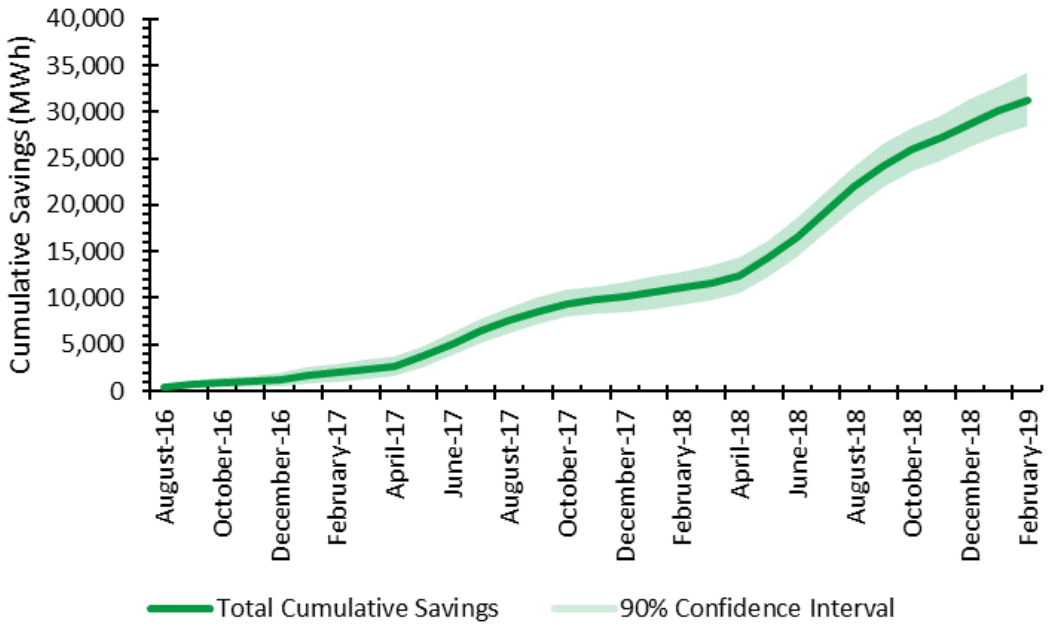


Figure 6. HER Program Cumulative Savings (Received PY18 HER Reports)

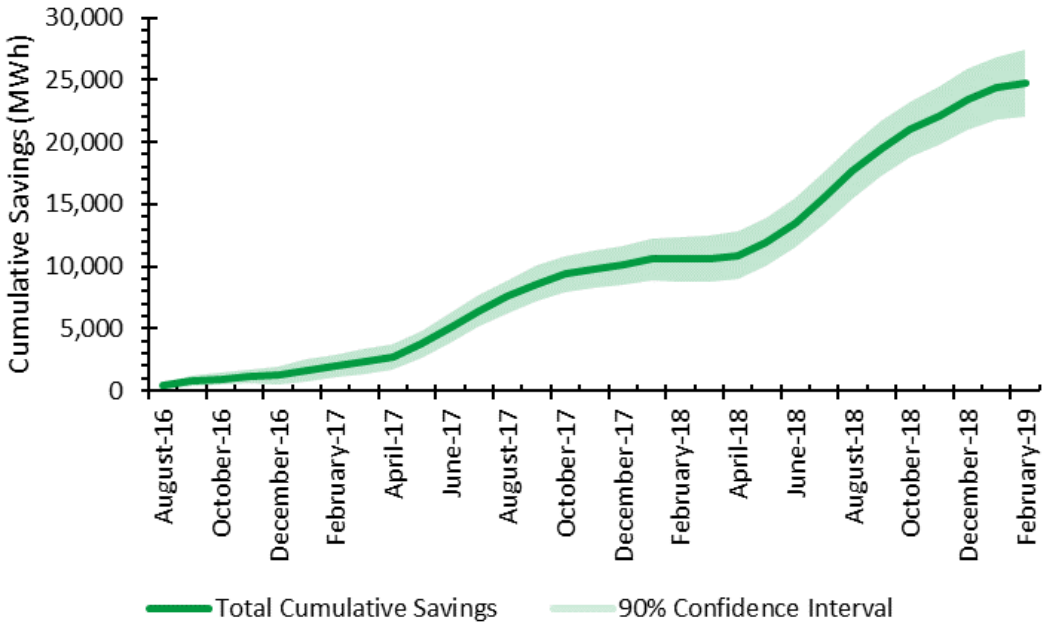


Figure 7 and Figure 8 show average daily kWh savings by wave over time, both for all customers and for customers who received reports in PY18. Overall, Wave 1 has the lowest variation in average daily savings over time and Wave 2 has the greatest. Wave eHER average daily savings has been steadily increasing since its inception, whereas Wave 3 savings initially increased but then decreased substantially in in the winter.

Figure 7. Average Daily Savings by Month (All Customers)

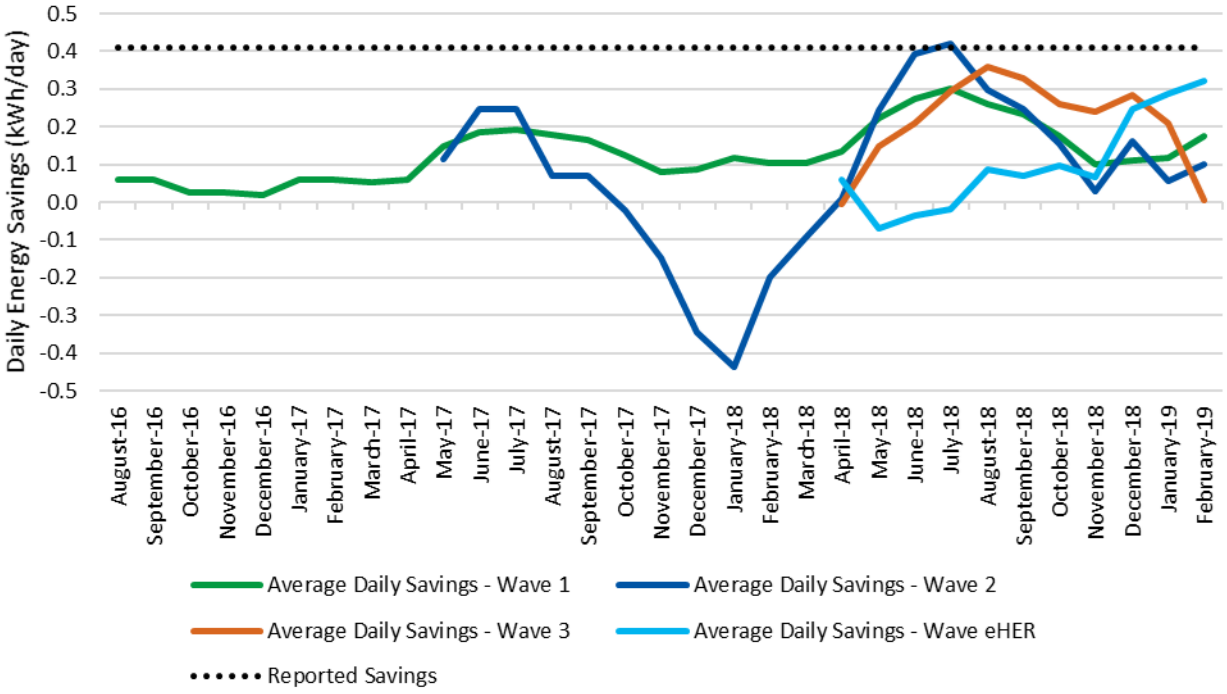
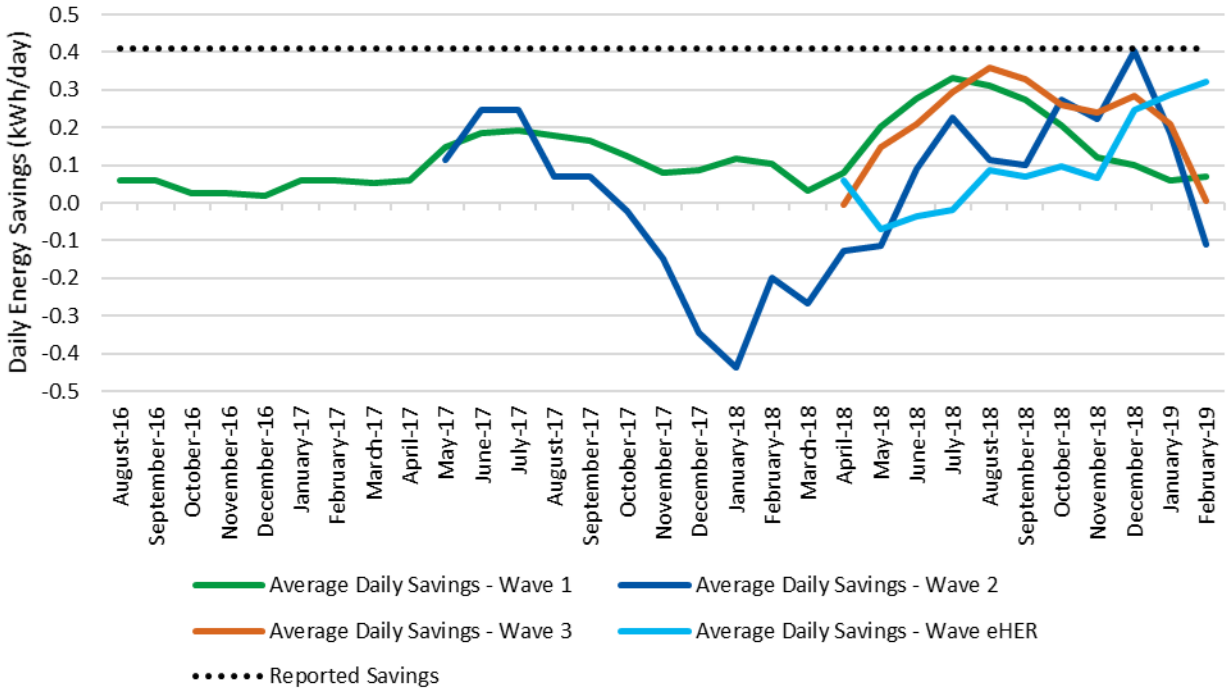


Figure 8. Average Daily Savings by Wave (Received PY18 HER Reports)



Demand Reduction Estimation

Cadmus used the residential Building Shell coincident peak demand factor to estimate the HER program's impact on customers' demand.[8] To estimate demand reduction, the team applied the coincidence peak demand factor of 0.000466 to the HER program's energy savings. Total demand reduction was 12,478 kW/year, or 78% of the MPSC-Approved demand savings target of 15,774 kW/year. Demand savings was estimated with the same confidence and precision as energy savings.

Customer-Specific Savings

Cadmus calculated average daily savings per customer for customers with different levels of energy usage prior to the HER program. Table 26 through Table 29 shows savings for all customers. The results specific to the subset of Wave 1 and Wave 2 customers that received PY18 HER reports are in Appendix H. Overall, customer specific savings were positive, but not consistently significant at 90% confidence. There were no correlations between savings and pre-program energy consumption in PY18.

In Wave 1 customer specific savings in the second and fourth quartiles were statistically significant.

Table 26. Wave 1 PY18 HER Program Savings by Quartile

Pre-Usage Quartile*	Average Daily Savings to Date**	
	kWh/day	% kWh/day
Quartile 1: < 8,541 kWh/year	0.059 [-0.01, 0.129]	0.3% [-0.1%, 0.7%]
Quartile 2: 8,542 - 11,899 kWh/year	0.100 [0.024, 0.175]	0.3% [0.1%, 0.6%]
Quartile 3: 11,900 - 16,608	0.049 [-0.052, 0.15]	0.1% [-0.1%, 0.4%]
Quartile 4: > 16,609	0.579 [0.411, 0.748]	0.9% [0.6%, 1.2%]

*Customers were assigned to quartiles based on total annual consumption (kWh/year) prior to receiving their first HER report.
**Estimates in brackets represent 90% confidence intervals around the savings estimate.

In Wave 2, only the lowest quartile customer savings were statistically significant.

Table 27. Wave 2 PY18 HER Program Savings by Quartile

Pre-Usage Quartile*	Daily Savings to Date**	
	kWh/day	% kWh/day
Quartile 1: < 8,724 kWh/year	0.343 [0.139, 0.547]	1.6% [0.6%, 2.5%]
Quartile 2: 8,742 – 12,264 kWh/year	-0.088*** [-0.312, 0.136]	-0.3%*** [-1.1%, 0.5%]
Quartile 3: 12,264 – 18,250 kWh/year	0.225 [-0.131, 0.582]	0.5% [-0.3%, 1.2%]
Quartile 4: > 18,250 kWh/year	0.113 [-0.305, 0.531]	0.2% [-0.5%, 0.9%]

*Customers were assigned to quartiles based on their total annual consumption (kWh/year) in the pre-period.
**Estimates in brackets represent 90% confidence intervals around the savings estimate.
***Note that although this average daily savings point estimate is negative, it is nonsignificant, i.e., we are 90% confident that the true average savings are in the interval, which contains negative, positive and zero values.

In Wave 3, all customer specific savings were statistically significant.

[8] See 2018 Ameren Missouri TRM, Appendix E.

Table 28. Wave 3 PY18 HER Program Savings by Quartile

Pre-Usage Quartile*	Daily Savings to Date**	
	kWh/day	% kWh/day
Quartile 1: < 15,403 kWh/year	0.115 [0.032, 0.199]	0.4% [0.1%, 0.6%]
Quartile 2: > 15,404 kWh/year	0.337 [0.170, 0.504]	0.5% [0.2%, 0.7%]

*Customers were assigned to quartiles based on their total annual consumption (kWh/year) in the pre-period.
**Estimates in brackets represent 90% confidence intervals around the savings estimate.

Wave eHER customer specific results were not statistically significant.

Table 29. Wave eHER PY18 HER Program Savings by Quartile

Pre-Usage Quartile*	Daily Savings to Date**	
	kWh/day	% kWh/day
Quartile 1: < 13,870 kWh/year	0.086 [-0.022, 0.193]	0.3% [-0.1%, 0.7%]
Quartile 2: > 13,871 kWh/year	0.094 [-0.178, 0.366]	0.1% [-0.3%, 0.6%]

*Customers were assigned to quartiles based on their total annual consumption (kWh/year) in the pre-period.
**Estimates in brackets represent 90% confidence intervals around the savings estimate.

Uplift Results

The HER program savings estimates above include energy savings due to behavioral changes and other investments in energy-efficient products resulting from the HER program. Some customers who invested in and installed efficient products received rebates from Ameren Missouri through other energy efficiency programs. In those cases, the program savings from the other rebate programs are included both in the other program's net savings and in the HER program net savings estimate in the residential portfolio. To account for this and ensure that the portfolio savings did not double count the other program savings, Cadmus assessed how much of the net HER program savings were due to customers participating in other programs, commonly referred to as "uplift" or "channeling". We analyzed participation uplift, or the rate at which treatment group customers participated in other programs compared to the control group, and savings uplift, or the amount energy treatment group customers saved through other programs, compared to the control group.

Participation uplift was estimated as the difference between the treatment group and control group participation rates. For example, if 3% of treatment customers participated in Efficient Products compared to 2% of control customers, participation uplift equaled the 1% difference. Then the percentage of participation uplift was equal to the participation uplift percentage divided by the control group participation rate. Continuing the example, if participation uplift was 1% and control group participation was 2%, then the percentage of participation uplift was 1% divided by 2%, or 50%. There was no sampling uncertainty associated with this estimate as Cadmus observed the population of program participants.

As shown in Table 30, participation uplift in the Heating Cooling and Efficient Products programs were generally positive. Multifamily Low-Income had the lowest participation uplift and was only positive in Wave 2. Participation per 1,000 customers was lowest for Wave 2 across all programs.

Table 30. PY18 HER Program Participation Uplift

Program	Participation per 1,000 Customers	Participation Uplift	% Participation Uplift
Wave 1			
Efficient Products	10	0.00%	-0.20%
Heating Cooling	25	-0.08%	-3.08%
Multifamily Low-Income	0	0.00%	-33.33%
Wave 2			
Efficient Products	6	-0.01%	-2.15%
Heating Cooling	13	0.13%	11.46%
Multifamily Low-Income	3	0.09%	38.26%
Wave 3			
Efficient Products	13	0.18%	16.23%
Heating Cooling	28	0.02%	0.86%
Multifamily Low-Income	0	0.00%	-72.97%
Wave 4			
Efficient Products	15	0.03%	2.12%
Heating Cooling	26	0.01%	0.40%
Multifamily Low-Income	0	0.00%	N/A

Table 31 shows savings uplift for each wave. Wave 3 total savings uplift was the highest compared to other waves. There was no sampling uncertainty associated with these estimates, as Cadmus did this analysis with the population of HER program participants. The total uplift savings were subtracted from the total *ex post* net HER program savings for each wave, as shown in Table 1.

Table 31. PY18 HER Program Savings Uplift

Program	Savings per Home per Year (kWh)	Total Savings (MWh)
Wave 1		
Efficient Products	-0.04	-7.0
Heating Cooling	-0.55	-108.4
Multifamily Low-Income	0.00	-0.4
Wave 1 Total	**-0.59**	**-115.8**
Wave 2		
Efficient Products	-0.87	-16.1
Heating Cooling	7.61	141.3
Multifamily Low-Income	0.21	3.8
Wave 2 Total	**6.95**	**129.1**
Wave 3		
Efficient Products	0.99	83.1
Heating Cooling	4.16	348.8
Multifamily Low-Income	-0.01	-0.6
Wave 3 Total	**5.14**	**431.3**
Wave eHER		
Efficient Products	-0.27	-5.9
Heating Cooling	-1.93	-41.5
Multifamily Low-Income	0.00	0.0
Wave eHER Total	**-2.20**	**-47.3**
Program Total Uplift		**397.2**

Figure 9 and Figure 10 compares the HER program's energy and demand savings summaries—MPSC-approved target, ex post net, and ex post net adjusted for uplift—in PY17 and PY18 (note that Cadmus did not estimate savings for PY16).

Figure 9. PY17-PY18 HER Program Energy Savings Summary

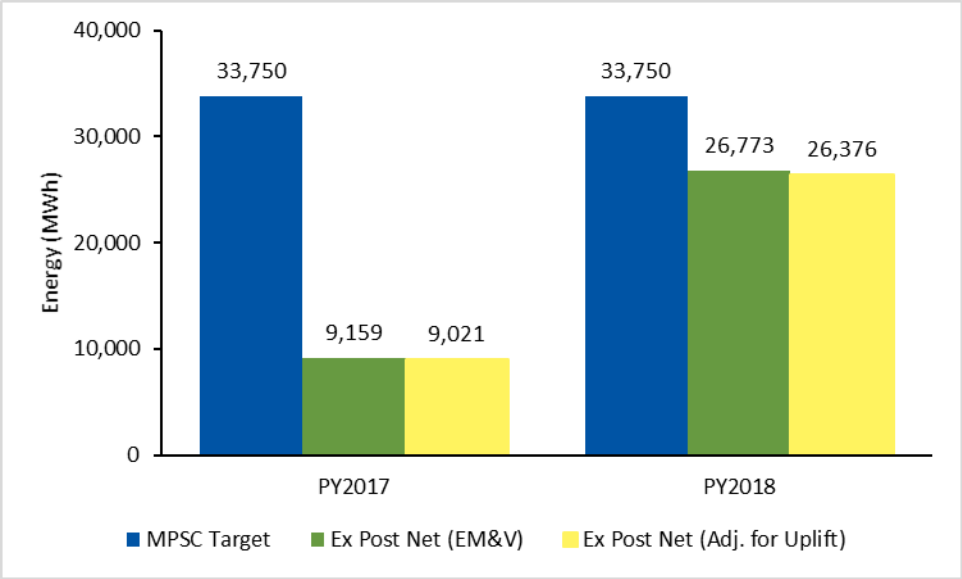
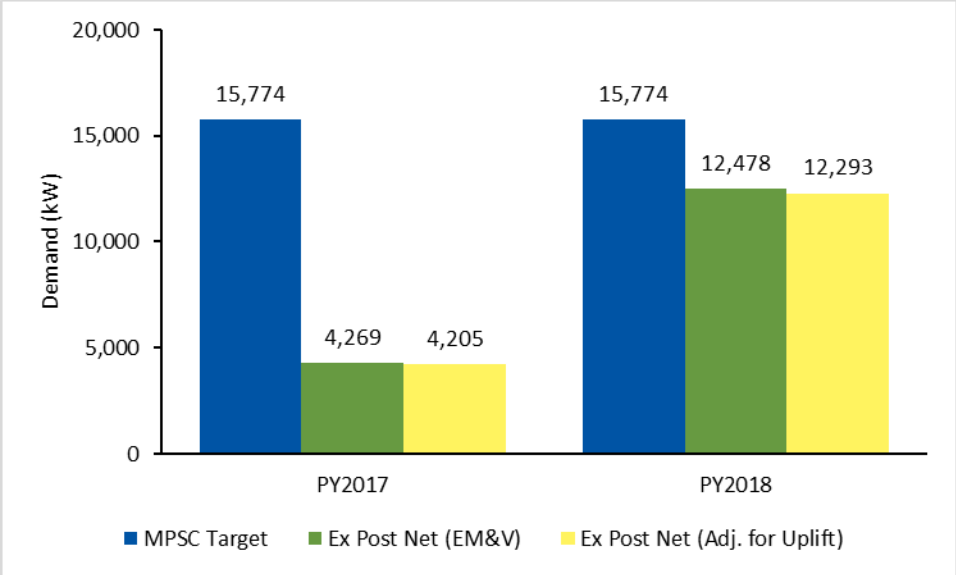


Figure 10. PY17-PY18 HER Program Demand Savings Summary



Benchmarking

In PY17, Cadmus compared Ameren Missouri's savings per customer to a similar program implemented by Ameren Illinois—Illinois Power Agency (IPA) (see Appendix B). The Ameren Illinois program included HER reports, similar to the Ameren Missouri program, but emailed reports in addition to mailed reports and a web portal. Cadmus included results (verified net savings adjusted for uplift) for participants who began receiving reports over the three program years, 2014–2015, 2015–2016, and 2016–2017, shown in

Table 32. The team also reviewed Entergy Arkansas' 2015 Behavioral Modification pilot, which included an HER report as well as an online portal that allowed customers to earn points for energy-efficient behaviors; these qualified for gift cards at certain retailers.

Savings resulting from Ameren Missouri's program were similar to Ameren Illinois' results for participants joining the program in 2016. Ameren Illinois treatment customers from the previous two years had higher average savings per customer than those in the 2016 year. This indicated that other factors could have resulted in lower-than-expected savings for Ameren Missouri's HER program and that target estimates of 150 kWh per customer might be too optimistic for the program.

Table 32. Benchmarked Program Energy Savings

Utility	Program Name	Year Began Receiving Reports	Evaluation Period	Number of Participants (Treatment)	Verified Net Savings* (MWh/yr)	Average kWh Savings per Customer per Year*
Ameren Illinois–Illinois Power Agency	Behavior Modification	2014	2016-2017	45,359	4,596	101.3
Ameren Illinois–Illinois Power Agency	Behavior Modification	2015	2016-2017	27,716	2,355	85.0
Ameren Illinois–Illinois Power Agency	Behavior Modification	2016	2016-2017	46,179	2,105	45.6
Entergy Arkansas	Behavioral Benchmarking Pilot**	2015	2015	108,532	8,424	77.6
Ameren Missouri	**Home Energy Reports**	**2016-2017**	**2017**	**230,962**	**9,159**	**39.1**
Ameren Missouri	**Home Energy Reports**	**2016-2018**	**2018**	**319,641**	**26,348**	**82.4**

* Savings adjusted for uplift.

** Entergy Arkansas' program included promotional incentives for customers making energy-efficiency improvements.

Cadmus reviewed a similar program by KCP&L, which began in 2014 and added additional waves in 2015 and 2016. As the report did not break out results by the starting year of each wave,

Table 32 does not include these results. One wave targeted only high energy users. The program achieved average 2016 savings of 136 kWh per participant—a rate lower than Ameren Missouri's targeted savings of 150 kWh/customer.

Cost-Effectiveness

The Cadmus Team assessed cost-effectiveness using the following five tests, as defined by the California Standard Practice Manual (except where modified as noted in this report):[9]

- Total Resource Cost Test (TRC)
- Utility Cost Test (UCT)
- Ratepayer Impact Measure Test (RIM)
- Participant Cost Test (PART)
- Societal Cost Test (SCT)

DSMore takes hourly prices and hourly energy savings from specific measures installed through the HER program and correlates them to 33 years of historic weather data. Using long-term weather ensures that the model captures low-probability, high-consequence weather events, and appropriately values these. As a result, the model produces an accurate evaluation of the demand-side efficiency measure relative to other alternative supply options.

Key assumptions include the following:

- Discount Rate of 6.46% for all tests except the SCT, which used a 3.0% discount rate
- Line Losses of 5.72% for residential customers and 4.84% for business customers
- Summer peak occurring during the 16th hour of a July weekday, on average
- Avoided costs from the 2017 IRP, filed October 1, 2017
- Escalation rates for different costs occurring at the component level, with separate escalation rates for fuel, capacity, generation, T&D, and customer rates carried out over 25 years

Ameren Missouri used evaluation results as model inputs (e.g., PY18-specific HER program participation counts, gross savings, and NTG). All PY18 inputs were entered into the model as "Year 3" values, and the model discounted all costs back to 2016 values; so results are comparable across program years.

The team used measure-specific load shapes provided by Ameren Missouri to inform the model when to apply savings for each measure over any given day. This ensured that the load shape for an end use matched the system peak impacts of that end use, and provided the correct summer coincident savings. The team used measure lifetime assumptions and incremental costs from the Ameren Missouri TRM or from the original Batch Tool provided with the Cycle 2 MEEIA filing.

The model also applied actual PY18 Ameren Missouri program costs. For the PY18 HER program, Ameren Missouri's costs included direct expenses for HER program administration and a percentage of portfolio-level costs. Portfolio costs—including research and development, EM&V, Educational Outreach,

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[9] *California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects*. October 2001.

Portfolio Administration, Potential Study, and Data Tracking—were allocated to each program based on the relative program benefits. The Cadmus team used cost data through March 2019, as provided by Ameren Missouri.

Table 33 summarizes cost-effectiveness findings by test. Any benefit-cost score above 1.0 passed the test as cost-effective. As shown, the HER program passed the UCT, TRC, and Societal tests. The participant cost test is N/A because there were no participant costs for this program.

Table 33. PY18 HER Program Cost-Effectiveness Results

Program	UCT	TRC	RIM	SCT	PART
Home Energy Reports	1.32	1.32	0.33	1.32	N/A

List of Appendices

Following are the Appendices for the Home Energy Reports program evaluation.

Appendix A. End-use Load Shapes and Coincidence Factors

Appendix B. Benchmarking Sources

Appendix C. Stakeholder Interview Guide

Appendix D. Implementer Interview Guide

Appendix E. Participant Survey Instrument

Appendix F. Participant Survey Responses

Appendix G. Billing Regression Model Specification and Estimation Results

Appendix H. Customer Specific Savings

Appendix A. End Use Load Shapes and Coincidence Factors

Appendix E

End-Use Category Energy Load Shapes

% Energy by Month

	Residential End-Use Category Load Shape								
Month	**Building Shell**	**Cooling**	**Freezer**	**HVAC**	**Lighting**	**Miscellaneous**	**Pool Spa**	**Refrigeration**	**Water Heating**
January	11.1297%	0.1200%	7.9579%	11.1297%	10.1182%	8.4893%	8.6451%	7.7053%	10.3527%
February	9.3077%	0.1100%	7.2518%	9.3077%	8.8441%	7.7366%	7.1145%	7.2169%	9.0720%
March	7.0042%	0.3130%	8.1080%	7.0042%	9.2879%	8.4863%	8.6052%	8.0272%	9.5543%
April	3.7116%	1.5047%	7.9918%	3.7116%	8.4645%	8.2144%	8.0702%	7.8752%	8.4799%
May	4.0888%	6.5410%	8.4083%	4.0888%	7.9393%	8.4847%	8.6052%	8.5646%	8.3600%
June	10.3973%	21.0823%	8.5730%	10.3973%	6.8508%	8.2122%	8.0702%	8.9112%	7.7065%
July	14.0100%	28.4780%	9.6095%	14.0100%	6.7864%	8.4883%	8.6451%	9.4239%	6.7712%
August	13.3207%	27.0766%	9.6095%	13.3207%	7.0565%	8.4840%	8.5653%	9.4212%	6.3688%
September	6.6759%	12.6605%	8.4277%	6.6759%	7.3792%	8.2136%	8.3032%	8.4971%	6.9373%
October	3.7011%	1.8472%	8.2582%	3.7011%	8.4539%	8.4869%	8.6052%	8.5653%	7.9644%
November	5.9593%	0.1444%	7.8465%	5.9593%	8.9880%	8.2122%	8.1088%	7.8717%	8.4752%
December	10.6937%	0.1222%	7.9579%	10.6937%	9.8312%	8.4915%	8.6619%	7.9204%	9.9577%

End-Use Category Energy to Coincident Peak Demand Factors

	Building Shell	**Cooling**	**Freezer**	**HVAC**	**Lighting**	**Miscellaneous**	**Pool Spa**	**Refrigeration**	**Water Heating**
	0.0004660805	0.0009474181	0.0001685722	0.0004660805	0.0001492529	0.0001148238	0.0002354459	0.0001285253	0.0000887318

Source: Ameren Missouri 2016-2018 Energy Efficiency Plan. MPSC file number EO-2015-0055 Appendix E to Evaluated Energy Savings.

Appendix B. Benchmarking Sources

Entergy Arkansas, Inc. *Arkansas Energy Efficiency Program Portfolio Annual Report*. Docket Number 07-085-TF. 2015 Program Year. 2016.

Opinion Dynamics. *Impact and Process Evaluation of 2016 (PY9) Illinois Power Agency Behavioral Modification Program*. Prepared for Ameren Illinois Company. 2018.

Appendix C. Stakeholder Interview Guide

Respondent name: _____

Respondent phone: _____

Interview date:_____ Interviewer name:_____

For the PY16-PY18 evaluation, Cadmus will interview stakeholders annually. The interview will focus on identifying recommendations for improving subsequent program years and informing the survey instrument.

Roles and Responsibilities

1. Have your roles and responsibilities changed in the third year of the program?
2. Last year, you told me about coordinating with ICF and the types of communication you have with them. Has that remained the same?

Program Implementation

3. In PY17, you told us about how the program came to fruition (i.e., it was of interest based on Ameren Illinois and KC Power & Light and there was a push to run a program that touches more customers). Do you think that the program has addressed these interests in PY18?
4. Last year, you told us that a tracker was added in May PY17 and that there were plans to add information about health benefits and lifestyle benefits from executing energy savings tips.
    a. Were these changes implemented?
    b. Have there been any other changes in PY18?
    c. Are you planning any changes in PY19?

Program Goals

5. Appendix B[1] showed 225,000 people for estimated participation and an estimated annual savings target of 33,750 MWh and 15.7MW. In PY16 and PY17 impact evaluations monitored progress in terms of savings throughout the year. In PY17, you indicated Ameren Missouri was doing additional analysis to see who was in the treatment and control groups, what profiles were in the high and low usage groups, etc. Did you incorporate them into PY18 HER reports or do you plan to in PY19?
6. In PY18, customers with low pre-program usage were removed from the treatment group. Have you identified additional plans for PY19?
7. In PY16, nine customers had opted out of receiving the HER reports at the end of the year. In PY17, 47 customers opted out. How many have opted out during this program year?

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[1] State of Missouri. "In the Matter of Union Electric Company d/b/a Ameren Missouri's 2nd Filing to Implement Regulatory Changes in Furtherance of Energy Efficiency as Allowed by MEEIA." File No. EO-2015-0055. February 5, 2016. Refer to Appendix B.

Program Delivery

8. In PY18, Cadmus randomized customers into treatment and control groups for the backfill to replace customers whose accounts had been finaled in PY17. We received a list of customers from Ameren Missouri to do this. Can you tell me what customer characteristics were used to identify eligible customers?
9. How many HER reports will be sent out in PY18?

Home Energy Report Design and Delivery

10. Can you confirm that there was still no web-portal component or any other delivery mechanism for home energy reports apart from mailed and emailed reports in PY18?
11. In PY18, emailed HER reports were added. In our last interview you mentioned that the reasons included the following: they are standard for most HER programs, general trends are to go electronic, you hope to increase savings with extra touches for each customer, and that it would be a more cost-effective channel than paper. You were also aiming to get more opportunities to track and analyze customer responsiveness and expect increase in customers visiting landing page or PDF, looking up measures on Ameren Missouri's website, etc. Were these aims realized in PY18
12. Compared to PY17, please describe any changes to the HER report design that were implemented in PY18?
13. Are any other changes being planned or considered for PY19?

Program Marketing

14. Can you confirm that cross-program marketing has been discontinued in the HER reports?
15. Were any other reminder tools provided to customers in PY18?

Successes, Challenges, Suggestions for Improvement

16. What would you say is working particularly well so far in PY17? Why is that?
17. What are the biggest challenges with the program?
18. What would you like the evaluation to help you solve?
19. Overall, do you have any suggestions for how to improve the program?
20. Do you have any feedback about last year's evaluation and what you might like to see differently?

Wrap Up

21. Those are all the questions I have for you. Is there anything else you would like to add or questions you'd like to ask?

Appendix D. Implementer Interview Guide

Respondent name:_____

Respondent phone:_____

Interview date:_____ Interviewer name:_____

For the PY16-PY18 evaluation, Cadmus will interview stakeholders annually. The interview will focus on identifying recommendations for improving subsequent program years and informing the survey instrument.

Roles and Responsibilities

1. Have your roles and responsibilities changed in the third year of the program?
2. Last year, you told us about coordinating with Ameren Missouri and the types of communication you have with them. Has that remained the same?
3. Prior to the program start in 2016, Ameren Missouri ran the program through a focus group panel. At the end of PY17, you indicated that updates to the HER reports were run through a focus group panel as well.

Program Goals

4. Appendix B[2] showed 225,000 people for estimated participation and an estimated annual savings target of 33,750 MWh and 15.7MW. In previous interviews, you shared that ICF performs a quarterly savings analysis and shares results broadly to the project team and that you developed mitigation plans (e.g., increasing frequency of HER report delivery) based on the signal that actual savings weren't tracking with targets. Can you describe similar efforts in PY18?
5. In PY16, nine customers had opted out of receiving the HER reports at the end of the year. In PY17, 47 customers opted out. How many have opted out in PY18?

Program Implementation

6. You previously told us about the program theory (normative comparison and customer specific, or self-comparison).
   a. In PY17, you indicated that the HER reports alternated between including a normative comparison and self-comparison. Did you implement the same schedule in PY18?
   b. In PY17, you indicated that the images in PY16 report layout were replaced with text in the header area including their name and account numbers as well as information about why customers were receiving the HER reports and that ICF was planning to add a summary to describe the type of information provided with normative and self-comparison in the reports. Did this update get implemented?

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[2] State of Missouri. "In the Matter of Union Electric Company d/b/a Ameren Missouri's 2nd Filing to Implement Regulatory Changes in Furtherance of Energy Efficiency as Allowed by MEEIA." File No. EO-2015-0055. February 5, 2016. Refer to Appendix B.

7. Have there been any other changes to program theory in PY18?
8. In PY18, Cadmus randomized customers into treatment and control groups for the "backfill" to replace customers whose accounts had been finaled in PY17). We received a list of customers from Ameren Missouri/ICF. What customer characteristics were used to identify eligible customers?
9. Can you confirm that there was still no web-portal component or any other delivery mechanism for home energy reports apart from mailed and emailed reports in PY18?
10. What dates were the PY18 HER and eHER reports sent?
11. PY16, there were delays due to the focus group panel and the election. In PY17, you did not have any challenges with sending reports on schedule. Did you face challenges with timing in PY18?

Home Energy Report Design and Delivery

12. Please describe any updates to the design of the HER reports in PY18, compared to PY17. For example, adding more detail to the energy savings tips, changes to the photos corresponding to the tips, etc.?
13. In PY17, you discussed the following benefits anticipated from emailing HER reports. Do you think they have been realized?

Program Marketing

14. In PY17, you had scaled cross-program marketing back. In a recent interview Cadmus conducted with the marketing manager at Ameren Missouri, she indicated that cross-program marketing had been removed altogether. Can you confirm this is the case?
15. In PY17, the HER reports promoted the existing Ameren Missouri customer portal and provided additional resources via the web URL, with additional energy saving tips available online. The goal was to promote the customer portal because Ameren Missouri wanted to determine if increased web activity coincided with a bump in program participation as part of a larger digital strategy?
16. Were any other reminder tools provided to customers in PY18?

Successes, Challenges, Suggestions for Improvement

17. What would you say is working particularly well so far in PY17? Why is that?
18. What are the biggest challenges with the program?
19. What would you like the PY18 evaluation to help you solve?
20. Overall, do you have any suggestions for how to improve the program?

Wrap Up

21. Those are all the questions I have for you. Is there anything else you would like to add or questions you'd like to ask?

Appendix E. Participant Survey Instrument

A. *Introduction and Screener*

Thank you for taking Ameren Missouri's survey. We are asking utility customers about how energy is used in the home.

A1. Are you involved in managing energy use in your home or paying your home's utility bills? **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

1. Yes
2. No [TERMINATE TEXT: We are only surveying customers who are involved in managing energy use and paying utility bills at the present time, but Ameren Missouri appreciates you for taking time to respond. Thank you. Have a nice day!]

A2. Are you, or any members of your household, employed by Ameren Missouri? **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

1. Yes, I or someone in my household works for Ameren Missouri [TERMINATE TEXT: "We are not surveying Ameren Missouri employee households, but we appreciate you for taking time to respond. Thank you. Have a nice day!"]
2. No, no one in my household works for Ameren Missouri

A3. Our records show that you received documents in the mail called Home Energy Reports. These reports included personalized recommendations on ways to cut your energy costs and take advantage of Ameren Missouri rebates. Do you recall seeing one of these reports or hearing someone in your household talking about these reports? **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

1. Yes
2. No [TERMINATE TEXT: "In that case we have no further questions for you. Ameren Missouri appreciates you for taking time to respond. Thank you. Have a nice day!"]

B. *HER Report Readership, Engagement, and Reception*

B1. Which of the following statements best describes what you did with the Home Energy Report you received? **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

1. I read the report thoroughly
2. I read some of the report
3. I skimmed the report
4. I did not read the report **[SKIP TO D1]**

B2. How much do you agree with the following statements about the Home Energy Reports? Please select a response from the drop-down menu. **[RANDOMIZE ORDER]**

A. The information in the reports is useful
B. The reports are easy to understand
C. The reports get others in my household involved in saving energy

MENU OPTIONS **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**:

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree
- Not applicable

B3. Have you completed any of these actions after receiving the Home Energy Reports? Please select a response from the drop-down menu. **[RANDOMIZE ORDER]**

A. Looked for opportunities to save energy
B. Talked about the report with others living in your home
C. Talked about the report with other people outside your home

B4. MENU OPTIONS **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**:

- Yes
- No
- Not applicable

C. Report Content

Household Efficiency Comparison

C1. Each Home Energy Report compares your energy use to that of similar homes. Do you remember seeing this comparison? **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

1. Yes
2. No [SKIP TO C5]

C2. How much do you agree with the following statements? Please select a response from the drop-down menu. **[RANDOMIZE ORDER]**

A. My household energy use was different than I expected, compared to similar homes
B. I believe the comparison of my home to similar homes is accurate
C. The comparison of my home to similar homes motivated me to read the rest of the Home Energy Report

MENU OPTIONS **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**:

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

C3. Below the similar home comparison, the newest Home Energy Report includes an energy use rating of between one and five stars that show how your energy use rates, compared to average (1 star = much more than average, 2 stars = more than average, 3 stars = average, 4 stars = less than average, and 5 stars= much less than average). What rating did you receive? **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

1. One star
2. Two stars
3. Three stars
4. Four stars
5. Five stars
6. Don't know **[SKIP TO C5]**

C4. Did you find the rating helpful? **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

1. Yes
2. No

How Has My Efficiency Changed?

C5. The most recent Home Energy Report tracks your progress by comparing your home's energy use to itself in the same time period of the previous year. Do you remember seeing this tracker? **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

1. Yes
2. No [SKIP TO C8]

C6. How much do you agree with the following statements? Please select a response from the drop-down menu. **[RANDOMIZE ORDER]**

A. My energy use this year was different than I expected compared to last year
B. I believe the personal comparison is accurate
C. The personal comparison helps me understand my household energy use

MENU OPTIONS **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**:

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

C7. Did you find the comparison helpful? **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

1. Yes
2. No

Home Health Checklist

C8. A previous Home Energy Report contained a "home health checklist" with recommendations or steps you can take to save energy, improve indoor air quality and prevent pests from entering your home. Do you remember seeing this information? **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

1. Yes
2. No [SKIP TO C12]

C9. How much do you agree with the following statements? Please select a response from the drop-down menu. **[RANDOMIZE ORDER]**

A. The home health recommendations make sense for my household
B. The home health recommendations are easy for my household to do
C. The home health recommendations provide enough information to take action

MENU OPTIONS **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**:

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

C10. Did you or anyone in your household complete any of the home health recommendations? **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

1. Yes
2. No [SKIP TO C12]
3. Don't Know [SKIP TO C12]

C11. Which of the recommendations did you complete? **[REQUIRED RESPONSE]**

[RECORD OPEN ENDED RESPONSE: _____]

Personalized Tips

C12. Each Home Energy Report contains three personalized recommendations or tips about how to save energy. Do you remember seeing these tips? **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

1. Yes
2. No [SKIP TO D1]

C13. How much do you agree with the following statements? Please select a response from the drop-down menu. **[RANDOMIZE ORDER]**

A. The personalized tips make sense for my household
B. The personalized tips are easy for my household to do
C. The personalized tips provide enough information to take action

MENU OPTIONS **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**:

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

C14. Did you or anyone in your household complete any of the personalized tips in the Home Energy Reports? **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

1. Yes
2. No [SKIP TO C17]
3. Don't know [SKIP TO D1]

C15. Which of the personalized tips did you complete? **[REQUIRED RESPONSE]**
[RECORD OPEN ENDED RESPONSE: _____]

C16. How important would you say the Home Energy Reports are in prompting you to make energy-saving improvements? **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

1. Very important
2. Somewhat important
3. Not too important
4. Not at all important

1.

C17. Why not? [REQUIRED RESPONSE]
[RECORD OPEN ENDED RESPONSE: _____]

D. Energy-Saving Improvements

D1. Have you made any of the following energy-saving improvements in the last 12 months? Please check all that apply. **[MULTIPLE RESPONSE; RANDOMIZE ORDER WITH "OTHER" and "NONE" LAST] [FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

A. Purchased and installed LEDs (LEDs are light emitting diodes and they are the super long- lasting light bulbs.)
B. Installed a programmable or smart thermostat (A programmable thermostat allows you to set the temperature for different times of the day. A smart thermostat learns your temperature setting behaviors and self-adjusts the temperature for you.)
C. Purchased and installed ENERGY STAR or high-efficiency appliances
D. Purchased and installed new heating or cooling equipment
E. Installed extra insulation to ceiling, ducts, walls, attic or basement
F. Added caulking, spray foam, weather stripping, or plastic sheeting
G. Installed a water/energy-saving showerhead, faucet head or aerator
H. Installed high-efficiency doors or windows
I. Other energy-saving improvements [SPECIFY:_____]
J. None of the above [EXCLUSIVE RESPONSE]

D2. How often have you taken these actions in your home over the past 12 months? Please select a response from the drop-down menu for each item below. **[RANDOMIZE ORDER]**

A. Replacing air filters for your air conditioners and heating systems
B. Turning off lights in rooms that are unoccupied
C. Washing laundry in cold water
D. Unplugging electronic equipment or appliances when not in use
E. Adjusting and maintaining thermostat settings when leaving or sleeping
F. Taking shorter showers
G. Setting and maintaining a lower water heater temperature
H. Using energy-saving or "sleep" features of your computer

MENU OPTIONS **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

- Always (at least once every couple months)
- Sometimes (once every 6 months or so)
- Never
- Not applicable

D3. [ASK THIS QUESTION FOR ALL "NEVER" ITEMS FROM D2] What is the biggest challenge to… [INSERT RESPONSE TEXT FROM D2 above, i.e., REPLACING AIR FILTERS, TURNING OFF LIGHTS]?

MENU OPTIONS **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

- [ONLY FOR D2 AIR FILTERS] Price of air filters
- [ONLY FOR D2 AIR FILTERS and WATER HEATER TEMPERATURE] Knowing how to do it
- It is too inconvenient
- I have safety or health concerns
- I am concerned about comfort
- I don't have control over this
- I don't see how it would help save energy
- Other [SPECIFY:_____]

E. Awareness of Energy Efficiency Programs

E1. Are you familiar with any energy-efficiency rebates or programs offered by Ameren Missouri to help you use less energy? **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

1. Yes
2. No [SKIP TO E3]

E2. Check all Ameren Missouri energy-efficiency or rebate programs you have heard about. [MULTIPLE RESPONSES. RANDOMIZE ORDER WITH "OTHER SPECIFY"] **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

A. Heating and Cooling: Rebate for installing efficient AC, heat pump or geothermal system
B. EnergyStar Certified Products: Rebate for buying EnergyStar certified products such as pool pumps, air purifiers, and more
C. Smart Thermostat: Rebate for installing a smart thermostat
D. Energy Efficient Lighting: Purchasing energy-efficient LED bulbs at reduced prices at local retailers or at the Ameren Missouri online store

E. CommunitySavers: Energy saving opportunities for income eligible Multifamily housing (advertised through low income agencies)
F. School Energy Education: Schools voluntarily sign up to distribute free energy-savings kits to 6th grade students and their parents each school year
G. Other [SPECIFY:_____]
H. None of the above [EXCLUSIVE RESPONSE]

E3. Have you visited Ameren Missouri's website to look for ways to save money on your bill? **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

1. Yes
2. No

F. Attitudes Toward Energy Efficiency

F1. How much do you agree with the following statements? Please select a response for each statement in the table below. **[RANDOMIZE ORDER]**

A. It is important to conserve energy as much as possible
B. Using energy to keep the home comfortable is my top priority
C. I am committed to actions that help the environment
D. I would like to save more energy but do not know where to start
E. I have already done as much as possible to save energy in my home
F. Energy-efficient products are too expensive
G. Health or comfort issues in my household require higher energy use
H. I have tried a few things to save energy but have not seen any real savings on my utility bills
I. I have an older, leaky, or non-efficient home
J. I cannot control energy use by other household members
K. I need energy for a home business or hobby in my household
L. My highest-priority home renovations are not related to saving energy
M. Energy-using equipment or appliances in my household are in need of repair
N. I am not willing to replace things that are working just fine
O. I am not interested in energy savings
P. There are no challenges to saving energy in my home

MENU OPTIONS **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**:

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

G. Satisfaction

G1. Thinking about your overall experiences with Ameren Missouri as your utility, how satisfied would you say you are with Ameren Missouri? **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

1. Very satisfied
2. Somewhat satisfied
3. Not too satisfied
4. Not satisfied at all

G2. Why are you **[RATING FROM H1]** with Ameren Missouri as your utility? **[REQUIRED RESPONSE]:** [RECORD OPEN ENDED RESPONSE:_____]

G3. How much do you agree with the following statement? Overall, I am satisfied with the Home Energy Reports. **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

1. Strongly agree
2. Somewhat agree
3. Somewhat disagree
4. Strongly disagree
5.

G4. As a result of receiving the Home Energy Reports, would you say your satisfaction with Ameren Missouri has…**[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**

1. Increased
2. Stayed the same
3. Decreased
4.

G5. What suggestions, if any, do you have for improving the Home Energy Reports? **[REQUIRED RESPONSE]: [RECORD OPEN ENDED RESPONSE: _____]**

H. Demographics

H1. How often do you read your utility bill statement sent by mail, email or text message? Please use the drop-down menu to indicate if you always, sometimes, or never check your utility bill statement sent through each of these communication channels… **[RANDOMIZE ORDER]**

A. My utility bill statement sent by mail
B. My utility bill statement sent by email
C. My utility bill statement sent by text message

MENU OPTIONS **[FORCED RESPONSE, NO SKIP OR DON'T KNOW]**:

- Always
- Sometimes
- Never

H2. Which of the following best describes your home?

1. A single-family detached residence
2. Attached house (such as a townhouse, row house, or twin)

3. Multifamily apartment or condo building with 4 or more units
4. Mobile or manufactured home
5. Other [SPECIFY:_____]
6. I prefer not to answer this question

H3. Do you own or rent this home?

1. Own/buying
2. Rent/lease
3. Other [SPECIFY:_____]
4. I prefer not to answer this question

H4. Counting yourself, how many people live in your home for most of the year?

1. [RECORD NUMBER]
2. I prefer not to answer this question

H5. How old are you?

1. 18-24
2. 25-34
3. 35-44
4. 45-54
5. 55-64
6. 65-74
7. 75 and older
8. I prefer not to answer this question

H6. What is the total combined income of all members of your household over the past 12 months?

1. Less than $20,000
2. $20,000 to less than $50,000
3. $50,000 to less than $75,000
4. $75,000 to less than $100,000
5. $100,000 to less than $150,000
6. $150,000 to less than $200,000
7. $200,000 or more
8. I prefer not to answer this question

That is the end of the survey. Ameren Missouri appreciates you for taking time to respond. Thank you. Have a nice day!

Appendix F. Participant Survey Responses

This appendix provides the responses to questions in the HER program survey. This survey was sent by email in March 2019 to randomly selected HER treatment group customers. The results below provide the number of responses to the answers for each survey question and the percentage of customers that selected each response, excluding customers who answered "not applicable." (Cadmus omitted "don't know" from the response options for most survey questions in PY18.) Although the counts corresponding to "not applicable" reposes are included in the tables for applicable questions, they are not used to calculate the percent of respondents for each response option.

Introduction and Screener

Table 1. Survey Question A1 Responses (n=361)

Are you involved in managing energy use in your home or paying your home's utility bills?		
Response	**Count of Response**	**Percentage of Respondents**
Yes	360	100%
No	1	0%

Table 2. Survey Question A2 Responses (n=360)

Are you, or any members of your household, employed by Ameren Missouri?		
Response	**Count of Response**	**Percentage of Respondents**
Yes, I or someone in my household works for Ameren Missouri	6	2%
No, no one in my household works for Ameren Missouri	354	98%

Table 3. Survey Question A3 Responses (n=351)

Our records show that you received documents in the mail called Home Energy Reports. These reports included personalized recommendations on ways to cut your energy costs and take advantage of Ameren Missouri rebates. Do you recall seeing one of these reports or hearing someone in your household talking about these reports?		
Response	**Count of Response**	**Percentage of Respondents**
Yes	289	82%
No	62	18%

Home Energy Report Readership, Engagement, and Reception

Table 4. Survey Question B1 Responses (n=287)

Which of the following statements best describes what you did with the Home Energy Report you received?		
Response	**Count of Response**	**Percentage of Respondents**
I read the report thoroughly	134	47%
I read some of the report	73	25%
I skimmed the report	75	26%
I did not read the report	5	2%

Table 5. Survey Question B2_1 Responses (n=247)

How much do you agree with the following statements about the Home Energy Reports? The information in the reports is useful.		
Response	**Count of Response**	**Percentage of Respondents**
Strongly agree	102	41%
Somewhat agree	122	49%
Somewhat disagree	20	8%
Strongly disagree	3	1%

Table 6. Survey Question B2_2 Responses (n=246)

How much do you agree with the following statements about the Home Energy Reports? The reports are easy to understand.		
Response	**Count of Response**	**Percentage of Respondents**
Strongly agree	145	59%
Somewhat agree	90	37%
Somewhat disagree	7	3%
Strongly disagree	4	2%
Not applicable	1	

Table 7. Survey Question B2_3 Responses (n=205)

How much do you agree with the following statements about the Home Energy Reports? The reports get other in my household involved in saving energy.		
Response	**Count of Response**	**Percentage of Respondents**
Strongly agree	25	12%
Somewhat agree	100	49%
Somewhat disagree	48	23%
Strongly disagree	32	16%
Not applicable	42	

Table 8. Survey Question B3_1 Responses (n=246)

Have you completed any of these actions after receiving the Home Energy Reports? Looked for opportunities to save energy.		
Response	Count of Response	Percentage of Respondents
Yes	211	86%
No	35	14%
Not applicable	1	

Table 9. Survey Question B3_2 Responses (n=213)

Have you completed any of these actions after receiving the Home Energy Reports? Talked about the report with other living in your home.		
Response	Count of Response	Percentage of Respondents
Yes	147	69%
No	66	31%
Not applicable	34	

Table 10. Survey Question B3_3 Responses (n=239)

Have you completed any of these actions after receiving the Home Energy Reports? Talked about the report with other people outside your home.		
Response	Count of Response	Percentage of Respondents
Yes	59	25%
No	180	75%
Not applicable	8	

Report Content

Table 11. Survey Question C1 Responses (n=247)

Each Home Energy Report compares your energy use to that of similar homes. Do you remember seeing this comparison?		
Response	Count of Response	Percentage of Respondents
Yes	208	84%
No	39	16%

Table 12. Survey Question C2_1 Responses (n=203)

How much do you agree with the following statement? My household energy use was different than I expected, compared to similar homes.		
Response	**Count of Response**	**Percentage of Respondents**
Strongly agree	45	22%
Somewhat agree	98	48%
Somewhat disagree	51	25%
Strongly disagree	9	4%

Table 13. Survey Question C2_2 Responses (n=203)

How much do you agree with the following statement? I believe the comparison of my home to similar homes is accurate.		
Response	**Count of Response**	**Percentage of Respondents**
Strongly agree	43	21%
Somewhat agree	101	50%
Somewhat disagree	43	21%
Strongly disagree	16	8%

Table 14. Survey Question C2_3 Responses (n=203)

How much do you agree with the following statement? The comparison of my home to similar homes motivated me to read the rest of the Home Energy Report.		
Response	**Count of Response**	**Percentage of Respondents**
Strongly agree	51	25%
Somewhat agree	100	49%
Somewhat disagree	37	18%
Strongly disagree	15	7%

Table 15. Survey Question C3 Responses (n=111)

Below the similar home comparison, the newest Home Energy Report includes an energy use rating with stars. What rating did you receive?		
Response	**Count of Response**	**Percentage of Respondents**
Five stars	6	5%
Four stars	32	29%
Three stars	30	27%
Two stars	27	24%
One star	16	14%
Don't know	92	

Table 16. Survey Question C4 Responses (n=111)

Did you find the rating helpful?		
Response	**Count of Response**	**Percentage of Respondents**
Yes	86	77%
No	25	23%

Table 17. Survey Question C5 Responses (n=241)

The most recent Home Energy Report tracks your progress by comparing your home's energy use to itself in the same time period of the previous year. Do you remember seeing this tracker?		
Response	Count of Response	Percentage of Respondents
Yes	208	86%
No	33	14%

Table 18. Survey Question C6_1 Responses (n=203)

How much do you agree with the following statement? My energy use this year was different than I expected compared to last year.		
Response	Count of Response	Percentage of Respondents
Strongly agree	33	24%
Somewhat agree	90	39%
Somewhat disagree	59	28%
Strongly disagree	21	9%

Table 19. Survey Question C6_2 Responses (n=203)

How much do you agree with the following statement? I believe the personal comparison is accurate.		
Response	Count of Response	Percentage of Respondents
Strongly agree	78	38%
Somewhat agree	102	50%
Somewhat disagree	17	8%
Strongly disagree	6	3%

Table 20. Survey Question C6_3 Responses (n=203)

How much do you agree with the following statement? The personal comparison helps me understand my household energy use.		
Response	Count of Response	Percentage of Respondents
Strongly agree	88	43%
Somewhat agree	97	48%
Somewhat disagree	16	8%
Strongly disagree	2	1%

Table 21. Survey Question C7 Responses (n=203)

Did you find the comparison helpful?		
Response	Count of Response	Percentage of Respondents
Yes	173	85%
No	30	15%

Table 22. Survey Question C8 Responses (n=234)

The most recent Home Energy Report contains a "home health checklist" with recommendations or steps you can take to save energy, improve indoor air quality and prevent pests from entering your home. Do you remember seeing this information?		
Response	**Count of Response**	**Percentage of Respondents**
Yes	142	61%
No	92	39%

Table 23. Survey Question C9_1 Responses (n=136)

How much do you agree with the following statement? The home health recommendations make sense for my household.		
Response	**Count of Response**	**Percentage of Respondents**
Strongly agree	38	28%
Somewhat agree	72	53%
Somewhat disagree	23	17%
Strongly disagree	3	2%

Table 24. Survey Question C9_2 Responses (n=136)

How much do you agree with the following statement? The home health recommendations are easy for my household to do.		
Response	**Count of Response**	**Percentage of Respondents**
Strongly agree	38	28%
Somewhat agree	72	53%
Somewhat disagree	23	17%
Strongly disagree	3	2%

Table 25. Survey Question C9_3 Responses (n=136)

How much do you agree with the following statement? The home health recommendations provide enough information to take action.		
Response	**Count of Response**	**Percentage of Respondents**
Strongly agree	29	21%
Somewhat agree	77	57%
Somewhat disagree	25	18%
Strongly disagree	5	4%

Table 26. Survey Question C10 Responses (n=136)

Did you or anyone in your household complete any of the home health recommendations?		
Response	**Count of Response**	**Percentage of Respondents**
Yes	27	20%
No	73	54%
Don't know	36	26%

Table 27. Survey Question C12 Responses (n=226)

Each Home Energy Report contains three personalized recommendations or tips about how to save energy. Do you remember seeing these tips?		
Response	Count of Response	Percentage of Respondents
Yes	134	59%
No	92	41%

Table 28. Survey Question C13_1 Responses (n=131)

How much do you agree with the following statement? The personalized tips make sense for my household.		
Response	Count of Response	Percentage of Respondents
Strongly agree	28	21%
Somewhat agree	82	63%
Somewhat disagree	17	13%
Strongly disagree	4	3%

Table 29. Survey Question C13_2 Responses (n=131)

How much do you agree with the following statement? The personalized tips are easy for my household to do.		
Response	Count of Response	Percentage of Respondents
Strongly agree	30	23%
Somewhat agree	72	55%
Somewhat disagree	21	16%
Strongly disagree	8	6%

Table 30. Survey Question C13_3 Responses (n=131)

How much do you agree with the following statement? The personalized tips provide enough information to take action.		
Response	Count of Response	Percentage of Respondents
Strongly agree	36	27%
Somewhat agree	76	58%
Somewhat disagree	17	13%
Strongly disagree	2	2%

Table 31. Survey Question C14 Responses (n=99)

Did you or anyone in your household complete any of the personalized tips in the Home Energy Reports?		
Response	Count of Response	Percentage of Respondents
Yes	38	38%
No	61	62%
Don't Know	32	

Table 32. Survey Question C15 Responses (n=37)

Which of the personalized tips did you complete?		
Response	**Count of Response**	**Percentage of Respondents**
LED lighting	10	27%
Insulation or weatherization	9	24%
Turning off equipment when not in use	6	16%
Turning down the thermostat	5	14%
Turning off lights	3	8%
Programmable or smart thermostat	3	8%
Installed new equipment	3	8%
Windows	2	5%
Changed air filters	1	3%
All	1	3%
None	1	3%

Multiple responses allowed.

Table 33. Survey Question C16 Responses (n=37)

How important would you say the Home Energy Reports are in prompting you to make energy-saving improvements?		
Response	**Count of Response**	**Percentage of Respondents**
Very important	10	27%
Somewhat important	24	65%
Not too important	3	8%

Table 34. Survey Question C17 Responses (n=46)

Why not?		
Response	**Count of Response**	**Percentage of Respondents**
Costs (e.g., cannot afford to make changes suggested in HER reports)	12	26%
HER reports do not account for conditions specific to my home (e.g., equipment like electric vehicles, or pools and pool pumps, previous efficient equipment installations, working at home, or home design)	11	24%
Do not believe the report is accurate/do not see value in the suggestions	8	17%
Comfort is a higher priority	6	13%
Have not had the opportunity to complete the suggestions	3	7%
New to home/moving soon	3	7%
Believe my household is pretty efficient as it is	2	4%
I do not have control over the suggested actions or others in my home	2	4%
I will not replace equipment that is working just fine	1	2%
Inconvenient	1	2%
Suggestions did not seem feasible	1	2%

Multiple responses allowed.

Energy-Savings Improvements

Table 35. Survey Question D1_1 Responses (n=218)

Have you made any of the following energy-saving improvements in the last 12 months?		
Response	**Count of Response**	**Percentage of Respondents**
Purchased and installed LEDs (LEDs are light emitting diodes and they are the super long- lasting light bulbs.)	163	75%
Installed a programmable or smart thermostat (A programmable thermostat allows you to set the temperature for different times of the day. A smart thermostat learns your temperature setting behaviors and self-adjusts the temperature for you.)	49	22%
Purchased and installed ENERGY STAR or high-efficiency appliances	70	32%
Purchased and installed new heating or cooling equipment	39	18%
Installed extra insulation to ceiling, ducts, walls, attic or basement	31	14%
Added caulking, spray foam, weather stripping, or plastic sheeting	69	32%
Installed a water/energy-saving showerhead, faucet head or aerator	34	16%
Installed high-efficiency doors or windows	36	17%
Other:		
Installed other equipment	7	3%
Not in the past year but in the past 2-3 years	1	0%
Plan to soon	1	0%
Installed extra insulation to ceiling, ducts, walls, attic or basement	1	0%
None of the above	34	16%

Multiple responses allowed.

Energy-Savings Behaviors

Table 36. Survey Question D2_1 Responses (n=214)

How often have you taken these actions in your home over the past 12 months? Replace air filters for your air conditioners and heating systems.		
Response	**Count of Response**	**Percentage of Respondents**
Always	165	77%
Sometimes	46	21%
Never	3	1%
Not applicable	4	

Table 37. Survey Question D2_2 Responses (n=217)

How often have you taken these actions in your home over the past 12 months? Turn off lights in rooms that are unoccupied.		
Response	**Count of Response**	**Percentage of Respondents**
Always	197	91%
Sometimes	19	9%
Never	1	0%
Not applicable	1	

Table 38. Survey Question D2_3 Responses (n=216)

How often have you taken these actions in your home over the past 12 months? Wash laundry in cold water.		
Response	**Count of Response**	**Percentage of Respondents**
Always	130	60%
Sometimes	59	27%
Never	27	13%
Not applicable	2	

Table 39. Survey Question D2_4 Responses (n=216)

How often have you taken these actions in your home over the past 12 months? Unplug electronic equipment or appliances when not in use.		
Response	**Count of Response**	**Percentage of Respondents**
Always	61	28%
Sometimes	79	37%
Never	76	35%
Not applicable	2	

Table 40. Survey Question D2_5 Responses (n=215)

How often have you taken these actions in your home over the past 12 months? Adjust thermostat settings when leaving or sleeping.		
Response	**Count of Response**	**Percentage of Respondents**
Always	153	71%
Sometimes	42	20%
Never	20	9%
Not applicable	3	

Table 41. Survey Question D2_6 Responses (n=213)

How often have you taken these actions in your home over the past 12 months? Take shorter showers.		
Response	**Count of Response**	**Percentage of Respondents**
Always	77	36%
Sometimes	80	38%
Never	56	26%
Not applicable	5	

Table 42. Survey Question D2_7 Responses (n=210)

How often have you taken these actions in your home over the past 12 months? Setting and maintaining a lower water heater temperature.		
Response	**Count of Response**	**Percentage of Respondents**
Always	57	27%
Sometimes	53	25%
Never	100	48%
Not applicable	8	

Table 43. Survey Question D2_8 Responses (n=207)

How often have you taken these actions in your home over the past 12 months? Use energy-saving or "sleep" features of your computer.		
Response	**Count of Response**	**Percentage of Respondents**
Always	138	67%
Sometimes	33	16%
Never	36	17%
Not applicable	11	

Table 44. Survey Question D3_1 Responses (n=2)

What is the biggest challenge to replacing air filters for your air conditioners and heating systems?		
Response	**Count of Response**	**Percentage of Respondents**
I don't have control over this	2	100%

Table 45. Survey Question D3_2 Responses (n=1)

What is the biggest challenge to turning off lights in rooms that are unoccupied?		
Response	**Count of Response**	**Percentage of Respondents**
I don't have control over this	1	100%

Table 46. Survey Question D3_3 Responses (n=25)

What is the biggest challenge to washing laundry in cold water?		
Response	**Count of Response**	**Percentage of Respondents**
I am concerned about comfort	3	12%
I don't have control over this	2	8%
I don't see how it would help save energy	2	8%
I have safety or health concerns	18	72%

Table 47. Survey Question D3_4 Responses (n=75)

What is the biggest challenge to unplugging electronic equipment or appliances when not in use?		
Response	**Count of Response**	**Percentage of Respondents**
I am concerned about comfort	12	16%
I don't have control over this	2	3%
I don't see how it would help save energy	8	11%
I have safety or health concerns	2	3%
It is too inconvenient	51	68%

Table 48. Survey Question D3_5 Responses (n=20)

What is the biggest challenge to adjusting thermostat settings when leaving or sleeping?		
Response	**Count of Response**	**Percentage of Respondents**
I am concerned about comfort	8	40%
I don't have control over this	2	10%
I don't see how it would help save energy	3	15%
It is too inconvenient	7	35%

Table 49. Survey Question D3_6 Responses (n=55)

What is the biggest challenge to taking shorter showers?		
Response	**Count of Response**	**Percentage of Respondents**
I am concerned about comfort	25	45%
I don't have control over this	10	18%
I don't see how it would help save energy	2	4%
I have safety or health concerns	2	4%
It is too inconvenient	10	18%
I already take short showers	6	11%

Table 50. Survey Question D3_7 Responses (n=99)

What is the biggest challenge to setting and maintaining a lower water heater temperature?		
Response	**Count of Response**	**Percentage of Respondents**
I am concerned about comfort	35	35%
I don't have control over this	6	6%
I don't see how it would help save energy	6	6%
I have safety or health concerns	10	10%
It is too inconvenient	18	18%
Knowing how to do it	17	17%
Have not considered	2	2%
Already set to a low temp	5	5%

Table 51. Survey Question D3_8 Responses (n=35)

What is the biggest challenge to using energy-saving or "sleep" features of your computer?		
Response	**Count of Response**	**Percentage of Respondents**
I don't have control over this	3	9%
I don't see how it would help save energy	7	20%
It is too inconvenient	16	46%
Don't have or use computer very much	3	9%
Use automatic features of computer	2	6%
Have not considered	2	6%
Need it on all of the time	2	6%

Awareness of Energy Efficiency Programs

Table 52. Survey Question E1 Responses (n=216)

Are you familiar with any energy-efficiency rebates or programs offered by Ameren Missouri to help you use less energy?		
Response	**Count of Response**	**Percentage of Respondents**
Yes	112	52%
No	104	48%

Table 53. Survey Question E2 Responses (n=112)

Which Ameren Missouri energy-efficiency or rebate programs have you heard about?		
Response	**Count of Response**	**Percentage of Respondents**
Heating and Cooling: Rebate for installing efficient AC, heat pump or geothermal system	90	80%
EnergyStar Certified Products: Rebate for buying EnergyStar certified products such as pool pumps, air purifiers and more	64	57%
Smart Thermostat: Rebate for installing a smart thermostat	58	52%
Energy Efficient Lighting: Purchasing energy-efficient LED bulbs at reduced prices at local retailers or at the Ameren Missouri online store	58	52%
CommunitySavers: Energy saving opportunities for income eligible Multifamily housing (advertised through low income agencies)	14	13%
School Energy Education: Schools voluntarily sign up to distribute free energy savings kits to 6th grade students and their parents each school year	10	9%
None of the above	1	1%

Multiple responses allowed.

Table 54. Survey Question E3 Responses (n=215)

Have you visited Ameren Missouri's website to look for ways to save money on your bill?		
Response	**Count of Response**	**Percentage of Respondents**
Yes	42	20%
No	173	80%

Attitudes Toward Energy Efficiency

Table 55. Survey Question F1_1 Responses (n=202)

How much do you agree with the following statement? It is important to conserve energy as much as possible.		
Response	**Count of Response**	**Percentage of Respondents**
Strongly agree	100	50%
Somewhat agree	84	42%
Somewhat disagree	13	6%
Strongly disagree	5	2%

Table 56. Survey Question F1_2 Responses (n=202)

How much do you agree with the following statement? Using energy to keep the home comfortable is my top priority.		
Response	**Count of Response**	**Percentage of Respondents**
Strongly agree	44	22%
Somewhat agree	111	55%
Somewhat disagree	40	20%
Strongly disagree	7	3%

Table 57. Survey Question F1_3 Responses (n=202)

How much do you agree with the following statement? I am committed to actions that help the environment.		
Response	**Count of Response**	**Percentage of Respondents**
Strongly agree	70	35%
Somewhat agree	110	54%
Somewhat disagree	17	8%
Strongly disagree	5	2%

Table 58. Survey Question F1_4 Responses (n=202)

How much do you agree with the following statement? I would like to save more energy but do not know where to start.		
Response	**Count of Response**	**Percentage of Respondents**
Strongly agree	15	7%
Somewhat agree	59	29%
Somewhat disagree	90	45%
Strongly disagree	38	19%

Table 59. Survey Question F1_5 Responses (n=202)

How much do you agree with the following statement? I have already done as much as possible to save energy in my home.		
Response	Count of Response	Percentage of Respondents
Strongly agree	30	15%
Somewhat agree	90	45%
Somewhat disagree	72	36%
Strongly disagree	10	5%

Table 60. Survey Question F1_6 Responses (n=202)

How much do you agree with the following statement? Energy-efficient products are too expensive.		
Response	Count of Response	Percentage of Respondents
Strongly agree	38	19%
Somewhat agree	76	38%
Somewhat disagree	63	31%
Strongly disagree	25	12%

Table 61. Survey Question F1_7 Responses (n=202)

How much do you agree with the following statement? Health or comfort issues in my household require higher energy use.		
Response	Count of Response	Percentage of Respondents
Strongly agree	20	10%
Somewhat agree	79	39%
Somewhat disagree	72	36%
Strongly disagree	31	15%

Table 62. Survey Question F1_8 Responses (n=202)

How much do you agree with the following statement? I have tried a few things to save energy but have not seen any real savings on my utility bills.		
Response	Count of Response	Percentage of Respondents
Strongly agree	36	18%
Somewhat agree	89	44%
Somewhat disagree	55	27%
Strongly disagree	22	11%

Table 63. Survey Question F1_9 Responses (n=202)

How much do you agree with the following statement? I have an older, leaky, or non-efficient home.		
Response	**Count of Response**	**Percentage of Respondents**
Strongly agree	26	13%
Somewhat agree	58	29%
Somewhat disagree	59	29%
Strongly disagree	59	29%

Table 64. Survey Question F1_10 Responses (n=202)

How much do you agree with the following statement? I cannot control energy use by other household members.		
Response	**Count of Response**	**Percentage of Respondents**
Strongly agree	22	11%
Somewhat agree	58	29%
Somewhat disagree	60	30%
Strongly disagree	62	31%

Table 65. Survey Question F1_11 Responses (n=202)

How much do you agree with the following statement? I need energy for a home business or hobby in my household.		
Response	**Count of Response**	**Percentage of Respondents**
Strongly agree	18	9%
Somewhat agree	58	29%
Somewhat disagree	45	22%
Strongly disagree	81	40%

Table 66. Survey Question F1_12 Responses (n=202)

How much do you agree with the following statement? My highest-priority home renovations are not related to saving energy.		
Response	**Count of Response**	**Percentage of Respondents**
Strongly agree	29	14%
Somewhat agree	81	40%
Somewhat disagree	66	33%
Strongly disagree	26	13%

Table 67. Survey Question F1_13 Responses (n=202)

How much do you agree with the following statement? Energy-using equipment or appliances in my household are in need of repair.		
Response	Count of Response	Percentage of Respondents
Strongly agree	7	3%
Somewhat agree	31	15%
Somewhat disagree	60	30%
Strongly disagree	104	51%

Table 68. Survey Question F1_14 Responses (n=202)

How much do you agree with the following statement? I am not willing to replace things that are working just fine.		
Response	Count of Response	Percentage of Respondents
Strongly agree	43	21%
Somewhat agree	103	51%
Somewhat disagree	43	21%
Strongly disagree	13	6%

Table 69. Survey Question F1_15 Responses (n=202)

How much do you agree with the following statement? I am not interested in energy savings.		
Response	Count of Response	Percentage of Respondents
Strongly agree	5	2%
Somewhat agree	22	11%
Somewhat disagree	45	22%
Strongly disagree	130	64%

Table 70. Survey Question F1_16 Responses (n=202)

How much do you agree with the following statement? There are no challenges to saving energy in my home.		
Response	Count of Response	Percentage of Respondents
Strongly agree	9	4%
Somewhat agree	51	25%
Somewhat disagree	102	50%
Strongly disagree	40	20%

Satisfaction

Table 71. Survey Question G1 Responses (n=202)

Thinking about your overall experiences with Ameren Missouri as your utility, how satisfied would you say you are with Ameren Missouri?		
Response	**Count of Response**	**Percentage of Respondents**
Very satisfied	95	47%
Somewhat satisfied	96	48%
Not too satisfied	8	4%
Not satisfied at all	3	1%

Table 72. Survey Question G2 Responses (n=203)

Why are you [very satisfied/somewhat satisfied/not too satisfied/not satisfied at all]?			
Satisfaction	**Response**	**Count of Response**	**Percentage of Respondents**
Not satisfied at all			
Not satisfied at all	Costs	2	1%
Not satisfied at all	Reliability	1	1%
Not too satisfied			
Not too satisfied	Costs	14	7%
Not too satisfied	Customer service/communication	4	2%
Not too satisfied	Do not see effects of EE on bill	2	1%
Not too satisfied	Environmental concerns	1	1%
Not too satisfied	HER reports	1	1%
Not too satisfied	Operations/infrastructure	1	1%
Not too satisfied	Reliability	2	1%
Somewhat satisfied			
Somewhat satisfied	Costs	23	12%
Somewhat satisfied	Customer service/communication	3	2%
Somewhat satisfied	Environmental concerns	2	1%
Somewhat satisfied	Not specified	27	14%
Somewhat satisfied	Only utility option	5	3%
Somewhat satisfied	Reliability	14	7%
Somewhat satisfied	Renewable and EE options (want more)	4	2%
Very satisfied			
Very satisfied	Costs	9	5%
Very satisfied	Customer service/communication	17	9%
Very satisfied	HER reports	2	1%
Very satisfied	Not specified	25	13%
Very satisfied	Online payment available	1	1%
Very satisfied	Only utility option	9	5%
Very satisfied	Reliability	28	14%
Very satisfied	Renewable and EE options	6	3%

Table 73. Survey Question G3 Responses (n=197)

How much do you agree with the following statement? Overall, I am satisfied with the Home Energy Reports.		
Response	**Count of Response**	**Percentage of Respondents**
Strongly agree	60	30%
Somewhat agree	119	60%
Somewhat disagree	12	6%
Strongly disagree	6	3%

Table 74. Survey Question G4 Responses (n=197)

As a result of receiving the Home Energy Reports, would you say your satisfaction with Ameren Missouri has…		
Response	**Count of Response**	**Percentage of Respondents**
Increased	64	32%
Stayed the same	125	63%
Decreased	8	4%

Table 75. Survey Question G5 Responses (n=40)

What suggestions, if any, do you have for improving the Home Energy Reports?		
Response	**Count of Response**	**Percentage of Respondents**
Clarify characteristics of similar homes in comparison (e.g., all electric versus gas heating, home all day versus out during business hours, number of people in household, presence of EV(s) or pool)	11	28%
Offer (more/better) discounts/rebates	6	15%
Remove paper/mail option	4	10%
Describe adjustments for variation in temperatures	3	8%
Add an online portal	2	5%
Decrease costs/taxes	2	5%
Disaggregate energy usage into end-uses and/or time of day	2	5%
Easier or cheaper tips (e.g. DIY)	2	5%
Love customer specific comparison	2	5%
More tips	2	5%
Update the HER report to account for upgrades I have made	2	5%
Use more (recent) data for customer specific comparison	2	5%
Improve Ameren Missouri infrastructure	1	3%
Include detailed energy usage	1	3%
Increase HER report accuracy	1	3%
Peak pricing messaging	1	3%
Project future costs	1	3%
Recommend contractors for upgrades	1	3%
Show energy use	1	3%

*Multiple responses allowed.

Customer Characteristics

Table 76. Survey Question H1_1 Responses (n=193)

How often do you check you utility bill sent by mail?		
Response	Count of Response	Percentage of Respondents
Always	125	65%
Sometimes	17	9%
Never	51	26%

Table 77. Survey Question H1_2 Responses (n=193)

How often do you check your utility bill sent by email?		
Response	Count of Response	Percentage of Respondents
Always	74	38%
Sometimes	33	17%
Never	86	45%

Table 78. Survey Question H1_3 Responses (n=193)

How often do you check your utility bill sent by text?		
Response	Count of Response	Percentage of Respondents
Always	30	16%
Sometimes	9	5%
Never	154	80%

Table 79. Survey Question H2 Responses (n=193)

Which of the following best describes your home…		
Response	Count of Response	Percentage of Respondents
A single-family detached residence	165	85%
Attached house (such as a townhouse, row house, or twin)	18	9%
Multifamily apartment or condo building with 4 or more units	8	4%
Mobile or manufactured home	1	1%
Prefer not to answer	1	1%

Table 80. Survey Question H3 Responses (n=190)

Do you own or rent this home?		
Response	Count of Response	Percentage of Respondents
Own/buying	176	93%
Rent/lease	14	7%
Prefer not to answer	2	

Table 81. Survey Question H4 Responses (n=179)

Counting yourself, how many people live in your home for most of the year?		
Response	Count of Response	Percentage of Respondents
1	23	13%
2	73	41%
3	38	21%
4	31	17%
5	10	6%
6	3	2%
7	1	1%

Table 82. Survey Question H5 Responses (n=180)

How old are you?		
Response	Count of Response	Percentage of Respondents
18-24	1	1%
25-34	25	14%
35-44	31	17%
45-54	47	26%
55-64	32	18%
65-74	33	18%
75 and older	11	6%
I prefer not to answer this question	13	

Table 83. Survey Question H6 Responses (n=131)

What is the total combined income of all members of your household over the past 12 months?		
Response	Count of Response	Percentage of Respondents
Less than $20,000	3	2%
$20,000 to less than $50,000	24	18%
$50,000 to less than $75,000	26	20%
$75,000 to less than $100,000	21	16%
$100,000 to less than $150,000	34	26%
$150,000 to less than $200,000	16	12%
$200,000 or more	7	5%
I prefer not to answer this question	62	

Appendix G. Billing Regression Model Specification and Estimation Results

This appendix provides details on the regression model Cadmus team selected for the analysis and the estimation results.

Cadmus used both the difference-in-differences approach and the post-only approach to fit numerous regression models.[3] The team selected the fully specified post-only model as the final evaluation model, which included the following:

- A program treatment group indicator variable
- Month-by-year fixed effects
- Pre-treatment consumption
- Pre-treatment consumption interacted with the month-by-year fixed effects

By including aggregated pre-treatment consumption in the regression, Cadmus controlled for differences between customers with respect to average energy use in the pre-period.

The team specified the post-only model assuming average daily consumption (ADC) of electricity for customer 'i' in month 't' depended on pre-usage and weather variables, as shown in Equation 1:

$$ADC_{it} = \beta_1 PART_i \times PY_{it} + \beta_2 Pre\text{-}Usage_i + \beta_3 Pre\text{-}Summer_i + \beta_4 Pre\text{-}Winter_i + \beta_5 Pre\text{-}Usage_i \times \tau_t + \beta_6 Pre\text{-}Summer_i \times \tau_t + \beta_7 Pre\text{-}Winter_i \times \tau_t + W'\gamma + \tau_t + \varepsilon_{it}$$

Equation 1

Where:

β_1 = Vector of coefficients representing the program's conditional average treatment effect on electricity use (average kWh per customer per day) during each given program year

$PART_i$ = Indicator variable for program participation (equaling 1 if customer 'i' is in the treatment group and 0 otherwise)

PY_{it} = Indicator variable for each given program year (equaling 1 if month '*t*' occurred in the given program year for customer '*i*' and 0 otherwise).

Pre-Usage = Mean household energy consumption across all pretreatment months

Pre-Summer= Mean household energy consumption during June, July, August, and September of the pretreatment period

[3] The post-only approach is described in Alcott and Rogers (2014). Allcott, Hunt, and T. Rogers. "The Short-Run and Long-Run Effects of Behavioral Interventions: Experimental Evidence from Energy Conservation." *American Economic Review*. 104(10): 3003-37. 2014.

Pre-Winter = Mean household energy consumption during December, January, February, and March of the pretreatment period

W = Vector using CDD and HDD variables to control for weather impacts on energy use

γ = Vector of coefficients representing the weather variables' average impact on energy use

τ_t = Average energy use in month 't' reflecting unobservable factors specific to the month also referred to as "month-by-year fixed effects"

ε_{it} = Error term for home 'i' in month 't'

The error term ε_{it} remains uncorrelated with program participation ($PART_i$) and other observable variables due to random assignment of customers to the treatment and control groups. Ordinary least squares resulted in an unbiased estimate of the average daily savings.[4] The estimated coefficient β_1 represents the program's average treatment effect (i.e., the daily kWh savings impact) on the population of customers in the treatment group.

Table 84, Table 85, Table 86, and Table 87 list the regression estimates for each parameter in the final regression model for Wave 1, Wave 2, Wave 3, and Wave eHER customers, respectively.

Table 84. Regression Model Estimates (Wave 1)

Variable	Estimate	Standard Error	95% Confidence Interval		z-statistic	Pr>|z|
			Lower	Upper		
pre_adc	0.1190	0.0137	0.0921	0.1458	8.6933	<0.0001
pre_winter	0.3973	0.0067	0.3842	0.4105	59.3168	<0.0001
pre_summer	0.4001	0.0057	0.3890	0.4112	70.7122	<0.0001
yr2016_month_8	7.0368	0.0547	6.9296	7.1439	128.7216	<0.0001
yr2016_month_9	-3.2010	0.0583	-3.3153	-3.0868	-54.9069	<0.0001
yr2016_month_10	3.0678	0.0496	2.9705	3.1651	61.7962	<0.0001
yr2016_month_11	5.8456	0.0550	5.7378	5.9535	106.2059	<0.0001
yr2016_month_12	-2.0048	0.0759	-2.1536	-1.8560	-26.4038	<0.0001
yr2017_month_1	-0.4032	0.0713	-0.5430	-0.2635	-5.6563	<0.0001
yr2017_month_2	4.6261	0.0600	4.5086	4.7436	77.1634	<0.0001
yr2017_month_3	6.4459	0.0535	6.3411	6.5507	120.5531	<0.0001
yr2017_month_4	5.0910	0.0479	4.9972	5.1848	106.3638	<0.0001
yr2017_month_5	0.1487	0.0578	0.0354	0.2621	2.5717	0.0101

[4] The random assignment of customers to treatment and control groups were tested by comparing the means of observable characteristics of customers in each group or by regressing a dummy variable for participation ($PART_i$) on observable variables. The group means were not significantly different and the coefficients of the variables in the regression were not be significant. Correlation will occur in each customer's consumption over time and the estimated standard errors were corrected for this correlation.

Variable	Estimate	Standard Error	95% Confidence Interval		z-statistic	Pr>|z|
			Lower	Upper		
yr2017_month_6	-3.3606	0.0709	-3.4995	-3.2217	-47.4125	<0.0001
yr2017_month_7	-1.8005	0.0875	-1.9721	-1.6290	-20.5680	<0.0001
yr2017_month_8	-2.1921	0.0678	-2.3250	-2.0591	-32.3097	<0.0001
yr2017_month_9	-1.2476	0.0624	-1.3699	-1.1253	-19.9969	<0.0001
yr2017_month_10	5.6550	0.0530	5.5510	5.7589	106.6194	<0.0001
yr2017_month_11	6.0153	0.0564	5.9047	6.1260	106.5742	<0.0001
yr2017_month_12	-2.0287	0.0824	-2.1901	-1.8673	-24.6336	<0.0001
yr2018_month_1	-4.9384	0.1134	-5.1605	-4.7162	-43.5652	<0.0001
yr2018_month_2	0.8345	0.0735	0.6904	0.9787	11.3465	<0.0001
yr2018_month_3	4.2685	0.0611	4.1488	4.3882	69.8870	<0.0001
yr2018_month_4	6.6711	0.0513	6.5706	6.7716	130.1320	<0.0001
yr2018_month_5	0.3991	0.0618	0.2781	0.5202	6.4629	<0.0001
yr2018_month_6	-0.9276	0.0844	-1.0930	-0.7622	-10.9902	<0.0001
yr2018_month_7	-0.4085	0.0843	-0.5738	-0.2432	-4.8428	<0.0001
yr2018_month_8	-0.7082	0.0728	-0.8508	-0.5655	-9.7301	<0.0001
yr2019_month_1	-1.9767	0.0839	-2.1412	-1.8122	-23.5562	<0.0001
yr2019_month_2	-2.5689	0.1276	-2.8191	-2.3188	-20.1271	<0.0001
preusage_yr2016_month_9	0.5971	0.0151	0.5676	0.6266	39.6477	<0.0001
preusage_yr2016_month_10	2.1470	0.0152	2.1172	2.1768	141.2052	<0.0001
preusage_yr2016_month_11	1.3118	0.0154	1.2817	1.3419	85.3592	<0.0001
preusage_yr2016_month_12	-0.9090	0.0195	-0.9473	-0.8708	-46.6062	<0.0001
preusage_yr2017_month_1	-0.9199	0.0188	-0.9568	-0.8830	-48.9241	<0.0001
preusage_yr2017_month_2	0.1776	0.0163	0.1457	0.2095	10.9186	<0.0001
preusage_yr2017_month_3	0.9113	0.0154	0.8811	0.9416	59.0017	<0.0001
preusage_yr2017_month_4	2.0640	0.0152	2.0342	2.0937	136.0537	<0.0001
preusage_yr2017_month_5	1.6832	0.0162	1.6516	1.7149	104.1728	<0.0001
preusage_yr2017_month_6	0.1177	0.0173	0.0839	0.1516	6.8234	<0.0001
preusage_yr2017_month_7	-0.8893	0.0185	-0.9257	-0.8530	-47.9885	<0.0001
preusage_yr2017_month_8	0.3044	0.0168	0.2715	0.3373	18.1210	<0.0001
preusage_yr2017_month_9	0.9591	0.0160	0.9276	0.9905	59.8183	<0.0001
preusage_yr2017_month_10	1.6952	0.0136	1.6686	1.7219	124.7712	<0.0001
preusage_yr2017_month_11	0.8121	0.0149	0.7828	0.8413	54.4239	<0.0001
preusage_yr2017_month_12	-1.0071	0.0197	-1.0458	-0.9685	-51.0844	<0.0001
preusage_yr2018_month_1	-2.0187	0.0233	-2.0643	-1.9731	-86.7681	<0.0001
preusage_yr2018_month_2	-0.9129	0.0183	-0.9489	-0.8769	-49.7605	<0.0001
preusage_yr2018_month_3	-0.0435	0.0162	-0.0753	-0.0117	-2.6829	0.0073
preusage_yr2018_month_4	1.0012	0.0133	0.9751	1.0273	75.1561	<0.0001

Variable	Estimate	Standard Error	95% Confidence Interval		z-statistic	Pr>|z|
			Lower	Upper		
preusage_yr2018_month_5	0.8981	0.0160	0.8667	0.9296	55.9689	<0.0001
preusage_yr2018_month_6	-0.4115	0.0185	-0.4477	-0.3752	-22.2479	<0.0001
preusage_yr2018_month_7	-0.6343	0.0182	-0.6699	-0.5987	-34.8899	<0.0001
preusage_yr2018_month_8	-0.1305	0.0163	-0.1624	-0.0986	-8.0099	<0.0001
preusage_yr2019_month_1	-1.5267	0.0199	-1.5656	-1.4878	-76.8703	<0.0001
preusage_yr2019_month_2	-1.6784	0.0370	-1.7510	-1.6058	-45.3119	<0.0001
prewinter_yr2016_month_9	-0.7081	0.0074	-0.7225	-0.6937	-96.2417	<0.0001
prewinter_yr2016_month_10	-1.3195	0.0074	-1.3341	-1.3049	-177.2465	<0.0001
prewinter_yr2016_month_11	-0.4990	0.0075	-0.5138	-0.4842	-66.1190	<0.0001
prewinter_yr2016_month_12	1.1610	0.0096	1.1421	1.1798	120.4597	<0.0001
prewinter_yr2017_month_1	1.1270	0.0093	1.1088	1.1452	121.3189	<0.0001
prewinter_yr2017_month_2	0.2752	0.0080	0.2595	0.2909	34.3570	<0.0001
prewinter_yr2017_month_3	-0.2770	0.0076	-0.2919	-0.2621	-36.4581	<0.0001
prewinter_yr2017_month_4	-1.1449	0.0074	-1.1595	-1.1304	-154.1132	<0.0001
prewinter_yr2017_month_5	-1.1307	0.0079	-1.1462	-1.1152	-143.2523	<0.0001
prewinter_yr2017_month_6	-0.4960	0.0084	-0.5125	-0.4795	-58.9720	<0.0001
prewinter_yr2017_month_7	-0.0423	0.0090	-0.0599	-0.0246	-4.6932	<0.0001
prewinter_yr2017_month_8	-0.5870	0.0082	-0.6030	-0.5709	-71.6848	<0.0001
prewinter_yr2017_month_9	-0.8698	0.0078	-0.8851	-0.8545	-111.1806	<0.0001
prewinter_yr2017_month_10	-1.0087	0.0067	-1.0217	-0.9956	-151.4306	<0.0001
prewinter_yr2017_month_11	-0.1839	0.0073	-0.1983	-0.1695	-25.0437	<0.0001
prewinter_yr2017_month_12	1.2109	0.0098	1.1916	1.2301	123.3604	<0.0001
prewinter_yr2018_month_1	1.9495	0.0116	1.9268	1.9723	168.2127	<0.0001
prewinter_yr2018_month_2	1.0830	0.0091	1.0652	1.1008	119.2374	<0.0001
prewinter_yr2018_month_3	0.4491	0.0080	0.4334	0.4649	55.9156	<0.0001
prewinter_yr2018_month_4	-0.3649	0.0066	-0.3778	-0.3521	-55.5433	<0.0001
prewinter_yr2018_month_5	-0.7979	0.0079	-0.8133	-0.7825	-101.5968	<0.0001
prewinter_yr2018_month_6	-0.2665	0.0090	-0.2842	-0.2489	-29.5516	<0.0001
prewinter_yr2018_month_7	-0.1594	0.0089	-0.1768	-0.1420	-17.9941	<0.0001
prewinter_yr2018_month_8	-0.3884	0.0080	-0.4040	-0.3728	-48.8322	<0.0001
prewinter_yr2019_month_1	1.5676	0.0099	1.5482	1.5870	158.4642	<0.0001
prewinter_yr2019_month_2	1.7094	0.0184	1.6733	1.7456	92.7017	<0.0001
presummer_yr2016_month_9	0.1617	0.0063	0.1494	0.1740	25.8300	<0.0001
presummer_yr2016_month_10	-0.8408	0.0063	-0.8531	-0.8286	-134.5225	<0.0001
presummer_yr2016_month_11	-0.7962	0.0063	-0.8087	-0.7838	-125.4671	<0.0001
presummer_yr2016_month_12	-0.1055	0.0081	-0.1213	-0.0897	-13.0609	<0.0001
presummer_yr2017_month_1	-0.1172	0.0078	-0.1325	-0.1019	-15.0456	<0.0001

Variable	Estimate	Standard Error	95% Confidence Interval		z-statistic	Pr>|z|
			Lower	Upper		
presummer_yr2017_month_2	-0.4798	0.0067	-0.4930	-0.4666	-71.2591	<0.0001
presummer_yr2017_month_3	-0.6995	0.0064	-0.7120	-0.6870	-109.8128	<0.0001
presummer_yr2017_month_4	-0.9565	0.0062	-0.9688	-0.9443	-153.1938	<0.0001
presummer_yr2017_month_5	-0.5166	0.0067	-0.5298	-0.5034	-76.8543	<0.0001
presummer_yr2017_month_6	0.4331	0.0073	0.4188	0.4474	59.3087	<0.0001
presummer_yr2017_month_7	0.9674	0.0079	0.9519	0.9829	122.2067	<0.0001
presummer_yr2017_month_8	0.3187	0.0071	0.3048	0.3327	44.8751	<0.0001
presummer_yr2017_month_9	-0.0871	0.0067	-0.1002	-0.0739	-12.9557	<0.0001
presummer_yr2017_month_10	-0.7276	0.0056	-0.7387	-0.7166	-129.0648	<0.0001
presummer_yr2017_month_11	-0.6673	0.0062	-0.6795	-0.6552	-107.6293	<0.0001
presummer_yr2017_month_12	-0.0821	0.0082	-0.0981	-0.0660	-10.0295	<0.0001
presummer_yr2018_month_1	0.2126	0.0096	0.1937	0.2315	22.0692	<0.0001
presummer_yr2018_month_2	-0.1529	0.0076	-0.1678	-0.1379	-20.0482	<0.0001
presummer_yr2018_month_3	-0.4392	0.0067	-0.4524	-0.4260	-65.2434	<0.0001
presummer_yr2018_month_4	-0.6807	0.0055	-0.6914	-0.6699	-123.9732	<0.0001
presummer_yr2018_month_5	-0.0909	0.0068	-0.1042	-0.0776	-13.4142	<0.0001
presummer_yr2018_month_6	0.7187	0.0079	0.7031	0.7343	90.4904	<0.0001
presummer_yr2018_month_7	0.8174	0.0078	0.8021	0.8328	104.2268	<0.0001
presummer_yr2018_month_8	0.5222	0.0070	0.5085	0.5360	74.4970	<0.0001
presummer_yr2019_month_1	0.0419	0.0082	0.0258	0.0581	5.0918	<0.0001
presummer_yr2019_month_2	0.0552	0.0153	0.0253	0.0851	3.6178	0.0003
hdd_day	-1.1088	0.0072	-1.1230	-1.0946	-153.3605	<0.0001
cdd_day	-0.0566	0.0166	-0.0893	-0.0240	-3.4035	0.0007
hdd_day_sq	0.0634	0.0005	0.0624	0.0645	118.3824	<0.0001
cdd_day_sq	0.0702	0.0021	0.0660	0.0744	32.8385	<0.0001
hdd_day_cub	-0.0008	<0.0001	-0.0008	-0.0008	-66.0327	<0.0001
cdd_day_cub	-0.0025	0.0001	-0.0026	-0.0023	-34.7232	<0.0001
part_PY1	-0.0481	0.0248	-0.0968	0.0006	-1.9378	0.0527
part_PY2	-0.1277	0.0284	-0.1834	-0.0720	-4.4934	<0.0001
part_PY3	-0.2772	0.0370	-0.3497	-0.2048	-7.4960	<0.0001

Table 85. Regression Model Estimates (Wave 2)

Variable	Estimate	Standard Error	95% Confidence Interval		z-statistic	Pr>|z|
			Lower	Upper		
pre_adc	2.7664	0.0333	2.7011	2.8318	82.9918	<0.0001
pre_winter	-1.0529	0.0146	-1.0814	-1.0244	-72.3356	<0.0001

Variable	Estimate	Standard Error	95% Confidence Interval		z-statistic	Pr>|z|
			Lower	Upper		
pre_summer	-0.6999	0.0156	-0.7305	-0.6694	-44.8447	<0.0001
yr2017_month_5	-0.6097	0.3501	-1.2959	0.0765	-1.7415	0.0816
yr2017_month_6	-1.6898	0.4092	-2.4918	-0.8878	-4.1297	<0.0001
yr2017_month_7	-0.7560	0.4533	-1.6443	0.1324	-1.6679	0.0953
yr2017_month_8	-0.5009	0.3987	-1.2824	0.2806	-1.2563	0.2090
yr2017_month_9	-0.1988	0.3727	-0.9293	0.5316	-0.5335	0.5937
yr2017_month_10	2.4619	0.4025	1.6730	3.2508	6.1162	<0.0001
yr2017_month_11	2.2957	0.4903	1.3347	3.2566	4.6823	<0.0001
yr2017_month_12	-2.2408	0.6496	-3.5141	-0.9675	-3.4493	0.0006
yr2018_month_1	-4.1697	0.7116	-5.5644	-2.7749	-5.8594	<0.0001
yr2018_month_2	-0.6947	0.6110	-1.8921	0.5028	-1.1370	0.2555
yr2018_month_3	1.3578	0.5567	0.2667	2.4489	2.4391	0.0147
yr2018_month_4	2.7976	0.4784	1.8601	3.7352	5.8485	<0.0001
yr2018_month_5	0.7790	0.4210	-0.0461	1.6041	1.8504	0.0643
yr2018_month_6	0.7011	0.4658	-0.2118	1.6139	1.5052	0.1323
yr2018_month_7	1.0134	0.4667	0.0987	1.9282	2.1714	0.0299
yr2018_month_8	0.9027	0.4432	0.0341	1.7712	2.0369	0.0417
yr2018_month_9	1.4094	0.4212	0.5838	2.2349	3.3460	0.0008
yr2018_month_10	3.8064	0.4796	2.8664	4.7463	7.9367	<0.0001
yr2018_month_11	1.0081	0.5966	-0.1613	2.1774	1.6896	0.0911
yr2018_month_12	-0.5428	0.6409	-1.7989	0.7133	-0.8469	0.3970
yr2019_month_1	-2.1777	0.6954	-3.5407	-0.8148	-3.1317	0.0017
yr2019_month_2	-3.1856	0.7724	-4.6994	-1.6718	-4.1245	<0.0001
preusage_yr2017_month_6	-1.6949	0.0310	-1.7557	-1.6342	-54.6812	<0.0001
preusage_yr2017_month_7	-2.8050	0.0474	-2.8980	-2.7120	-59.1189	<0.0001
preusage_yr2017_month_8	-1.6449	0.0416	-1.7265	-1.5634	-39.5337	<0.0001
preusage_yr2017_month_9	-0.9996	0.0403	-1.0786	-0.9206	-24.7944	<0.0001
preusage_yr2017_month_10	-0.2731	0.0427	-0.3569	-0.1894	-6.3899	<0.0001
preusage_yr2017_month_11	-1.4036	0.0677	-1.5363	-1.2710	-20.7416	<0.0001
preusage_yr2017_month_12	-3.1945	0.0807	-3.3526	-3.0364	-39.6040	<0.0001
preusage_yr2018_month_1	-4.2368	0.0871	-4.4075	-4.0660	-48.6338	<0.0001
preusage_yr2018_month_2	-3.2434	0.0696	-3.3798	-3.1070	-46.6031	<0.0001
preusage_yr2018_month_3	-2.3395	0.0656	-2.4680	-2.2110	-35.6833	<0.0001
preusage_yr2018_month_4	-1.2069	0.0561	-1.3167	-1.0970	-21.5296	<0.0001
preusage_yr2018_month_5	-1.2605	0.0478	-1.3542	-1.1668	-26.3681	<0.0001
preusage_yr2018_month_6	-2.5977	0.0606	-2.7164	-2.4790	-42.8896	<0.0001
preusage_yr2018_month_7	-2.7966	0.0635	-2.9210	-2.6721	-44.0440	<0.0001

Variable	Estimate	Standard Error	95% Confidence Interval		z-statistic	Pr>|z|
			Lower	Upper		
preusage_yr2018_month_8	-2.3198	0.0598	-2.4370	-2.2026	-38.7794	<0.0001
preusage_yr2018_month_9	-1.7062	0.0542	-1.8125	-1.6000	-31.4689	<0.0001
preusage_yr2018_month_10	-1.0416	0.0576	-1.1546	-0.9286	-18.0688	<0.0001
preusage_yr2018_month_11	-2.4962	0.0779	-2.6489	-2.3435	-32.0375	<0.0001
preusage_yr2018_month_12	-3.1861	0.0824	-3.3476	-3.0245	-38.6554	<0.0001
preusage_yr2019_month_1	-3.9876	0.0944	-4.1725	-3.8026	-42.2585	<0.0001
preusage_yr2019_month_2	-3.9842	0.1287	-4.2364	-3.7320	-30.9616	<0.0001
prewinter_yr2017_month_6	0.6234	0.0135	0.5970	0.6499	46.2328	<0.0001
prewinter_yr2017_month_7	1.0889	0.0206	1.0486	1.1292	52.9341	<0.0001
prewinter_yr2017_month_8	0.5935	0.0181	0.5581	0.6290	32.7819	<0.0001
prewinter_yr2017_month_9	0.3407	0.0176	0.3063	0.3752	19.3817	<0.0001
prewinter_yr2017_month_10	0.2428	0.0187	0.2061	0.2795	12.9708	<0.0001
prewinter_yr2017_month_11	1.1564	0.0299	1.0979	1.2150	38.7298	<0.0001
prewinter_yr2017_month_12	2.4711	0.0362	2.4001	2.5420	68.2969	<0.0001
prewinter_yr2018_month_1	3.1684	0.0393	3.0915	3.2453	80.7206	<0.0001
prewinter_yr2018_month_2	2.3921	0.0313	2.3308	2.4534	76.4816	<0.0001
prewinter_yr2018_month_3	1.7793	0.0293	1.7220	1.8367	60.7980	<0.0001
prewinter_yr2018_month_4	0.9627	0.0248	0.9142	1.0112	38.8820	<0.0001
prewinter_yr2018_month_5	0.4992	0.0209	0.4583	0.5402	23.8767	<0.0001
prewinter_yr2018_month_6	0.9943	0.0264	0.9425	1.0462	37.6019	<0.0001
prewinter_yr2018_month_7	1.0838	0.0278	1.0294	1.1382	39.0569	<0.0001
prewinter_yr2018_month_8	0.8838	0.0261	0.8326	0.9350	33.8425	<0.0001
prewinter_yr2018_month_9	0.6480	0.0237	0.6016	0.6943	27.3821	<0.0001
prewinter_yr2018_month_10	0.6808	0.0252	0.6313	0.7303	26.9736	<0.0001
prewinter_yr2018_month_11	1.8879	0.0345	1.8202	1.9555	54.7103	<0.0001
prewinter_yr2018_month_12	2.3565	0.0365	2.2848	2.4281	64.4853	<0.0001
prewinter_yr2019_month_1	2.9178	0.0420	2.8355	3.0000	69.5296	<0.0001
prewinter_yr2019_month_2	2.9766	0.0571	2.8648	3.0885	52.1625	<0.0001
presummer_yr2017_month_6	1.0927	0.0150	1.0634	1.1220	73.0565	<0.0001
presummer_yr2017_month_7	1.7293	0.0227	1.6848	1.7739	76.0678	<0.0001
presummer_yr2017_month_8	1.0286	0.0198	0.9897	1.0675	51.8360	<0.0001
presummer_yr2017_month_9	0.5933	0.0190	0.5560	0.6306	31.1966	<0.0001
presummer_yr2017_month_10	-0.0550	0.0199	-0.0939	-0.0161	-2.7687	0.0056
presummer_yr2017_month_11	0.1729	0.0312	0.1118	0.2339	5.5471	<0.0001
presummer_yr2017_month_12	0.8253	0.0371	0.7527	0.8980	22.2577	<0.0001
presummer_yr2018_month_1	1.2090	0.0402	1.1303	1.2878	30.0904	<0.0001
presummer_yr2018_month_2	0.8512	0.0323	0.7879	0.9145	26.3487	<0.0001

Variable	Estimate	Standard Error	95% Confidence Interval		z-statistic	Pr>|z|
			Lower	Upper		
presummer_yr2018_month_3	0.5013	0.0305	0.4416	0.5610	16.4587	<0.0001
presummer_yr2018_month_4	0.1520	0.0259	0.1012	0.2028	5.8630	<0.0001
presummer_yr2018_month_5	0.6973	0.0227	0.6529	0.7417	30.7776	<0.0001
presummer_yr2018_month_6	1.5861	0.0291	1.5292	1.6431	54.5714	<0.0001
presummer_yr2018_month_7	1.6831	0.0305	1.6234	1.7429	55.2360	<0.0001
presummer_yr2018_month_8	1.3767	0.0285	1.3208	1.4326	48.2627	<0.0001
presummer_yr2018_month_9	0.9526	0.0257	0.9024	1.0029	37.1296	<0.0001
presummer_yr2018_month_10	0.2263	0.0267	0.1739	0.2786	8.4732	<0.0001
presummer_yr2018_month_11	0.5693	0.0362	0.4983	0.6402	15.7341	<0.0001
presummer_yr2018_month_12	0.8465	0.0384	0.7712	0.9218	22.0361	<0.0001
presummer_yr2019_month_1	1.1284	0.0439	1.0423	1.2145	25.6954	<0.0001
presummer_yr2019_month_2	1.1014	0.0597	0.9844	1.2184	18.4519	<0.0001
hdd_day	-0.4315	0.0508	-0.5311	-0.3318	-8.4880	<0.0001
cdd_day	0.1009	0.0908	-0.0770	0.2789	1.1118	0.2662
hdd_day_sq	0.0262	0.0028	0.0208	0.0317	9.4008	<0.0001
cdd_day_sq	0.0019	0.0093	-0.0163	0.0202	0.2087	0.8347
hdd_day_cub	-0.0003	<0.0001	-0.0004	-0.0002	-5.5516	<0.0001
cdd_day_cub	0.0006	0.0003	<0.0001	0.0011	1.9479	0.0514
part_PY2	0.0351	0.0816	-0.1249	0.1951	0.4299	0.6673
part_PY3	-0.1712	0.1097	-0.3862	0.0439	-1.5600	0.1188

Table 86. Regression Model Estimates (Wave 3)

Variable	Estimate	Standard Error	95% Confidence Interval		z-statistic	Pr>|z|
			Lower	Upper		
pre_adc	1.5901	0.0216	1.5478	1.6324	73.6259	<0.0001
pre_winter	-0.1856	0.0093	-0.2038	-0.1673	-19.9455	<0.0001
pre_summer	-0.5235	0.0103	-0.5437	-0.5033	-50.8298	<0.0001
yr2018_month_4	0.7826	0.2549	0.2830	1.2821	3.0706	0.0021
yr2018_month_5	0.0734	0.2857	-0.4865	0.6334	0.2570	0.7971
yr2018_month_6	1.6181	0.3067	1.0169	2.2193	5.2751	<0.0001
yr2018_month_7	2.2876	0.3078	1.6843	2.8909	7.4316	<0.0001
yr2018_month_8	1.9906	0.2921	1.4181	2.5631	6.8146	<0.0001
yr2018_month_9	1.0808	0.2853	0.5216	1.6401	3.7880	0.0002
yr2018_month_10	1.9062	0.2956	1.3269	2.4855	6.4496	<0.0001
yr2018_month_11	0.3648	0.3022	-0.2275	0.9572	1.2071	0.2274
yr2018_month_12	-0.8428	0.3341	-1.4977	-0.1879	-2.5223	0.0117
yr2019_month_1	-2.7530	0.3820	-3.5016	-2.0043	-7.2071	<0.0001

Variable	Estimate	Standard Error	95% Confidence Interval		z-statistic	Pr>|z|
			Lower	Upper		
yr2019_month_2	-3.0473	0.4366	-3.9030	-2.1916	-6.9800	<0.0001
preusage_yr2018_month_5	-0.7637	0.0229	-0.8084	-0.7189	-33.4149	<0.0001
preusage_yr2018_month_6	-2.0351	0.0311	-2.0960	-1.9743	-65.5405	<0.0001
preusage_yr2018_month_7	-2.2048	0.0329	-2.2692	-2.1404	-67.0954	<0.0001
preusage_yr2018_month_8	-1.8351	0.0303	-1.8945	-1.7757	-60.5510	<0.0001
preusage_yr2018_month_9	-0.9570	0.0311	-1.0179	-0.8961	-30.8079	<0.0001
preusage_yr2018_month_10	0.2828	0.0314	0.2213	0.3443	9.0106	<0.0001
preusage_yr2018_month_11	-0.6112	0.0400	-0.6895	-0.5328	-15.2840	<0.0001
preusage_yr2018_month_12	-1.0262	0.0411	-1.1067	-0.9457	-24.9894	<0.0001
preusage_yr2019_month_1	-1.9328	0.0470	-2.0249	-1.8407	-41.1209	<0.0001
preusage_yr2019_month_2	-2.0908	0.0688	-2.2256	-1.9559	-30.3856	<0.0001
prewinter_yr2018_month_5	-0.0948	0.0098	-0.1140	-0.0756	-9.6836	<0.0001
prewinter_yr2018_month_6	0.3811	0.0133	0.3551	0.4071	28.7275	<0.0001
prewinter_yr2018_month_7	0.4551	0.0140	0.4277	0.4826	32.4566	<0.0001
prewinter_yr2018_month_8	0.2981	0.0130	0.2727	0.3235	22.9899	<0.0001
prewinter_yr2018_month_9	-0.0525	0.0133	-0.0785	-0.0264	-3.9465	0.0001
prewinter_yr2018_month_10	-0.3049	0.0134	-0.3312	-0.2787	-22.7573	<0.0001
prewinter_yr2018_month_11	0.5468	0.0172	0.5132	0.5805	31.8400	<0.0001
prewinter_yr2018_month_12	0.8590	0.0176	0.8244	0.8935	48.7194	<0.0001
prewinter_yr2019_month_1	1.4262	0.0202	1.3865	1.4659	70.4565	<0.0001
prewinter_yr2019_month_2	1.5306	0.0295	1.4729	1.5884	51.9410	<0.0001
presummer_yr2018_month_5	0.9168	0.0112	0.8949	0.9387	82.0127	<0.0001
presummer_yr2018_month_6	1.7855	0.0151	1.7558	1.8152	117.9728	<0.0001
presummer_yr2018_month_7	1.8680	0.0160	1.8366	1.8994	116.6173	<0.0001
presummer_yr2018_month_8	1.6053	0.0148	1.5763	1.6342	108.7446	<0.0001
presummer_yr2018_month_9	1.0602	0.0150	1.0308	1.0897	70.5077	<0.0001
presummer_yr2018_month_10	0.0203	0.0150	-0.0091	0.0497	1.3547	0.1755
presummer_yr2018_month_11	0.1259	0.0192	0.0882	0.1635	6.5501	<0.0001
presummer_yr2018_month_12	0.3032	0.0197	0.2645	0.3419	15.3621	<0.0001
presummer_yr2019_month_1	0.6534	0.0226	0.6091	0.6976	28.9495	<0.0001
presummer_yr2019_month_2	0.6902	0.0329	0.6257	0.7547	20.9693	<0.0001
hdd_day	-0.0863	0.0360	-0.1569	-0.0158	-2.3981	0.0165
cdd_day	0.0480	0.0790	-0.1068	0.2028	0.6075	0.5436
hdd_day_sq	0.0046	0.0028	-0.0009	0.0101	1.6397	0.1011
cdd_day_sq	-0.0048	0.0098	-0.0239	0.0144	-0.4870	0.6262
hdd_day_cub	0.0001	0.0001	-0.0001	0.0002	1.0473	0.2950
cdd_day_cub	0.0011	0.0004	0.0004	0.0018	3.1322	0.0017
part_PY3	-0.2216	0.0542	-0.3279	-0.1153	-4.0847	<0.0001

Table 87. Regression Model Estimates (Wave eHER)

Variable	Estimate	Standard Error	95% Confidence Interval		z-statistic	Pr>|z|
			Lower	Upper		
pre_adc	1.3706	0.0968	1.1808	1.5604	14.1541	<0.0001
pre_winter	-0.0936	0.0431	-0.1781	-0.0091	-2.1718	0.0299
pre_summer	-0.4096	0.0481	-0.5039	-0.3152	-8.5089	<0.0001
yr2018_month_4	2.0795	1.8676	-1.5810	5.7400	1.1134	0.2655
yr2018_month_5	1.1885	1.7364	-2.2148	4.5919	0.6845	0.4937
yr2018_month_6	3.4178	1.7351	0.0171	6.8185	1.9698	0.0489
yr2018_month_7	4.0451	1.7406	0.6336	7.4567	2.3239	0.0201
yr2018_month_8	3.8994	1.7274	0.5137	7.2850	2.2574	0.0240
yr2018_month_9	2.9202	1.6959	-0.4036	6.2440	1.7219	0.0851
yr2018_month_10	3.0594	1.8670	-0.5999	6.7187	1.6387	0.1013
yr2018_month_11	2.8693	2.3537	-1.7439	7.4824	1.2190	0.2228
yr2018_month_12	2.2946	2.5472	-2.6979	7.2870	0.9008	0.3677
yr2019_month_1	0.6481	2.6753	-4.5954	5.8915	0.2422	0.8086
yr2019_month_2	0.3417	2.6296	-4.8121	5.4956	0.1300	0.8966
preusage_yr2018_month_5	-0.7996	0.0588	-0.9149	-0.6843	-13.5894	<0.0001
preusage_yr2018_month_6	-1.9327	0.0732	-2.0762	-1.7892	-26.3967	<0.0001
preusage_yr2018_month_7	-2.0476	0.0731	-2.1910	-1.9043	-27.9982	<0.0001
preusage_yr2018_month_8	-1.6516	0.0704	-1.7895	-1.5136	-23.4606	<0.0001
preusage_yr2018_month_9	-0.9311	0.0979	-1.1230	-0.7392	-9.5101	<0.0001
preusage_yr2018_month_10	0.1598	0.0910	-0.0186	0.3381	1.7556	0.0792
preusage_yr2018_month_11	-0.5954	0.1073	-0.8058	-0.3850	-5.5471	<0.0001
preusage_yr2018_month_12	-0.9476	0.1060	-1.1555	-0.7398	-8.9367	<0.0001
preusage_yr2019_month_1	-1.7802	0.1260	-2.0271	-1.5334	-14.1342	<0.0001
preusage_yr2019_month_2	-1.8883	0.2000	-2.2802	-1.4964	-9.4428	<0.0001
prewinter_yr2018_month_5	-0.0749	0.0252	-0.1243	-0.0254	-2.9691	0.0030
prewinter_yr2018_month_6	0.3375	0.0318	0.2752	0.3998	10.6146	<0.0001
prewinter_yr2018_month_7	0.3865	0.0318	0.3242	0.4487	12.1670	<0.0001
prewinter_yr2018_month_8	0.2223	0.0304	0.1628	0.2818	7.3215	<0.0001
prewinter_yr2018_month_9	-0.0602	0.0420	-0.1424	0.0220	-1.4348	0.1513
prewinter_yr2018_month_10	-0.2574	0.0390	-0.3339	-0.1809	-6.5973	<0.0001
prewinter_yr2018_month_11	0.5326	0.0470	0.4404	0.6247	11.3310	<0.0001
prewinter_yr2018_month_12	0.8224	0.0466	0.7311	0.9137	17.6553	<0.0001
prewinter_yr2019_month_1	1.3650	0.0552	1.2569	1.4731	24.7398	<0.0001
prewinter_yr2019_month_2	1.4571	0.0869	1.2868	1.6274	16.7719	<0.0001
presummer_yr2018_month_5	0.9346	0.0290	0.8779	0.9914	32.2712	<0.0001
presummer_yr2018_month_6	1.7308	0.0361	1.6600	1.8016	47.8993	<0.0001

Variable	Estimate	Standard Error	95% Confidence Interval		z-statistic	Pr>|z|
			Lower	Upper		
presummer_yr2018_month_7	1.7885	0.0361	1.7178	1.8592	49.5541	<0.0001
presummer_yr2018_month_8	1.5070	0.0346	1.4391	1.5748	43.5535	<0.0001
presummer_yr2018_month_9	1.0376	0.0482	0.9432	1.1321	21.5386	<0.0001
presummer_yr2018_month_10	0.0849	0.0445	-0.0024	0.1722	1.9061	0.0566
presummer_yr2018_month_11	0.1188	0.0523	0.0163	0.2213	2.2713	0.0231
presummer_yr2018_month_12	0.2542	0.0520	0.1523	0.3561	4.8904	<0.0001
presummer_yr2019_month_1	0.5666	0.0618	0.4455	0.6877	9.1689	<0.0001
presummer_yr2019_month_2	0.5774	0.0979	0.3855	0.7693	5.8976	<0.0001
hdd_day	-0.2904	0.0975	-0.4815	-0.0993	-2.9780	0.0029
cdd_day	0.2868	0.3633	-0.4252	0.9988	0.7895	0.4298
hdd_day_sq	0.0101	0.0047	0.0010	0.0192	2.1653	0.0304
cdd_day_sq	-0.0665	0.0254	-0.1163	-0.0167	-2.6182	0.0088
hdd_day_cub	<0.0001	0.0001	-0.0002	0.0002	0.0052	0.9958
cdd_day_cub	0.0038	0.0006	0.0026	0.0051	6.0720	<0.0001
part_PY3	-0.0874	0.0845	-0.2531	0.0782	-1.0346	0.3009

Appendix H. Customer Specific Savings

This appendix provides results from the customer specific analysis when only the subset of customers that received HER reports in PY18 were included in the analysis.

Table 88. Wave 1 PY18 HER Program Savings by Quartile (Received PY18 HER)

Pre-Usage Quartile*	Daily Savings to Date**	
	kWh/day	% kWh/day
Quartile 3: < 13,306 kWh	0.053 [-0.033, 0.14]	0.2% [-0.1%, 0.5%]
Quartile 4: > 13,307	0.310 [0.17, 0.451]	0.5% [0.3%, 0.8%]

*Customers were assigned to quartiles based on total annual consumption (kWh/year) prior to receiving their first HER report.
**The brackets represent 90% confidence intervals around the savings estimate.

Table 89. Wave 2 PY18 HER Program Savings by Quartile (Received PY18 HER)

Pre-Usage Quartile*	Daily Savings to Date**	
	kWh/day	% kWh/day
Quartile 3: < 15,941 kWh/year	0.043 [-0.251, 0.337]	0.2% [-0.9%, 1.2%]
Quartile 4: > 15,942 kWh/year	0.150 [-0.299, 0.599]	0.3% [-0.5%, 1.1%]

*Customers were assigned to quartiles based on their total annual consumption (kWh/year) in the pre-period.
**The brackets represent 90% confidence intervals around the savings estimate.
***Note that although this average daily savings point estimate is negative, it is nonsignificant, i.e., we are 90% confident that the true average savings are in the interval, which contains negative, positive and zero values.