Ameren Missouri CommunitySavers Impact and Process Evaluation: Program Year 2013

May 27, 2014

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Nexant

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EXECUTIVE SUMMARY

Ameren Missouri (Ameren) engaged the Cadmus team (composed of Cadmus and Nexant) to perform annual process and impact evaluations of the CommunitySavers program for a three-year period from 2013 through 2015. This annual report covers the impact and process evaluation findings for Program Year 2013 (PY13), the period from January 1, 2013, through December 31, 2013.

Program Description

Through CommunitySavers, Ameren delivers cost-effective, energy-efficiency services to low-income multifamily properties that have three or more dwelling units.

Honeywell Smart Grid Solutions (Honeywell), the program implementer, contracts the direct installation of all energy-efficiency measures (EEMs) to multiple contractors. The EEMs consist of low cost measures such as:

- Lighting (compact fluorescent lamps [CFLs]);
- Insulation of hot water heaters and pipes;
- Showerheads and faucet aerators;
- Programmable thermostats; and
- Smart power strips (newly offered in PY13).

Additionally, the program offers replacement of older appliances—such as refrigerators and air conditioners (both room and through-the-wall units)—with ENERGY STAR® models. This year, the program also began offering tune-ups for central air conditioning systems (CAC) and heat pumps.

To be eligible for CommunitySavers, the participating property owners and/or managers committed to implementing standard lighting installations in common areas, as applicable, through Ameren's Business Energy Efficiency Program. This commitment, albeit nonbinding, bridges Ameren's residential and commercial program offerings in an attempt to provide comprehensive, whole-building energy savings in the low-income multifamily sector.

Key Impact Evaluation Findings

These are the Cadmus team's key impact findings for PY13.

Gross Impacts

Table 1 shows measure installations, the Cadmus team's per-unit *ex post* annual energy savings, retention rates, and total *ex post* energy savings by measure for PY13. The *ex post* savings values for 13W CFLs, refrigerators, programmable thermostats, and advanced power strips were lower than those estimated in the Ameren Technical Resource Manual (TRM). However, a few measures, especially cooling measures, showed much higher savings than the TRM estimates, and these contributed to the high realization rate for PY13.

The Cadmus team's measure-specific realization rates are the ratio of Ameren's planning (*ex ante*) savings from its TRM and our evaluated (*ex post*) savings.

Table 1. PY13 Participation, Per-Unit *Ex Post* Gross Savings, Realization Rates, and Total Savings

Measure	PY13 Installations	*Ex Ante* Per-Unit Gross Savings (kWh/Year)	Per-Unit *Ex Post** Savings (kWh/Year)	Realization Rate (*Ex Post**/*Ex Ante*)	Verified & Operable	Total *Ex Post* Savings (MWh/Year)
CFL - 13W	46,188	48	38.7	80%	95.7%	1,708.6
CFL - 18W	5,003	37	37.0	99%		177.2
CFL - 23W	5,014	51	40.3	79%		193.4
Refrigerator	1,278	1,126	906	80%	100%	1,158.3
Showerhead	4,394	204	184	90%	95%	763.3
Programmable Thermostat	4,210	234	166	71%	100%	698.3
Faucet Aerator	8,639	37	40	109%	96%	335.9
Pipe Wrap	7,662	23	22	95%	100%	167.3
Room Air Conditioner	675	273	539	197%	100%	363.7
HVAC Tune-up**	1,591	75	131	150%	100%	208.4
HVAC Charging**	870	87	365	420%	100%	318.0
Advanced Power Strip	857	184	70	38%	95%	56.9
Water Heater Blanket	4	33	20	59%	100%	0.1
Total	**86,385**					**6,148.6**

***Excluding measure retention (verified and operable)**

***Honeywell reported the total number of tune-ups completed on central air conditioners (CACs) and heat pumps under the CAC Tune-up measure (2,461 reported in the program database). This included units that were both tuned and charged through the program. The Cadmus team approach does not break these into two separate measures when completed on the same unit. In addition, Honeywell reported each pound of refrigerant adjusted as part of the CAC charging measure. While its figures are correct, the Cadmus team developed savings at a unit level. While 1,101 pounds of refrigerant were adjusted under the CAC chagrining measure, only 870 units received the measure.

Net Savings

To estimate PY13 net-to-gross (NTG) ratios, the Cadmus team used the following formula:

NTG = 1 - Freeridership + Participant Spillover + Nonparticipant Spillover + Market Effects

Unlike other program evaluations, CommunitySavers is not available to the general public, but rather serves an income qualified population; therefore, non-participant spillover is not applicable. Similarly,

we did not assess market effects as marketing for CommunitySavers is directed at property managers or owners of the units, not the income-eligible recipients.

Table 2 summarizes the net savings estimates for PY13. The program experienced an overall NTG of 95.8%, resulting in a total program net savings of 5,890 MWh per year.

Table 2. PY13 Net Impact Results Summary

Program	*Ex Post* Gross Savings (MWh/yr)	Free Ridership	Participant Spillover	Nonparticipant Spillover	Market Effects	NTG Ratio	Net Savings (MWh/yr)
CommunitySavers	6,149	4.2%	0%	0%	0%	95.8%	5,890

As shown in Table 3, the PY13 CommunitySavers program realized 102% of its net energy savings target approved by Missouri Public Service Commission (MPSC), and 63% of its demand reduction goal.

Table 3. CommunitySavers Savings Comparisons

Metric	MPSC-Approved Target[1]	*Ex Ante* Gross Savings Utility Reported (Prior to Evaluation)[2]	*Ex Post* Gross Savings Determined by EM&V[3]	*Ex Post* Net Savings Determined by EM&V[4]	Percent of Goal Achieved[5]
Energy (MWh)	5,797	7,472	6,149	5,890	102%
Demand (kW)	774	728	505	484	63%

[1] https://www.ameren.com/sites/AUE/Rates/Documents/UECSheet191EEResidential.pdf

[2] Calculated by applying tracked program activity to TRM savings values.

[3] Calculated by applying tracked program activity and retention rates from tenant surveys to Cadmus' evaluated savings values.

[4] Calculated by multiplying Cadmus' evaluated gross savings and NTG ratio, which accounts for free ridership, participant spillover, nonparticipant spillover, and market effects.

[5] Compares MPSC Approved Target and *Ex Post* Net Savings Determined by EM&V.

Key Process Evaluation Findings

In PY13, the Cadmus team interviewed 160 tenants receiving CommunitySavers upgrades in their apartments. Similar to previous program years, these participants expressed high levels of satisfaction with the program and the tenant education provided. Almost one-half believed they had saved money on their utility bills as a result of the program, and 95% indicated installers were very courteous.

While the program implementation staff that we interviewed expected to meet this year's energy savings goal and key performance indicators, they expressed concerns about the ability to do so in future years. As the low-income multifamily market reaches its saturation point, program managers planned to meet goals with the addition of income-qualifying, single-family residential properties in PY13. The planned "neighborhood sweep" portion of the CommunitySavers program would have provided single-family residences in neighborhoods defined as low-income with many of the same measures included in the multifamily portion of the program. However, the single-family component did

not launch as planned in PY13 due to stakeholder concerns about non-low-income homes receiving program benefits, and later concerns that the neighborhood sweep portion of the program was not covered under the Missouri Energy Efficiency Investment Act filing made by Ameren.

Most stakeholders agreed that successfully ramping up this new element will be critical to meeting future goals. Program implementation staff were concerned about profitability impacts without the launch of the neighborhood sweep component as they have already incurred losses associated with the program delay and the resulting disruption in subcontractor work flow. Stakeholders hoped that the single-family portion of the program could be launched by the end of PY13, and expected to make up for their lost revenue from its delay in future years. As of the writing of this report, this portion of the program appears to be on hold indefinitely.

According to Ameren and Honeywell program managers, data collection and reporting proved more challenging in PY13. All parties described meeting the new requirements as time consuming and costly. Specifically, the program requires a multitude of reports from different parties: regulatory staff, a third-party auditor, the evaluation contractor, and internal management. These reports—which are required weekly, monthly, and quarterly—cover not only installations completed, but also projected installations and explanations of deviations.

Honeywell staff makes a significant effort to identify and approach property decision makers, rather than cold calling on-site. While this approach is more time consuming, it has also proven more productive. In PY13, they began additional outreach to property management companies with low-income tax credit designated properties in their portfolio.

Honeywell continues to address the challenge of getting property managers to complete the necessary program paperwork, especially information on the current refrigerators in units. Honeywell staff have been expediting the process for some properties by gathering and completing this information themselves rather than relying on the property manager.

Implementers reported only a few challenges with measure installations in PY13. The tune-ups require property maintenance personnel to allow access to tenant properties, and they are not always available or cooperative. However, the reports of Honeywell's field technicians reveal many of the CACs are poorly maintained and require extensive tune-up work. This has resulted in significant savings for the residents and the program overall.

While participating owners and managers of multifamily properties committed to implementing standard lighting installations in common areas, there has been little follow-through. Participants expressed a general lack of awareness of the Ameren Business Energy Efficiency Program.

Key Conclusions and Recommendations

Based on the impact and process evaluation findings, the Cadmus team presents the following conclusions and recommendations.

Conclusion 1. Participants (both property managers and tenants) express high levels of satisfaction with the CommunitySavers program. The implementation team focuses on providing a high-quality experience for tenants and adeptly facilitating the installations with property managers and their maintenance staff. Property managers are highly satisfied with the program, and some tenants cite benefits such as reductions in bills and increased comfort in their home.

> **Recommendation 1. Continue the program's focus on providing high levels of customer service, both to property managers and tenants.**

Conclusion 2. The program's inclusion of CAC/heat pump tune-ups and refrigerant charging has been a boon to tenants and property managers, and has increased program savings substantially. The level of disrepair and neglect of central air systems at some participating buildings generated significant savings when these units were tuned and charged. These electric savings also translated into dollars saved for low-income households and increased longevity of equipment for low-income properties.

> **Recommendation 2. Continue offering air conditioner and heat pump tune-ups to all eligible properties.** The program should revisit pre-PY13 participants and perform tune-ups and refrigerant charges if applicable and as necessary.

Conclusion 3. The program is successfully introducing and helping energy-efficient technologies gain acceptance in low-income households. For example, 66% of the tenants we surveyed who received CFLs said this was their first experience with them and, after using the CFLs, 80% said that they plan to purchase these when they need light bulbs. Our survey results also indicate that the diversity of CFL wattages offered in PY13 contributed to higher overall tenant satisfaction rates.

As another example, most (95%) of the tenants receiving advanced power strips kept them installed and operating on either their computer or their home entertainment center (82% of them being very satisfied with the measure). Additionally, after receiving education from the installer, a good portion of these respondents reported understanding the measure's purpose and how to operate it.

> **Recommendation 3. Continue offering the diversity of CFL wattages.** The program should continue offering 18W and 23W bulbs in addition to 13W and 14W bulbs.

Conclusion 4. Program managers have concerns about the future of CommunitySavers. There are Low-Income Housing Tax Credit (LIHTC) properties that could participate in the program, but property managers have been hesitant to participate because of confusion around Missouri's Energy Efficiency Investment Act (MEEIA) language and whether that language excluded LIHTC recipients from participating in Ameren's energy-efficiency program.

The other concern is the failure to launch the single-family neighborhood sweep component portion of the program. The lack of this single-family component (which Honeywell and subcontractor firms included as part of their implementation proposal) creates issues as those firms bid their work as a package.

Recommendation 4. Honeywell and Ameren need to consider methods to increase future program participation. Options include additional emphasis on clarification of perceived obstacles by low-income tax credit property managers and the launch of the neighborhood sweeps component.

Conclusion 5. The reporting requirements for the program are a burden to all involved in management, implementation, and delivery. While the onerous amount of reporting required has negative impacts on project profitability (particularly for the small and non-profit subcontractor firms), it also impacts Honeywell and Ameren staff. Currently, most of the smaller firms maintain such a high-quality relationship with Honeywell staff that they have been willing to overlook this issue in the short term; however, it may be an issue for all firms in the long term.

Adding to the issue for the subcontractor firms is their continued struggle with the Nextel phone application that Honeywell requires for data collection. Thus, most subcontractor firms are doing double data entry because they must use this outdated technology.

Recommendation 5a. Reduce the reporting requirements for the program overall or prioritize the most important reporting and allow less formal reports on other items. The current requirements place a large burden on both the staff and the program's operation. Although reporting is important and necessary, it should not impede the ability to meet the program's overall goals. The reporting requirements should take into account that there are multiple variables in energy-efficiency program delivery, some of which cannot be foreseen nor reported on so stringently. At the time of this report, Ameren is launching a new database system. This may help to reduce the reporting burden of the program.

Recommendation 5b. Honeywell should implement Cadmus' PY12 recommendation to upgrade its data entry systems from the Nextel phone application to a more universal and manageable technology.

Conclusion 6. Similar to previous program years, very few participating property managers are following through on the commitment they made at time of application to install common area measures through the Business Energy Efficiency Program.

Recommendation 6. Ameren should enable greater collaboration between CommunitySavers and the Business Energy Efficiency Program. While awareness of and participation in the Business Energy Efficiency Program has historically been low, the CommunitySavers transition from exclusively serving government housing to including for-profit management firms will provide a good opportunity for greater cross-over. These firms are more likely to have access to the resources necessary to undertake common area improvements.

INTRODUCTION

Ameren Missouri (Ameren) engaged the Cadmus team (composed of Cadmus and Nexant) to perform a process and impact evaluation of the CommunitySavers program for a three-year period. This annual report covers the impact and process evaluation findings for Program Year 2013 (PY13), the period from January 1, 2013, through December 31, 2013.

Program Description

Through CommunitySavers, Ameren delivers cost-effective, energy-efficiency services to low-income residents in single-family homes and multifamily properties having three or more dwelling units.

Honeywell Smart Grid Solutions (Honeywell), the program implementer, contracts the direct installation of all energy-efficiency measures (EEMs) to multiple contractors. The EEMs consist of the following low-cost measures:

- Lighting (compact fluorescent lamps [CFLs]);
- Insulation of hot water heaters and pipes;
- Showerheads and faucet aerators;
- Programmable thermostats; and
- Smart power strips (newly offered in PY13).

Additionally, the program offers replacements of older appliances—such as refrigerators and air conditioners (both room and through-the-wall units)—with ENERGY STAR® models. This year, the program also began offering tune-ups for central air conditioning (CAC) systems.

Program participants for multifamily buildings are defined as program-enrolled owners, operators, and managers of income-eligible, multifamily residential properties, as these determine whether or not a property participates. Program participants for multifamily buildings must commit to implementing standard lighting installations in property common areas, as applicable through Ameren's Business or Residential Energy Efficiency Program.

In PY13, Ameren and Honeywell had planned to launch "neighborhood energy-efficiency sweeps," targeting single-family homes in low-income neighborhoods. A popular and cost-effective offering in other jurisdictions, the neighborhood sweep would provide and promote energy-efficient items among a population that the energy-efficiency industry considers hard to reach and that does not generally have the means to invest in higher-efficiency technology. As of this report, however, the neighborhood sweep component of the program is on hold indefinitely. One reason cited for the delayed launch is the concern that non-low-income households could be residing in low-income neighborhoods and receive program benefits. Another concern brought forward was that some felt the program was not covered under the Missouri Energy Efficiency Investment Act (MEEIA) filing made by Ameren.

Program Implementer and Installers

Honeywell conducts outreach to identified multifamily buildings that house low-income families. These residences include federally subsidized buildings overseen by agencies such as the U.S. Department of Agriculture (USDA) and the U.S. Department of Housing and Urban Development (HUD). Currently, program participants include buildings from several local city housing authorities in Ameren's territory. In PY13, Honeywell performed outreach to and secured the participation of some low-income housing developers that received tax credits for the construction and oversight of properties for income-eligible households. Honeywell subcontracts the installation of EEMs and the recycling of old appliances to several program partners, these installers also provide in-home education to the tenants. The program partners In PY13 are listed in Table 4.

Table 4. CommunitySavers Installer Partners

Installer	Program Role
7 Oaks Home Inspection, LLC	Installs measures on-site and delivers energy education to tenants in homes. This company has delivered the CommunitySavers program to residents since the program began in 2010.
Urban League of Metropolitan St. Louis, Inc.	Installs measures on-site and delivers energy education to tenants in homes. This entity began delivering the program to residents in PY13 and completes the majority of projects inside the city of St. Louis.
Advantage Air, LLC	Provides CAC tune-ups and charging. This company was an installer in previous program years; however, in PY13, it provided only CAC and heat pump charging and tune-ups.
Whirlpool/J.B. Hunt	Delivers new refrigerators to residents and recycles removed refrigerators. Since 2010, these entities have supplied and delivered new refrigerators and recycled old refrigerators.

Before or during installation, program staff conducts educational meetings with tenants and residents to encourage project acceptance and to provide education on energy efficiency. In large building complexes, these meetings are hosted by Honeywell staff.

Program Activity

During PY13, CommunitySavers served 80 properties,[1] which resulted in 5,872 tenants receiving measures and services (such as CAC tune-up) and the installation of 86,385 measures (Table 5).

[1] There were an additional 36 properties where participants received other measures in PY12 but received room air conditioner upgrades in PY13.

Table 5.PY13 Program Participation

Measure	PY13
EEMs	
13W CFL Pre-EISA	46,188
18W CFL Post-EISA	5,003
23W CFL Post-EISA	5,014
Refrigerator	1,278
Showerhead	4,394
Programmable Thermostat	4,210
Faucet Aerator	8,639
Pipe Insulation	7,662
Room Air Conditioner	250
Through the Wall Air Conditioner	425
CAC Tune-up	1,591
CAC Charging	870
Advanced Power Strip	857
Water Heater Blanket	4
Education	
Group Energy Education	531
In-home Energy Education	3,285

Honeywell reported the total number of tune-ups completed on central air conditioners (CACs) and heat pumps under the CAC Tune-up measure (2,461 reported in the program database). This included units both tuned and charged through the program. The Cadmus team approach did not break these into two separate measures when completed on the same unit. Therefore, the count of CAC tune-ups was considered 1,591, because the other 870 had savings related to CAC charging as well.

In addition, Honeywell reported each pound of refrigerant adjusted as part of the CAC charging measure. While their figures are correct, the Cadmus team has developed savings at a unit level. While 1,101 pounds of refrigerant were adjusted under the CAC chagrining measure, only 870 units received the measure.

EVALUATION METHODOLOGY

The Cadmus team identified the following impact and process evaluation priorities in PY13.

Impact Evaluation Priorities

- Determining the gross and net energy savings and the demand reductions generated by the program;
- Estimating and accounting for any interactive effects caused by program measures; and
- Identifying any cost-effective measures not currently offered by CommunitySavers that could result in deeper savings.

Process Evaluation Priorities

- Assessing success in penetrating the non-governmental multifamily housing market;
- Assessing the impacts of design changes, marketing activities, and program processes;
- Assessing achievements against goals;
- Examining participant experience, satisfaction, and decision-making motivations;
- Identifying primary market barriers and offering suggestions for effectively overcoming barriers through program design and delivery improvements; and
- Determining the program's ability to generate participation in the commercial program (i.e., common-area improvements), where applicable.

Table 6 lists our evaluation activities and a brief explanation of the purpose of each activity.

Table 6.PY13 Process and Impact Evaluation Activities and Rationale

Evaluation Activity	Process	Impact	Rationale
Review the Technical Resource Manual (TRM)		•	Review TRM values and assumptions and conduct engineering analysis to provide updated information for future program years.
Review the Tracking Data	•	•	Provide ongoing support to ensure all necessary program data are tracked accurately; identify gaps for evaluation, measurement, and verification (EM&V) purposes.
Interview Program Managers and Implementers	•		Obtain an in-depth understanding of the program and identify its successes and challenges.
Review Marketing Materials	•		Identify gaps and opportunities in the program's outreach and marketing strategies and determine brand recognition by tenants and property managers.
Survey Tenant	•		Verify measure installation and retention; gather inputs for engineering analysis; determine tenants' satisfaction with the program.

Evaluation Activity	Process	Impact	Rationale
Survey Property Managers (Participant)	•	•	Provide insights into program delivery; marketing; and the flow of communication between the implementation contractor, property management, and tenants. Gather data used to estimate net-to-gross (NTG) ratios.
Conduct a Metering Study*		•	Determine daily hours of operation for program compact fluorescent lamps (CFLs) for the program overall as well as by room and other important program demographics. Determine respective central and room/window/wall air conditioner equivalent full-load hours (EFLHs). Collect inputs for programmable thermostat savings.
Conduct an Engineering Analysis		•	Determine gross kWh savings for each measure.
Conduct a Cost-Effectiveness Analysis		•	Measure the cost-effectiveness of the program through five standard perspectives.

*The Cadmus team installed meters in 73 units between July and September 2013. We will remove the meters in the Summer 2014 and include our findings in the PY14 evaluation.

TRM Review

At the outset of the PY13 evaluation, the Cadmus team reviewed both the algorithms Ameren specified in its TRM for CommunitySavers measures and the algorithms from other TRMs for similar measures. After we benchmarked each measure's algorithm, assumptions, and savings against other TRMs, we attempted to identify early in the program year any potential differences between the values Ameren assumed in the TRM and the values that may result from the formal evaluation process. Our goals were: (1) to enhance our understanding of the specific measures that Ameren implementer's were delivering; and (2) to provide early feedback that could potentially allow Ameren's implementers to make mid-year course corrections for improving program delivery.

Data Tracking Review

In conjunction with the TRM review, the Cadmus team reviewed the program tracking database. Specifically, we assessed whether Honeywell was gathering the data necessary for our evaluation and for use with the algorithms detailed in the Ameren TRM. Our review included an assessment of data quality and completeness. Because of the timing of our review, we were able to notify Ameren and Honeywell early in the evaluation process of issues we observed.

Program Manager and Implementer Interviews

Beginning in July 2013, the Cadmus team interviewed seven program stakeholders (Table 7). We designed our interviews to: (1) gather information on how the program is operating so far, (2) identify any challenges that program staff and implementers have encountered, and (3) determine appropriate solutions, as needed. Before conducting the interviews, we prepared an interview guide consisting of

questions to elicit comprehensive information about the program (Appendix B provides a copy of this guide).

Table 7.Completed Interviews

Stakeholder Group	Interviews Conducted
Ameren Program Staff	1
Honeywell Program Management	2
Third-Party Installation Subcontractors	4
Total	7

Marketing Review

The Cadmus team reviewed the CommunitySavers marketing materials and documentation of the short- or long-term plans for PY13. Our assessment encompassed all aspects of the materials, outreach channels, and survey findings so that we could:

- Assess the current state of program marketing efforts; and
- Identify potential opportunities for optimizing marketing, outreach, and communications to property managers and tenants for efficiently generating customer acceptance of the program and for generating participation from additional properties.

Tenant Surveys

As part of the PY13 evaluation, the Cadmus team conducted telephone surveys with 160 participating tenants. Through the program, various tenants received—at no cost to them—some small EEMs (CFLs, faucet aerators, energy efficient showerheads, programmable thermostats), some large measures (such as refrigerators and room air conditioners [RACs]), and CAC tune-up services. To keep the survey at a manageable length, we limited the tenant survey to ask specific questions about a maximum of four measures (as many participants received more than that).

In our surveys, we asked participants about these key topics:

- What equipment was installed and remains installed and operating in their unit?
- Were they satisfied with the equipment they received?
- What education did they receive from the program?
- What is there overall satisfaction with the program?

We designed our survey sample to achieve results at 90% confidence with 10% precision at the measure level, and we generated a simple random sample for the tenant phone surveys. (We discuss the precision levels we achieved for gross savings and installation rates later in this report.) A copy of the tenant survey is included in this report as Appendix C.

Property Manager Surveys

Property managers and owners are considered the program participants because they make the decision for their buildings to participate in the program. As part of the PY13 evaluation, the Cadmus team surveyed 21 participating property owners/managers. Our surveys asked questions about these key topics: (1) interest in and recruitment to the program; (2) awareness of the Act On Energy® brand; (3) the measures their properties received; and (4) overall satisfaction. We also asked questions for determining free ridership and spillover.

After generating a stratified sample for our property manager surveys, we surveyed 10 participants whose buildings were among the highest 20 in terms of expected savings. We completed an additional 11 surveys with a random sample of the remaining properties. We took this approach to make sure that the participant buildings with the highest savings would have the opportunity to respond to questions on free ridership and spillover. We designed the phone survey samples to achieve results at 90% confidence with 10% precision at the program level. (We discuss the achieved precision levels for NTG later in this report.) A copy of the property manager survey is included in this report as Appendix D.

Metering Study

The Cadmus team installed metering equipment in 73 participating tenant units. We placed light loggers on CFLs installed by the program, temperature loggers on thermostats, and run-time loggers on heating and cooling equipment. We have left the loggers in place, and will retrieve them in summer 2014. In our PY14 evaluation, we will use the logger data to: develop accurate estimates of hours of use for program CFLs (overall and by room type); understand better the thermostat-setting behaviors for manual and programmable thermostat users (both were metered); and determine the usage patterns for the heating and cooling systems.

Engineering Analysis

To estimate per-unit *ex post* gross savings for each CommunitySavers measure, the Cadmus team utilized the engineering algorithms and assumptions and all of the Ameren- and program-specific inputs available. These algorithms yielded estimates of the difference between the energy usage of the installed product and the energy usage of the replaced measure. Every algorithm and input assumption (originally provided in the CommunitySavers evaluation plan) is presented in the Gross Impact Evaluation Section.

Cost-Effectiveness Analysis

Using the final PY13 CommunitySavers participation data, implementation data, the *ex post* gross savings estimates, and the *ex post* net savings estimates (presented in this report) with the DSMore tool, Morgan Marketing Partners (MMP) determined the program's cost-effectiveness. MMP also calculated measure-specific cost-effectiveness (as shown in the Cost-Effectiveness chapter) using the five standard perspectives produced by DSMore:

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

PROCESS EVALUATION FINDINGS

We have organized our findings based on the data collection activity: program manager and implementer interviews, property manager surveys, and tenant surveys.

Stakeholder Interviews

To assess the effectiveness, general program operations, and satisfaction with CommunitySavers, the Cadmus team interviewed seven program staff members in PY13.

Program Design and Implementation

CommunitySavers achieves energy savings and demand reductions through the direct installation of cost-effective EEMs in the tenant units of low-income housing in Ameren's service territory. Ameren subsidizes all of the measures installed through the program and provides them at no cost to tenants and property managers. In PY13, Ameren eliminated the dehumidifier upgrades and added advanced power strips and CAC and heat pump tune-ups and refrigerant charging.

While originally designed for multifamily properties, Ameren hoped to expand the program in PY13 to include income-qualifying single-family residential properties. Program managers wanted to launch the single-family component by the end of PY13. However, as mentioned, program managers have not implemented the single-family component to date. In our interviews, stakeholders discussed the negative impacts of this delay, the possible future of the planned single-family program, and the profitability issues and challenges with subcontractor workflow planning.

Marketing and Outreach

The CommunitySavers Program is different from other Ameren Act On Energy programs, as it targets eligible property managers rather than Ameren's customer population. Therefore, it does not use typical marketing tools, such as direct mail, bill inserts, radio or television advertising, billboards, or point-of-purchase signage. In past years, Ameren and Honeywell had success in generating participation through contacts and relationships with the USDA properties and local housing authorities. In PY13, they began outreach to property management companies who have low-income designated properties in their portfolios. To encourage properties to participate, Honeywell uses program collateral (Figure 1), references from past participants, and testimonials.

Figure 1.CommunitySavers Outreach Collateral

Visit *Act*OnEnergy.com and save

Helping building owners and property managers use less energy and save money is the number one goal of our energy efficiency programs. There are several programs being offered for Ameren Missouri electric customers, including:

- LIGHTSAVERS (lighting rebates)
- APPLIANCESAVERS (recycling old, working refrigerators and freezers)
- CONSTRUCTIONSAVERS (new home construction)
- COOLSAVERS (cooling system improvements)
- COMMUNITYSAVERS (low-income)
- REBATESAVERS (EE product rebates)
- BIZSAVERS (business programs)

Our customers have the ability to better manage and control their energy usage - and ultimately their energy costs with the new energy efficiency programs.

Common area and central plant energy efficiency upgrade assistance: 1.866.941.7299

*Act*OnEnergy.com
1.855.207.6254
Ameren Missouri CommunitySavers Program

RESIDENTIAL ENERGY EFFICIENCY

More Efficient. More Appeal.

COMMUNITYSAVERS

For Building Owners and Property Managers

Ameren MISSOURI

FOCUSED ENERGY. For Life.

Ameren MISSOURI

An Opportunity to Upgrade Every Single Unit is Nothing Short of Amazing.

The Ameren Missouri CommunitySavers program is a remarkable opportunity for you to make a wide range of energy efficiency upgrades to your property.*

Your property may qualify for some or all of these energy efficiency upgrades:

- ENERGY STAR® compact fluorescent (CFL) bulbs
- ENERGY STAR refrigerators
- ENERGY STAR room-size window and through the wall air conditioners
- Programmable thermostats
- Electric domestic hot water heaters
  - Insulation jackets
  - Hot water pipe insulation
  - Low-flow faucet aerators
  - Low-flow showerheads
- Smart power strips

A program that pays now and for years to come.

Not only will your property benefit from new and upgraded products, such as refrigerators, but these energy efficient products will use less energy and save money. These new products will also provide reduced maintenance time and costs.

* Some restrictions may apply. Call for details.

Program Benefits

- Make otherwise cost-prohibitive upgrades to your property.
- Improve performance while reducing energy usage and costs.
- Reduce maintenance costs of servicing existing older equipment.
- Improve tenant satisfaction with many new features and appliances.
- Increase pride throughout your community by becoming greener.
- Promote no-cost and low-cost energy saving tips to your tenants.
- Create a healthier indoor environment.

We'll help you every step of the way.

From assessment and planning to resident communications and the completion of quality work, Ameren Missouri will provide you with a team of specially trained, seasoned professionals. They'll use their energy efficiency expertise to ensure your project implementation is smooth and successful.

Is your multifamily rental property eligible?

Participation is open to all building owners and operators of federally subsidized (HUD, USDA and/or Public Housing Authority) multifamily properties consisting of three (3) dwelling units or more with Ameren Missouri electrical service.

For information about the CommunitySavers program:

- Visit *Act*OnEnergy.com
- Call CommunitySavers **1.855.207.6254** or email us at communitysavers@ameren.com

Rather than cold calling or stopping by potentially eligible properties, Honeywell staff members make a significant effort to identify and approach property decision makers through research and outreach to large organizations. While this approach is time-consuming, it has been productive.

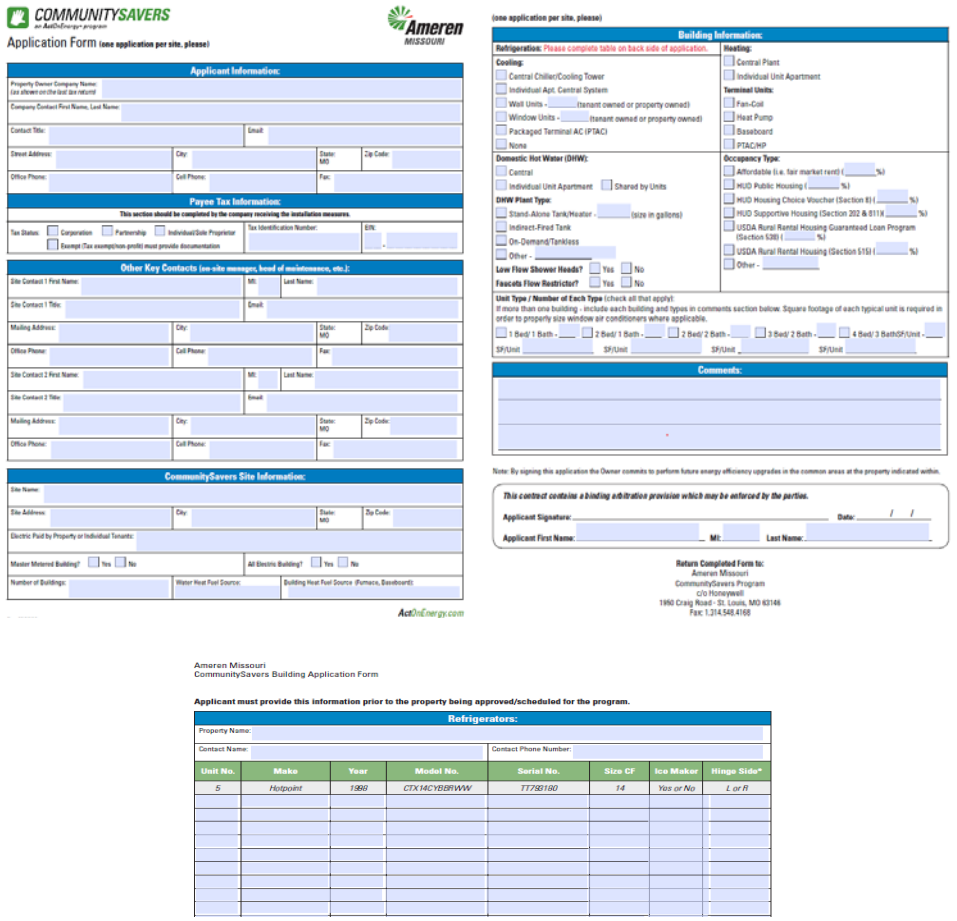
The brochure's style appeared consistent with the Act On Energy® brand guidelines, with a streamlined look and feel; it effectively communicated aspects of the program. While cross-program promotion does not apply, the brochure includes information about other Ameren energy-efficiency programs.

One manager said that the multifamily portion of the program is reaching its saturation point, noting that most of the eligible USDA properties have already participated in earlier program years. Another manager felt there were still many multifamily buildings to be served, especially with the ability to serve Low-Income Housing Tax Credit (LIHTC) properties in PY13. However, some of the LIHTC property managers are reluctant to participate without some certainty that Missouri law (Senate Bill 376)—which forbids these properties from accepting public funding beyond their tax credits—would allow their participation.

Application Forms

Once Honeywell has identified eligible properties and the managers/owners of those properties have agreed to participate, the property managers/owners must complete enrollment paperwork, which includes providing existing refrigerator specifications for all units (Figure 2).

Figure 2. PY13 Application Form



COMMUNITYSAVERS
an ActOnEnergy® program

Application Form (one application per site, please)

Ameren MISSOURI

Applicant Information:

Property Owner Company Name: (as shown on the last tax return)

Company Contact First Name, Last Name:

Contact Title: | Email:

Direct Address: | City: | State: MO | Zip Code:

Office Phone: | Cell Phone: | Fax:

Payee Tax Information:

This section should be completed by the company receiving the installation measures.

Tax Status: ☐ Corporation ☐ Partnership ☐ Individual/Sole Proprietor ☐ Exempt (Tax exempt/non-profit) must provide documentation

Tax Identification Number: | EIN:

Other Key Contacts (on-site manager, head of maintenance, etc.):

Site Contact 1 First Name: | MI: | Last Name:

Site Contact 1 Title: | Email:

Mailing Address: | City: | State: MO | Zip Code:

Office Phone: | Cell Phone: | Fax:

Site Contact 2 First Name: | MI: | Last Name:

Site Contact 2 Title: | Email:

Mailing Address: | City: | State: MO | Zip Code:

Office Phone: | Cell Phone: | Fax:

CommunitySavers Site Information:

Site Name:

Site Address: | City: | State: MO | Zip Code:

Electric Paid by Property or Individual Tenants:

Master Metered Building? ☐ Yes ☐ No | All Electric Building? ☐ Yes ☐ No

Number of Buildings: | Water Heat Fuel Source: | Building Heat Fuel Source (Furnace, Baseboard):

ActOnEnergy.com

(one application per site, please)

Building Information:

Refrigeration: Please complete table on back side of application.

Cooling:
☐ Central Chiller/Cooling Tower
☐ Individual Apt. Central System
☐ Wall Units - _____ (tenant owned or property owned)
☐ Window Units - _____ (tenant owned or property owned)
☐ Packaged Terminal AC (PTAC)
☐ None

Heating:
☐ Central Plant
☐ Individual Unit Apartment

Terminal Units:
☐ Fan-Coil
☐ Heat Pump
☐ Baseboard
☐ PTAC/HP

Domestic Hot Water (DHW):
☐ Central
☐ Individual Unit Apartment ☐ Shared by Units

DHW Plant Type:
☐ Stand-Alone Tank/Heater - _____ (size in gallons)
☐ Indirect-Fired Tank
☐ On-Demand/Tankless
☐ Other - _____

Low Flow Shower Heads? ☐ Yes ☐ No
Faucets Flow Restrictor? ☐ Yes ☐ No

Occupancy Type:
☐ Affordable (i.e. fair market rent) (_____%)
☐ HUD Public Housing (_____%)
☐ HUD Housing Choice Voucher (Section 8) (_____%)
☐ HUD Supportive Housing (Section 202 & 811) _____%)
☐ USDA Rural Rental Housing Guaranteed Loan Program (Section 538) (_____%)
☐ USDA Rural Rental Housing (Section 515) (_____%)
☐ Other - _____

Unit Type / Number of Each Type (check all that apply):
If more than one building - include each building and types in comments section below. Square footage of each typical unit is required in order to properly size window air conditioners where applicable.

☐ 1 Bed/ 1 Bath - ___ SF/Unit | ☐ 2 Bed/ 1 Bath - ___ SF/Unit | ☐ 2 Bed/ 2 Bath - ___ SF/Unit | ☐ 3 Bed/ 2 Bath - ___ SF/Unit | ☐ 4 Bed/ 3 Bath SF/Unit - ___

Comments:

Note: By signing this application the Owner commits to perform future energy efficiency upgrades in the common areas at the property indicated within.

This contract contains a binding arbitration provision which may be enforced by the parties.

Applicant Signature: _____ Date: ___/___/___

Applicant First Name: _____ MI: _____ Last Name: _____

Return Completed Form to:
Ameren Missouri
CommunitySavers Program
c/o Honeywell
1950 Craig Road - St. Louis, MO 63146
Fax: 1.314.548.4168

Ameren Missouri
CommunitySavers Building Application Form

Applicant must provide this information prior to the property being approved/scheduled for the program.

Refrigerators:

Property Name: | Contact Name: | Contact Phone Number:

Unit No.	Make	Year	Model No.	Serial No.	Size CF	Ice Maker	Hinge Side*
5	Hotpoint	1998	CTX14CYBBRWW	TT758180	14	Yes or No	L or R

The application process is not lengthy, however, the one challenge implementer staff noted was the difficulty of getting property managers to provide refrigerator information for the units in their buildings. Honeywell, again this year, has been visiting some properties to gather this information to avoid delaying the application process.

Tenant Notification, Signage, and Education

Tenants, as the ultimate recipient of CommunitySavers services, are notified of the program delivery in their buildings by property management staff. The program is communicated to tenants through the use of door hangers, window clings, and signage, as shown in Figure 3 and Figure 4.

Figure 3.CommunitySavers Tenant Awareness

Figure 4. Property Yard Signs

At large properties, Honeywell staff members conduct information sessions to provide tenants with an overview of the work occurring in their units, information on how to use the new equipment installed in their homes, and some tips for saving additional energy. The tenant education presentation and the tips flyer used as a leave behind are included in Appendix G.

Contractor Training and Participation

7 Oaks has been part of the program since PY10, and in PY13 Honeywell contracted with a new organization, the Urban League of Metropolitan St. Louis (Urban League). The Urban League also delivers Missouri's low-income weatherization program in the St. Louis area.

The Urban League provides the same services as 7 Oaks—direct installation of the small measures, installation of programmable thermostats, and replacement of room or through-the-wall air conditioners. Reports indicate that the Urban League has had few problems adapting to the CommunitySavers Program delivery and, as the Urban League's team had trained weatherization installers, those individuals needed little additional training.

Advantage Air is again a subcontractor for CommunitySavers in PY13, having been an installer since PY11. Advantage Air focused solely on the air conditioner tune-up and charging portion of the program this year.

Honeywell conducted training this year on the new measures (advanced power strips and air conditioner tune-ups), and Honeywell has staff available to answer questions and provide training as needed by any of the installer partners.

Measures and Installation

Stakeholders agreed that the PY13 program measures listed here are adequate and provide energy savings for tenants in participating buildings:

- Compact fluorescent lights
- Faucet aerators
- Water heater blankets
- Water heater pipe insulation
- Programmable thermostats
- Showerheads
- Refrigerators
- Window and through-the-wall air conditioners
- Advanced power strips
- CAC and heat pump tune-ups and refrigerant charge

For future years, the program staff we interviewed suggested the adding following to the program:

- Insulation measures, especially attic insulation in multifamily buildings with electric heating and cooling;

- Some small air-sealing measures, such as caulking or window repairs; and
- Upgrades of Packaged Terminal Air Conditioner (PTAC) heating and cooling units and installation of ductless heat pumps in smaller efficiency-style apartments with baseboard heating and RACs.

Some stakeholders also suggested that Ameren consider eliminating water heater wraps as there are few apartments where the measure is applicable, and, if these are placed on newer water heaters, they can void the water heater warranty. One stakeholder suggested developing a process to influence property managers to follow through with their commitment to install stairwell lighting and other common-area measures.

Program staff reported some challenges with measure installations in PY13. Based on their experience in the field, they said that the CACs are often poorly maintained and require extensive tune-up work. The Cadmus team recognizes this as an opportunity for significant savings when such equipment tune-ups are complete. However, these tune-ups require access to tenant units, and it can be difficult to connect with maintenance personnel (who are sometimes difficult to contact). In some cases, property maintenance personnel also view the overall program installations as an inconvenience because they are required to accompany installer crews.

Stakeholders also reported that they liked being able to offer an advanced power strip to tenants in PY13, but they found that only a small portion of the units met the installation qualifications.[2]

Subcontractors were glad that the number of room air conditioner unit types available for installation reduced from 10 to four. This helped streamline the tracking and installation of the measure.

Customer and Property Manager Feedback

Program staff reported receiving positive feedback from customers and property managers to date. Most property managers—once they are educated about the program and after measure installation begins—are generally very enthusiastic.

One stakeholder noted that property managers who are program skeptics—or prejudiced against their tenants—may never be CommunitySavers participants. However, some of the large property management companies that are participating in the program have been very interested in having all of their eligible properties participate.

Regarding the tenant concerns that property managers reported, the issues were limited to requests for measures for which some tenants were not eligible for and reassurance regarding the safety of CFLs.

Quality Assurance

The primary intent of the quality assurance process is to verify that subcontractors are reporting accurate measurements. Ameren requires that Honeywell conduct a follow-up inspection at 5% of units.

[2] Smart power strips are only installed in units where tenants have at least two electronics to plug into the controlled outlets on the strip, and cable boxes are not considered an applicable electronic.

Honeywell reports exceeding that goal and generally checks some installations at almost all participating properties. (Some subcontractors also send a project manager back to check after installations at a property.) In addition, the Ameren project manager occasionally accompanies Honeywell on some quality assurance inspections. The installers and Honeywell are available for callbacks if the measure installations do not pass inspection.

Data Collection and Reporting

According to Ameren and Honeywell's program managers, collecting and reporting data were more challenging in PY13 due to substantially greater requirements. All parties said that meeting the new requirements was time-consuming and costly. Specifically, the program requires a multitude of reports from different parties: regulatory staff, a third-party auditor, the evaluation contractor, and internal management. The reports—which are required is weekly, monthly, and quarterly—cover the installations completed, the projected installations, explanations of deviations, and truing up numbers.

Another issue was Honeywell's use of Nextel phones for the primary database input device. These phones continue to be a challenge, and subcontractors report repeated failures resulting from phones dropping connections and the difficulties of entering data correctly. The phones have necessitated additional paperwork and time from the subcontractors (most of whom are tracking data twice), who then have to double-check or re-enter the data manually once back in their offices.

Communications

Communications between stakeholders is an area of success again for CommunitySavers in PY13. All of the stakeholders reported easy, consistent communications around all aspects of program delivery. Ameren and Honeywell speak at least weekly and have regularly scheduled meetings to make sure the program is on track.

Honeywell and the subcontractors also communicate on a regular basis, and all of the subcontractors reported that the Honeywell staff are easy to contact and are responsive to any concerns or issues raised. Many subcontractors praised individual Honeywell staff members and said that they enjoyed the opportunity to work with them.

Property Manager/Participant Surveys

As part of the PY13 CommunitySavers evaluation, the Cadmus team surveyed 21 participating property managers. Our surveys asked questions about these key topics:

- Interest in and recruitment to the program;
- The measures received;
- Overall satisfaction with the program;

- Awareness of the Act On Energy brand; and
- Free ridership and spillover.

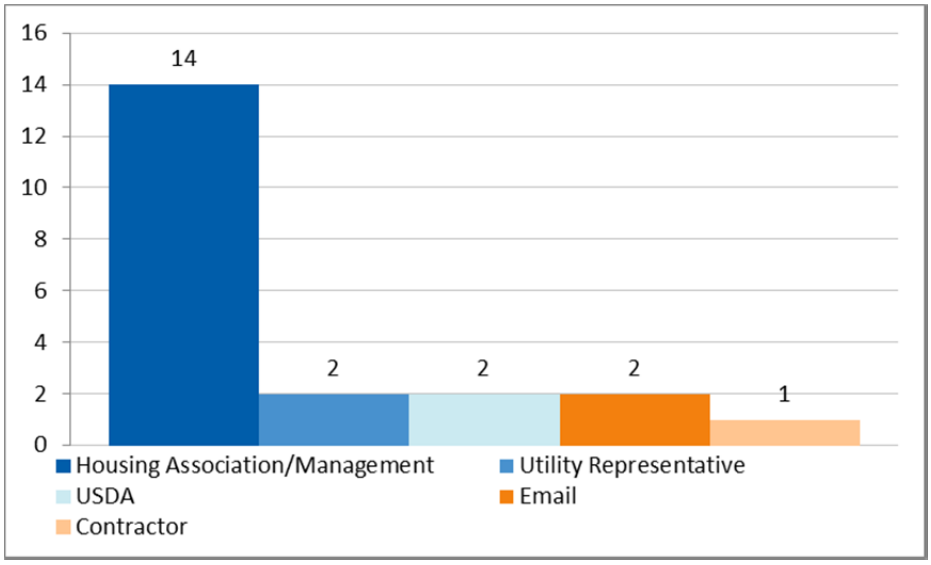
Interest in Program and Recruitment

Of the 21 property managers we surveyed, only four reported participating in a similar type of program prior to CommunitySavers. The programs cited by the four property managers were these:

- ARRA-funded weatherization;
- A program with Urban League that paid half for package terminal heat pumps, refrigerators, and light bulbs;
- CAC tune-ups; and
- A program that provided light bulbs and hot water heater wraps.

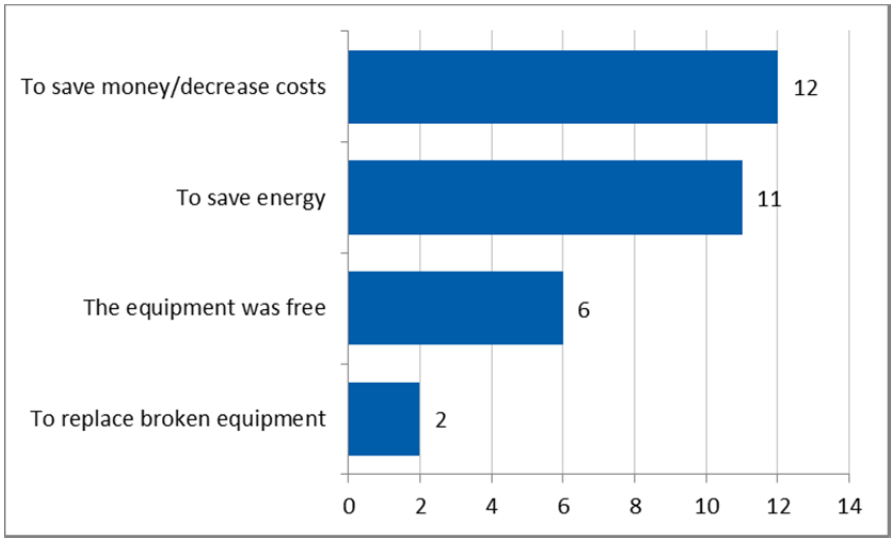
When property managers asked how they first heard about CommunitySavers, most said they learned of it from either the company that owns their property or their housing association. Figure 5 shows the full breakdown of responses.

Figure 5. How Respondents Heard About the Program



When asked what motivated the program managers to participate, the top two responses were saving money and saving energy. Other reasons given (as shown in Figure 6) were to receive free energy-efficient equipment and to replace broken equipment.

Figure 6. Why Respondents Participated



One respondent said his property accepts "anything they can get for free," such as "donations from anyone, including previous residents." Another said "[we] do as much as [we] can to keep it affordable" for residents.

When we asked the property managers if they encountered any difficulties when enrolling in the program, only two said they did not receive all of the program information they would have liked at the beginning of their participation (Table 8).

Table 8. Initial Information and Concerns

Question	Yes	No
Did you receive all the program information you needed when you agreed to participate in Ameren's CommunitySavers program?	19	2
When you agreed to participate, did you have any concerns about being involved in the program?	5	16

Of the respondents who wanted more information at the beginning, one reported not receiving any information, and one wanted to know more about the program's history and rationale (so as to understand why the equipment was free). The five respondents who reported having initial concerns about being involved with the program cited:

- Coordinating with the residents for three occasions of equipment delivery and installation;
- Helping their residents to understand how to use the programmable thermostats or other equipment; and
- Wariness regarding the upfront costs and eventual actual savings.

When asked whether these concerns were addressed during their program participation, all said that they were. The respondent who mentioned being nervous about coordinating the deliveries and installations said, "It ended up just fabulous."

Act On Energy Awareness

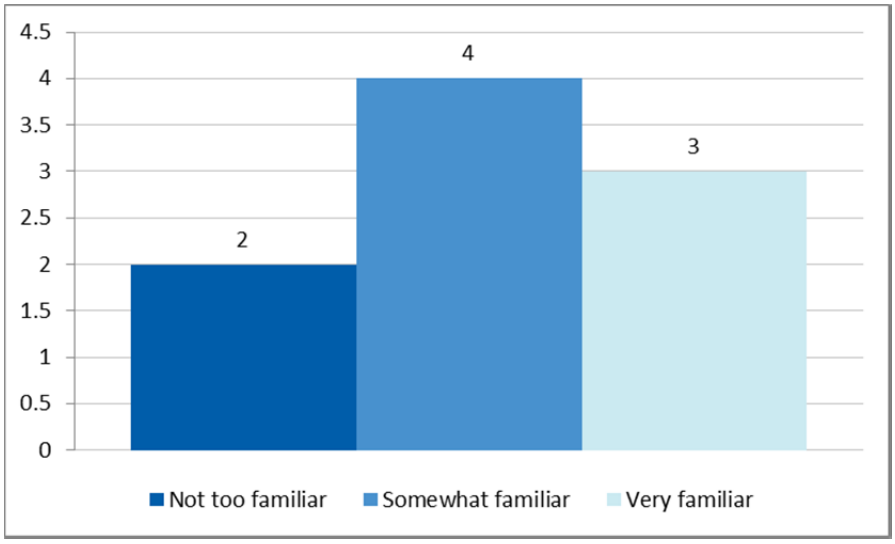
Almost one-half of the respondents said they were familiar with the Act On Energy campaign, as shown in Table 9. However, only three reported being aware of the business program that could provide services to the common areas of multifamily properties.

Table 9. Awareness of the Act On Energy Campaign

Question	Yes	No
Are you familiar with the energy-efficiency campaign "Act On Energy"?	9	12
The Ameren Act On Energy Business Program provides… Are you aware of this program?	3	18

Most respondents familiar with Act On Energy rated themselves as being either *somewhat aware* or *very aware*. However, two respondents rate themselves as *not too familiar* with the Act On Energy campaign (Figure 7).

Figure 7. Awareness Levels Regarding Act On Energy



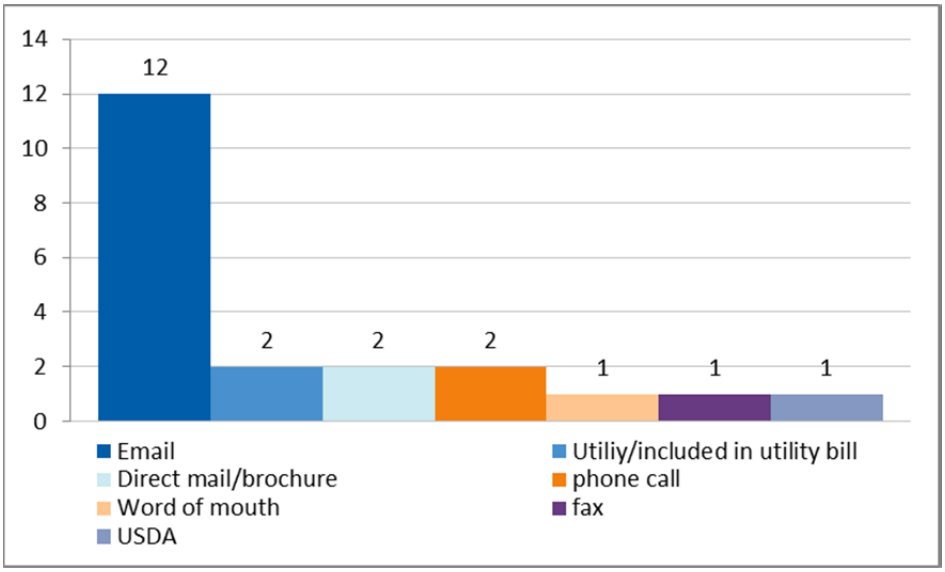
Respondents reported hearing about Act On Energy from these sources:

- An Energy Professionals Alliance meeting;
- Committee to Keep Missouri Warm;
- Newsletters from Ameren and mentions on television;
- Mentions in the newspaper;

- Direct mailings of brochures; or
- An Ameren or Honeywell representative

When we asked how best to inform the respondents about other programs or other ways to save energy at their properties, the majority said e-mail, as shown in Figure 8.

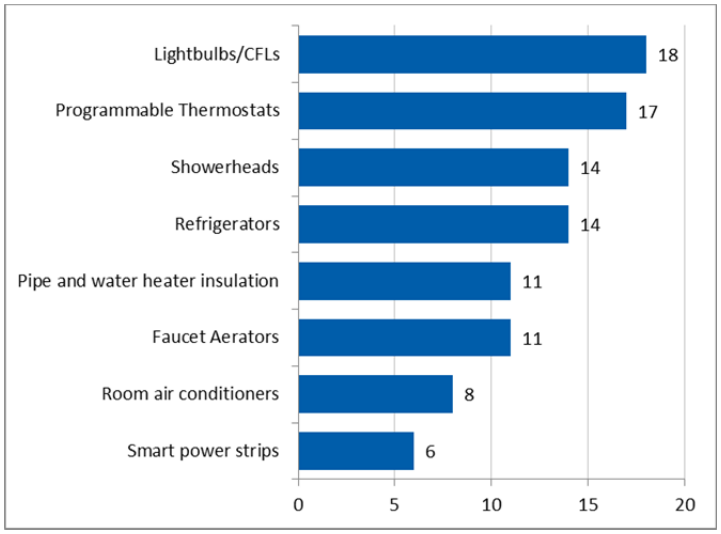
Figure 8. Best Contact Methods



Program Equipment

Figure 9 shows the types of equipment installed and the number of properties responding to the survey that had residents receiving each type. The most commonly installed EEMs were lighting and programmable thermostats. The least commonly installed item was the smart power strip (only six property managers said their residents received this).

Figure 9. Equipment Installed



Overall, tenant feedback reported by property managers was positive.

- Some said tenants reported decreased energy bills.
- One respondent said that program staff needs to replace faulty showerheads.
- Two said that their senior residents did not like the light from the CFL bulbs (in one instance the bulb was too dim, while in another instance the bulb was too bright). Also, some residents have replaced the CFLs.

Other issues mentioned were: the aerators slowing down the water flow too much, confusion about how to use the new thermostats, and complaints that new refrigerators made too much noise.

When asked if there were any other types of energy-efficient equipment they would like to see installed through the program, respondents specified the following:

- Stoves and ovens;
- Clothes washers and clothes dryers;
- Other types of light bulbs;
- Furnace filters;
- Wall air conditioner units;[3] and
- Water heaters.

Only three respondents said they did not recall their tenants receiving any energy education during the course of the program.

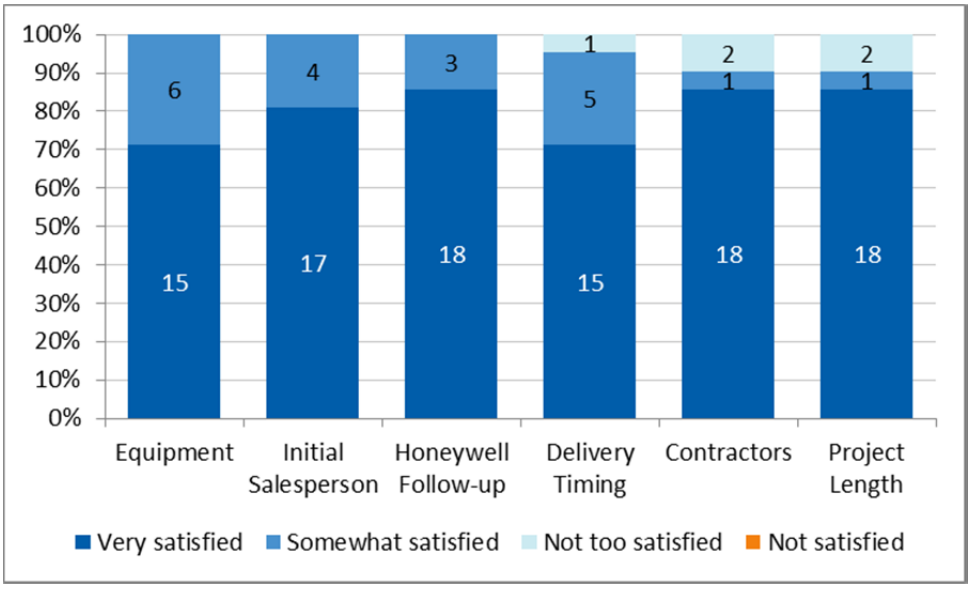
[3] Note that the program already supplies through-the-wall air conditioner units. However, the implementer determines which units are eligible for replacements.

There were concerns mentioned by respondents overseeing properties for seniors or adults with developmental disabilities. In these venues, the property managers had to continue following up with tenants to make sure they understood how to use their new equipment (especially programmable thermostats).

Program Satisfaction

Satisfaction was very high with all aspects of the program, with a majority of respondents saying they were very satisfied (from 70% to 85%, depending on the program component in question). Figure 10 shows the satisfaction levels of property managers across several components.

Figure 10. Satisfaction with Program Elements



The elements of the program with which respondents were most likely to say there were *somewhat satisfied* were the equipment received and the timing of the equipment delivery.

Most of the feedback concerning the initial contact with the Honeywell salesperson was very positive. Of the two respondents who had complaints, one said there was poor initial follow-up and communication, but that everything ultimately got done. The other said that setting up the presentation to the residents happened at the last minute; however, the presentation was described as “great” and very useful.

Regarding the follow-up from Honeywell, the feedback was again very positive. Only one respondent said that the Honeywell salesperson missed the initial appointment without calling. This resulted in the property manager having to reschedule, which delayed the program’s implementation at the building.

The satisfaction rating regarding the timing of deliveries was slightly lower than for the other topics. A majority (13) of respondents reported that everything occurred on time and without problem. The

issues raised among the remaining respondents included some delays in equipment arriving and that the delivery crews showed up late.

Overall, the feedback on the installation crews was positive. Respondents described them as "very professional" and said they "got in there and got it done." The two respondents who said they were *not too satisfied* with the contractors reported encountering contractor staff who were not good at communicating.

When respondents were asked what could improve their experience with the program, most said they thought the program was fine as is. The few suggestions for improvement were: (1) increasing the communication from the beginning of participation; and (2) focusing on making sure the timing and coordination of the deliveries and installation went smoothly.

All of the property managers we spoke to said they would recommend the program to others.

Tenant Survey

The Cadmus team surveyed 160 tenants who received measures through the CommunitySavers program. In our surveys, we asked about these issues: satisfaction with the equipment installed in their homes, interactions with installer staff, and if they had noticed any savings as a result of the program. To avoid a lengthy survey instrument that asked participants about all the measures they received through CommunitySavers, we limited the number of detailed measure inquiries (e.g., installation, usage, satisfaction) to up to four measures per respondent. As a result, the sample sizes listed in the report reflected the number of tenants that provided responses regarding a specific measure (not the total number of participating tenants we interviewed).

Equipment Installation and Retention

There was only one instance each (of a CFL and showerhead) in which a measure was left for the tenant to install and, in both cases, the tenants said they installed the equipment.

Since this equipment is removable, we also asked tenants if they took any measures out after they were installed (Table 10).

Table 10. Equipment Retention Rates

Did you take out any of the installed equipment?	CFLs (n=69)	Aerators (n=26)	Showerheads (n=73)
Yes	9%	4%	5%
No	91%	96%	95%

Of the respondents who said they removed their CFL bulbs, one replaced it with an energy-saving bulb, three replaced it with a regular bulb, and one did not replace that bulb. The tenants who removed their aerators said they were not working well. Of those who removed showerheads, one said the showerhead was not working, two preferred other types of showerheads, and one said the property maintenance personnel removed it.

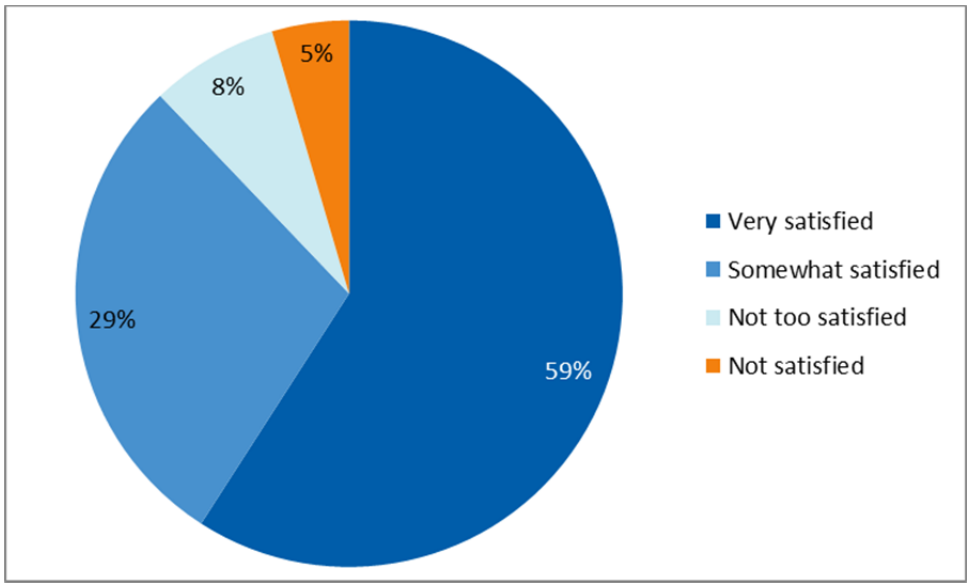
Equipment Satisfaction

The Cadmus team asked tenants about their satisfaction with the EEMs.

CFLs

Sixty-nine tenants surveyed were asked about the CFL bulbs installed in their home. Most rated themselves as either *very satisfied* or *somewhat satisfied* with the equipment, as shown in Figure 11.

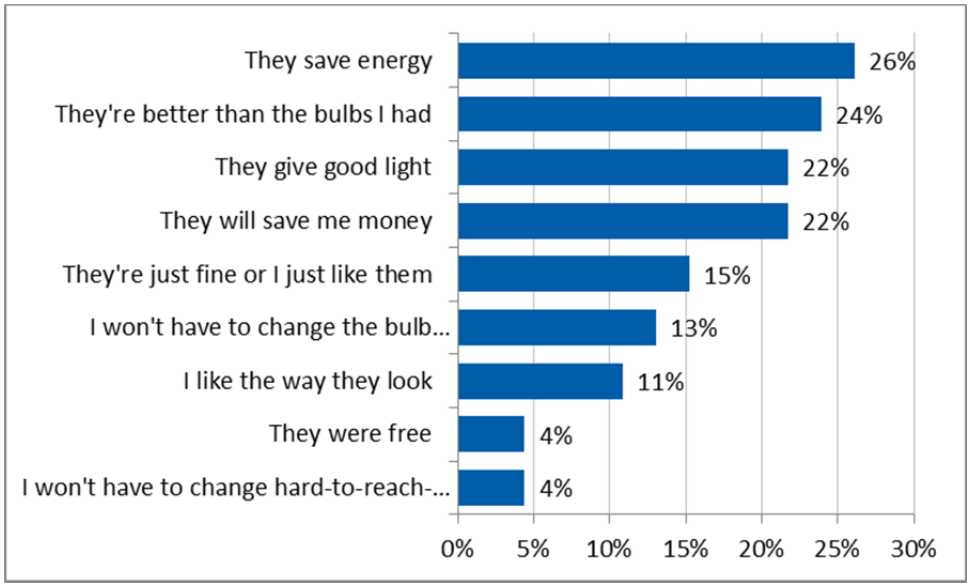
Figure 11. CFL Satisfaction Levels (n=66)



Two of the tenants who said they were *less than satisfied* said the light from the CFL was too dim, while another two said the light was too bright. Two others said they just did not like the bulbs, and one said the bulbs burn out too quickly.

The 46 tenants who said they were satisfied with the bulbs gave the reasons shown in Figure 12.

Figure 12. CFL Satisfaction Reasons (n=46, Multiple Responses Allowed)



Tenants liked that the CFL bulbs saved energy and money. Others said CFLs are better or give better light than the bulbs they had previously. Very few cited the fact that the bulbs were free as the reason they were satisfied.

We asked tenants about previous and future purchases of energy-saving light bulbs, as shown in Table 11.

Table 11. Energy Efficient Lighting Purchases

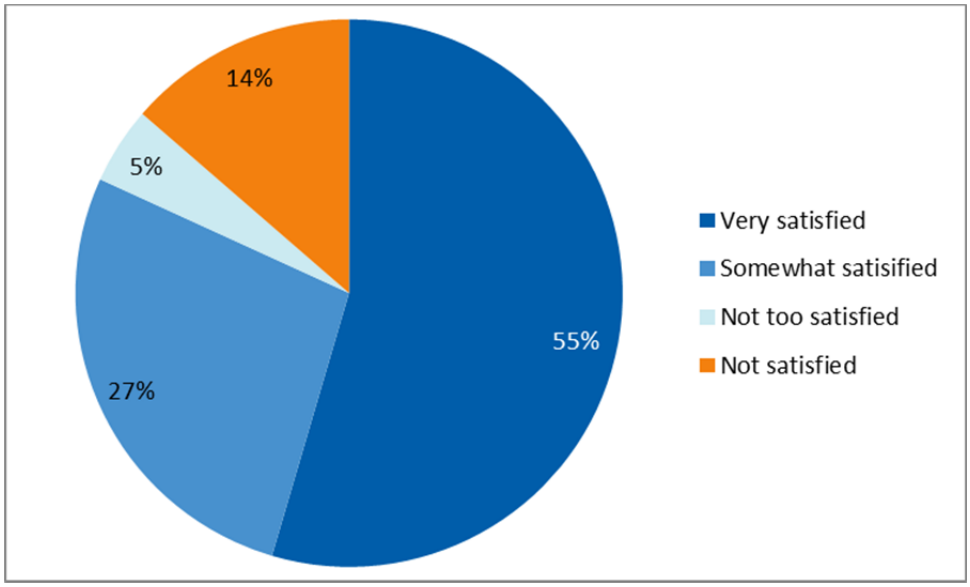
Question	Yes	No
Were these the first energy-saving light bulbs you ever owned? (n=68)	66%	34%
Did you purchase any additional energy-saving light bulbs? (n=69)	17%	83%
Do you plan to purchase energy-efficient bulbs in the future? (n=51)	80%	20%

Refrigerators

Twenty-two survey respondents had new refrigerators installed; Figure 13 shows their satisfaction levels. Four said the refrigerators were too small, and two said they just did not like them.[4]

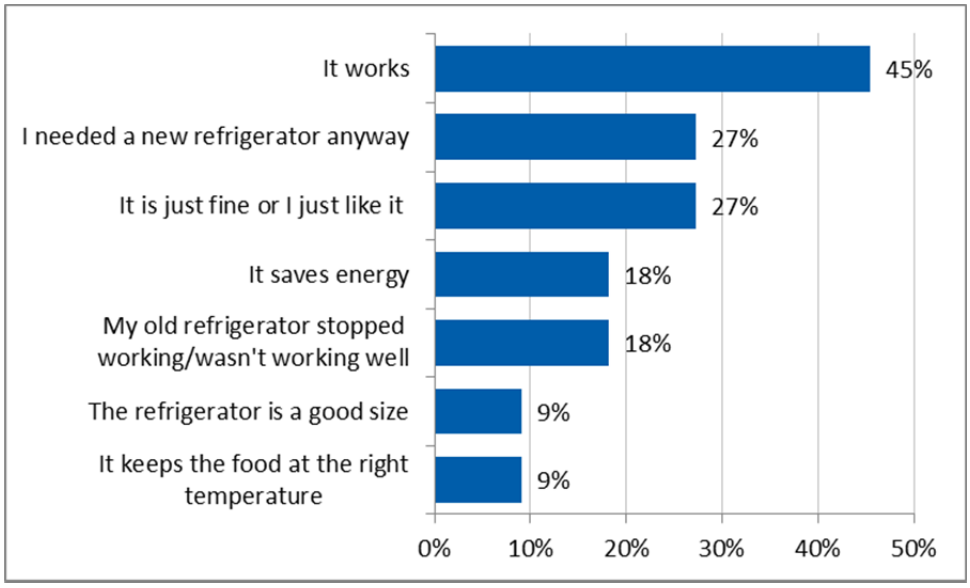
[4] The program provides replacement refrigerators that are the same size in cubic feet as the original refrigerator.

Figure 13. Refrigerator Satisfaction Levels (n=22)



Tenants who were satisfied with their refrigerator gave the reasons listed in Figure 14.

Figure 14. Refrigerator Satisfaction Reasons (n=11, Multiple Responses Allowed)



Aerators

We spoke to 26 tenants who had faucet aerators installed in their home. Tenant satisfaction levels are shown in Figure 15. Only two respondents gave reasons why they rated themselves as *less than satisfied* with their aerators; one said the flow was too weak, and one said it was installed at the wrong angle.

Figure 15. Aerator Satisfaction Levels (n=25)

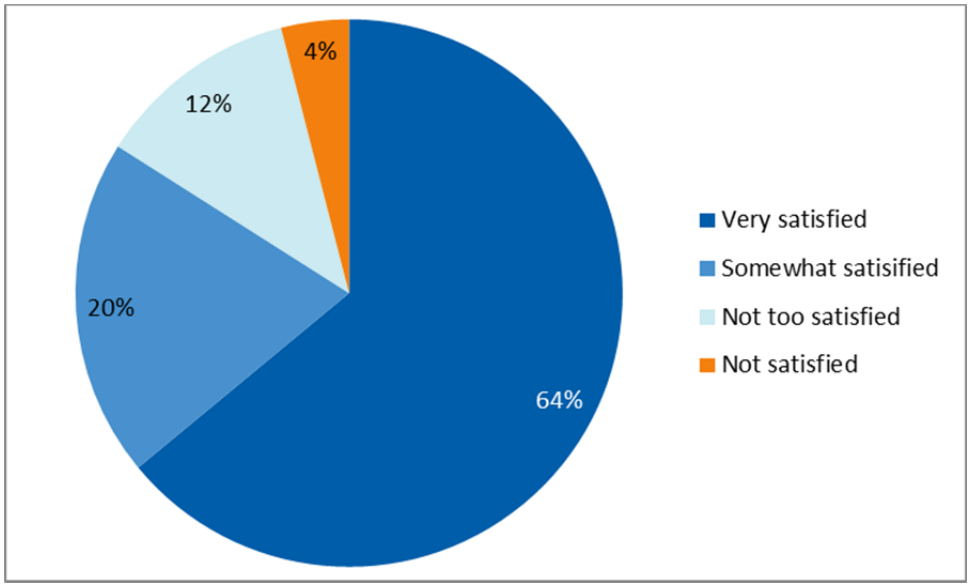
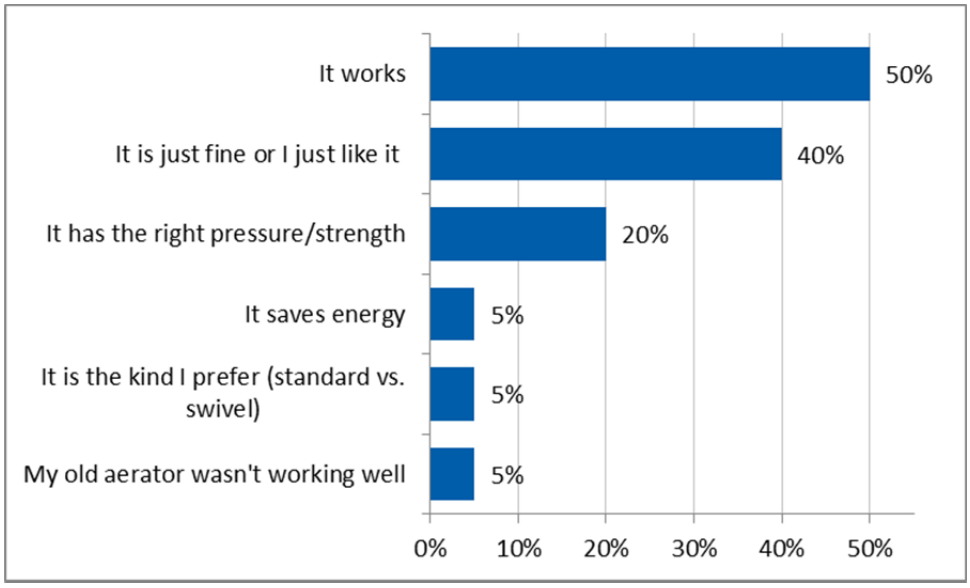


Figure 16 shows the reasons respondents said they were satisfied with their aerators.

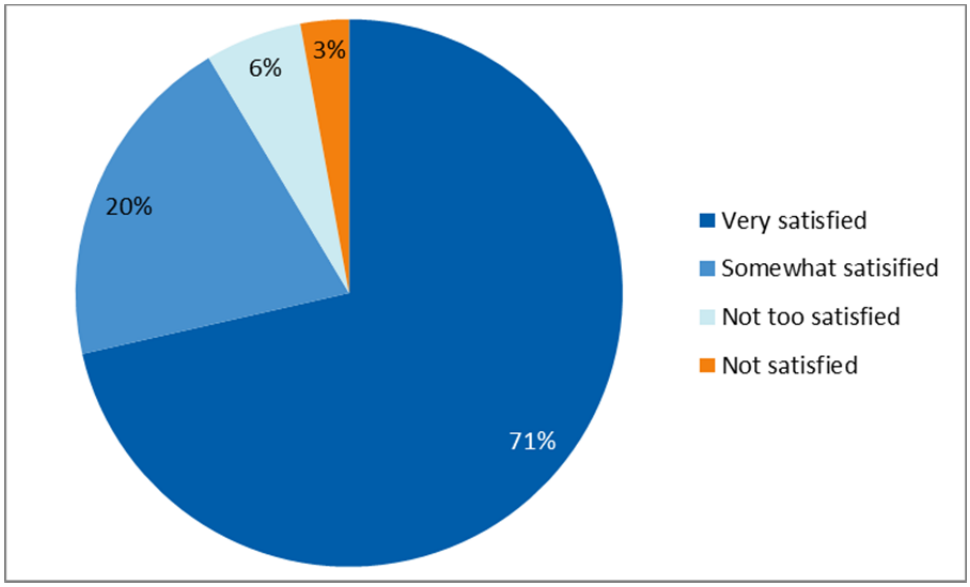
Figure 16. Aerator Satisfaction Reasons (n=20, multiple responses allowed)



Showerheads

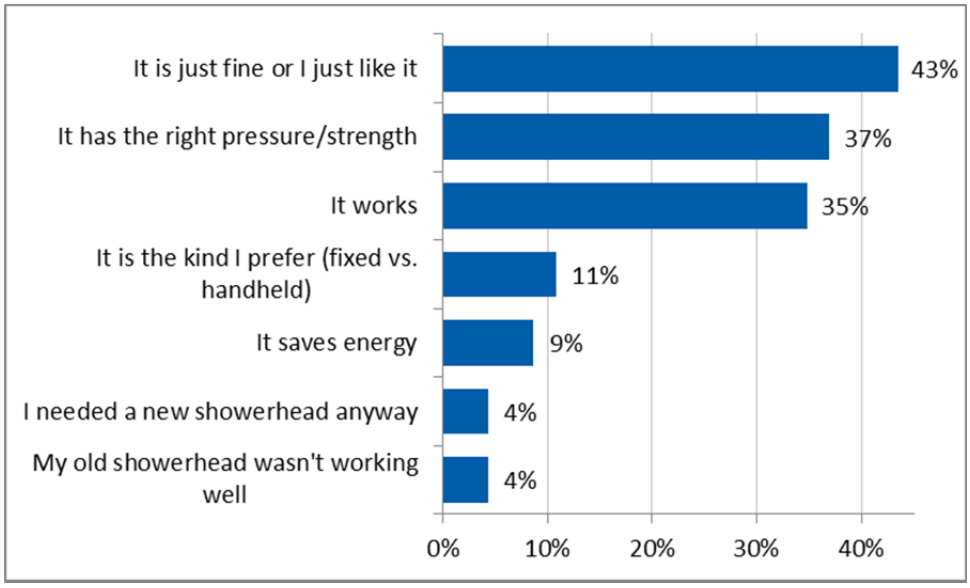
Seventy-three of the survey respondents we spoke to had showerheads installed through the CommunitySavers program. Figure 17 shows tenants' level of satisfaction with the showerheads they received. Of those respondents who said they were *less than satisfied*, three said they did not like the type of showerhead because it was fixed or handheld, three said they just did not like it, and two said the flow was too weak or slow.

Figure 17. Showerhead Satisfaction Levels (n=70)



The reasons tenants said they were satisfied with the showerheads are listed in Figure 18.

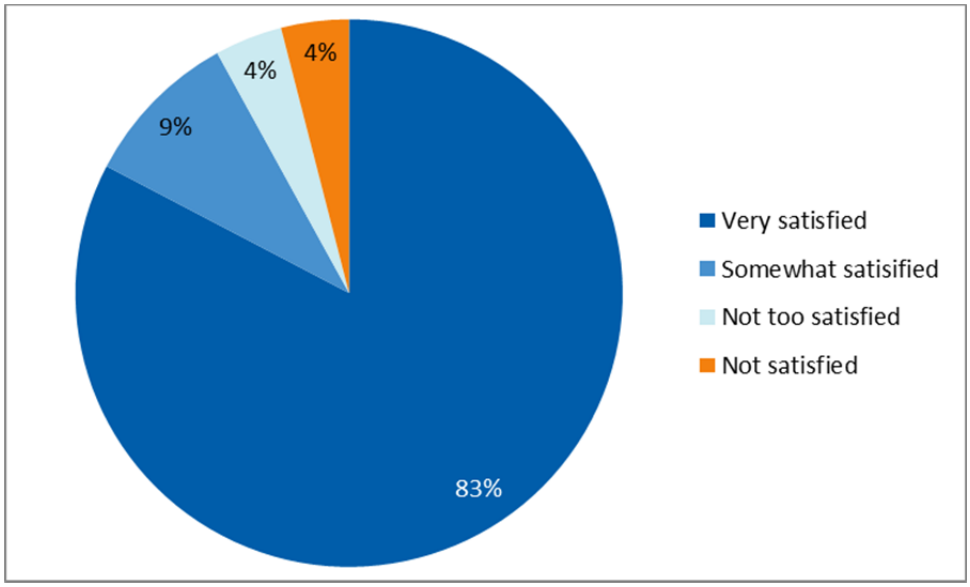
Figure 18. Showerhead Satisfaction Reasons (n=46, Multiple Responses Allowed)



Programmable Thermostats

We spoke to 76 tenants who received programmable thermostats through the program. The tenants' satisfaction levels with the thermostats they received are shown in Figure 19.

Figure 19. Thermostat Satisfaction Levels (n=75)



The respondents who described themselves as *less than satisfied* said either that the new thermostat was difficult to operate or that they had difficulty reading the information it displayed.

The reasons tenants said they were satisfied with the programmable thermostats are shown in Figure 20.

Figure 20. Thermostat Satisfaction Reasons (n=54, Multiple Responses Allowed)

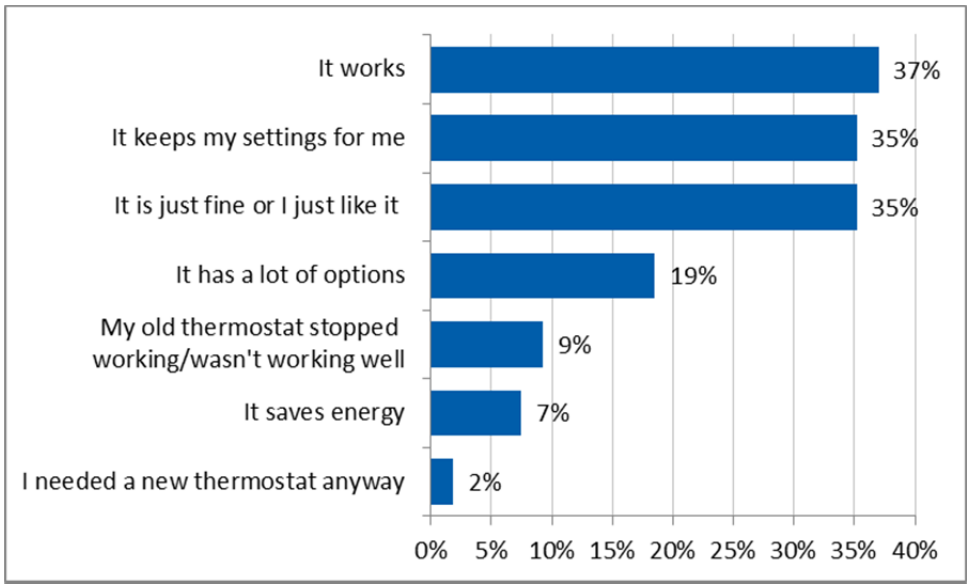


Table 12 shows the percentage of respondents who said the installers programmed the thermostat or gave them instructions on its use.

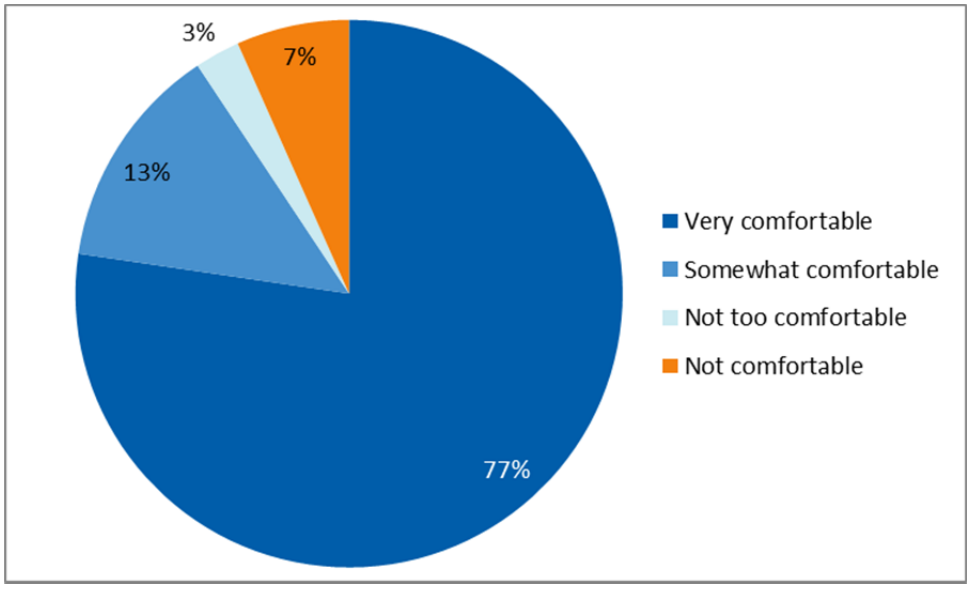
Table 12. Thermostat Programming and Instruction

Question	Yes	No
Did the installer program your thermostat for you? (n=75)	80%	20%
Did the installer show you how to use the programmable thermostat? (n=76)	75%	25%

When we asked them if the thermostat's programming feature set their temperature or if they manually adjusted it, about one-half (54%) said they continued to manually adjust the temperature rather than having the thermostat do it automatically.

Figure 21 shows how comfortable tenants are with using their new thermostats. Most (90%) said they felt *very comfortable* or *somewhat comfortable* using their new thermostat, but 7% rated themselves as *not comfortable* using the thermostat.

Figure 21. Tenant Comfort Levels Operating New Thermostat (n=75)

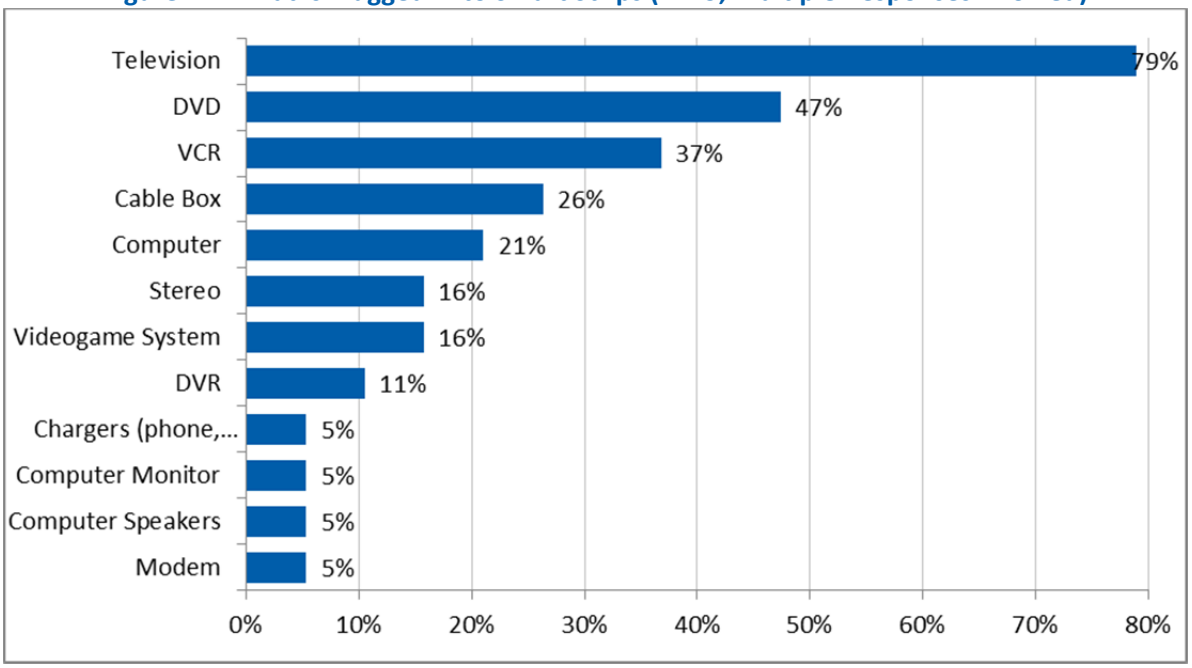


Advanced Power Strips

Nineteen[5] of the surveyed respondents received advanced power strips from the program, and we asked them what equipment they currently had plugged into the strips they received. Their answers are shown in Figure 22.

[5] Only 857 households received Advanced Power Strips.

Figure 22. What is Plugged in to Smart Strips (n=19, Multiple Responses Allowed)

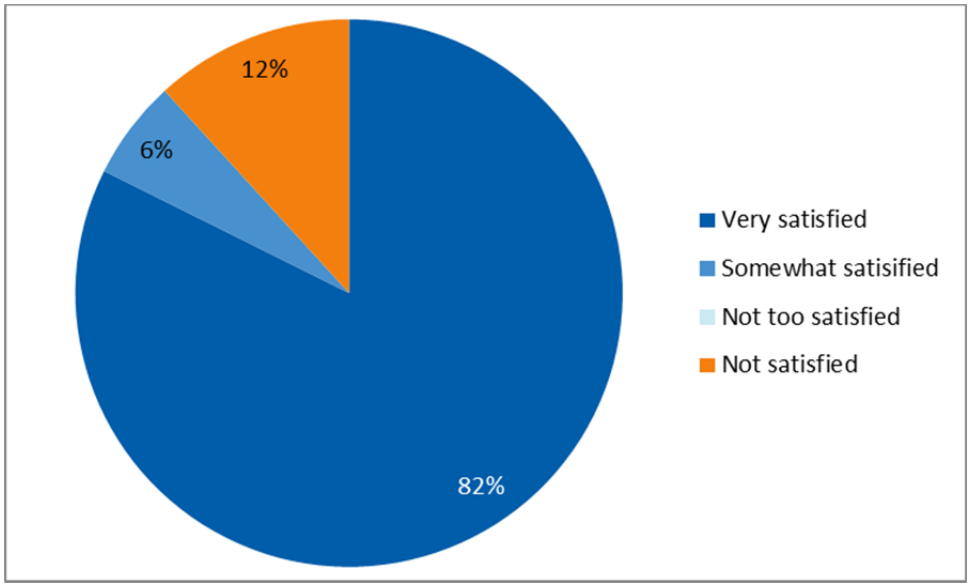


Almost 80% said they had plugged in a television and a home video device (DVD or VCR). About one-quarter said they had also plugged in a cable box.[6] The next types of equipment most frequently plugged in to smart strips were computers, stereos, and videogame consoles.

Figure 23 shows how satisfied respondents said they were with their advanced power strips. The respondents who said they were not satisfied with the strips said they were either unhappy that it turned off their electronics or they did not understand how it worked.

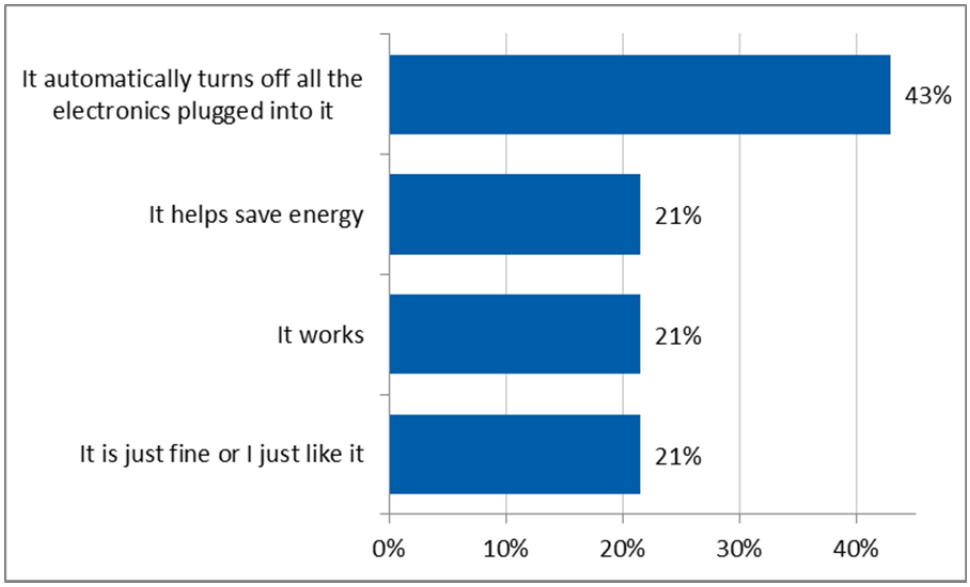
[6] Program subcontractors install the advanced power strips and decide which electronics to plug into the "controlled" and "always on" outlets. Cable boxes are plugged into the "always on" outlets and not the "controlled" outlets.

Figure 23.Advanced Power Strip Satisfaction Levels (n=17)



The reasons stated by respondents who said they were satisfied with the smart strips are shown in Figure 24. Most of the satisfied respondents said they liked the fact that it turned off all the equipment plugged into it.

Figure 24. Smart Strip Satisfaction Reasons (n=14, Multiple Responses Allowed)



Air Conditioners

Ten of the tenants we surveyed received new room air conditions or through-the-wall air conditioners. All of the tenants said the old units were taken away, either by a technician or landlord.

When we asked these tenants how satisfied they were with their new air conditioner, seven described themselves as *very satisfied* because the unit kept their home at the right temperature—and it worked. Only one tenant reported being *somewhat satisfied*.

Education and Program Satisfaction

About three-quarters said the education was very helpful, and 10% found it less than helpful.

Figure 25. Program Education Helpfulness (n=109)

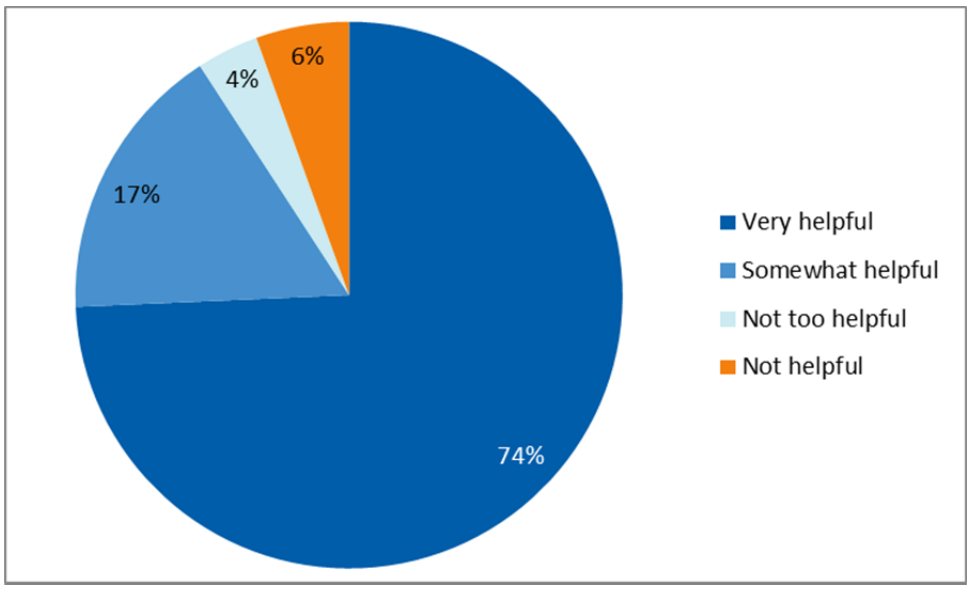


Table 13 shows tenants' responses when asked if the education they received had any influence on their energy-saving knowledge and behavior.

Table 13. Program Education Influence

Question	Yes	No
Did you learn any new ideas about how you could save money/energy in your home? (n=109)	80%	20%
Have you made any changes in your home to do that? (n=55)	75%	25%

Figure 26 shows the effect participating in the program had on overall home comfort. While 49% rated their home now as being either *somewhat more comfortable* or a *lot more comfortable*, 45% said the program had no effect.

Figure 26. Program Effect on Home Comfort (n=156)

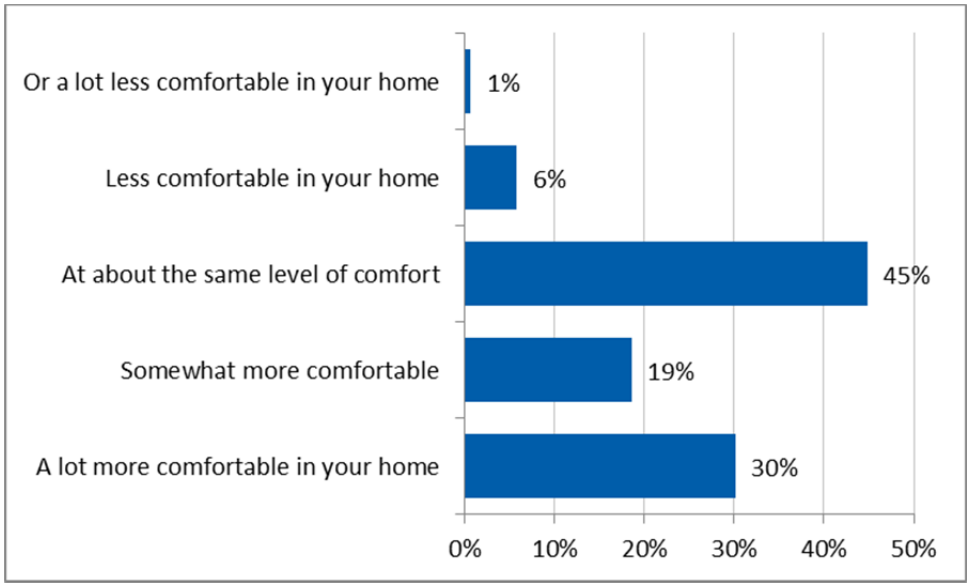
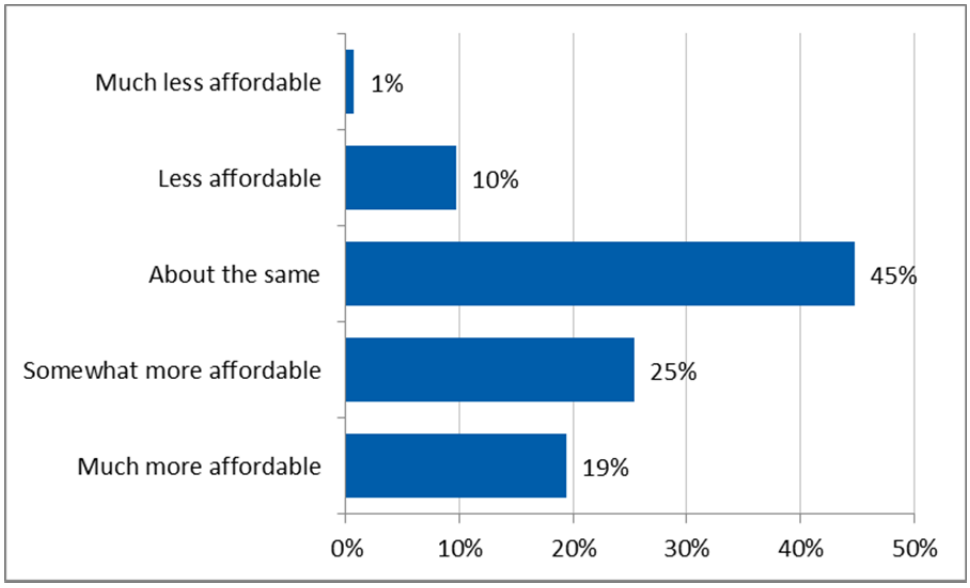


Figure 27 shows the effect of the program on respondents' energy bills.

Figure 27. Program Effect on Energy Bills (n=134)



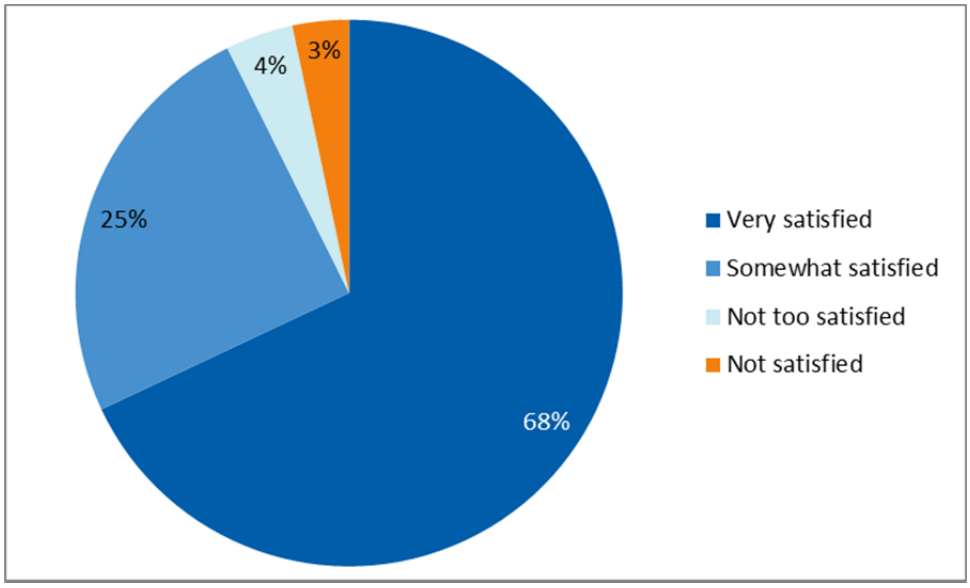
We asked tenants how courteous the installation and program staff members were, with the results shown in Table 14. Almost all tenants (95%) rated their installers as very courteous, and most (89%) said the same thing about the program staff they met.

Table 14. Experience with Installers and Program Staff

Rating	Installers (n=135)	Program Staff (n=136)
Very Courteous	95%	89%
Somewhat Courteous	4%	9%
Not Too Courteous	1%	0%
Not Courteous	0%	2%

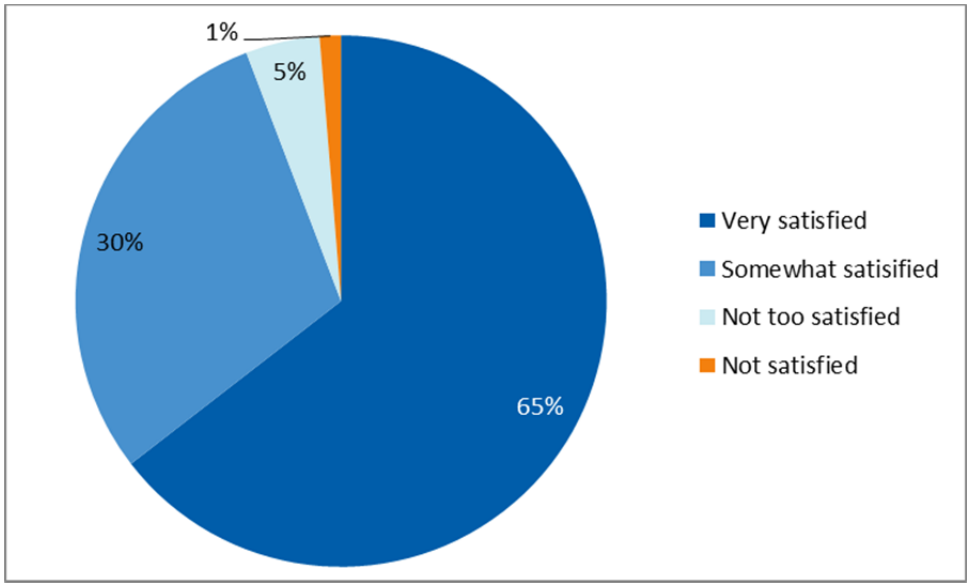
Figure 28 shows how satisfied respondents said they were with the program services they received. Overall, tenants were satisfied with the program services, with 93% describing themselves as either very satisfied or somewhat satisfied.

Figure 28. Overall Satisfaction with Program Services (n=150)



Tenant satisfaction with Ameren as their utility is shown in Figure 29. Almost all (95%) of the respondents said they were either *very satisfied* or *somewhat satisfied* with Ameren as their utility.

Figure 29. Overall Satisfaction with Ameren (n=155)



Demographics

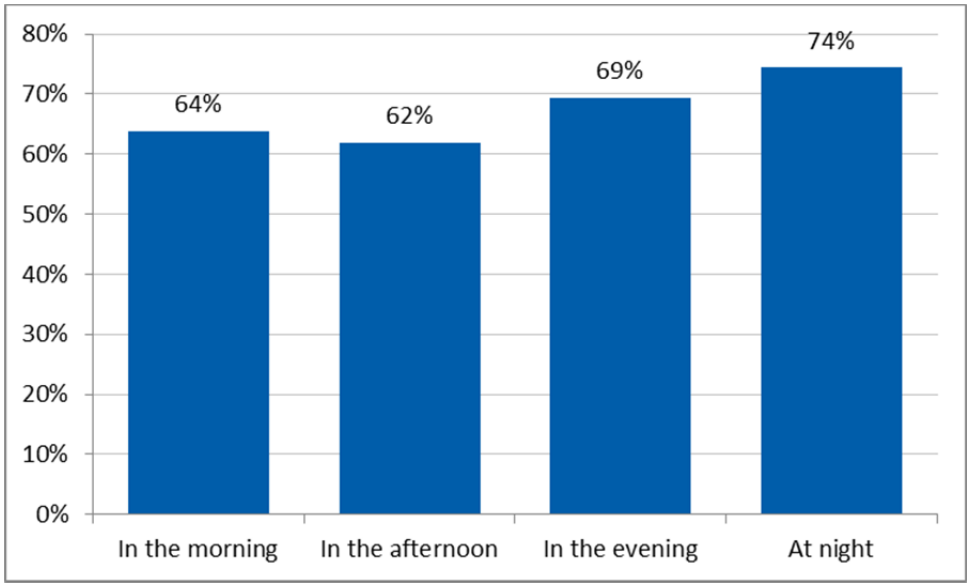
The Cadmus team asked tenants for household demographic information. Table 15 shows the number and percentage of residents, bedrooms, and bathrooms tenants said they have in their homes. Almost three-quarters of the survey respondents said they live alone. A majority of tenants live in a one- or two-bedroom home with one bathroom. Very few respondents have a half bathroom or more than three bedrooms.

Table 15. Number of Residents, Bedrooms, and Bathrooms

Number	Residents (n=153)	Bedrooms (n=154)	Full Bathroom (n=157)	Half Bathroom (n=156)
0	—	—	—	95%
1	71%	38%	83%	5%
2	10%	54%	17%	—
3	12%	7%	—	—
4	3%	1%	—	—
5	3%	—	—	—
6	1%	—	—	—
7	1%	—	—	—
Average	1.59	1.72	1.17	0.05

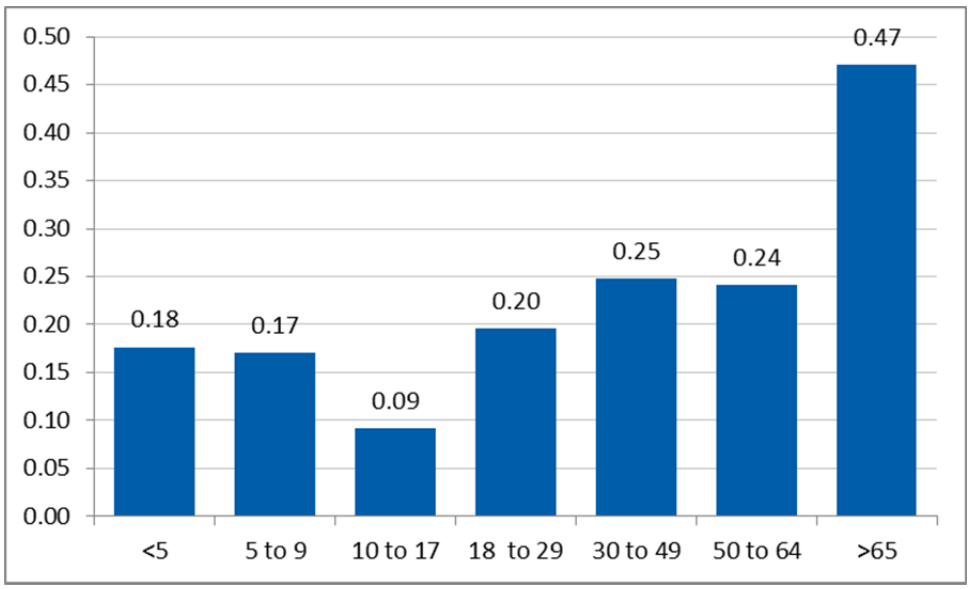
We asked respondents at what times of day their homes were occupied. This program has traditionally served a high portion of respondents who are home for most of the day. Almost 75% said they were home at night, and almost 70% said they were home during the evenings. As Figure 30 shows, approximately 60% said they were home in the mornings or afternoons.

Figure 30. Time Periods Homes are Occupied (n=160)



We calculated the proportion of respondents by age groups, as shown in Figure 31. In most of the households we surveyed, the residents were 50 years old or older. Most children living in the home were under ten.

Figure 31. Proportional Age of Residents (n=153)



CSR Summary

According to the Missouri Code of State Regulations (CSR),[7] demand-side programs that are part of a utility's preferred resource plan are subject to ongoing process evaluations that address, at a minimum, the five questions listed in Table 16. While the process evaluation findings above touch on each of these topics, the table offers a summary response for each specified CSR requirements.

Table 16: Summary Responses to CSR Process Evaluation Requirements

CSR Requirement Number	CSR Requirement Description	Summary Response
1	What are the primary market imperfections common to the target market segment?	The primary market imperfections include: split incentives between property managers and tenants; and the work required by the property manager/maintenance staff to facilitate installations.
2	Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?	The low-income multifamily market could be merged with a low-income single-family market if concerns about serving non-low-income households can be resolved.
3	Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?	The mix of measures provides cost-effective electric savings in multifamily buildings housing low-income residents. Current measures address lighting, water heating, appliances, electronics, heating, and cooling. Additional measures could be supplied for households with natural gas heating or water heating if natural gas utilities co-sponsored the program. Program stakeholders have also suggested including air sealing measures.
4	Are the communication channels and delivery mechanisms appropriate for the target market segment?	The communication channels for the target market include direct contact with property managers by Honeywell staff. Communication with tenants is handled by: property managers, through workshops with Honeywell staff and directly with installation contractors in apartments. The delivery mechanism is direct installation performed by program subcontractors. The communication and delivery mechanism are necessarily direct and hands-on as both the tenant and property managers are considered a hard-to-reach population and have split incentives.

[7] http://sos.mo.gov/adrules/csr/current/4csr/4c240-22.pdf

CSR Requirement Number	CSR Requirement Description	Summary Response
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?	The CommunitySavers design and implementation has had great success for several years, with high levels of participation and tenant acceptance of new measures such as CFLs and advanced power strips. While many of the federally-subsidized properties have been treated, there are still LIHTC properties that can be served through the program. The program can help these property managers understand their eligibility for the program.

GROSS IMPACT EVALUATION RESULTS

The Cadmus team estimated PY13 per-unit *ex post* gross energy savings for CommunitySavers using program data, secondary sources, and data and analysis leveraged from concurrent Cadmus evaluation activities for the LightSavers, ApplianceSavers, and PerformanceSavers programs. This section of the report details each measure's per-unit savings calculations and installation rates.

Measure Installation Verification

In our PY11 and PY12 evaluations of CommunitySavers, we used site visit data (collected in PY11) to verify installation and retention rates. Since these data are not current and do not take into account the changes in program delivery since PY11, the measure retention rates for PY13 relied solely on tenant surveys. While this information is not as reliable as site visit data, the changes to the program are substantial enough for us not to assume that installation rates were similar. Specifically, we asked tenants if any measures had failed or been removed.

As shown in Table 17, we verified through the tenant survey that the majority of program measures are installed and continuing to operate.

Table 17. Measure Verification and Retention

Measure	PY13 Installations	Percentage Verified & Operable
CFL - 13W	46,188	95.7%
CFL - 18W	5,003	
CFL - 23W	5,014	
Refrigerator	1,278	100%
Showerhead	4,394	94.5%
Programmable Thermostat	4,210	100%
Faucet Aerator	8,639	96.2%
Pipe Wrap	7,662	100%
Room Air Conditioner	675	100%
CAC Tune-up	1,591	100%
CAC Charging	870	100%
Advanced Power Strip	857	94.7%
Water Heater Blanket	4	100%

Measure-Specific Gross Savings

Engineers on the Cadmus team developed measure-specific savings algorithms for all program measures in the CommunitySavers PY13 evaluation plan. In this section, we provide these algorithms and specify the energy savings we determined for each measure.

CFLs

CFLs were installed in lamps and light fixtures of participating residences.[8] The program installed CFL bulbs that were: 13W, 18W, and 23W. Cadmus estimated CFL savings using the following algorithm:

$$Savings = \frac{(WattINC - WattCFL) \times Hours \times Days}{1{,}000} \times WHF$$

Where:

- WattINC = the wattage of the original incandescent bulb replaced by a CommunitySavers CFL.
- WattCFL = the wattage of the CFL installed by CommunitySavers.
- Hours = the average hours of use per day.
- Days = the days used per year.
- 1,000 = the conversion factor between Wh and kWh (Wh/kWh).
- WHF = the waste heat factor to account for interactive effects.

The inputs for the algorithm are shown in Table 18.

Table 18. CFL Engineering Algorithm Inputs

Term	Value	Source
$WattsINC_{(60W)}$	60	Program Replacement Protocol
$WattsINC_{(75W)}$	63	Weighted average of 75W bulbs installed prior to EISA and 52W bulbs installed post EISA
$WattsINC_{(100W)}$	72	Post-EISA baseline wattage
$WattsCFL_{(13\ W)}$	13	Program Wattage
$WattsCFL_{(18\ W)}$	18	Program Wattage
$WattsCFL_{(23\ W)}$	23	Program Wattage
Hours	2.62	Estimated using a logarithmic function with metering data from the PY11 Multifamily Income Qualified evaluation and the PY11 LightSavers evaluation to estimate usage based on an increase in average residents per unit this year
Days	365	Conversion Factor (day/yr)
WHF	0.83	PY13 LightSavers Evaluation and CommunitySavers Program Data

Similar to the LightSavers evaluation, the Cadmus team accounted for the Energy Independence and Security Act of 2007 (EISA 2007) in determining the baseline wattages of the replaced bulbs. Because EISA does not regulate retail sales directly, we account for a six-month "phase out" period, during which retail stores sell out their existing stock of bulbs that have been prohibited. The phase-out period expired in 2012 for 100W bulbs, so we apply a baseline of 72W for all 23W CFLs (lumen-equivalent of 100W incandescents). 75W bulbs were phased out in January 2013, so we apply a 75W baseline for all 18W CFLS (lumen-equivalent of 75W) installed in the first half of the year, and a 52W baseline for all

[8] Replacements did not include specialty bulbs.

18W CFLs installed in the second half of the year. The weighted average baseline for 18W CFLs (based on install date) was 63W.

The Cadmus team conducted a metering study in PY11 to determine the CFL hours-of-use (HOU) for CommunitySavers (Multifamily Income Qualified Program or MFIQ). Our metering study entailed an analysis of 90 lighting loggers installed in 23 CommunitySavers residences. The average CFL operated for 1.7 hours per day (later updated to 2.13 when the program began installing CFLs only in high use fixtures).[9]

Our PY11 metering study included households having an average of 1.2 occupants and the housing type served was almost exclusively senior and disabled. In PY13, the number of occupants increased to 1.9 and the housing types served was more diverse (32% of properties housed families). To adjust for these differences, we fit a logarithmic function to the PY11 metering data and the average number of occupants, and the resulting calculation was an average of 2.62 hours.

Using the engineering algorithms, calculations, and inputs, we estimated the *ex post* energy savings for each wattage of CFL listed in Table 19. The variation in *ex ante* and *ex post* estimates was mainly the result of applying a multifamily-specific waste heat factor to account for interactive effects of the heating and cooling systems and the adjusted baseline as a result of EISA 2007. The TRM did not adjust *ex ante* savings for either factor. In addition, the TRM assumed higher HOUs for the bulbs than that found in through the evaluation.

Table 19. CFLs: *Ex Ante* and *Ex Post* Comparison

Measure	*Ex Ante*	*Ex Post*	Realization Rate
CFL - 13W	48.4	38.7	80%
CFL - 18W	37.4	37.0	99%
CFL - 23W	51.2	40.3	79%

Refrigerators

Under the program, Whirlpool replaced all of the refrigerators that were manufactured before 2000. These new, ENERGY STAR-qualified, replacement refrigerators varied in capacity (12, 15, 18, and 21 cubic feet), and the capacity of the existing unit determined the size of the replacement.

Similar to past years, we leveraged the concurrent ApplianceSavers evaluation information to estimate the energy use of existing refrigerators. This methodology, which the ApplianceSavers report describes in detail, draws upon multiple metering studies and on a replaced refrigerator's age, size, configuration, and location within the home.

[9] This metering study will be updated in PY14. Cadmus installed meters on lighting and other equipment in July and August 2013. The meters will be retrieved in the Spring and Summer PY14 and estimates of use updated for all impacted measures.

For CommunitySavers, we determined the energy use of the new unit using a weighted average of ENERGY STAR-based energy consumption by refrigerator size and configuration. We estimated refrigerator savings using the following algorithm:

$$Savings = EnergyUse_{EXISTING} - EnergyUse_{NEW}$$

Where:

- EnergyUseExisting = the use of the replaced refrigerator.
- EnergyUseNew = the use of the new ENERGY STAR refrigerator.

Unlike ApplianceSavers—where gross savings equal the consumption of the replaced appliances—the CommunitySavers refrigerator savings equal the difference in consumption between existing units and new units. This is because the CommunitySavers' direct-install program design prohibits refrigerators recycled through CommunitySavers from being relocated for continued use. Table 20 lists the value and source used for each refrigerator algorithm input.

Table 20. Refrigerator Savings Assumptions

Input	Value	Source
EnergyUseExisting	1,268	PY13 ApplianceSavers Evaluation
EnergyUseNew	362	PY13 Program Data and ENERGY STAR

Using these engineering algorithms and inputs, we estimated *ex post* energy savings of 906kWh/year for each refrigerator. This rate fell below the program's *ex ante* value (1,126 kWh), which was based on the PY10 Multifamily Income Qualified evaluation.

Table 21. Refrigerators: *Ex Ante* and *Ex Post* Comparison

Ex Ante	*Ex Post*	Realization Rate
1,126 kWh/year	906 kWh/year	80%

Showerheads

The program installed two types of showerheads (handheld and fixed units), replacing equivalent units. Both showerheads produced a rated flow of 2.0 gallons per minute (GPM). We estimated showerhead savings using the following algorithm:

$$Savings = \frac{People \times ShowerTime \times Days \times \%Days \times GPM \times (T_{SHOWER} - T_{IN}) \times C_P \times Den}{3{,}413 \times RE \times Number of Showerheads}$$

Where:

- People = the number of people taking showers (ppl/household).
- Shower Time = the average shower length (min/shower).
- Days = the number of days per year (day/yr).
- %Days = the number of showers taken per person, per day.

- ΔGPM = the difference in GPM for the base showerhead and the new showerhead (gal/min).
- T_{SHOWER} = the average water temperature at the showerhead (°F).
- T_{IN} = the average inlet water temperature (°F).
- CP = the specific water heat (BTU/lb-°F).
- Den = the water density (lb/gal).
- 3,413 = the conversion rate between BTU and kWh (BTU/kWh).
- EF = the water heater's energy factor.
- Number of Showerheads = the number of showerheads installed per home.

Table 22 lists the values and sources used for each showerhead algorithm input. Using these engineering algorithm and inputs, we estimated *ex post* energy savings of 184 kWh/year for each showerhead installed by CommunitySavers and retained by a participating resident, a rate slightly lower than the program's *ex ante* value (204 kWh).

Table 22. Showerheads: Engineering Algorithm Inputs

Term	Value	Source
People	1.9	PY13 CommunitySavers Program Data
Shower Time	8.66	Secondary Source*
Days	365	Conversion Factor (day/yr)
%Days	0.66	Secondary Source*
ΔGPM	0.5	PY13 CommunitySavers Program Data (2.56 to 2 GPM)
T_{SHOWER}	105	Secondary Source**
T_{IN}	61.3	Ameren TRM
EF	0.98	PY11 CommunitySavers Site Visits
CP	1	Constant (BTU/lb-oF)
Den	8.33	Constant (lb/gal)
3,413	3413	Conversion Factor (BTU/kWh)
Number of Showerheads	1.18	PY13 CommunitySavers Program Data

*DeOreo, William, P. Mayer, L. Martien, M. Hayden, A. Funk, M. Kramer-Duffield, and R. Davis (2011). "California Single-Family Water Use Efficiency Study."

**The Bonneville Power Administration measured average shower temperatures as 104–106°F

The disparity in *ex ante* and *ex post* estimates resulted from program and secondary data. The program data provided showed that the actual change in GPM was 0.5 and not 0.75. Also the average number of showerheads installed in each home was 1.18 rather than 1.0, as some units had multiple bathrooms with showers. In addition, our research shows that most residents do not shower in the home every day. Therefore, the percentage of shower days dropped from 100% to 66%. Counteracting those factors (which decreased the program savings) is the increase in number of occupants per apartment, which rose to 1.9 in PY13.

Table 23. Showerheads: *Ex Ante* and *Ex Post* Comparison

Ex Ante	*Ex Post*	Realization Rate
204 kWh/year	184 kWh/year	90%

Programmable Thermostats

Programmable thermostats can generate savings when they are programmed to reduce heating temperatures and increase cooling temperatures at certain times of day, generally when the apartment is unoccupied. CommunitySavers installation staff installed and programmed thermostats in the tenant homes.

Thermostat savings are based on several variables: (1) the type of heating and cooling equipment in the unit; (2) the square footage of space heated and cooled; and (3) the rate at which tenants use their thermostat correctly. (That is, the rate at which tenants allow the programmed thermostat to control the temperature of the unit, without frequent manual adjustments.)[10] We used the Morgan Measures Library (MML) database savings estimates—specific for heating equipment type and home vintage—to calculate the savings for the programmable thermostats. Table 24 lists the data used in our analysis.

Table 24. CommunitySavers MML kWh Value

System Type	Vintage	MML database kWh(per 1,000 sq ft)	HVAC System Weighting	Vintage Weighting	Square Footage Conversion	kWh
Central AC with gas furnace	Average	107	25%	33%	80%	7.0
	New	88	25%	33%	80%	5.8
	Old	115	25%	33%	80%	7.5
Central AC with electric furnace	Average	632	66%	33%	80%	111.0
	New	483	66%	33%	80%	84.7
	Old	671	66%	33%	80%	117.8
PTAC	Average	523	1%	33%	80%	1.6
	New	269	1%	33%	80%	0.8
	Old	719	1%	33%	80%	2.2
Central air source heat pump	Average	345	8%	33%	80%	7.8
	New	269	8%	33%	80%	6.1
	Old	368	8%	33%	80%	8.3
Total						360.6

To determine how the participants used their thermostats, we analyzed tenant survey data. Specifically, we asked whether the newly installed thermostat controlled the home's daytime and evening

[10] Detailed information on these topics is provided in the memo to Ameren: *Programmable Thermostats Methodology and PY13 Savings Estimates*, January 16, 2014.

temperatures. We also asked if the respondents manually turned the heat on and off as needed. The results of our survey indicated that 46% of respondents used programming to control both their daytime and evening temperatures. We then used the results of our analysis to make behavioral adjustments to the savings values in the MML database, (i.e., 360.6 x 0.46 = 166 kWh/year) as shown in Table 25.

Table 25. Programmable Thermostat: *Ex Ante* and *Ex Post* Comparison

Ex Ante	*Ex Post*	Realization Rate
234 kWh/year	166 kWh/year	71%

These *ex* ante savings were based on the original implementer estimates (assumed in PY10). While the calculated savings for CommunitySavers are lower than those specified in the TRM, savings are higher in the CommunitySavers program than any of the other Ameren programs.

There are several reasons why the CommunitySavers calculated savings are higher than the other Ameren programs offering programmable thermostats.

- The program has a higher saturation of electric heating at 75%, compared to the RebateSavers and CoolSavers population where 32% and 35% of homes, respectively, have electric heating.
- The thermostats were installed and programmed on-site by the implementer.
- The participant survey showed a higher percentage of people using thermostats correctly.[11]

Faucet Aerators

The program installed two types of faucet aerators (fixed and swivel), and these high-efficiency aerators, which have a flow rate of 1.5 GPM, replaced older units of equivalent types. Most apartments received two faucet aerators: one for the kitchen and one for the bathroom.

We used this algorithm to estimate faucet aerator savings:

$$Savings = \frac{People \times FaucetTime \times Days \times \Delta GPM \times (T_{FAUCET} - T_{IN}) \times C_P \times Den}{3413 \times EF \times NumberofFaucets}$$

Where:

- People = the number of people in the home (ppl/household).
- Faucet Time = the average length of faucet use per day (min/day).
- Days = the number of days per year (day/yr).
- ΔGPM = the GPM difference between the base unit and the new unit (gal/min).
- TFAUCET = the average water temperature out of the faucet (°F).
- TIN = the average inlet water temperature (°F).
- ΔTemp = the temperature at the tap minus the temperature at the water main.

[11] To the extent possible, these data will be updated with CommunitySavers-specific metering results in PY14.

- RE = recovery efficiency of the electric hot water heater.
- Number of Faucets = the number of faucets installed per home.

Table 26 lists the values and sources used for each faucet aerator algorithm input.

Table 26. Faucet Aerator Savings Assumptions

Term	Value	Source
People	1.9	PY13 CommunitySavers Program Data
Faucet Time	3.7	PY11 CommunitySavers Metering Study
Days	365	Conversion Factor (day/yr)
ΔGPM	0.66	PY13 CommunitySavers Program Data
T_{FAUCET}	80	Secondary Source*
T_{IN}	61.3	Ameren TRM
RE	0.98	Secondary Source**
CP	1	Constant (BTU/lb-oF)
Den	8.33	Constant (lb/gal)
3413	3,413	Conversion Factor (BTU/kWh)
Number of faucets	1.96	PY13 CommunitySavers Program Data

*Vermont Technical Reference Manual, 2009.

The results of the water metering study we conducted for PY11 provided one of the most critical inputs—daily minutes of use—because this is CommunitySavers-specific primary data (as opposed to that of secondary sources). Our PY11 study (consisting of 13 kitchen faucets and 15 bathroom faucets) determined that CommunitySavers participants used their kitchen faucets 4.7 minutes per person per day, and they used their bathroom faucets 2.6 minutes per person per day. As program records did not differentiate between kitchen and bathroom aerators, the algorithm above relied on a simple average of the two values (3.7 minutes/ day/person/faucet).

Using our engineering algorithm and these inputs, we estimated *ex post* energy savings of 40kWh/year for each faucet aerator—which is slightly higher than the program's *ex ante* value (37 kWh).

As shown in Table 27, the primary difference between *ex ante* and *ex post* savings arose in the reduction of the delta GPM value, resulting from the introduction of primary data collected by Honeywell regarding pre-program flow rates (ΔGPM decreased from an estimated 0.7 to the program data verified 0.66). The increase in the number of people per household in PY13 partially mitigated the impact of this reduction in savings.

Table 27. Faucet Aerators: *Ex Ante* and *Ex Post* Comparison

Ex Ante	*Ex Post*	Realization Rate
37 kWh/year	40 kWh/year	109%

Water Heater Pipe Wrap

Under CommunitySavers, installation contractors applied pipe wrap in three-foot increments to reduce heat loss from pipes attached to the water heater.

We used the following algorithm to estimate the savings resulting from water heater pipe wrap:

$$Savings = \frac{\left(\left(\frac{1}{R_{EXIST}} - \frac{1}{R_{NEW}}\right) \times L \times C \times \Delta T \times 8{,}760\right)}{\text{RE} \times 3413}$$

Where:

- R_{EXIST} = the pipe heat loss coefficient of uninsulated pipe (existing) (Btu/hr-°F-ft) = 1.0.
- R_{NEW} = the pipe heat loss coefficient of insulated pipe (new) (Btu/hr-°F-ft).
- L = the length of pipe from the water heating source covered by pipe wrap (ft).
- C = the circumference of pipe (ft); (Diameter (in) * π * 0.083).
- ΔT = the average temperature difference between supplied hot water (at the faucet) and the outside water main temperature (°F).
- 8,760 = the number of hours during which heat loss occurred throughout the year (hr/yr).
- RE = the recovery efficiency of the electric hot water heater.
- 3,413 = the conversion rate between BTUs and kWhs (BTU/kWh).

Table 28 lists the value and source used for each water heater pipe wrap algorithm input.

Table 28. Water Heater Pipe Wrap: Engineering Algorithm Inputs

Input	Value	Source
R_{EXIST}	1	Secondary Source*
R_{NEW}	3.6	PY13 CommunitySavers Program Data
L	1	PY13 CommunitySavers Program Data
C	0.196	PY11 CommunitySavers Site Visits
Δ T	58.9	PY11 CommunitySavers Site Visits and Secondary Source**
8760	8,760	Days
RE	0.98	Secondary Source***
3413	3,413	Conversion Factor (BTU/kWh)

*Navigant. *Measures and Assumptions for DSM Planning; Appendix C Substantiation Sheets*. April 2009. p 77.
**126.4 – 67.5 = 58.9; 126.4 is based on hot water temperatures collected during PY11 CommunitySavers site visits; 67.5 degrees is the average ambient air temperature.
*** 2010 Ohio Technical Reference Manual, August 6, 2010.

Using these engineering algorithm and inputs, we estimated *ex post* energy savings of 22 kWh/year for every foot of pipe wrap —a rate slightly lower than the program's *ex ante* value (23 kWh), as determined through the PY11 evaluation. *Ex ante* and *ex post* savings primarily differ in the R-value of

the pipe wrap (assumed to be 3.3 in the *ex ante* estimate). We confirmed the updated R-value of 3.6 with the program implementer in PY13.

Table 29. Water Heater Pipe Wrap: *Ex Ante* and *Ex Post* Comparison

Ex Ante	*Ex Post*	Realization Rate
23 kWh/year	22 kWh/year	95%

RACs

For participating residences, CommunitySavers replaced older, inefficient RACs (both window units and through-the-wall units) with new, ENERGY STAR units that offered comparable cooling capacities. To estimate the savings for this measure, we used this algorithm:

$$Savings = \frac{\frac{BTU}{hr} \times \left(\frac{1}{EER_{BASE}} - \frac{1}{EER_{EFF}}\right) \times EFLH_{COOL} \times AF}{1,000}$$

Where:

- BTU/hr = the room air conditioner's cooling capacity (BTU/hour).
- EER_{BASE} = the baseline energy-efficiency ratio (BTU/W-hour).
- EER_{EFF} = the energy-efficiency ratio (BTU/W-hour).
- $EFLH_{COOL}$ = the cooling equivalent full-load hours (hour).
- AF = the adjustment factor converting central air conditioner HOU to room air conditioner HOU.
- 1,000 = the conversion factor between Wh and kWh (Wh/kWh).

Table 30 lists the values and sources used for each RAC algorithm input.

Table 30. RACs: Engineering Algorithm Inputs*

Input	Value	Source
BTU/hr	12,936	PY13 Program Data (weighted average of installed units)
EER_{BASE}	6.7	Secondary Source**
EER_{EFF}	9.9	PY13 Program Data (weighted average of installed units)
EFLHCOOL	860	PY13 CoolSavers Metering Study
AF	1.0	Secondary Source***

*The PY13 CoolSavers Report describes the algorithm inputs, such as the EERBASEM, EFLH, and AF, in detail.

**The Cadmus Group. *OPA Keep Cool Metering Study*. 2008: (http://www.powerauthority.on.ca/sites/default/files/2008%20OPA%20Every%20Kilowatt%20Counts%20Power Savings%20Event%2C%20Keep%20Cool%2C%20and%20Rewards%20for%20Recycling%20Evaluation%20Retailer %20Names%20redacted.pdf)

***Cadmus' findings from a low-income HVAC metering study at a Midwest utility. In addition, CommunitySavers use their RACs as their primary (and usually only) source of cooling.

Using the engineering algorithm and inputs listed in Table 30, the Cadmus team estimated *ex post* energy savings of 539 kWh/year for each RAC, a rate much higher than program's *ex ante* value

(274 kWh). The e*x ante* savings were based on the assumption of the program replacing a current, standard efficiency RAC. Since the program replaces much older RACs, the base efficiency is lower and the *ex post* savings are higher. In addition, the RACs operate as the primary cooling source in apartments rather than as a secondary or supplemental unit (as occurs in other programs).

Table 31. Window Air Conditioners: *Ex Ante* and *Ex Post* Comparison

Ex Ante	*Ex Post*	Realization Rate
274 kWh/year	539 kWh/year	197%

CAC Tune-ups and Refrigerant Charge

CAC tune-ups and refrigerant charge were offered for the first time through the program in PY13. The offering was popular, with 2,470 tune-ups conducted through the program. Data provided on individual jobs indicated that many of the CAC units were in poor repair; thus, the program's tune-ups and charging provided a significant boost to the units' efficiency.

The Cadmus team calculated savings for these measures based on the evaluation activities completed through the CoolSavers evaluation. We adjusted the savings for the program to reflect the number of CACs and heat pumps tuned and charged through the program. We also made adjustments to reflect the smaller size and smaller cooling load of the units used in apartment buildings (versus single-family homes).

Table 32. CAC Tune-ups: *Ex Ante* and *Ex Post* Comparison

Ex Ante	*Ex Post*	Realization Rate
87 kWh/year	131 kWh/year	150%

Table 33. CAC Refrigerant Charge : *Ex Ante* and *Ex Post* Comparison

Ex Ante	*Ex Post*	Realization Rate
87 kWh/year	365 kWh/year	420%

Advanced Power Strips

The program installed advanced power strips to help reduce phantom power draw from electronics that are in stand-by mode when not in use (such as DVDs and gaming systems, or printers and scanners). To estimate savings from the measure, the Cadmus team used a deemed number, due to the challenges of gathering reliable primary data on peripheral devices from phone surveys.[12] We reviewed over 20 studies on advanced power strips, examining their assumptions for different equipment types (home office and home entertainment). The main differences we noted between the studies were the average number of controlled devices assumed in each equation and the type of smart-strip technologies used.

[12] Cadmus found that survey responses about the number and type of equipment plugged into "controlled" outlets were often unreliable.

After this detailed review, we determined that a 2011 study conducted by NYSERDA combined the most in-depth research with the most reasonable assumptions to calculate energy savings for load-sensing smart strips.[13] Table 34 shows the per-unit savings found by NYSERDA for home office and home entertainment applications.[14]

Table 34. NYSERDA Savings Values

Smart Strip Location	Savings/Unit (kWh)
Home Office	31
Home Entertainment	75

To determine final savings values for load sensing and motion sensing strips provided through the program, we adjusted *ex post* savings based on the percentage of participants having the measure installed with their home entertainment systems versus their computer systems (which we determined through tenant survey responses). Later, we adjusted the savings for retention rate, as one participant removed the smart strip.

Table 35. Adjusted *Ex Post* Values Considering Peripheral Device Saturation

Home Office Saturation	Entertainment Center Saturation	Adjusted *Ex Post* Savings/unit (kWh)
11%	89%	70

The Cadmus team estimated *ex post* energy savings of 70 kWh/year for each advanced power strip. The MML estimated much higher savings, based on the assumption of more electronics controlled by the advanced power strip and partially due to the assumption of less variable usage of the home entertainment and home office systems.

Table 36. Advanced Power Strips: *Ex Ante* and *Ex Post* Comparison

Ex Ante	Ex Post	Realization Rate
185 kWh/year	70 kWh/year	38%

Water Heater Blankets

The program wrapped water heater blankets around electric water heaters connected to participant residences. The installation of water heater blankets in PY13 was very low; only four water heaters were wrapped through the program.

Five engineering algorithms provided estimates of savings realized from the use of water heater blankets. Annual energy-savings estimates derived from the following, final, composite algorithm:

[13] NYSERDA report. "Advanced Power Strip Research Report." developed by Lockheed Martin, Inc. 2011.

[14] A detailed overview of the NYSERDA algorithms used and the differences in assumptions between the NYSERDA report and the Ameren Missouri TRM is provided in the memo to Ameren entitled: *Smart-Strip Savings*, December 2013.

$$Savings = \left[U_{BASE} - \left(\frac{1}{\frac{1}{U_{BASE}} + R_{WRAP}}\right)\right] \times A_{WRAP} \times (T_{TANK} - T_{AMB}) \times \frac{8{,}760}{3{,}413}$$

Where:

- U_{BASE} = the water heater's overall heat transfer coefficient before water heater blanket installation (BTU/hr-ft2- °F).
- R_{WRAP} = the installed water heater blanket's R-value (hr- ft2- °F /BTU).
- A_{WRAP} = the water heater's surface area, excluding its base (ft2).
- T_{TANK} = the tank thermostat setpoint temperature (°F).
- T_{AMB} = the temperature of ambient air surrounding the water heater (°F).
- 8,760 = the number of hours during which heat loss occurs throughout the year (hr/yr).
- 3,413 = the conversion rate between BTUs and kWh (BTU/kWh).

Table 37 lists the values and sources used. Using these engineering algorithm and inputs, we estimated *ex post* energy savings of 19 kWh/year, a rate lower than the program's *ex ante* value.

Table 37. Water Heater Blankets: Engineering Algorithm Inputs

Input	Value	Source
People	1.9	PY13 CommunitySavers Program Data
Usage	23	Secondary Source*
Den	8.33	Constant (lb/gal)
CP	1	Constant (BTU/lb-°F)
T_{TANK}	126.4	PY11 CommunitySavers Site Visits
T_{IN}	61.3	Ameren TRM
Q_{OUT}	23,698	Calculated
EF_{BASE}	0.92	PY11 CommunitySavers Site Visits
RE_{BASE}	0.98	Recovery Efficiency
T_{AMB}	67.5	Secondary Source**
24	24	Conversion Factor (hr/day)
Pon_{BASE}	15,354	Secondary Source***
UA_{BASE}	1.19	Calculated
Diameter	1.61	Secondary Source***
Height	4.31	Secondary Source***
A_{BASE}	47.65	Calculated
R_{WRAP}	11	PY13 CommunitySavers Program Data
U_{BASE}	0.03	Calculated
A_{WRAP}	23.82	Calculated

Input	Value	Source
8,760	8,760	Conversion Factor (hr/yr)
3,413	3,413	Conversion Factor (BTU/kWh)

*Average of several sources, including: New York TRM, ACEEE, Ohio TRM, EPA, and others.
**Department of Energy Domestic Hot Water Test Procedure Ambient Air Temperature.
***Average size from two electric water heaters: 40 and 50 gallon. Grainger #3WA68 and #3WA71, respectively.

Table 38. Water Heater Blankets: *Ex Ante* and *Ex Post* Comparison

Ex Ante	*Ex Post*	Realization Rate
33 kWh/year	20 kWh/year	59%

Summary of Measure-Level Gross Savings

The Cadmus team provides summaries of the measure-level gross savings through several tables in this section.

Table 39 summarizes per-unit *ex ante* and *ex post* gross savings by measure. The *ex post* demand savings, determined through DSMore using the *ex post* energy savings reported here, are provided in Appendix A.

Table 39. PY13 Summary: Comparison of *Ex Ante and Ex Post* Per-Unit Gross Savings

Measure	*Ex Ante* (kWh/yr)	*Ex Post* (kWh/yr)	Realization Rate
CFL - 13W	48.4	38.7	80%
CFL - 18W	37.4	37.0	99%
CFL - 23W	51.2	40.3	79%
Refrigerator	1,126	906	80%
Showerhead	204	184	90%
Programmable Thermostat	234	166	71%
Faucet Aerator	37	40	109%
Pipe Wrap	23	22	95%
Room Air Conditioner	273	539	197%
CAC Tune-up	87	131	150%
CAC Charging	87	365	420%
Advanced Power Strip	185	70	38%
Water Heater Blanket	33	20	59%

Table 40 applies these per-unit values to the CommunitySavers' PY13 participation rates to estimate the program's total gross energy savings.

Table 40. PY13 Summary: *Ex Post* Program Gross Savings Accounting for Retention Rates*

Measure	PY13 Installations	Per-Unit *Ex Post* Savings (kWh/Year)	Verified & Operable	Total *Ex Post* Savings (MWh/Year)
CFL - 13W	46,188	38.7		1,708.6
CFL - 18W	5,003	37.0	95.7%	177.2
CFL - 23W	5,014	40.3		193.4
Refrigerator	1,278	906	100%	1,158.3
Showerhead	4,394	184	95%	763.3
Programmable Thermostat	4,210	166	100%	698.3
Faucet Aerator	8,639	40	96%	335.9
Pipe Wrap	7,662	22	100%	167.3
Room Air Conditioner	675	539	100%	363.7
CAC Tune-up	1,591	131	100%	208.4
CAC Charging	870	365	100%	318.0
Advanced Power Strip	857	70	95%	56.9
Water Heater Blanket	4	20	100%	0.1
Total	**86,385**			**6,149**

***Confidence and precision rates for these estimates to be provided in the final draft.

NET IMPACT EVALUATION RESULTS

To calculate CommunitySavers PY13 NTG ratios, the Cadmus team used the following formula:

NTG = 1.0 – Free Ridership + Participant Spillover + Nonparticipant Spillover + Market Effects

Unlike other program evaluations, CommunitySavers is not available to the general public; rather, it is an income-qualified population. The Cadmus team nonparticipant survey did not target CommunitySavers nonparticipants (nonparticipating property managers overseeing low-income properties). Therefore, nonparticipant spillover does not apply. Similarly we did not assess market effects as marketing for CommunitySavers targets property managers or owners for the units, not the income- eligible recipients or the general public.

For CommunitySavers, free riders are defined as property managers who would have purchased and installed the measures their tenants received without the support of the program. These property managers account for some of the costs but none of the benefits of the program, decreasing program net savings. We estimated free ridership by asking participating property managers a battery of questions regarding their purchasing decision.

Spillover is the additional savings that would be generated by property managers installing additional energy-efficient measures outside the program and as a result of their experience participating in CommunitySavers, either at the participating property, or at another property. Unlike free ridership, no program costs are associated with spillover savings, but there are energy saving benefits that increase net savings.

Similar to our methodology for free ridership, we estimated spillover using a battery of survey questions that assess whether their energy efficient actions were: (1) influenced by participation in the CommunitySavers program; and (2) not incentivized through another program. This section discusses how we calculated the net savings by measure.

Free Ridership

The Cadmus team determined free ridership via a self-report approach, based on a standard battery of questions that define whether the property manager:

- Had ever installed the same equipment in tenant spaces before the program;
- Would have installed the same package of measures without the program;
- Would have installed products that were just as energy-efficient without the program;
- Would have installed the same quantity of items in the package;
- Would have installed them within the same year, within two years, within five years, or in more than five years; and
- The money for the new energy-efficient equipment was in their budget.

We then apply a free ridership score (ranging from 0% to 100%) to all participants individually, based on their collective responses to the set of survey questions. Our process for determining a free ridership score is as follows:

- We categorized customers as 0% free riders in the following instances: (1) they had never installed energy efficiency upgrades in tenant spaces; (2) they would have installed none of the measures included in the CommunitySavers program, or would have installed them at a lower efficiency level; (3) they would have installed the same measures, but in three years or later; or (4) they did not have money in their budget to cover the installation of the same set of measures installed in the program.
- We categorized customers as 100% free riders if they had installed the same group of measures, at the same efficiency level before participating in the program, or if they would have installed the same group of measures, at the same quantity, within the next two years, and had funds set aside in their budget to do so without the assistance of the program. Note that none of the property managers scored as 100% free rider.
- We assign a partial free ridership score (ranging from 12.5% to 75%) to customers who, before participating in the program, had installed some of the equipment provided under the program, or if the customers would have installed some of the same equipment without the assistance of the program.

This approach, which scores property managers' propensity as well as ability to make energy-efficient improvements in tenant units, mitigates self-report bias. After translating survey responses into each participant's free ridership score, we calculated an average free ridership estimate for the program as a whole.

Free ridership Results

As noted above, the evaluation relied on phone surveys with property managers to assess free ridership. The free ridership results shown are based on the level of free ridership attributed to each survey respondent, weighted by the total expected savings generated by their property.

Most property managers indicated that, in the absence of the program, they would not have upgraded their properties with the types of items the program furnished. As noted earlier, however, there were some property managers who had participated in another energy-efficiency program prior to their participation in CommunitySavers. Also, some property managers also cited green programs undertaken by their property management firms.

Only three respondents said that, prior to participating in CommunitySavers, they had installed some of the equipment types provided the program—specifically, CFL bulbs, ENERGY STAR® refrigerators, and AC units. Most of the respondents said they only install new items as older items break or age out.

- Eight said there was no money in their budget for the equipment.

- Eleven reported having a budget to replace some old or broken equipment. Also, some said they were instructed to replace old units with ENERGY STAR units.

When asked whether they would have installed the same package of equipment without the program, 14 respondents said they would not have installed any of the measures.

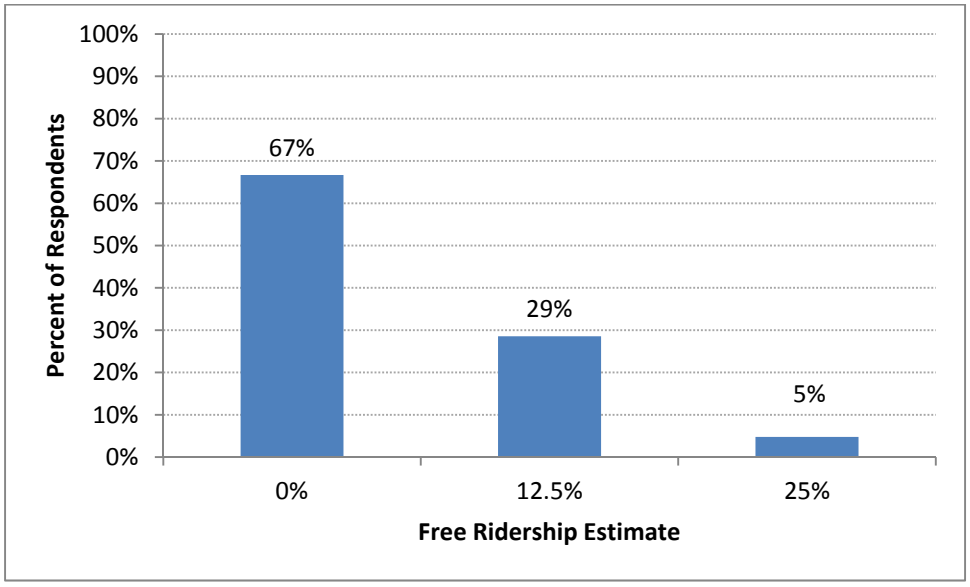
Only one said "yes," while two said they would have installed some of the equipment. The two who said they would install some equipment said that they would have replaced showerheads and appliances as they aged. They also said they would have encouraged tenants to install CFL bulbs. However, these two would not have installed equipment such as programmable thermostats, water heaters, or pipe insulation. Additionally, these three respondents said they would have installed the same level of efficient equipment as provided by the program. The details of their responses are as follows:

- One would have installed the same quantity of equipment;
- Two would have installed the same quantities for only some equipment; and
- Two would have installed the equipment within the same year.

Four respondents said that since participating in the program, they have installed some energy-efficient appliances in their apartments; however, these items were installed upon equipment failure.

Figure 32 shows the distribution of free ridership scores by the percentage of respondents.

Figure 32. Distribution of Free Ridership Scores



Ultimately, the free ridership factor determined for the participants in PY13 is 4.2%, indicating that, without the CommunitySavers program, only 4.2% of these energy-efficiency upgrades would have happened. This value is a bit lower than PY12 and PY11 results, but higher than the PY10 free ridership factor.

Participant Spillover

We asked CommunitySavers participants whether they had undertaken any additional energy-efficient actions since participating in the program, either at this property or another property that they manage. To calculate spillover, we then asked them to rate how important was their CommunitySavers experience in their decision to purchase and install additional energy efficient equipment. We only considered responses where the property manager answered "Important" to the questions for allocation to program spillover. To avoid double-counting the savings captured by a concurrent program, we eliminated any responses that indicated the energy-efficiency actions were incentivized by another Ameren program or a different program.

One property manager installing energy-efficient measures for tenants at another property for which her participation in the CommunitySavers program was "important" to her decision. The measures installed at her other property had been paid for through a different energy-efficiency program; so participant spillover was considered zero for CommunitySavers in PY13.

Summary

Table 41 lists the program's net impacts.

Table 41. CommunitySavers NTG and Net Savings

Program	*Ex Post* Gross Savings (MWh/yr)	Free Ridership	Participant Spillover	Nonparticipant Spillover	Market Effects	NTG Ratio	Net Savings (MWh/yr)
CommunitySavers	6,149	4.2%	0%	0%	0%	95.8%	5,890

As shown in Table 42, the PY13 CommunitySavers program realized 83.8% of its *ex ante* net savings based on actual PY13 participation. Due to higher-than-expected participation, the program reached its proposed net energy savings target for PY13 (5,798 MWh) in Ameren's residential tariff.[15]

[15] https://www.ameren.com/sites/AUE/Rates/Documents/UECSheet191EEResidential.pdf

Table 42. PY13 Savings

Metric	MPSC-Approved Target[1]	*Ex Ante* Gross Savings Utility Reported (Prior to Evaluation) [2]	*Ex Post* Gross Savings Determined by EM&V[3]	*Ex Post* Net Savings Determined by EM&V[4]	Percent of Goal Achieved[5]
Energy (MWh)	5,798	7,472	6,149	5,890	102%
Demand (kW)	774	728	505	484	115%

[1] https://www.ameren.com/sites/AUE/Rates/Documents/UECSheet191EEResidential.pdf

[2] Calculated by applying tracked program activity to TRM savings values.

[3] Calculated by applying tracked program activity to Cadmus' evaluated savings values.

[4] Calculated by multiplying Cadmus' evaluated gross savings and NTG ratio, which accounts for free ridership, participant spillover, nonparticipant spillover, and market effects.

[5] Compares MPSC Approved Target and *Ex Post* Net Savings Determined by EM&V

BENCHMARKING

While many utilities offer low-income programs and multifamily programs, there are relatively few other programs around the country offering a similar low-income, multifamily design. As a result, the Cadmus team has provided an overview of key CommunitySavers metrics since PY10.

At the beginning of this multifamily program (PY10), measures focused primarily on lighting (13W bulbs) and the program started modestly. Participation grew until the PY12 bridge year and successfully re-launched as CommunitySavers with additional measures. The demographics of participating tenants has also changed. PY13 participants included a fewer seniors and a larger number of families with multiple family members than previous years.

The program's NTG has remained consistently high over time, showing that property managers would not have independently installed the overwhelming majority of the program's measures. The NTG ratio may change, however, as a greater number of for-profit housing facilities (likely with greater financial resources to make energy-efficient improvements) participate in the future.

Table 43. CommunitySavers Measure Installations

Measure	PY10	PY11	PY12	PY13
AC-Energy Star Room	9	590	141	250
AC-Energy Star Room-Thru-Wall	-	-	712	425
CFL-13W	58,861	84,705	13,144	46,188
CFL-18W	-	-		5,003
CFL-23W	-	-		5,014
Refrigerator	818	3,699	1,057	1,278
CAC Tune-up	-			1,591
Faucet Aerator	6,328	7,636	3,119	8,639
Showerhead	3,304	3,837	1,391	4,394
Pipe Insulation	3,134	3,123	1,606	7,662
CAC Charge				870
Programmable Thermostat	1,238	2,672	1,375	4,210
Advanced Power Strip	-	-	-	857
Water Heater Blanket	9	869	215	4

Table 44. CommunitySavers Per-Unit Measure Savings (kWh/Year)

Measure	PY10	PY11	PY12	PY13
AC-Energy Star Room	273	471	426	422
AC-Energy Star Room-Thru-Wall	-	-		422
CFL-13W	48	34	35	39
CFL-18W	-	-		37
CFL-23W	-	-		40
Refrigerator	1,126	807	900	906
CAC Tune-up	-	-		131
Faucet Aerator	40	39	33	40
Showerhead	210	218	262	184
Pipe Insulation	28	23	22	22
CAC Charge				365
Programmable Thermostat	234	234	234	166
Advanced Power Strip	-	-		70
Water Heater Blanket	33	41	31	20

Table 45. CommunitySavers Tenant Demographics

Demographics	PY10	PY11 & PY12	PY13
Residing in one bedroom, one bath units	69%	76%	59%
Tenants living alone	73%	77%	32%
Tenants report being home all day	83%	79%	48%
Primary tenant over age 50	69%	79%	49%

Table 46. CommunitySavers NTG

PY10	PY11 & PY12	PY13
0.91	0.98	0.96

COST-EFFECTIVENESS RESULTS

To analyze the cost-effectiveness of the PY13 CommunitySavers program, MMP utilizing DSMore. MMP assessed cost-effectiveness using the following five tests as defined by the California Standard Practice Manual:[16]

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

DSMore takes hourly prices and hourly energy savings from the specific measures installed through CommunitySavers, and correlates both prices and savings to 30 years of historic weather data. Using long-term weather ensures the model captures the low probability, but high consequence weather events and appropriately values them. As a result, the model's produces an accurate evaluation of the demand-side efficiency measure relative to other alternative supply options.

Key assumptions include these:

- Discount Rate = 6.95%
- Line Losses = 5.72%
- Summer Peak would occur during the 16th hour of a July day on average
- Avoided Electric T&D = $31.01/kW
- Escalation rates for different costs occur at the component level with separate escalation rates for fuel, capacity, generation, T&D and customer rates carried out over 25 years.

In addition, MMP leveraged the "Batch Tools" (model inputs) used by Ameren in their original analysis as input into the *ex post* DSMore analysis. By starting with the original DSMore Batch Tool used by Ameren and only modifying with new data from the evaluation (PY13-specific CommunitySavers participation counts, per-unit gross savings and NTG), consistency is assured. In particular the assumptions in the model are driven by measure load shapes which tells the model when to apply the savings during the day. This assures that the load shape for that end use matches the system peak impacts of that end use and provides the correct summer coincident savings. MMP used measure lifetime assumptions and incremental costs based the program's database, the Ameren Missouri TRM, or the original Batch Tool.

A key step in the analysis process was acquiring PY13 Ameren program spending data: actual spending broken down into implementation, incentives, and administration costs. MMP applied these numbers at

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

the program level, not the measure level. While applying incentives at the measure level is useful for planning purposes, it is unnecessary for the cost-effectiveness modeling as the results are based on the program overall. MMP applied administrative costs (e.g., evaluation, potential study costs, and data tracking) in the portfolio summary analysis, not by program as they apply to the whole residential effort.

Table 47 summarizes the cost-effectiveness findings by test. Any benefit/cost score above 1.0 passes the test as cost-effective. The table also includes the cost of conserved energy (CCE) which describes the costs of acquiring those savings based on the lifetime benefits. In addition, the table includes the present value of the net lifetime benefits (net avoided costs minus program costs). As seen in the table, the CommunitySavers program passed only the societal test, which is not uncommon for low-income programs. The CCE is just over five cents per kWh and net lifetime benefits are -$175,047.

Table 47. Cost-Effectiveness Results (PY13)

	TRC	UCT	RIM	PART	Societal	CCE - $/kWh	Net Lifetime Benefits
CommunitySavers	0.95	0.95	0.42	N/A	1.17	$0.052	-$175,047

APPENDIX A. EX POST DEMAND REDUCTIONS

MMP determined *ex post* demand reductions using the *ex post* energy savings estimated in this PY13 report and DSMore (using load shapes provided by Ameren).

Table 48. PY13 Summary: *Ex Post* Per-Unit Demand Reductions

Measure	PY13 Installations	Net Per-Unit *Ex Post* Demand Reduction (kW)	Total *Ex Post* Savings (kW)*
CFL - 13W	46,188	0.002	68.86
CFL - 18W	5,003	0.001	7.14
CFL - 23W	5,014	0.002	7.79
Refrigerator	1,278	0.153	195.91
Showerhead	4,394	0.020	81.72
Programmable Thermostat	4,210	-0.094	-394.84
Faucet Aerator	8,639	0.004	35.96
Pipe Wrap	7,662	0.002	17.91
Room Air Conditioner	675	0.295	199.24
HVAC Tune-up**	1,591	0.095	151.38
HVAC Charging* *	870	0.120	104.04
Advanced Power Strip	857	0.011	8.63
Water Heater Blanket	4	0.002	0.01
Total	**86,385**		**483.8**

APPENDIX B. STAKEHOLDER INTERVIEW GUIDE

APPENDIX B. STAKEHOLDER INTERVIEW GUIDE

Respondent name: _____

Respondent phone: _____

Interview date: _____ Interviewer initials: _____

For the PY5, PY6 and PY7 evaluations, Cadmus will interview stakeholders bi-annually. The first interview (Wave 1) will focus on the program's launch and changes to the previous program design. The second interview (Wave 2) will assess the program at year end and identify recommendations for improving subsequent programs. In general, the first interview will focus more prospectively, while the second interview is more retrospective.

A. Introduction

1) What are your main responsibilities for Ameren Missouri's Community Savers Program?

2) What percent of your time is dedicated to CommunitySavers?

3) What tasks do you regularly spend the majority of your time on?

B. Program Design and Implementation

7) Can you provide a summary of how the program is intended to perform?

8) How did Ameren determine which measures to rebate?

9) Do you expect any new measures to be added this year, or later in the cycle?

10) Outside of the change in program scale (i.e. from the bridge year), are there any other changes to the program design between PY4 and PY5? If yes, what were they and what was the impetus for the change (Probe: new measures)?

11) What is the target population for CommunitySavers this year? Do you think the target population should be defined differently (Probe: expanded to include others, restricted to not include so many homes)?

12) What would you say is working particularly well so far in PY5? Why is that?

13) Conversely, what is not working as well as anticipated? Why is that?

14) Have there been any lessons learned from the PY5 launch?

15) What do you think have been the most influential program or market factors to attract program participation this year?

16) What program or market factors have you seen serve as a barrier to participation this year?

C. Program Goals

17) What are the program's participation and savings goals for PY5?

18) How are these goals determined?

19) Does the program have any process or non-impact goals for PY5? (Probe: subcontractor participation, increased awareness, education of participants or subcontractors, minimization of logistical problems, cancelation rates)?

20) How are these goals determined?

21) In your opinion, how has the program performed so far in PY5 (in terms of both process and savings/participation goals)?

Why do you think this is?

22) Are there benchmarks in place to monitor progress throughout the year?

23) Have you identified the triggers for contingency plans in case goals are not being met?

D. Measures

25) In your opinion, should any additional measures be considered for inclusion in future programs? If so, what measures?

26) Conversely, should any current measures be excluded?

E. Marketing Efforts

27) How are you identifying participants and conducting outreach for CommunitySavers in PY5? Have you changed the way you identify potential participants this year compared to last year (Probe: USDA housing, HUD housing, other avenues)?

28) What methods are you using to market the program in PY5? (Probe: phone calls, canvassing, business associations, or other. Probe: single family and multifamily differences).)

29) How effective would you say these methods are proving? (Probe: Are there any lessons learned from the last year that were implemented this year? Single family vs. multifamily?)

30) How are landlords of single family participants engaged by the program? Who facilitates the contact with the single family landlords? Are there any special program considerations around the single family landlords (procedures, policies, etc.)?

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31) Do you think eligible property managers and customers are aware of the program? Why or why not? (Probe: single family compared to multifamily)

32) What types of barriers to participation have you encountered or heard about from participants? (PROBE for differences between multifamily and single family participants).

33) Are you working with or coordinating with local low-income weatherization programs?

a. If so, has that helped with providing more services to program participants? Has it helped with successful outreach to potential participants?

b. If not, why has the program decided not to coordinate services with local low-income agencies?

F. Subcontractors

34) [AMEREN and HONEYWELL ONLY] Next, I'd like to discuss the other parties involved in delivering the program. Can you please tell me if you have engaged any new contractors and their roles in the program? (Probe: AC tune-up contractor)

35) [AMEREN and HONEYWELL ONLY] How were the new contractors selected to participate in delivering the program?

36) What training, if any, was provided for the contractors so far in PY5? Do you have additional training planned for PY5?

G. Property Audits and Measure Installation

37) What types of audits are conducted on properties in PY5? Is a formal audit result prepared and presented to the participant? (PROBE for difference between MF and SF)

38) Who decides which measures will be included in each project? Is this decided jointly by implementation staff and participants? Are any measures considered optional in PY5 or is each property/home required to install the full suite of available measures?

39) Who installs the measures? [Probe: Are any measures left with tenants, property managers, or maintenance staff to be installed?]

40) Is there any monitoring or quality control process to assure measures are installed appropriately? Who completes the quality control for PY5?

41) Are the AC tune ups this year for both single and multifamily participants?

42) [HONEYWELL AND CONTRACTORS] How do you determine if programmable thermostats are appropriate for the tenants?

H. Energy Education

43) How are you offering energy education in PY5? Has a single family education curriculum been developed? How does it differ from the multifamily curriculum?

44) How does the workshop curriculum differ from the in-unit curriculum shared with tenants?

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About what percentage of tenants do you believe participate in the energy education portion of the program?

I. Communication

45) How is communication, both formal and informal, between Honeywell and Ameren conducted?

46) How does Honeywell communicate with building managers/owners?

J. Quality Control

43) In your own words, please explain how the program's quality control process works.

44) Does Ameren perform any ride-alongs or independent quality control checks? Please explain.

K. Customer Feedback

47) What has been the response of customers, both property owners and tenants, to the program, especially the new measures and expanded eligible population?

L. Data Tracking

48) How is the program collecting and tracking participation data? There were some concerns in PY4 about the technologies used to report data to Honeywell, have these concerns been addressed?

49) How effective would you say the process has proved to date in PY5?

M. Summary

50) From your perspective, what are the biggest challenges facing the program in PY5?

51) Is there anything else you'd like us to know about your experience administrating/implementing the program so far this year?

52) Cadmus is reaching out to program stakeholders earlier in the year for PY5 to figure out how each stakeholder group can best benefit from the program evaluation process. Is there anything specific you were hoping to learn from this evaluation?

53) Is there anything else you'd like us to know?

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APPENDIX C. TENANT SURVEY INSTRUMENT

APPENDIX C. TENANT SURVEY INSTRUMENTS

Respondent name:_____

Respondent phone: _____

Interview date: _____ Interviewer initials: _____

Hello, my name is _____. I'm calling from Pragmatic Research on behalf of Ameren Missouri. We are talking to people who recently received energy-saving services such as new light bulbs, showerheads and other energy-saving equipment through your landlord and Ameren Missouri earlier this year. We would like to ask you a few questions about the items you received, in order to help improve this program for other people like you.

[IF NO: ASK IF THERE IS A BETTER TIME TO REACH THEM THEN TERMINATE THE CALL]

[IF CONCERNED ABOUT OUR INTENT]

This is not a sales call, but a call for research purposes. We are working to improve our services, develop more programs, and provide more energy-saving equipment to better help customers save money on their energy bills. All of your answers are confidential and will not be shared with Ameren or your landlord in a way that identifies you.

[IF THEY SEEM CONFUSED: CONTINUE WITH SCREENING QUESTIONS]

S. Screening

S1. Did you live at your current home when the new energy-saving items were installed there?

1 Yes
2 No
98 Don't know
99 Refused

S2. Do you remember receiving items such as [READ ALL EQUIPMENT THEY RECEIVED]

1 Yes [SKIP TO EQUIPMENT BATTERY]
2 No
98 Don't know
99 Refused

S3. [IF S2=2, 98, or 99:]
The program may have been working with your landlord or maintenance staff to make these changes. Do you remember any changes in appliances, lighting or other work in your apartment sometime earlier this year?

1 Yes [SKIP TO EQUIPMENT BATTERY]
2 No
98 Don't' Know
99 Refused

S4. [IF S3=2:]
Is there anyone else at your home we could talk to that may have more knowledge of these services?

1 Yes [IF SO, ASK IF YOU MAY SPEAK TO THIS PERSON NOW OR WHEN WOULD BE A GOOD TIME TO REACH THEM]
2 No
98 Don't know
99 Refused
[IF 2 OR 98 OR 99: Thank and Terminate the call.]

Equipment

First I am going to ask you about the energy-saving Items you received.

[ASK THE FOLLOWING EQUIPMENT-SPECIFIC QUESTIONS ONLY FOR THOSE EQUIPMENT THE PARTICIPANT RECEIVED. IF THE PARTICIPANT RECEIVED MORE THAN 4 ITEMS, ASK ABOUT THE FIRST 4 ITEMS] (Possible equipment: CFL's (C), refrigerator (R), showerheads (SH), faucet aerators (F), programmable thermostat (T), room air conditioner (AC), smart power strips (SS) insulation for water heater (no questions asked))

C. CFL

[IF EQUIPMENT=CFLS, READ C1, ELSE SKIP TO NEXT EQUIPMENT]

C1. Our records show that you received new energy efficient light bulbs. Is this correct?

1 Yes [SKIP TO C2]
2 I didn't receive energy efficient light bulbs [SKIP TO NEXT EQUIPMENT]
98 Don't know [PROMPT: THESE ARE CURLY LIGHTBULBS SHAPED LIKE ICE CREAM CONES. IF STILL DON'T KNOW, SKIP TO NEXT EQUIPMENT]
99 Refused [SKIP TO NEXT EQUIPMENT]

C2. Were these new bulbs installed directly into your lights or were they left with you to install yourself?

1 The new light bulbs were installed directly in the light fixtures [SKIP TO C4]
2 The new light bulbs were left behind for me to install
3 I didn't receive new light bulbs [SKIP TO NEXT EQUIPMENT]
98 Don't know [SKIP TO C4]
99 Refused [SKIP TO C4]

C3. Did you install them?

1 Yes, all of them
2 Yes, some of them
3 No
98 Don't know
99 Refused

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C4. Have you removed any of the new light bulbs that were installed?

1 Yes
2 No [SKIP TO QUESTION C8]
98 Don't know [SKIP TO QUESTION C8]
99 Refused [SKIP TO QUESTION C8]

C5. How many energy efficient light bulbs did you remove?
[RECORD NUMBER VERBATIM]

C6. Why did you remove them?

1 Bulb burned or out stopped working
2 I don't like the light from this type of bulb
3 I don't like the shape/appearance of this type of bulb
4 I needed a different type of bulb (dimmable, different wattage, etc.)
5 Other [RECORD ANSWER]
98 Don't know
99 Refused

C7. When you removed the energy saving bulbs(s), did you replace it/them with another energy efficient bulb, with a regular light bulb, or something else?

1 Energy saving bulb (CFL or LED)
2 Regular light bulbs
3 Something else [RECORD ANSWER]
4 Did not replace
98 Don't Know
99 Refused

C8. How satisfied are you overall with the energy saving bulbs you received from Ameren Missouri? Would you say you are:

1 Very satisfied
2 Somewhat satisfied
3 Not too satisfied
4 Not satisfied
98 Don't Know
99 Refused

C9. Why do you say that? [DO NOT READ, MARK ALL THAT APPLY]
<u>Negative (if C8=3 or C8=4)</u>

1 I don't like the color of the light
2 The light is too bright
3 The light is too dim
4 They flicker

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5 They take too long to light up
6 They don't fit well in my fixtures
7 They don't look nice in my fixtures
8 I just didn't like them
9 They burn out quickly
10 Other [RECORD ANSWER]

Positive (If C8=1 or C8=2)

11 They're better than the bulbs I had
12 They're just fine or I just like them
13 I like the way they look
14 They give good light
15 They save energy
16 They [will] save me money
17 They were free
18 I needed new light bulbs anyway
19 I won't have to change hard-to-reach fixture
20 I won't have to change the bulb frequently
21 Other [RECORD ANSWER]
98 Don't know
99 Refused

C10. Were these the first energy-efficient light bulbs you've ever owned?

1 Yes
2 No
98 Don't know
99 Refused

C11. Did you purchase any additional energy efficient light bulbs on your own that are like the new lights you received?

1 Yes
2 No [SKIP TO C13]
98 Don't know [SKIP TO C13]
99 Refused [SKIP TO C13]

C12. Do you remember where you bought your energy efficient bulbs?

1 Big Box Hardware store (i.e., Home Depot)
2 Small hardware store
3 Big Box Retail (like Walmart) or Wholesale Club (like Costco)
4 Discount Retailer (like Dollar Store)
5 Grocery Store
6 Online
7 Other [RECORD ANSWER]
98 Don't Know

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99 Refused

C13. [ASK IF C11=2, 98, or 99] Do you plan to purchase energy efficient bulbs in the future?

1 Yes
2 No
98 Don't know
99 Refused

C14. [IF C13=2] Why not?

1. Too expensive
2. Don't know where to buy them
3. Bulb is too bright
4. Bulb is too dim
5. Delay in turning on
6. Doesn't fit properly/sticks out of fixture
7. Doesn't work with dimmer or 3-way switch
8. No savings/savings not obvious
9. Safety concern
10. Flicker
11. Light color
12. Other [RECORD ANSWER]
98. Don't Know
99. Refused

R. Refrigerators

[IF EQUIPMENT=REFRIGERATOR, READ R1, ELSE SKIP TO NEXT EQUIPMENT]

R1. Our records show that you received a new energy efficient refrigerator. Is this correct?

1 Yes
2 I didn't receive a refrigerator [SKIP TO NEXT EQUIPMENT]
98 Don't know [SKIP TO NEXT EQUIPMENT]
99 Refused [SKIP TO NEXT EQUIPMENT]

R2. How satisfied are you overall with the new refrigerator you received from Ameren Missouri? Would you say you are:

1 Very satisfied
2 Somewhat satisfied
3 Not too satisfied
4 Not satisfied
5 Didn't receive a refrigerator [SKIP TO NEXT EQUIPMENT]
98 Don't know [SKIP TO NEXT EQUIPMENT]
99 Refused [SKIP TO NEXT EQUIPMENT]

R3. Why do you say that? [DO NOT READ, MARK ALL THAT APPLY]

Negative (If R2=3 or R2=4)

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1 I don't like the way it looks
2 I don't like the color
3 The refrigerator is too small
4 The refrigerator is too large
5 It doesn't keep the food at the right temperature
6 It stopped working
7 I just didn't like it
8 Other [RECORD ANSWER]

Positive (If R2=1 or R2=2)

9 It saves energy
10 I like the way it looks
11 I like the color
12 The refrigerator is a good size
13 It keeps the food at the right temperature
14 It works
15 I was glad not to have to clean out my old refrigerator
16 I needed a new refrigerator anyway
17 My old refrigerator stopped working/wasn't working well
18 It is just fine or I just like it
19 Other [RECORD ANSWER]
98 Don't know
99 Refused

F. Faucet Aerators

[IF EQUIPMENT=FAUCET AERATORS, READ F1, ELSE SKIP TO NEXT EQUIPMENT]

F1. Our records show that you received energy efficient faucet aerators. These go on water faucets to break up the water flow. They may be replacing old ones in your kitchen or bathroom sinks. Did you receive these?

1 Yes [SKIP TO F2]
2 Didn’t receive new faucet aerator [SKIP TO NEXT EQUIPMENT]
98 Don’t know [SKIP TO NEXT EQUIPMENT]
99 Refused [SKIP TO NEXT EQUIPMENT]

F2. Were these new aerators installed directly into your faucets or were they left with you to install yourself?

1 The new aerators were installed directly into the faucets [SKIP TO F4]
2 The new faucet aerators were left behind for me to install
3 I didn’t receive new faucet aerators [SKIP TO NEXT EQUIPMENT]
98 Don’t know [SKIP TO F4]
99 Refused [SKIP TO F4]

F3. Did you install them?

1 Yes
2 No
98 Don’t know
99 Refused

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F4. Did you take out any of the new faucet aerators that were installed?

1 Yes
2 No [SKIP TO F6]
98 Don't know [SKIP TO F6]
99 Refused [SKIP TO F6]

F5. Why did you remove them?
[RECORD ANSWER]

F6. How satisfied are you overall with the new faucet aerators you received from Ameren Missouri? Would you say you are:

1 Very satisfied
2 Somewhat satisfied
3 Not too satisfied
4 Not satisfied
5 Didn't receive any aerators [SKIP TO NEXT EQUIPMENT]
98 Don't know [SKIP TO NEXT EQUIPMENT]
99 Refused [SKIP TO NEXT EQUIPMENT]

F7. Why do you say that? [DO NOT READ, MARK ALL THAT APPLY]

Negative (If F6=3 or F6=4)

1 I do not like the kind it is (standard vs. swivel)
2 The flow is too weak/slow
3 It is at the wrong angle
4 I just didn't like it
5 Other [RECORD ANSWER]

Positive (If F6=1 or F6=2)

6 It saves energy
7 It is the kind I prefer (standard vs. swivel)
8 It has the right pressure/strength
9 I needed faucet aerators anyway
10 It works
11 My old aerator wasn't working well
12 It is just fine or I just like it
13 Other [RECORD ANSWER]
98 Don't know
99 Refused

SH. Showerheads

[IF EQUIPMENT=LOW FLOW SHOWERHEADS, READ SH1, ELSE SKIP TO NEXT EQUIPMENT]

SH1. Our records show that you received a new energy efficient showerhead. Is this correct?

1 Yes [SKIP TO SH2]
2 I didn't receive a new showerhead [SKIP TO NEXT EQUIPMENT]
98 Don't know [SKIP TO NEXT EQUIPMENT]
99 Refused [SKIP TO NEXT EQUIPMENT]

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SH2. Was this new showerhead installed directly into your shower or were they left with you to install yourself?

1 The new showerhead was installed directly [SKIP TO SH4]
2 The new showerhead was left behind for me to install
3 I didn't receive a new showerhead [SKIP TO NEXT EQUIPMENT]
98 Don't know [SKIP TO SH4]
99 Refused [SKIP TO SH4]

SH3. Did you install them?

1 Yes
2 No
98 Don't know
99 Refused

SH4. Did you take out the showerhead that was/were installed?

1 Yes
2 No [SKIP TO SH 6]
98 Don't know [SKIP TO SH 6]
99 Refused [SKIP TO SH 6]

SH5. Why did you remove it?
[RECORD ANSWER]

SH6. How satisfied are you overall with the new showerhead you received from Ameren Missouri? Would you say you are:

1 Very satisfied
2 Somewhat satisfied
3 Not too satisfied
4 Not satisfied
5 Didn't receive a showerhead [SKIP TO NEXT EQUIPMENT]
98 Don't know [SKIP TO NEXT EQUIPMENT]
99 Refused [SKIP TO NEXT EQUIPMENT]

SH7. Why do you say that? [DO NOT READ, MARK ALL THAT APPLY]

<u>Negative (If SH6=1 or SH6=2)</u>

1 I don't like the kind it is (fixed vs. handheld)
2 The flow is too weak/slow
3 It is at the wrong angle
4 I just didn't like it
5 Other [RECORD ANSWER]

<u>Positive (If SH6=1 or SH6=2)</u>

6 It saves energy
7 It is the kind I prefer (fixed vs. handheld)
8 It has the right pressure/strength
9 I needed a new showerhead anyway
10 It works
11 My old showerhead wasn't working well

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12 It is just fine or I just like it
13 Other [RECORD ANSWER]
98 Don't know
99 Refused

T. Programmable Thermostats

[IF EQUIPMENT=PROGRAMMABLE THERMOSTATS, READ T1, ELSE SKIP TO NEXT EQUIPMENT]

T1. Our records show that you received a new energy efficient programmable thermostat. The thermostat lets you set different temperatures for different times of the day. Is this correct?

1 Yes
2 Didn't receive a thermostat [SKIP TO NEXT EQUIPMENT]
98 Don't know [SKIP TO NEXT EQUIPMENT]
99 Refused [SKIP TO NEXT EQUIPMENT]

T2. How satisfied are you overall with the new programmable thermostat? Would you say you are:

1 Very satisfied
2 Somewhat satisfied
3 Not too satisfied
4 Not satisfied
5 Didn't receive a thermostat [SKIP TO NEXT EQUIPMENT]
98 Don't know [SKIP TO T4]
99 Refused [SKIP TO T4]

T3. Why do you say that? [DO NOT READ, MARK ALL THAT APPLY]

Negative (If T2=3 or T2=4)

1 I don't like the way it looks
2 I don't know how to use it
3 It takes too much work to set up
4 It is hard to reach
5 It is hard to read
6 It stopped working
7 I just didn't like it
8 Other [RECORD ANSWER]

Positive (IfT2=1 or T2=2)

9 It saves energy
10 It keeps my settings for me
11 It has a lot of options
12 It works
13 I needed a new thermostat anyway
14 My old thermostat stopped working/wasn't working well
15 It is just fine or I just like it
16 Other [RECORD ANSWER]
98 Don't know
99 Refused

T4. Did the installer program your new thermostat for you?

1 Yes

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2 No
98 Don't know
99 Refused

T5. Did the installer show you how to use the programmable thermostat?
1 Yes
2 No
98 Don't know
99 Refused

T6. Have you changed the programming since it's been installed?
1 Yes [Ask "How have you changed it?" RECORD ANSWER]
2 No
98 Don't know
99 Refused

T7. How comfortable are you with using your new programmable thermostat? Are you: [READ]
1 Very comfortable
2 Somewhat comfortable
3 Not too comfortable
4 Not comfortable
98 Don't know
99 Refused

T8. Does the thermostat programming set by the program contractor control your daytime and evening temperatures or do you manually turn the heat on and off as needed?
1 Setting temperatures
2 Turning it on and off
3 Other [RECORD ANSWER]
98 Don't know
99 Refused

T9. Now that you have a programmable thermostat, do you heat or cool your home any differently than you did before you had one?
1 Yes [Ask "What do you do differently?" RECORD ANSWER]
2 No
98 Don't know
99 Refused

G. Smart Strips

[IF EQUIPMENT=SMART STRIPS, READ SS1, ELSE SKIP TO NEXT EQUIPMENT]

SS1. Our records show that you received an energy efficient smart power strip. These are power strips that turn off electricity electronics such as your computer station or your entertainment center at the same time. Were one of these smart strips installed in your home?
1 Yes [SKIP TO SS2]
2 Didn't receive smart power strip [SKIP TO NEXT EQUIPMENT]
98 Don't know [SKIP TO NEXT EQUIPMENT]

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99 Refused [SKIP TO NEXT EQUIPMENT]

SS2. Are you still using (it/them)?
1 Yes [SKIPTO SS4]
2 No
98 Don't know [SKIPTO SS4]
99 Refused [SKIPTO SS4]

SS3. Why are you no longer using (it/them)?
[RECORD ANSWER] [SKIP TO NEXT EQUIPMENT]

SS4. What do you have plugged into your smart power strips? [Accept multiple responses]
1 Television
2 VCR
3 DVD
4 DVR
5 Cable box
6 Videogame system
7 Stereo
8 Speakers
9 Computer
10 Computer Monitor
11 Computer Speakers
12 Printer
13 Scanner
14 Modem
15 Wireless internet router
16 Chargers (phone, game, other)
17 Other [RECORD ANSWER]
98 Don't know
99 Refused

SS5. How satisfied are you overall with the new smart power strips you received from Ameren Missouri? Would you say you are:
1 Very satisfied
2 Somewhat satisfied
3 Not too satisfied
4 Not satisfied
5 Didn't receive any power strips [SKIP TO NEXT EQUIPMENT]
98 Don't know [SKIP TO NEXT EQUIPMENT]
99 Refused [SKIP TO NEXT EQUIPMENT]

SS6. Why do you say that? [DO NOT READ, MARK ALL THAT APPLY]
<u>Negative (If SS5=3 or SS5=4)</u>
1 I do not like the kind it is
2 I do not like using it
3 I do not like that it turns off all my electronics

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4 I don’t understand how it works
5 I don’t have a need for it/nothing to plug in
6 I liked my old one better
7 I just didn't like it
8 Other [RECORD ANSWER]

Positive (If SS5=1 or SS5=2)

9 It is the kind I prefer
10 It automatically turns off all the electronics plugged into it
11 I needed one anyway
12 It helps save energy
13 It works
14 It is just fine or I just like it
15 Other [RECORD ANSWER]
98 Don't know
99 Refused

AC. Room Air Conditioner

[IF EQUIPMENT=ROOM AIR CONDITIONER, READ AC1, ELSE SKIP TO NEXT EQUIPMENT]

AC1. Our records show that you received a new energy efficient air conditioner. Is this correct?

1 Yes
2 Didn’t receive an air conditioner [SKIP TO NEXT EQUIPMENT]
98 Don’t know [SKIP TO NEXT EQUIPMENT]
99 Refused [SKIP TO NEXT EQUIPMENT]

AC2. Did the energy efficient air conditioner you received replace an old air conditioner?

1 Yes
2 No [SKIP TO AC4]
98 Don’t know [SKIP TO AC4]]
99 Refused

AC3. What did you do with the old air conditioner? [DO NOT READ, CHOOSE ONE]

1 Had it recycled
2 Had it hauled away
3 Put it in storage
4 Use it in another room
5 Threw it away
6 Sold it
7 Gave it to someone else
8 The technician or landlord took it away
98 Don’t know [SKIP TO NEXT EQUIPMENT]
99 Refused [SKIP TO NEXT EQUIPMENT]

AC4. Is the new air conditioner you received still installed and in use during hot days?

1 Yes
2 No
98 Don’t know

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99 Refused

AC5. How satisfied are you overall with the new air conditioner you received from Ameren Missouri? Would you say you are:

1 Very satisfied
2 Somewhat satisfied
3 Not too satisfied
4 Not satisfied
5 Didn't receive any power strips [SKIP TO NEXT EQUIPMENT]
98 Don't know [SKIP TO NEXT EQUIPMENT]
99 Refused [SKIP TO NEXT EQUIPMENT]

AC6. Why do you say that? [DO NOT READ, MARK ALL THAT APPLY]

Negative (If AC5=3 or AC5=4)

1 I don't like the way it looks
2 It is too noisy
3 It's too large
4 It does not keep the room at the right temperature
5 It stopped working
6 I just didn't like it
7 Other [RECORD ANSWER]

Positive (If AC5=1 or AC5=2)

8 It saves energy
9 It is quiet
10 It is a nice size
11 It keeps the room at the right temperature
12 It works
13 I did not have an air conditioner before
14 I needed a new air conditioner anyway
15 My old air conditioner stopped working/wasn't working well
16 It is just fine or I just like it
17 Other [RECORD ANSWER]
98 Don't know
99 Refused

E. Energy Education / Non-Energy Benefits

Now I have a few questions about the information you received as part of this program.

E1. Did you receive information on your new energy-efficiency items through a group session or from the person that installed the items in your home?

1 Yes
2 No [SKIP to E7]
98 Don't know[SKIP to E7]
99 Refused[SKIP to E7]

E2. How would you rate the information you received? Would you say it was: [READ LIST, CHOOSE ONE]

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1 Very helpful
2 Somewhat helpful
3 Not too helpful
4 Not helpful
98 Don't know
99 Refused

E3. Did you learn any new ideas about how you could save money and energy in your home?
1 Yes
2 No[SKIP to E7]
98 Don't know[SKIP to E7]
99 Refused[SKIP to E7]

E4. Can you tell me what you learned about additional ways to save money and energy in your home?
[RECORD VERABATIUM]

E5. Since you learned new ways to save energy and money, haveyou made any changes in your home to do that?
1 Yes
2 No [SKIP TO QUESTION E7]
98 Don't know [SKIP TO QUESTION E7]
99 Refused [SKIP TO QUESTION E7]

E6. Can you tell me what changes you have made?
[RECORD ANSWER]

Now I'd like to ask you a few questions about other changes you may have experienced since you've received these services.

E7. Thinking back on all the energy-saving services you received, would you say that you are now [READ LIST]:
1 A lot more comfortable in your home
2 Somewhat more comfortable
3 At about the same level of comfort
4 Less comfortable in your home
5 Or a lot less comfortable in your home
98 Don't know [SKIP TO E18]
99 Refused [SKIP TO E18]

E8. Why do you say that?
[RECORD ANSWER]

E13. Which best describes how your electricity bills are paid? [READ]
1 You pay the electricity bills
2 Your landlord pays the electricity bills [SKIP TO E15]
3 A relative pays the electricity bills [SKIP TO E15]
4 Other [RECORD ANSWER]

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98 Don't Know [SKIP TO E15]
99 Refused [SKIP TO E15]

E14. Since receiving these services, would you say that your electric bills have been [READ LIST]:
1 Much more affordable
2 Somewhat more affordable
3 About the same
4 Less affordable
5 Much less affordable
98 Don't know
99 Refused

E15. Had you heard of the Act On Energy program before your building received these services?
1 Yes
2 No
98 Don't know/don't remember
99 Refused

E16. Do you recall any problems or difficulties from being part of this program?
1 Yes [RECORD ANSWER]
2 No [SKIP TO PS1]
98 Don't know/don't remember [SKIP TO PS1]
99 Refused [SKIP TO PS1]

E17. How would you have liked them to resolve this problem?
[RECORD ANSWER]

PS Overall Program Satisfaction

Next, I'd like to ask you to rate the service you received.

PS1. How courteous and respectful was the staff that did the installation? Would you say they were [READ LIST]:
1 Very courteous
2 Somewhat courteous
3 Not too courteous
4 Not courteous
98 Don't know/don't remember
99 Refused

PS2. How courteous and respectful was the staff that provided you with information about the program and tips for saving energy? Would you say they were [READ LIST]:
1 Very courteous
2 Somewhat courteous
3 Not too courteous
4 Not courteous
98 Don't know/don't remember
99 Refused

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PS3. How satisfied are you overall with the services this program provided? Would you say that you are [READ LIST]:

1 Very satisfied
2 Somewhat satisfied
3 Not too satisfied
4 Not satisfied
98 Don't know
99 Refused

PS4. Thinking about your overall experiences with Ameren Missouri as your utility, how satisfied would you say you are with Ameren Missouri ?

1 Very satisfied
2 Somewhat satisfied
3 Not too satisfied
4 Not satisfied
98 Don't know
99 Refused

H. Household Characteristics / Demographics

I have just a few more general questions for you.

H1. Do you live in a single-family or multifamily building?

1 Single-family
2 Multifamily
98 Don't know
99 Refused

H2. How many bedrooms do you have in your home [IF ONE-ROOM EFFICIENCY OR STUDIO APARTMENT, BEDROOMS = 0]

___ [ENTER # OF BEDROOMS]
98 Don't know
99 Refused

H3. How many **full** bathrooms, that is bathrooms that contain a shower do you have in your home? And how many **half bathrooms** (bathrooms that don't have a shower) do you have in your home?

___ [ENTER # OF **FULL** BATHROOMS]
___ [ENTER # OF **HALF** BATHROOMS]
98 Don't know
99 Refused

H4. In the past year, how many people usually live in your home at the same time?

___ [RECORD RESPONSE]
98 Don't know
99 Refused

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H5. Of the people that lived in your home at the same time in the past year, how many were: [RECORD NUMBER IN EACH CATEGORY]

____ Under age 5
____ Age 5 to less than age 10
____ Age 10 to less than age 18
____ Age 18 to less than 30
____ Age 30 to less than 50
____ Age 50 to less than 65
____ Age 65 or older
98 Don't know
99 Refused

H6. Have any of these changes occurred in your home in the past year [READ LIST]?

1 Family or roommates moved in
2 Or moved out
3 Using more rooms
4 Or Using less rooms
5 None of these [DO NOT READ]
98 Don't know
99 Refused

H7. On a normal day, how much time do you spend at home? Are you home [MARK ALL THAT APPLY]: (If they say home all day, mark all 4)

1 In the morning
2 In the afternoon
3 In the evening
4 At night
98 Don't know
99 Refused

[DO NOT ASK, BUT RECORD GENDER OF RESPONDENT (MALE/FEMALE)]

"Thank you for your time today; those were all the questions I had."

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APPENDIX D. PROPERTY MANAGER SURVEY

APPENDIX D. PROPERTY MANAGER INTERVIEW GUIDE

Respondent name:_____

Respondent phone: _____

Interview date: _____ Interviewer initials: _____

Hello, my name is _____ and I'm calling on behalf of Ameren Missouri. As part of Ameren Missouri's efforts to provide the best energy programs possible, they have asked my firm to gather feedback from property owners and building managers who approved the installation of energy saving equipment for tenants through the Ameren Missouri CommunitySavers Program. Anything you say is confidential and will be combined with responses to similar questions provided by other participating building owners and managers.

[IF ASKED: On average, the interviews take approximately 15 minutes. If this isn't a good time, I'd be happy to call you back at another time that works better for you.]

A. Screening

1. Are you the person who decided to be involved in the CommunitySavers program or facilitated your building's participation in the program?
   1. Yes
   2. No
      Who made the decision? _____
      Number to contact them: _____
   98. Don't know
   99. Refused

B. General

1. How did you first hear about this program that helps make your tenant spaces more energy efficient? [DO NOT READ – Mark all that apply]
   1. Housing association
   2. Contractor
   3. Utility representative
   4. Marketing flyer in utility bill
   5. Television commercial
   6. Website (Specify:_____)
   7. Newspaper Ad
   8. Retailer, Salesperson
   9. Friend
   10. Other (Specify**:** _____)
   98. Don't know
   99. Refused

2. What were the main reasons you decided to participate in the CommunitySavers program? (DO NOT READ – Mark all that apply)
    1. The equipment was free
    2. To save money/decrease costs
    3. To save energy
    4. Liked the make/model/design
    5. Reduce tenant turnover through improved lighting, heating, etc.
    6. Good advertisement for apartments that are well insulated, comfortable, and have safe lighting
    7. To replace broken equipment
    8. Help the environment
    9. Other (Specify: _____)
    98. Don't know
    99. Refused

3. Are you familiar with the energy efficiency campaign 'Act on Energy'?
    a. Yes
    b. No
    98. Don't know
    99. Refused

4. How familiar are you with Act on Energy? Would you say:
    a. Not at all familiar
    b. Not too familiar
    c. Somewhat familiar
    d. Very familiar
    98. Don't know
    99. Refused

5. Where do you recall having seen or heard about Act on Energy? **[DO NOT READ, CHOOSE ALL THAT APPLY]**
    a. Information on utility bill
    b. Act on Energy website or Ameren website
    c. Other Website **[SPECIFY_____]**
    d. Family/friends/word-of-mouth
    e. Ameren representative
    f. Contractor
    g. Newspaper
    h. Radio
    i. Internet or Email
    j. Television
    k. Event
    l. Direct mail/brochure
    m. Social media (i.e. Facebook, Twitter)
    n. Other **[SPECIFIC_____]**
    98. DON'T KNOW
    99. REFUSED

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6. Before participating in this program, had you participated in any other programs to help your building or residents save energy?
    1. Yes (Specify: _____)
    2. No
    98. Don't know
    99. Refused
7. How would you prefer to receive information about ways to save energy in the building you manage or your own home? **[DO NOT READ, CHOOSE ALL THAT APPLY]**
    a. Television
    b. Newspaper/magazines/print media/radio
    c. Utility/included in utility bill
    d. Contractor
    e. Word of mouth (family, friends, colleagues)
    f. Email
    g. Internet
    h. Online ads
    i. Online groups
    j. Events
    k. Direct mail/brochure
    l. Social media (i.e. Facebook, Twitter)
    m. Other **[SPECIFIC_____]**
    100. DON'T KNOW
    101. REFUSED

8. Did you receive all the program information you needed when you agreed to participate in Ameren's CommunitySavers program?
    1. Yes [Skip to Q10]
    2. No
    98. Don't know
    99. Refused [Skip to Q10]

9. What information would you have liked to receive at the start of your participation?

10. When you agreed to participate, did you have any concerns about being involved in the program?
    1. Yes
    2. No [Skip to Q13]
    98. Don't know [Skip to Q13]
    99. Refused [Skip to Q13]

11. What concerns did you have?
    1. [Record Verbatim]
    2. Don't have any concerns [Skip to Q13]
    98. Don't know [Skip to Q13]
    99. Refused [Skip to Q13]

12. Were those concerns resolved?
    1. [Record Verbatim]

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2. Don't have any concerns [Skip to Q13]
98. Don't know [Skip to Q13]
99. Refused [Skip to Q13]

13. The Ameren *Act On Energy* Business program provides rebates for equipment installed in common areas, such as efficient lighting in hallways and entryways. Are you aware of this program?
    1. Yes
    2. No [Skip to Q15]
    98. Don't know [Skip to Q15]
    99. Refused [Skip to Q15]

14. How did you first learn about the *Act On Energy* Business program?
    1. Housing association
    2. Contractor
    3. Utility representative
    4. Marketing flyer in utility bill
    5. Television commercial
    6. Website (Specify:_____)
    7. Newspaper Ad
    8. Retailer, Salesperson
    9. Friend
    10. Other (Specify**:** _____)
    98. Don't know
    99. Refused

15. Do you plan to install any energy-efficiency equipment like new lighting in the common areas in the next one to three years?
    1. Yes
    2. No [Skip to Equipment Section]
    98. Don't know [Skip to Equipment Section]
    99. Refused [Skip to Equipment Section]

16. What do you plan to install?
    3. [Record Verbatim]
    4. Don't plan to install anything [Skip to Equipment Section]
    98. Don't know [Skip to Equipment Section]
    99. Refused [Skip to Equipment Section]

17. When do you plan to install this new energy-efficiency equipment?
    1. [Record Verbatim]
    2. Don't plan to install anything [Skip to Equipment Section]
    98. Don't know [Skip to Equipment Section]
    99. Refused [Skip to Equipment Section]

C. Equipment

1. Our records show that [MEASURE LIST] were installed at your property through the CommunitySavers program, does this sound correct?

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1. Yes [Skip to Q3]
2. No
98. Don't know
99. Refused [Skip to Q3]

2. Can you tell me which items were installed at your property? (Mark all that apply)
   1. Lightbulbs/CFLs
   2. Showerheads
   3. Faucet Aerators
   4. Programmable Thermostats
   5. Pipe and water heater insulation
   6. Smart power strips
   7. Room air conditioners
   8. Refrigerators
   98. Don't know
   99. Refused

3. How satisfied were you with the energy saving equipment available for your apartment buildings through this program?
   1. Very satisfied
   2. Somewhat satisfied
   3. Not too satisfied
   4. Not satisfied
   98. Don't know
   99. Refused

4. Why do you say that? [Probe specifically about their satisfaction regarding thermostats.]

5. Were there other energy saving items you would have liked to have installed but were not available through the program?
   1. Yes
   2. No [Skip to Q7]
   98. Don't know [Skip to Q7]
   99. Refused [Skip to Q7]

6. What equipment would you have liked to see?

7. What feedback have you received from your tenants about the energy saving equipment they received?

8. Have the tenants been particularly happy or unhappy with any of the specific equipment?

9. Did your tenants receive any educational materials or presentations as part of the program?
   1. Yes
   2. No [Skip to Q11]
   98. Don't know [Skip to Q11]

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99. Refused [Skip to Q11]

10. What feedback have you received from your tenants about the educational materials and presentations that were provided?

11. Have you installed any other energy efficient equipment at this property since this project, besides the equipment in the CommunitySavers program?
    1. Yes
    2. No [Skip to Q13]
    98. Don't know [Skip to Q13]
    99. Refused [Skip to Q13]

12. What did you install?
    1. [Record Verbatim]
    2. Don't plan/Did not install anything
    98. Don't know
    99. Refused

13. Do you manage any other properties?
    1. Yes
    2. No [Skip to Freeridership Section]
    98. Don't know [Skip to Freeridership Section]
    99. Refused [Skip to Freeridership Section]

14. Do you plan that these properties will participate in the CommunitySavers program as well?
    1. Yes [Skip to Freeridership Section]
    2. No
    98. Don't know [Skip to Freeridership Section]
    99. Refused [Skip to Freeridership Section]

15. [IF Q14=No] Why not? [RECORD ANSWER]

Freeridership and Spillover

We'd like to ask you a couple of questions about the energy saving equipment that was installed at your property.

Previously, you stated that you had [MEASURES FROM C1 LIST] installed within apartments at [PROPERTY NAME].

1. Before participating in the program, had you ever installed the same equipment in tenant spaces that was installed through the program?
    1. Yes
    2. Some of the equipment
    3. No [Skip to Q3]
    98. Don't know [Skip to Q3]
    99. Refused [Skip to Q3]

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2. [Ask if Q1 = Yes or Some of the equipment] Which equipment have you installed previously?

3. Would you have installed this same package of energy efficient equipment without the CommunitySavers program?
   1. Yes [Skip to Q5]
   2. I would have installed some, but not all, of them
   3. No, none of them [Skip to Q11]
   98. Don't know [Skip to Q11]
   99. Refused [Skip to Q11]

4. [Ask if Q3 = I would have installed some of them] Which equipment would you have installed?

5. [Ask if Q3 = "Yes" or "I would have installed some of them"] When you say you would have installed the same equipment as in the package, would they have been just as energy efficient or would it have been more or less efficient?
   1. More efficient
   2. Same efficiency
   3. Less efficient
   98. Don't know
   99. Refused

6. And would you have installed the same quantity of each item in the package?
   1. Yes [Skip to Q8]
   2. Some equipment at the same quantities
   3. No
   98. Don't know [Skip to Q8]
   99. Refused [Skip to Q8]

7. [Ask if Q6 = Some equipment or No] What quantities of each type of equipment would you have installed?

8. And would you have installed them …
   1. Within the same year?
   2. Within one to two years?
   3. Within three to five years?
   4. In more than five years?
   98. Don't know
   99. Refused

9. Was money for the equipment in the package planned for in your budget?
   1. Yes [Skip to Q11]
   2. Some of the equipment
   3. No [Skip to Q11]
   98. Don't know [Skip to Q11]
   99. Refused [Skip to Q11]

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10. [Ask if Q9 = Some of the equipment] Which equipment was in your budget?

11. Since participating in the program, have you installed any additional energy-efficient equipment at this [PROPERTY]?
    1. Yes
    2. No [Skip to Q14]
    98. Don't know [Skip to Q14]
    99. Refused [Skip to Q14]

12. [Ask if Q11 = Yes] What sort of equipment?

13. [Ask if Q 11 = Yes] How influential was your experience with the CommunitySavers program in your decision to install additional high-efficiency equipment on your own?
    1. Very influential
    2. Somewhat influential
    3. Not very influential
    4. Not at all influential
    98. Don't know
    99. Refused

14. Have you installed any additional energy efficient equipment at your other property/properties?
    1. Yes
    2. No [Skip to Program Satisfaction Section]
    3. Do not have other properties [Skip to Program Satisfaction Section]
    98. Don't know [Skip to Program Satisfaction Section]
    99. Refused [Skip to Program Satisfaction Section]

15. What did you install? [RECORD ANSWER]

16. How influential was your experience with the CommunitySavers program in your decision to install additional high-efficiency equipment at your other properties?
    1. Very influential
    2. Somewhat influential
    3. Not very influential
    4. Not at all influential
    98. Don't know
    99. Refused

17. While the focus of this survey is on [Property Name], was the decision making process we just discussed similar for the other properties you manage, or does your decision making process differ across properties?
    1. Same for all properties[Skip to Program Satisfaction Section]
    2. Decision process differs across properties
    98. Don't know[Skip to Program Satisfaction Section]
    99. Refused[Skip to Program Satisfaction Section]

18. What is your decision making process for other properties?

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1. [Record Verbatim]
98. Don't know
99. Refused

D. Program Satisfaction

Now, I have a few questions about how well the Ameren Missouri CommunitySavers program worked for you.

1. How satisfied were you with your interactions with the initial sales and audit person from Honeywell (PROMPT: His name would have been Mike)?
   1. Very satisfied
   2. Somewhat satisfied
   3. Not too satisfied
   4. Not satisfied
   98. Don't know [Skip to Q3]
   99. Refused [Skip to Q3]

2. Why do you say that?

3. How satisfied were you with Honeywell's follow-up after the audit was completed? [If asked about the 'follow-up': "Honeywell may have contacted you to make sure all equipment was installed or may have done an inspection afterwards to see how the equipment was functioning."
   1. Very satisfied
   2. Somewhat satisfied
   3. Not too satisfied
   4. Not satisfied
   98. Don't know [Skip to Q5]
   99. Refused [Skip to Q5]

4. Why do you say that?

5. How satisfied were you with the timing of the delivery of the energy saving equipment and / or appliance?
   1. Very satisfied
   2. Somewhat satisfied
   3. Not too satisfied
   4. Not satisfied
   98. Don't know [Skip to Q7]
   99. Refused [Skip to Q7]

6. Why do you say that?

7. How satisfied were you with the contractors who installed the equipment?
   1. Very satisfied
   2. Somewhat satisfied
   3. Not too satisfied

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4. Not satisfied
98. Don't know [Skip to Q9]
99. Refused [Skip to Q9]

8. Why do you say that?

9. How satisfied were you with the length of time it took to complete the project?
   1. Very satisfied
   2. Somewhat satisfied
   3. Not too satisfied
   4. Not satisfied
   98. Don't know
   99. Refused

10. Why do you say that?

11. Is there anything that could have been done to make your participation in the program easier?
    1. Yes
    2. No [Skip to Q13]
    98. Don't know [Skip to Q13]
    99. Refused [Skip to Q13]

12. What could have been done to make your experience with the program better?
    1. [Record Verbatium]
    2. Nothing
    98. Don't know
    99. Refused

13. Would you recommend the program to other property managers you know?
    1. Yes [Skip to Final Questions]
    2. No
    98. Don't know [Skip to Final Questions]
    99. Refused [Skip to Final Questions]

14. Why not?
    1. [Record Verbatium]
    2. Nothing
    98. Don't know
    99. Refused

E. Final Questions

1. Who pays for the electric bills, you or your tenants?
   1. Property owner/manager
   2. The tenants

720 SW Washington Street
Suite 400
Portland, OR 97205
Voice: 503.467.7100
Fax: 503.228.3696

3. Other _____
98. Don't know
99. Refused

2. OK, that's all of my questions. Is there anything else you'd like to tell Ameren Missouri about the program before we finish?

720 SW Washington Street
Suite 400
Portland, OR 97205
Voice: 503.467.7100
Fax: 503.228.3696

APPENDIX E. ADVANCED POWER STRIP SAVINGS METHODOLOGY

APPENDIX E.ADVANCED POWER STRIP SAVING METHODOLOGY

INTRODUCTION

Smart-strip technology has been available for several years. Although it is becoming more common, the technology has not yet been widely evaluated. In this document, Cadmus reviews some of the leading research on smart-strip technology to date, summarizes differences among the three Ameren programs offering smart strips, and offers a preliminary estimate of the gross energy savings for each program.

Smart strips typically have one master or controller outlet, several controlled or switched outlets, and one or two uncontrolled or always-on outlets. The controlled outlets automatically draw no power when the homeowner turns off the controller device. This creates energy savings by reducing the power draw from the controlled devices' standby mode. (Devices continue to draw power when inactive but still plugged into a live outlet.)

Some smart strips contain occupancy sensors. These turn off controlled outlets when no motion has been detected for 30 minutes in the room containing the smart strip. When motion is again detected, the smart strip turns the controlled devices back on.

Devices plugged into the always-on socket will not save energy, as we assume that the installation of a smart strip will not cause the homeowner's behavior to change.

Ameren offers smart-strip technology to its residential customers as part of three programs:

- RebateSavers
- PerformanceSavers
- CommunitySavers.

Each of these programs has different smart-strip technologies, delivery mechanisms, and installation requirements. These differences can greatly impact evaluated savings. We have listed these differences in Table 1 and Table 2.

Table 1. Available Smart Strips

Manufacturer and Model	Type	Image
TrickleStar 12 Outlet Advanced Power Strip	Load-sensing	
TrickleStar Motion Sensor Advanced Power Strip	Occupancy-sensing/load-sensing	
TrickleStar 7-Outlet Advanced Power Strip	Load-sensing	

Table 2. Program Differences

Program	Available Smart Strips	Delivery	Direct Installation Requirements
RebateSavers (Participation: Home Energy Kit – 2,248*; On-line Store – 10,061**)	All three TrickleStar devices	Purchased and installed by customers at their discretion through Ameren's online store, or received in free home energy kit and installed by customer	Not Applicable
CommunitySavers (Participation: 619*)	TrickleStar 7-Outlet Advanced Power Strip	Directly installed by program implementer staff.	Installed only if two or more peripherals are attached to primary device. Cable boxes and DVRs are not considered an eligible peripheral device
PerformanceSavers (Participation: 192*)	TrickleStar 7-Outlet Advanced Power Strip	Directly installed by program implementer staff.	Installed only if two or more peripherals are attached to primary device. Cable boxes and DVRs are not considered an eligible peripheral device.

*As of September 30, 2013
**As of November 26, 2013

CURRENT AVAILABLE RESEARCH

Few reports have documented the usage and savings of smart strips. All research on the measure applies different data collection models and different assumptions to determine usage and savings.

Below, we have summarized the two reports providing the best data on smart strips. We believe these represent the best primary research conducted on smart strips to date. We also reviewed other reports and TRMs and include their findings and assumptions following the review of the two highlighted reports.

Ecos Report

The 2009 Ecos Report, "Smart Plug Strips: Draft Report," reviews a variety of smart-strip technologies and, like the SDG&E report, provides estimated savings for both home office and home entertainment center applications.

To verify that installing smart strips results in energy savings, Ecos conducted a field study, using power metering equipment to track the energy consumption before and after installation of the smart strip. Ecos was able to verify that the use of smart strips resulted in energy savings for these applications. In addition, the Ecos study found an incremental increase in energy use from the smart strip itself of 8.8 kWh per year.

The controlled devices for both home office and home entertainment center are shown in Table 3.

Table 3. Controlled Devices by Smart Strip Application

Home Office	Home Entertainment
LCD Monitor	Audio Receiver
Computer Speaker	DVD Player
Multi-Function Device	-

Ecos calculated smart strip energy savings by accounting for the device power consumption (active, low, and standby mode), hours of use, and saturation in the home. These variables are based on a 2006 technical report "Final Field Research Report." [1] In this study, each metered smart power strip had all of the devices plugged in.

In the Ecos report, smart-strip savings are calculated in three steps:

1. Calculate the consumption associated with the controlled devices in active, low, and standby mode without the hours of use being impacted by the controller device.
2. Calculate the consumption associated with the controlled devices in active, low, and standby mode with the hours of use being impacted by the controller device.
3. Take the difference in consumption between steps 1 and 2 and remove 8.8 kWh to account for the added load from the smart strip.

The overall calculated smart-strip savings are shown in Table 4.

Table 4. Ecos Report Calculated Savings per Smart Strip Application

Smart Strip Location	Energy Savings (in kWh/yr)	Per Unit
Home Office	38.4	Per Home Office
Home Entertainment	79.0	Per Home Entertainment Center

NYSERDA Report

The 2011 NYSERDA report, "Advanced Power Strip Research Report" was developed by Lockheed Martin, Inc and provides potential savings for both home office and home entertainment center smart strip applications.

To establish which peripheral technologies would be considered for home office and entertainment smart strip savings, the NYSERDA report looked at a consumer electronics market characterization and included peripherals with an average New York household saturation of 50% or greater. The peripherals chosen for inclusion in the smart strip analysis are listed below in Table 5.

Table 5. Controlled Devices by Smart Strip Application

Home Office	Home Entertainment
LCD Monitor	Cable Set Top Box
Printer	DVD Player
-	VCR
-	Video Game Console

Similar to the Ecos report, the NYSERDA report uses the device power consumption (active, low, and standby mode), hours of use, and saturation in the home in order to calculate smart strip energy savings. The NYSERDA report compiles data from six sources to establish the power consumption and hours of use for the devices.

[1] Moorefield, L., Porter, S., May-Ostendorp, P. Final Field Research Report. Technical Report. California Energy Commission Public Interest Energy Research Program, October 31, 2006.

1. Energy Center of Wisconsin[2]
2. IT Energy – Denmark[3]
3. Ecos Consulting[4]
4. Lawrence Berkeley National Laboratory[5]
5. TIAX LLC[6]
6. Energy Efficient Strategies[7]

To calculate smart strip savings, the NYSERDA report uses the combined savings from the following two calculations:

$$\frac{\Delta kWh_e}{Year} = \sum_m SDW_{e,m} \times \frac{SDHrs_{e,m}}{Day} \times \frac{kW_e}{1000\ W_e} \times \frac{365\ Days}{Year}$$

Where:

- e = type of home electronic equipment
- m = shutdown mode (standby or off)
- $\mathbf{SDW_{e,m}}$ = shutdown watts, the watts drawn by e in shutdown mode m
- $\mathbf{SDHrs_{e,m}}$ = number of hours e is in shutdown mode m with respect to the number of hours the product in the master control is in shutdown mode

$$\frac{\Delta kWh_e}{Year} = \sum_m SDW_{e,m} \times \frac{SDHrs_{i,m}}{Day} \times \frac{kW_e}{1000\ W_e} \times \frac{365\ Days}{Year}$$

Where:

- e = type of home electronic equipment
- i = type of home electronic equipment in the master control outlet
- m = shutdown mode (standby or off)
- $\mathbf{SDW_{e,m}}$ = shutdown watts, the watts drawn by e in shutdown mode m
- $\mathbf{SDHrs_{i,m}}$ = number of hours i is in shutdown mode m; = 24 – Number of operating hrs

[2] Energy Center of Wisconsin. 2010 May. Electricity Savings Opportunities for Home Electronics and Other Plug-In Devices in Minnesota Homes. Madison, Wis.: Energy Center of Wisconsin.
[3] Fjordbak Larson, Troels. 2007 Dec 7. Standby and Energy Savings Sockets. Herlev, Denmark.: IT Energy.
[4] Ecos Consulting. 2009 Jul 31. Energy Trust of Oregon Smart Plug Strip Project: Final Meeting.
[5] Lawrence Berkeley National Laboratory. 2011. Standby Power Summary Table. Berkeley, Calif.: Lawrence Berkeley National Laboratory.
[6] Roth, Kurt W. and McKenney, Kurtis. 2007 Jan. Energy Consumption by Consumer Electronics in U.S. Residences. Cambridge, Mass.: TIAX LLC.
[7] Energy Efficient Strategies. 2006 Mar. 2005 Intrusive Residential Standby Survey Report.

The overall calculated smart-strip savings are shown below in Table 6.

Table 6. NYSERDA Report Calculated Savings per Smart Strip Application

Smart Strip Location	Energy Savings (in kWh/yr)	Per Unit
Home Office	31.0	Per Home Office
Home Entertainment	75.1	Per Home Entertainment Center

Additional Studies

Cadmus reviewed additional studies to understand the range of savings values being considered for smart strips. It should be noted that many of these studies and reports were intended to determine potential savings for smart strips and hence do not include factors that can affect final savings values such as installation rates and net-to-gross ratios. The studies and reports are listed below in Table 7, along with some of the key assumptions made in each.

Table 7. Smart Strip References and Estimated Savings

Source	Smart Strip Location	Controlled Devices	Smart Strip Type	Savings (kWh)
Ameren Technical Reference Manual 2012 Filing	Home Office	4	Load-Sensing Smart Strip	146.7
Michigan Energy Measures Database 2009	Home Office	4	Load-Sensing Smart Strip	146.7
ECEEE 2009 Summer Study, Jensen & Fjorkbak	Home Office	2.5	Load-Sensing Smart Strip	90
Arkansas Technical Reference Manual, Version 3.0, 2013	Home Office	4	Load-Sensing Smart Strip	84
Ecos Field Study 2009 Metering Exercise	Home Office	3	Load-Sensing Smart Strip	82
Ecos Field Study 2009	Home Office	3	Load-Sensing Smart Strip	38.4
NYSERDA Report, 2011	Home Office	2	Load-Sensing Smart Strip	31
SDG&E Report, 2009	Home Office	Unknown	Load-Sensing Smart Strip	26.3
Advanced Power Strip Measure Workbook, Regional Technical Forum, 2013	Home Office	2.5	Load-Sensing Smart Strip, Direct-Install	20
BPA Smart Power Strip Energy Savings Evaluation, 2011	Office Cubicle	3	Load-Sensing Smart Strip, Direct-Install	145
Ecos Field Study 2009 Metering Exercise	Home Entertainment	5	Remote Control Smart Strip and Timer	626.3
Ecos Field Study 2009 Metering Exercise	Home Entertainment	5	Load-Sensing Smart Strip and Timer	610.3
Ecos Field Study 2009 Metering Exercise	Home Entertainment	5	Remote Control Smart Strip	265
Ecos Field Study 2009 Metering Exercise	Home Entertainment	5	Load-Sensing Smart Strip	248.9
Ameren Technical Reference Manual 2012 Filing	Home Entertainment	5	Load-Sensing Smart Strip	221.9
Michigan Energy Measures Database 2009	Home Entertainment	5	Load-Sensing Smart Strip	221.9

Source	Smart Strip Location	Controlled Devices	Smart Strip Type	Savings (kWh)
Arkansas Technical Reference Manual, Version 3.0, 2013	Home Entertainment	4	Load-Sensing Smart Strip	141
Ecos Field Study 2009	Home Entertainment	2	Load-Sensing and Occupancy-Sensing Smart Strip	86
Ecos Field Study 2009	Home Entertainment	2	Load-Sensing Smart Strip	79
NYSERDA Report, 2011	Home Entertainment	4	Load-Sensing Smart Strip	75.1
ECEEE 2009 Summer Study, Jensen & Fjorkbak	Home Entertainment	3.4	Load-Sensing Smart Strip	61
Advanced Power Strip Measure Workbook, Regional Technical Forum, 2013	Home Entertainment	2.3	Load-Sensing Smart Strip, Direct-Install	40
SDG&E Report, 2009	Home Entertainment	Unknown	Load-Sensing Smart Strip	21.7
Embertec Field Trials (as reported in Research Plan: Residential Advanced Power Strips by Bonneville Power Administration, 2013)	Unknown	Unknown	Load-Sensing and Occupancy-Sensing Smart Strip, Direct-Install	258
Advanced Power Strip Measure Workbook, Regional Technical Forum, 2013	Either	Unknown	Occupancy-Sensing Smart Strip, owner- or direct-installed.	70
PECO's Smart House Call Program Filing, 2013	Either	Unknown	Unknown	57

Cadmus reviewed each of these reports in detail, examining the assumptions, secondary sources, engineering algorithms, and metering tests used to calculate savings. As shown in the table, the notable differences between all these findings are largely the average number of controlled devices assumed in each equation and the type of smart-strip technologies used.

The Ecos field study found especially large savings for smart strips and remote-control smart strips having five controlled peripherals. Even higher savings are achieved when those smart strips are plugged into a programmable timer, which turns off all electronics on the smart strip, not just those in the controlled socket.

Table 8 and Table 9 below show the range of savings claimed in the studies above for load-sensing smart strips.

Table 8. Home Entertainment Range of Savings and Number of Controlled Devices

Home Entertainment	Savings	Controlled Devices
Min	21.7	Unknown
Max	248.9	5.0
Mean	130.5	3.6

Table 9. Home Office Range of Savings and Number of Controlled Devices

Home Office	Savings	Controlled Devices
Min	20	2.5
Max	146.7	4.0
Mean	73.9	3.1

CADMUS APPROACH

This memo section reviews the following for the above studies and for the suggested Cadmus approach:

- Energy-savings algorithm
- Input assumptions (number and type of peripherals)
- Hours of use
- Modes of use
- Installation rates

Following this detailed information is a discussion of the smart-strip data-collection efforts undertaken by Cadmus to date. Finally, we propose using the findings of the NYSERDA report of 75.1 kWh savings for home entertainment systems and 31.0 kWh savings for home office applications (adjusted by installation/retention rates). Cadmus believes this report combines the most in-depth research with the most reasonable assumptions to calculate energy savings.

Our conclusion will provide a summary of expected savings for each of the types of smart strips by program, considering the differing installation rates and applications as found in participant surveys.

Energy-Savings Algorithm

The Ameren TRM determines savings from the smart strip using the algorithm below:

$$Energy\ Savings\ \left(\frac{kWh}{Year}\right) = \left(\frac{(Base\ Watts_{AVG} - Efficient\ Watts_{AVG}) \times 24 \times 365}{1{,}000}\right)$$

Where:

- Base Idle $Watts_{AVG}$ = weighted average of controlled devices' energy used when in standby mode.
- Idle Hours per Day_{AVG} = weighted average hours per day by device when system is assumed to be turned off.
- Base $Watts_{AVG}$ = weighted average of all devices' energy use.
- Efficient Idle $Watts_{AVG}$ = weighted average of controlled all device(s) energy used when controlled devices are turned off by controller device.

This algorithm is similar to those used to calculate savings in the other reports and studies we cited above. Below we review the inputs to the Ameren TRM algorithm versus those used in the NYSERDA Report.

Input Assumptions

The most critical algorithm input assumptions relate to the type and number of peripherals plugged into the smart strip, as this determines the base idle watts and efficient idle watts. As shown in Table 7, the number of peripherals assumed to be present in each study varied greatly, as did the associated savings estimates. In addition, we consider the type of peripherals assumed to be plugged into the smart strip. Table 10 below shows the assumptions made by Morgan Measures Library in calculating the average watts of controlled devices for the Ameren TRM.

Table 10. Ameren TRM: Controlled Devices by Smart Strip Application

Home Office	Home Entertainment
Computer Speakers	Audio System
Inkjet Printer	Speakers
Internet Terminal	DVD
Phone/Fax/Copier	VCR
-	Cable Box
-	Video Game Console
Average Daily Wattage Decrease: 20W	**Average Daily Wattage Decrease: 32W**

In contrast to these assumptions, the NYSERDA report (see Table 5 on page 4) researched the average number of peripherals present and found two peripherals for home office applications and four for home entertainment centers.

While we expect that homes will have internet terminals (i.e., modems and wireless internet routers), we do not anticipate that participants will control these devices with their smart strips, as household electronics other than computers (e.g., phones, tablets, and some home entertainment systems) rely on internet access when the home office computer is not in use. Similarly, we do expect most homes to have cable boxes and HD-DVRs but do not believe these should be included as a controlled device, as these devices often do not function properly if powered down. Both CommunitySavers and PerformanceSavers have officially excluded these as eligible controlled devices for this reason.

Hours of Use

The hours of use for the controller and controlled device contribute to the savings estimates. The Ameren TRM assumes that the television is on for 5 hours per day and that the computer is on for 4 hours per day (citing the Morgan Measure Library for both assumptions). These assumptions result in a total time in standby mode of 19 hours for the television and 20 for the computer. The NYSERDA report shows that televisions are in active use 5.3 hours per day, and that computers are in active use 3.2 hours per day. This results in 18.7 hours in standby for the television and 4.1 hours in standby for the computer with 16.7 hours switched off completely.

Modes of Use

Most of the above referenced studies consider the amount of time each controller and controlled device is in each of four modes during an average day:

- Active use – where a device is switched on and being actively used
- Low-power mode – where the device is switched on, but is not being actively used

- Standby mode – where the device is switched off, but still plugged in and able to be turned on with a remote control

- Unplugged mode – where the device is unplugged or power to the device is turned off through use of a smart strip

The Ameren TRM calculations do not differentiate among these types of use, but assumes that all measures plugged into the smart strip are on and in active use while the controlled device is turned on. The NYSERDA report opts for the more common approach[8], where device hours of use are divided into these different modes and savings are calculated from the difference between the baseline scenario without a smart strip and the smart strip scenario.

Occupancy Sensors

A few smart strips come with occupancy sensors that turn off peripherals when a room is unoccupied for a length of time.[9] These are mainly designed to work in an office setting, where computers may remain turned on for long periods of time without being used. Almost no research exists on the improvement in savings from this type of device. The Ecos field study estimates an increase of savings of 9% for an occupancy-sensing smart strip used with entertainment centers.

CADMUS SAVINGS ESTIMATES

In an effort to gather as much Ameren and program-specific primary data as possible to inform the savings algorithm and inputs shown above, Cadmus surveyed participants in all three programs to determine how participants were using smart strips in their homes. The survey responses led to several conclusions:

1. People are generally confused about smart-strip technology, its purpose, and how to use it.[10]

2. This technology is not a good candidate for survey self-reports. Participants were unable or unwilling to correctly report the number and type of devices plugged into the smart strip.

Since the self-reported peripheral data we collected were unreliable, Cadmus has decided to use the NYSERDA report savings estimates to estimate savings for all three Ameren programs. This report combines data from numerous other studies and provides a detailed picture of all the inputs into their savings estimates. These savings are detailed in Table 11.

Table 11. NYSERDA Report Savings Estimates

Home Office	Home Entertainment
31.0 kWh	75.1 kWh

[8] This approach is mapped out in the Ecos field study, and followed in the ECEEE report, the Arkansas TRM, and the Regional Technical Forum estimates.

[9] The occupancy-sensing smart strip available for reduced cost through Ameren turn off peripherals after a room has been vacant for 30 minutes.

[10] This was also shown in the NYSERDA report, where respondents indicated their level of knowledge of phantom load averaged at 1.65 on a scale of 1 to 5. Respondents also indicated a lack of familiarity with smart strips, 42% said they had never heard of them and 30% had heard of them but knew little about them.

The NYSERDA report was written to assess the potential of savings in the market, and therefore leaves out a key variable for evaluation. The in-service rate for the smart strips was determined through participant surveys and will be used for each of the three programs.[11]

Table 12 shows the in-service rates for smart strips found through participant surveys[12], as well as the percentage of smart strips used for each application: home office or home entertainment center.

Table 12. Participant Survey Findings on Installation of Smart Strips

Program/Measure	ISR	Home Office Saturation	Entertainment Center Saturation
CommunitySavers Smart Strip	100%*	0%	100%
PerformanceSavers Smart Strip	90%	36%	64%
RebateSavers – Home Energy Kit Smart Strip	46%	48%	52%
RebateSavers - Online Store Smart Strip	100%	36%**	64%**

*As of October 31, 2013, all CommunitySavers respondents indicated their smart strips were still installed and functioning. A second wave of surveys is currently in the field and this number may change.
** We have assumed that the application of these smart strips is consistent with the PerformanceSavers program.

The savings by measure and application type, considering in-service rates and the baseline energy use of the smart strips, are shown in Table 13.

Table 13. Smart-Strip Savings by Program and Measure

Program/ Measure	Number Purchased/ Direct-Installed	Home Office Application kWh Savings (adjusted for ISR)	Entertainment Center Application kWh Savings (adjusted for ISR)
CommunitySavers Smart Strip	619	31	75
PerformanceSavers Smart Strip	192	28	67
RebateSavers - Kit Participant Smart Strip	2,248	14	35
RebateSavers - Online Store Smart Strip	10,006	31	75
RebateSavers - Online Store Smart Strip with Occupancy Sensor	55	34	82

[11] While survey respondents struggled to report the number and type of devices plugged into the smart strip, they were able to confirm whether or not they were using the smart strip.
[12] The evaluation team expected most smart strips to be delivered through the PerformanceSavers and CommunitySavers direct-install programs as well as through the RebateSavers Home Energy Kit program. Initially, Ameren did not collect contact data for participants purchasing smart strips through the on-line store. Hence, the evaluation team did not conduct surveys of these participants. In lieu of primary data on installation rates, we are assuming a 100% in-service rate as the customer sought out and purchased the strips (which indicates their likely intention to use them).

APPENDIX F. FREE RIDERSHIP SCORING TABLES

Table 49 illustrates how initial survey responses are translated into whether the response is 'yes", "no", or "partially" indicative of free ridership (in parentheses).

Table 49. Raw Survey Responses Translation to Free Ridership Scoring Matrix Terminology

1. Before participating in the program, had you ever installed the same equipment in tenant spaces that was installed through the program?	3. Would you have installed this same package of energy efficient equipment without the CommunitySavers program?	5. [Ask if Q3 = "Yes" or "I would have installed some of them"] When you say you would have installed the same equipment as in the package, would they have been just as energy efficient or would it have been more or less efficient?	6. And would you have installed the same quantity of each item in the package?	8. And would you have installed them …	9. Was money for the equipment in the package planned for in your budget?
Yes (Yes)	Yes (Yes)	More efficient (Yes)	Yes (Yes)	Within the same year (Yes)	Yes (Yes)
Some of the equipment (No)	I would have installed some, but not all, of them (Partial)	Same efficiency (Yes)	Some of the equipment (Partial)	Within one to two years? (Partial)	Some equipment (Partial)
No (No)	No (No)	Less efficient (No)	No (No)	Within three to five years? (No)	No (No)
Don't know (Partial)	Refused (Partial)	Don't know (Partial)	Don't know (Partial)	In more than five years? (No)	Don't know (Partial)
Refused (Partial)	Don't know (Partial)	Refused (Partial)	Refused (Partial)	Don't Know (Partial)	Refused (Partial)
	Refused (Partial)			Refused (Partial)	

Table 50 shows how the string of responses from Table 49 is then translated into a free ridership score.

Table 50. Sample of Free Ridership Scores

1. Before participating in the program, had you ever installed the same equipment in tenant spaces that was installed through the program?	3. Would you have installed this same package of energy efficient equipment without the CommunitySavers program?	5. [Ask if Q3 = "Yes" or "I would have installed some of them"] When you say you would have installed the same equipment as in the package, would they have been just as energy efficient or would it have been more or less efficient?	6. And would you have installed the same quantity of each item in the package?	8. And would you have installed them …	9. Was money for the equipment in the package planned for in your budget?	FR Score
Yes	Yes	Yes	Yes	Yes	Yes	100%
Yes	Yes	Yes	Yes	Yes	Partial	75%
Yes	Yes	Yes	Yes	Yes	No	50%
Yes	Yes	Yes	Yes	Partial	Yes	75%
Yes	Yes	Yes	Yes	Partial	Partial	50%
Yes	Yes	Yes	Yes	Partial	No	25%

1. Before participating in the program, had you ever installed the same equipment in tenant spaces that was installed through the program?	3. Would you have installed this same package of energy efficient equipment without the CommunitySavers program?	5. [Ask if Q3 = "Yes" or "I would have installed some of them"] When you say you would have installed the same equipment as in the package, would they have been just as energy efficient or would it have been more or less efficient?	6. And would you have installed the same quantity of each item in the package?	8. And would you have installed them …	9. Was money for the equipment in the package planned for in your budget?	FR Score
Yes	Yes	Yes	Yes	No	x	0%
Yes	Yes	Yes	Partial	Yes	Yes	75%
Yes	Yes	Yes	Partial	Yes	Partial	50%
Yes	Yes	Yes	Partial	Yes	No	25%
Yes	Yes	Yes	Partial	Partial	Yes	50%
Yes	Yes	Yes	Partial	Partial	Partial	25%
Yes	Yes	Yes	Partial	Partial	No	12.50%
Yes	Yes	Yes	Partial	No	x	0%
Yes	Yes	Yes	No	Yes	Yes	50%
Yes	Yes	Yes	No	Yes	Partial	25%
Yes	Yes	Yes	No	Yes	No	12.50%
Yes	Yes	Yes	No	Partial	Yes	25%
Yes	Yes	Yes	No	Partial	Partial	12.50%
Yes	Yes	Yes	No	Partial	No	0%
Yes	Yes	Yes	No	No	x	0%
Yes	Yes	Partial	Yes	Yes	Yes	75%
Yes	Yes	Partial	Yes	Yes	Partial	50%
Yes	Yes	Partial	Yes	Yes	No	25%
Yes	Yes	Partial	Yes	Partial	Yes	50%
Yes	Yes	Partial	Yes	Partial	Partial	25%
Yes	Yes	Partial	Yes	Partial	No	12.50%
Yes	Yes	Partial	Yes	No	x	0%
Yes	Yes	Partial	Partial	Yes	Yes	50%
Yes	Yes	Partial	Partial	Yes	Partial	25%
Yes	Yes	Partial	Partial	Yes	No	12.50%
Yes	Yes	Partial	Partial	Partial	Yes	25%
Yes	Yes	Partial	Partial	Partial	Partial	12.50%
Yes	Yes	Partial	Partial	Partial	No	0%
Yes	Yes	Partial	Partial	No	x	0%
Yes	Yes	Partial	No	Yes	Yes	25%
Yes	Yes	Partial	No	Yes	Partial	12.50%
Yes	Yes	Partial	No	Yes	No	0%
Yes	Yes	Partial	No	Partial	Yes	12.50%
Yes	Yes	Partial	No	Partial	Partial	0%
Yes	Yes	Partial	No	Partial	No	0%
Yes	Yes	Partial	No	No	x	0%
Yes	Yes	No	x	x	x	0%

Each participant free ridership score starts with 100%, which we decrement based on their responses to the nine questions as shown in Table 51.

Table 51.Free Ridership Scoring Legend

Q#	Decrement
FR1	50% decrement for "No", 25% decrement for "Partial"
FR2	50% decrement for "No", 25% decrement for "Partial"
FR3	100% decrement for "No", 25% decrement for "Partial"
FR4	50% decrement for "No", 25% decrement for "Partial"
FR5	100% decrement for "No", 25% decrement for "Partial"
FR6	50% decrement for "No", 25% decrement for "Partial"

Below, we illustrate the unique response combinations from applicants answering the CommunitySavers online survey (actual responses mapped to “yes”, “no”, or “partial”, as indicative of free ridership); the free ridership score assigned to each combination; and the number of responses. Table 52 shows phone respondents. We calculated free ridership scores for the package of measures, based on the distribution of scores within the matrix.

Table 52. Frequency of Free Ridership Scoring Combinations—Phone Results

1. Before participating in the program, had you ever installed the same equipment in tenant spaces that was installed through the program?	3. Would you have installed this same package of energy efficient equipment without the CommunitySavers program?	5. [Ask if Q3 = “Yes” or “I would have installed some of them”] When you say you would have installed the same equipment as in the package, would they have been just as energy efficient or would it have been more or less efficient?	6. And would you have installed the same quantity of each item in the package?	8. And would you have installed them …	9. Was money for the equipment in the package planned for in your budget?	FR Score	Frequency
Partial	Partial	Yes	Partial	Yes	Partial	12.5%	1
Partial	No	x	x	x	Partial	12.5%	1
Partial	No	x	x	x	No	0%	1
No	Yes	Yes	Yes	Yes	Partial	25%	1
No	Partial	Yes	Yes	Partial	Partial	0%	1
No	Partial	x	x	x	Partial	12.5%	4
No	No	x	x	x	Partial	0%	5
No	No	x	x	x	No	0%	7

APPENDIX G. TENANT EDUCATION

Energy Efficiency tips used as a leave behind for tenants.

RESIDENTIAL ENERGY EFFICIENCY

Energy efficiency at your fingertips.

COMMUNITYSAVERS
an ActOnEnergy® program

Appliances

> Always look for the ENERGY STAR® label when shopping for appliances.
> Wash only full loads of dishes and clothes.
> Use cold water to pre-rinse dishes for the dishwasher and for clothes washing.
> Don't over-dry your clothes in the dryer.
> Dry towels in a separate load from lighter-weight items.

Cooking

> Put lids on pots and pans to cook food faster.
> Keep your oven and cook top clean to work more efficiently.
> Preheat the oven only when indicated. There's no need to preheat the broiler.
> Use a microwave or crock pot in summer instead of the oven.
> Let hot foods cool before putting them in your refrigerator or freezer.

Electronics

> Plug TVs and DVD players into power strips which can be easily switched off.
> Unplug battery chargers when not in use.

Heating & Cooling

> Set heat at 68° or lower and air conditioning at 78° or higher.
  - Boosting the thermostat will not heat or cool your home faster!
> Keep warm lamps and TVs away from your thermostat.
> In the winter, open curtains on south-facing windows to allow sunlight to naturally heat your home.
> Keep your home cooler in the summer by keeping curtains closed.
> Raise your AC and use fans to create a wind chill effect.
> Clean warm-air registers, baseboard heaters, and radiators regularly.
  - Make sure they're not blocked by furniture, carpeting or drapes.
> Add weather-stripping to doors and windows that leak air.
> Make sure window AC filters are cleaned or changed monthly.

Lighting

> Turn off the lights in any room you're not using.
> Shear curtains take advantage of daylight while preserving privacy.
> Install compact fluorescent lighting (CFLs) to reduce lighting costs by 75%.

Water Heating Savings

> Take short showers instead of baths.
> Lower the thermostat on your hot water heater to 120°.
> Repair leaky faucets promptly.

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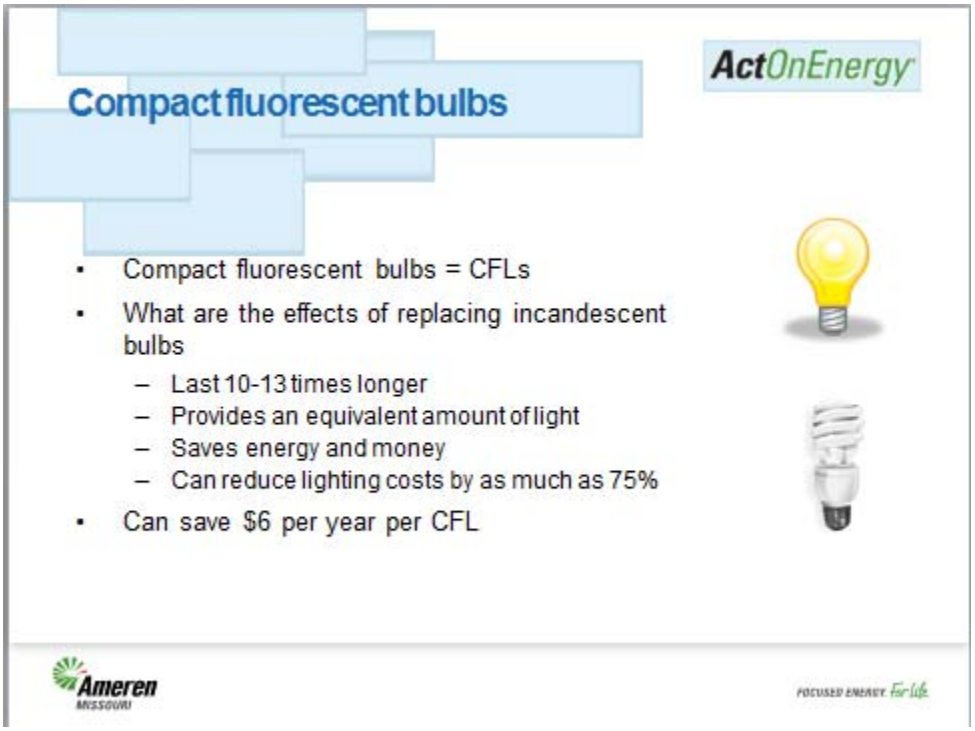
Please recycle

ActOnEnergy.com

AMEMTIPS-1212

Education presentation used on site with large income eligible properties.



Compact fluorescent bulbs

ActOnEnergy

- Incandescent bulbs are energy hogs
  - Only 10% of the energy is converted to light
  - The other 90% just creates heat around the bulb
- CFLs save money and energy
  - Almost 70% of the energy is converted to light
  - Only 30% heats up the area around the bulb
- Safety
  - An incandescent light bulb can reach a temperature of 572° F, more than enough to ignite wool, cotton or paper
  - A CFL operates at about 90° F

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Programmable thermostats

ActOnEnergy

- More accurate temperatures
- Maintains temperature when you are there and reduce costs when you are away or asleep
- An easy way to save money on your heating and cooling bills
- 4 programmable daily settings
  - Wake, Leave, Return, Sleep
  - Also separate schedules for Monday – Friday, Saturday and Sunday

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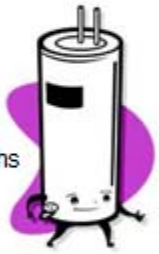
Electric water heater wrap and pipe insulation

ActOnEnergy

- Raises water temperature at the faucet
- Decrease time for hot water to get to the faucet or showerhead
- Helps prevent pipes from freezing during the winter months
- Helps prevent pipes from sweating during the summer months
- Most efficient water heater settings: 120 degrees
  - This will help avoid scalding
  - This slows mineral buildup and corrosion in your water heater and pipes which will allow to your water heater to last longer and operate at maximum efficiency



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Low-flow aerators and showerheads

ActOnEnergy

- What is an aerator?
  - Mixes air and water
  - Maintains water pressure
- Showerheads have aerators installed inside them
- Reducing hot water use saves energy

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Focused Energy For Life

Refrigerators

ActOnEnergy

- ENERGY STAR qualified refrigerators are up to 20% more efficient than non-qualified models
- If everyone purchasing a refrigerator this year chose a model that has earned the ENERGY STAR, together we would save 715 million kWh per year and reduce greenhouse gas emissions equivalent to those from about 100,000 cars.
- Recommended temperatures are 37° to 40°F for the fresh food compartment of the refrigerator and 0-5°F for the freezer section
- Models with top-mounted freezers use 10–25% less energy than bottom-mount or side-by-side models.

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Room Air Conditioners

ActOnEnergy

- **An ENERGY STAR window AC uses 10% less energy**
- **Use the Energy Saving Mode**
- **Clean your filters once a month when in use**
  - Most allow easy access and it should slide or snap out easily
  - Wipe off any large or loose particles with a cloth before washing
  - Fill a tub or sink with hot sudsy water and soak the filter in the water for at least 15 minutes. You can use a cloth or sponge to gently scrub it, but take care not to damage the filter. Rinse with clean cold water and let it stand in an empty tub to dry before returning it to the unit.

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Smart Strips

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- Many electrical devices continue to use electricity even when they are off, cutting power at the socket can help to insure this does not happen, saving electricity.
- Smart strips stop standby power consumed by PC and TV devices (printers, speakers, DVD players, gaming systems, etc.)
- Automatically switches off selected devices when main device is switched off

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Recycling

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- Recycle
  - Check if there is a local organization or government agency that takes CFL light bulbs. You also can call a CommunitySavers represenative toll free at 1.855.207.6254 for more information.
- Bag it
  - If there is no place to recycle your CFL light bulb, seal in a plastic bag and put it in the trash.

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CFL clean-up

ActOnEnergy

- CFLs contain trace amounts of mercury vapor – its what makes them so energy efficient
- Amount equal to the size of the period at the end of this sentence.
- The most important steps to reduce exposure to mercury vapor from a broken bulb are:
  - Have everyone leave the room
  - Collect materials needed to clean up broken bulb
    - Stiff paper or cardboard
    - Sticky tape
    - Damp paper towels or disposable wet wipes (for hard surfaces)
    - Sealable plastic bag

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CFL clean-up

ActOnEnergy

- During clean-up:
  - Be thorough in collecting broken glass and visible powder
  - Place cleaned up materials in a sealable plastic bag
- After clean-up:
  - Promptly place all bulb debris and cleanup materials in a trash container or keep for recycling until materials can be disposed of properly
  - Wash hands thoroughly

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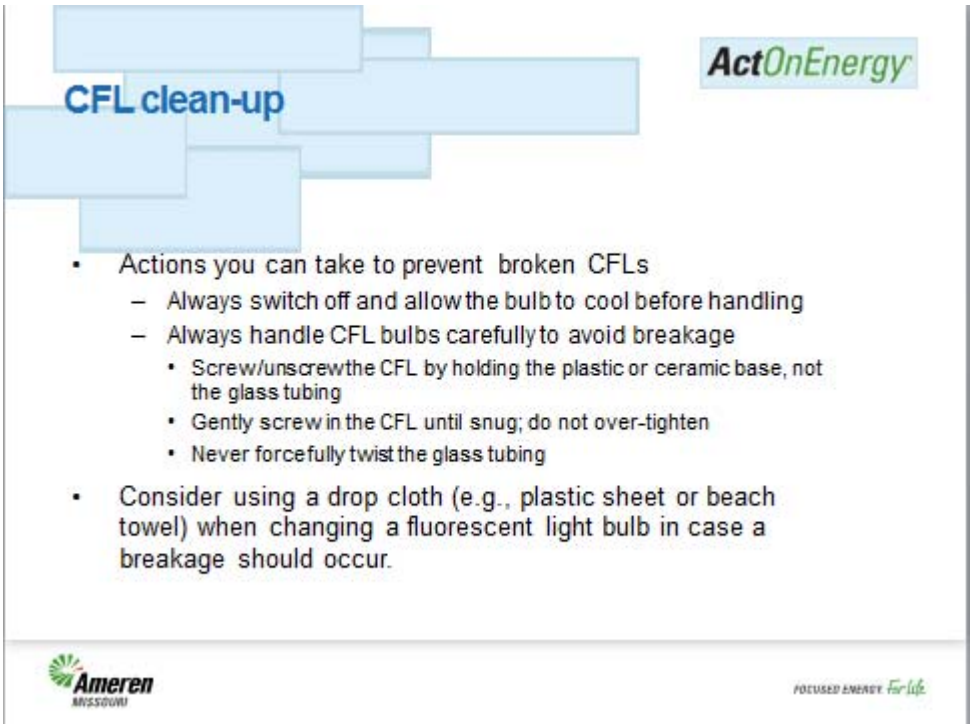
CFL clean-up
ActOnEnergy
• Actions you can take to prevent broken CFLs
– Always switch off and allow the bulb to cool before handling
– Always handle CFL bulbs carefully to avoid breakage
• Screw/unscrew the CFL by holding the plastic or ceramic base, not the glass tubing
• Gently screw in the CFL until snug; do not over-tighten
• Never forcefully twist the glass tubing
• Consider using a drop cloth (e.g., plastic sheet or beach towel) when changing a fluorescent light bulb in case a breakage should occur.
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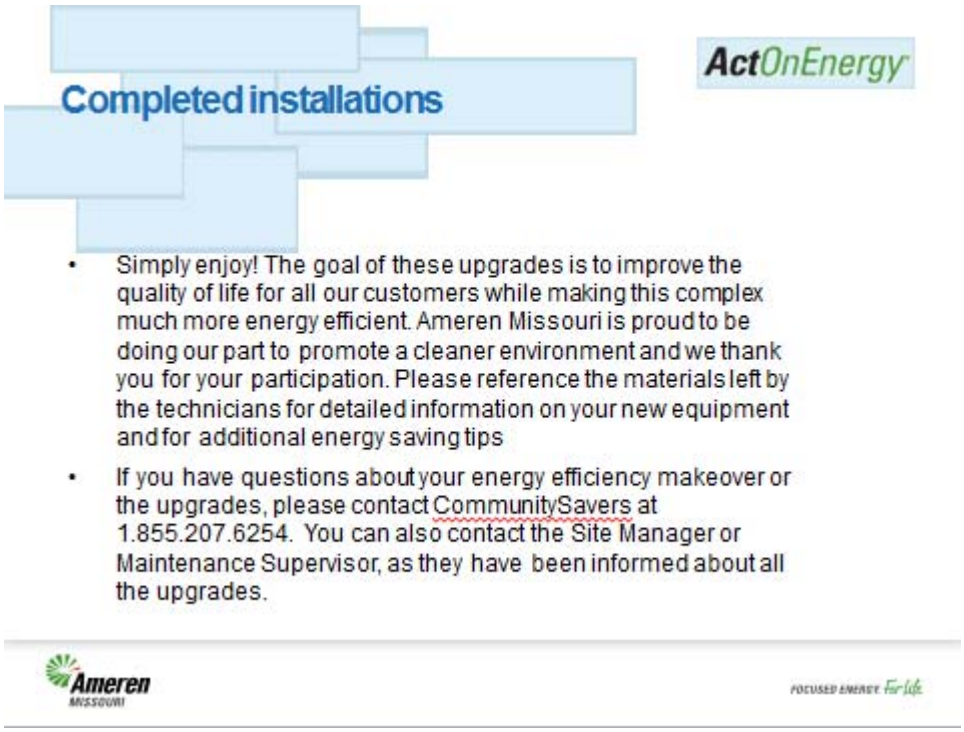
Completed installations
ActOnEnergy
• Simply enjoy! The goal of these upgrades is to improve the quality of life for all our customers while making this complex much more energy efficient. Ameren Missouri is proud to be doing our part to promote a cleaner environment and we thank you for your participation. Please reference the materials left by the technicians for detailed information on your new equipment and for additional energy saving tips
• If you have questions about your energy efficiency makeover or the upgrades, please contact CommunitySavers at 1.855.207.6254. You can also contact the Site Manager or Maintenance Supervisor, as they have been informed about all the upgrades.
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