CommunitySavers Program Evaluation Report

March 2016 – February 2017

Prepared For:

Ameren Missouri

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1. Executive Summary

This report presents the results of the impact, process, and cost effectiveness evaluations of the CommunitySavers Program implemented during program year 2016 (PY2016), which occurred during March 2016 – February 2017. ADM Associates performed the evaluation, measurement and verification of the program. The primary evaluation activities include the following:

- The evaluation team collected data for the evaluation through review of program materials, on-site inspections, and interviews with Ameren Missouri staff members, ICF International (ICF) staff members, participating customers, and affiliated subcontractors.
- The evaluation team developed a verification tenant survey sample for the programs that provided information on in-service rates for estimation of energy savings estimates at a 90% statistical confidence level.
- Analysts performed gross ex post kWh energy savings calculations for each implemented measure. Ex post saving calculations incorporated in-service rates developed through a survey of tenants that received the measures through the program and observations made during on-site visits of a sample of projects.
- Participating property manager or owner surveys provided insight into the participants experience and level of satisfaction with the program.
- Surveys of tenants to verify measure installation and develop in-service rates, also provided information on satisfaction with the installed measures and the installation process.
- Interviews with participating direct install (DI) subcontractors that provided direct installation of in unit measures provided feedback on program training, scheduling processes, and interactions with the implementation contractor.

Table 1-1 provides a summary of these data collection efforts. The table lists data sources used for the evaluation, the data collection method, the dates during which data collection and/or analysis was performed, the research objectives, and the type of analysis performed (qualitative vs. quantitative).

Table 1-1 Summary of CommunitySavers EM&V Data Collection Efforts

*Data Source**	*Method*	*Dates*	*Research Objective*	*Analysis Type*
Program staff (4), Ameren Missouri (1), ICF (3)	In-depth interview	December 2016 to March 2017	Program function; communication; tracking and reporting; quality control	Qualitative
Program documentation	Document review	July 2016 to February 2017	Program function; tracking and reporting; quality control	Qualitative
Database analysis	Database review	July 2016 to February 2017	Number of projects; project type and details; data quality	Quantitative
Participants (17)	Online/Telephone Survey	January to March 2017	Program experiences; satisfaction with program	Quantitative and qualitative
Tenant (132)	Mail	January 2017	Install rates; program experiences; satisfaction with program	Quantitative and qualitative
MFLI subcontractor Interviews (3)	In-depth interview	February to March 2017	Training sufficiency; program procedures; tenant and program staff interactions; satisfaction	Qualitative
Ride-Along Site Visits (3)	On-site M&V	January to March 2017	Observe direct install procedures	Qualitative
Post-install site visit (16 units)	On-site M&V	January to March 2017	Verify baseline operating conditions	Quantitative and qualitative

* Sample sizes in parentheses

Table 1-2 provides a summary of the evaluated energy savings of the CommunitySavers PY2016 Program. The table displays the ex ante gross kWh, ex post gross kWh, and ex post net kWh savings as compared with the PY2016 energy savings goal. The net-to-gross (NTG) ratio for the CommunitySavers Program is estimated to be 1.0, in line with common practice for estimation of low-income program net savings.[1]

[1] See Violette and Rathbun, Chapter 17: Estimating Net Savings: Common Practices. The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures, available electronically at http://www.nrel.gov/docs/fy14osti/62678.pdf, p. 50.

Table 1-2 Summary of kWh Savings for CommunitySavers Program

PY2016 kWh Savings Targets	*Ex Ante kWh Savings*	*2017 Ameren Missouri TRM kWh Savings*	*Ex Post Gross kWh Savings*	*Gross kWh Savings Realization Rate*	*Ex Post Net kWh Savings*	*Estimated Net-to-Gross Ratio*	*Percent of Goal Achieved*
5,398,920	2,099,409	2,191,037	2,349,841	112%	2,349,841	100%	44%

During this period, the program gross and net ex post energy savings totaled 2,349,841 kWh.

Table 1-3 summarizes the kW savings of the program. The program gross and net ex post savings totaled 724.69 kW.

Table 1-3 Summary of kW Savings for CommunitySavers Program

PY2016 kW Savings Targets	*Ex Ante kW Savings*	*2017 Ameren Missouri TRM kW Savings*	*Ex Post Gross kW Savings*	*Gross kW Savings Realization Rate*	*Ex Post Net kW Savings*	*Estimated Net-to-Gross Ratio*	*Percent of Goal Achieved*
1,261.00	618.92	656.74	724.69	117%	724.69	100%	57%

The following section summarizes findings and recommendations that resulted from the evaluation activities. They are organized to present impact and process findings separately.

1.1. Impact Conclusions

Below is a summary of conclusions that characterize key trends from the impact analyses.

- The overall program realization rate was 112%, but this varied by measure. Reasons for why ex ante savings differed from ex post savings are discussed in Section 3.2. Key findings include:
    - The refrigerator realization rate was 54% and the PY2016 per unit savings were considerably less than PY2015 ex post savings. Fifty-two percent of the baseline units used to develop the average per unit savings were manufactured before 1990.[2] In comparison, 5% of the baseline units replaced through CommunitySavers in PY2016 were manufactured before 1990. Additionally, three replaced units were manufactured after 2001, contrary to program guidelines.

[2] Ameren Missouri ApplianceSavers Impact and Process Evaluation: Program Year 2013, p. 27.

  - The realization rate for HVAC replacements was 49%. The primary reason for the difference between ex ante and ex post savings was that ex ante calculations were based on an average capacity of 3.4 tons – larger than the average 1.77 ton unit installed through the program. The ex ante savings values were developed for use in estimating savings for single-family systems. Staff have subsequently developed values for multifamily systems, which are comparable to the PY2016 ex post savings.
  - HVAC tune-up and refrigerant recharge rates were 198% and 57%, respectively. The realization rate of the combined measure savings was 149%, and were generally consistent with the combined tune-up and recharge ex post savings from the prior three program evaluations.

- During the completion of site visits, ADM found that some dirty filter alarms were oriented incorrectly by the installing subcontractor. Tenants and maintenance technicians could have similar difficulty with correctly orienting the filter alarms during filter replacements and this may negatively impact the persistence of the savings.
- CommunitySavers fell short of its program goal and did not achieve the targeted 40% of savings from common area improvements. The late launch of the program contributed to both results, as did the process of transitioning to a new implementation contractor.

1.2. Impact Recommendations

Based on the above conclusions, the evaluation team offers the following impact recommendations for consideration in planning future program cycles.

- Include fields in program tracking data for HVAC replacement unit SEER and capacity. Currently, information on SEER is built into the measure name and capacity level is not recorded in the data. Staff reported that this information is being added to the program data.
- Provide information on unit space heating and cooling type for LED projects. Space conditioning equipment information is used to appropriately apply heating and cooling interactive factors in the estimate of lighting savings. Space heating and cooling type was available from project applications but some applications indicated that the properties had multiple heating types.
- To improve average savings for refrigerator replacements, consider limiting year of manufacture to 2000 or earlier, as was the case in PY2015. ADM recognizes that multiple factors should be considered when setting the year of manufacture, including the value of refrigerator replacements as a measure that may be entice

property managers to complete a program project that includes additional efficiency measures.

- Improve screening of refrigerator replacements. Although the three refrigerators replaced that were manufactured after 2001 comprise less than 1% of refrigerator replacements, staff should review screening protocols to prevent additional units not qualified for the program from being replaced in the future.
- Although Ameren Missouri applies the correct coincident factor when reporting kW savings, a calculation error within Vision resulted in incorrect ex ante kW reduction estimates. Staff should correct calculations made within the Vision data system so that ex ante kW estimates tracked in the system are correct.
- Provide tenants and building maintenance staff with instructions on how to correctly install the dirty filter alarm. ADM observed instances where the filter alarms were oriented incorrectly by the installing subcontractor and tenants or maintenance technicians may have similar difficulty installing the device correctly.

1.3. Regulator Research Questions – Process Conclusions and Recommendations

Below, conclusions and recommendations are organized according to the five regulatory research questions specified in 4 CSR 240-22.070(8). The conclusions address the first four questions; the fifth question speaks to recommendations.

Research Question 1: What are the primary market imperfections common to target market segment?

- Multiple market imperfections were identified that may prevent low-income multifamily property owners from investing in energy efficiency improvements either through the CommunitySavers Program or outside of it. The identified market imperfections are: cost, state policy, multifamily property budgeting cycles, geography, lack of property staff resources, and split incentives.
- Cost. The cost of energy efficient equipment is a barrier to completing efficiency improvements through the program and outside of it. Program staff that work with multifamily property owners and managers noted that cost is a significant barrier to efficiency improvements in the properties managed. This sentiment was echoed by a survey respondent who noted that the properties generate limited income from which efficiency improvements could be financed. Additionally, securing financing for property improvements can be challenging for low-income multifamily property owners

and program staff recognize that assistance in securing financing is an important service that the program can provide.[3]

- State Policy. Missouri state law disallowed properties that received Missouri state Low-Income Housing Tax Credits (LIHTC) from receiving incentives for energy efficiency improvements made to common areas of the properties.[4] Program staff stated that this is a significant barrier to common area projects and historical data on program participation indicates that a significant share of prior participants received the LIHTC. Staff appeared to have made progress in reaching properties that do not receive the LIHTC in PY2016, as approximately one-fifth of the participating properties were identified as LIHTC recipients. Additionally, review of the National Housing Preservation database on subsidized housing indicates that approximately 40% of subsidized properties in Ameren Missouri's service territory do not receive the LIHTC, suggesting that there is a sizable market of low-income properties that are qualified to receive common area measures. That said, the prohibition against properties that receive the LIHTC was an important barrier to participation in the program.
- Budget Cycle. Budgeting cycles create barriers to participation to the extent that program outreach efforts are misaligned with these cycles. Program staff indicated that this misalignment was an issue during PY2016 because of the program's late start. Future years should not be impacted by this issue so long as outreach efforts take these budget planning processes into consideration.
- Geography. Analysis of the program activity in comparison to the location of multifamily properties, lower income customers, and subsidized multifamily properties found that program activity was disproportionately concentrated in St. Louis and its surrounding suburbs.
- Insufficient Property Staff. Multifamily property operators may not have staff available to implement efficiency measures. One survey respondent stated that they did not have the staff available to implement efficiency improvements at the property.[5] CommunitySavers is designed to minimize the time required by property managers and owners through the assistance provided by the account manager who will assist with program paperwork and the scheduling of the work completed.
- Split Incentives: One form of split incentives in multifamily occurs when the tenant pays the cost of the electricity use, but the owner is responsible for choices that affect

[3] Energy Efficiency for All (2015). Program design guide: Energy efficiency programs in multifamily affordable housing. Energy Efficiency for All Project.

[4] Although it is likely less impactful, buildings that receive Historic Tax Credits are also ineligible for common area incentives.

[5] Prior evaluations of CommunitySavers also identified staffing issues as a barrier to program participation. Ameren Missouri Low Income and Process Evaluation: program Year 2015.

how efficiently the equipment and building utilizes electricity. This issue is most likely to occur for equipment and building characteristics that affect tenant energy use. The program addresses the barrier to efficiency resulting from the split incentives between owners and occupants by providing the direct install measures and HVAC tune-ups at no cost to the building operator or the tenant. The program measure that is likely most affected by the impact of split incentives between owners and occupants are HVAC replacements that are metered under 1(M) residential rate class. Split incentives are not a factor common area improvements for which the building operator is responsible for the cost of the equipment and the cost of electricity service.

Research Question 2: Is target market segment appropriately defined, or does it need further subdivision or merging with other segments?

- The target market is appropriately defined. The program targets subsidized multifamily properties and properties with tenants residing in non-subsidized housing with an income of at or below 200% federal poverty level.

  The current evaluation found that the PY2016 participating properties included both subsidized housing and low-income market rate housing. Within the subsidizing housing properties, the program reached HUD housing, LIHTC housing, and USDA properties. Moreover, staff discussions of outreach approaches and challenges demonstrated a recognition that subsidized housing and fair market affordable housing are different sub-segments of the low-income multifamily housing market.

- Because providing services to the low-income multifamily market requires a sufficiently specialized set of outreach and project implementation processes, maintaining the focus on this market is likely preferable to expanding the program to target single family low-income housing or mass-market multifamily housing.

Research Question 3: Do program measures reflect the diversity of end-use needs and available technologies for target segment?

- The program offers measures that cover all major multifamily in-unit end-use needs: lighting, appliances, space cooling and heating, and water heating. Additionally, the Standard and SBDI incentives available for common areas cover lighting, commercial refrigeration and kitchen equipment, and pool pumps. Building envelope improvements are eligible for Custom incentives.

- Survey respondents did not identify any additional measures that should be included in the program. Two-thirds of participant survey respondents aware of the common area incentives stated that these incentives completely met their needs for efficiency improvements (the remaining one-third did not elaborate on why their needs were not met). Additionally, 94% of property managers were satisfied with the equipment installed through the program.

- One potential opportunity is the addition of standard incentives for clothes washers. Review of the participant applications found that several of the participating properties had laundry rooms on the premises. A limitation on effectively targeting washing machines is that many multifamily properties lease laundry equipment from a third party.[6] Targeting equipment leasers would require the development of additional outreach approaches and require additional resources. Moreover, split incentives between leasers that own the equipment and properties that pay for the energy costs would need to be addressed. As such, targeting this measure may not be worth the cost required to do it effectively.

Research Question 4: Are communication and delivery channels/mechanisms appropriate for the target market segment?

- The program uses three strategies for reaching the target market: direct outreach; outreach to building management groups (e.g., HUD, Public Housing Authorities), and other multifamily housing groups such as Community Development Corporations and neighborhood associations; and earned media. Direct outreach and repeated contact is important for this market segment because this segment is typically viewed as unresponsive and difficult to reach.[7] The outreach performed and staff's activities in working with building management groups and other stake holders is also a recommended practice for reaching multifamily property decision makers.[8] Earned media may be effective at generating broader awareness of the program but the program did not focus on this outreach tactic during PY2016.
- Program messaging focuses on the availability of incentives and no-cost measures and secondarily on the assistance provided by knowledgeable program staff and the benefits to tenants are likely. These messages are likely to resonate with property managers as they address barriers to energy efficiency improvements, such as insufficient financial and staff resources, and are consistent with motivations for participating noted by participant survey respondents.
- There may be an opportunity to improve the awareness of common area incentives. Survey responses suggest that some qualified direct install participants may not be aware of common area incentives, although program staff stated that they discuss the program incentives for common area improvements with eligible participants. It may

[6] Shaaf, R. and Shah, R. (2017). Efficiency opportunities in multifamily common area laundry facilities. Stewards of Affordable Housing for the Future.

[7] Energy Efficiency for All (2015). Program design guide: Energy efficiency programs in multifamily affordable housing. Energy Efficiency for All Project.

[8] CNTenergy and American Council for an Energy-Efficient Economy (2013). Engaging as partners in energy efficiency: A primer for utilities on the energy efficiency needs of multifamily buildings and their owners.

be the case that while the information is presented to the participants, it has not garnered their interest.

Research Question 5: Are there better ways to address market imperfections to increase adoption of each program measure?

- Additional staffing resources to identify qualified unsubsidized housing, cultivate relationships with potential participants, financers, multifamily property groups, and trade allies should assist with customer recruitment. Program staff reported that a second account manager has been hired to better meet staffing needs.
- Continue to develop relationships with financing institutions. Staff recognizes that facilitating financing is key to developing common area improvement projects that require properties to fund a portion of the measure cost. Additionally, financial organizations may also be an important source of referrals and may direct property managers and owners to the program when they are in the process of seeking financing for building improvements.
- Develop marketing materials focused on common area improvements. The program brochure focuses on direct install measures, although it does reference the availability of other incentives. Staff should consider developing marketing materials that focus on common area improvements such as SBDI lighting projects that can be completed at no cost to the owner.
- Develop case studies based on common area projects. A few common area projects have been completed in PY2016 and early PY8. Staff should look to these successes to develop case studies to promote these projects with other property managers and owners. Case studies that illustrate the cost savings, ease of participation, and service provided by program staff should be effective at addressing concerns related to project costs and time commitments. Other important messages include the financial benefits of reduced maintenance and equipment longevity (i.e., for LED lighting in particular).
- Focus trade ally outreach on HVAC suppliers and contractors. Split-incentives between owners and occupants are most likely to adversely impact decisions to install efficient air conditioner and heat pump replacement projects. For this reason, replacements are most likely to occur when units burn out. HVAC contractors and suppliers are positioned to effectively intercede on behalf of the program to encourage multifamily properties to install efficient equipment when systems are replaced.

2. Introduction

This report presents the results of the impact and process evaluations of the CommunitySavers Program. This program is available to owners and managers of low-income multifamily properties that receive electrical service from Ameren Missouri. This report presents results for activity during PY2016.

2.1. Program Description

The CommunitySavers Program provides financial incentives and services to encourage comprehensive energy efficiency improvements in income-eligible multifamily properties. The program uses a “one-stop shop” model through which a dedicated account manager provides a variety of services to assist property managers and owners with the identification of energy efficiency opportunities and completion of application materials, guidance on development of project proposals for bidding, and provision of communication materials for distribution to tenants.

Multifamily properties with three or more units that receive electric service under Ameren Missouri Service Classification of Residential or Non-Residential (excluding lighting classifications) and that meet the tenant income qualifications are eligible. Income eligibility is established by meeting one of the following requirements:

- Reside in federally-subsidized housing units and fall within that programs’ income guidelines (U.S. Department of Housing and Urban Development (HUD), U.S. Department of Agriculture (USDA), and/or Public Housing Authorities). State Low-Income Housing Tax Credit (LIHTC) buildings are only eligible for in-unit efficiency improvements.
- Reside in non-subsidized housing with an income at 200% of poverty level or below.

Properties with a mix of qualifying and non-qualifying tenants are eligible for incentives for the entire building if at least 51% of tenants meet the income requirements. If fewer than 51% of the tenants meet the income requirements, the building may receive common area and in-unit upgrades if the owner or manager verifies that comparable efficiency improvements have been made in all non-qualifying units.

The program provides the following type of incentives:

- Direct installation of measures at no cost to the property owner or tenant. The direct install measures include:
    - ENERGY STAR room air conditioners;
    - ENERGY STAR refrigerators;
    - LED lamps;

- Low flow faucet aerators and showerheads, and pipe insulation;
- HVAC Maintenance and tune-ups;
- Programable thermostats; and
- Dirty filter alarms.

- Small Business Direct Install (SBDI) incentives for common area lighting;
- HVAC system replacement incentive for properties with dwelling units with a residential account 1(M) service rating. Incentives are 25% higher than for non-qualifying residential customers; and
- Custom/standard incentives for common areas. The incentives provided are 25% higher than those offered for non-qualifying non-residential customers.

2.2. Program Trends in PY2016

The initial start of CommunitySavers was delayed while Ameren Missouri sought final approval of its MEEA filing, completed contract negotiations with ICF, and transitioned from the previous program implementation contractor. As shown in Figure 2-1, the program activity was steady after July through the end of the program year in February.

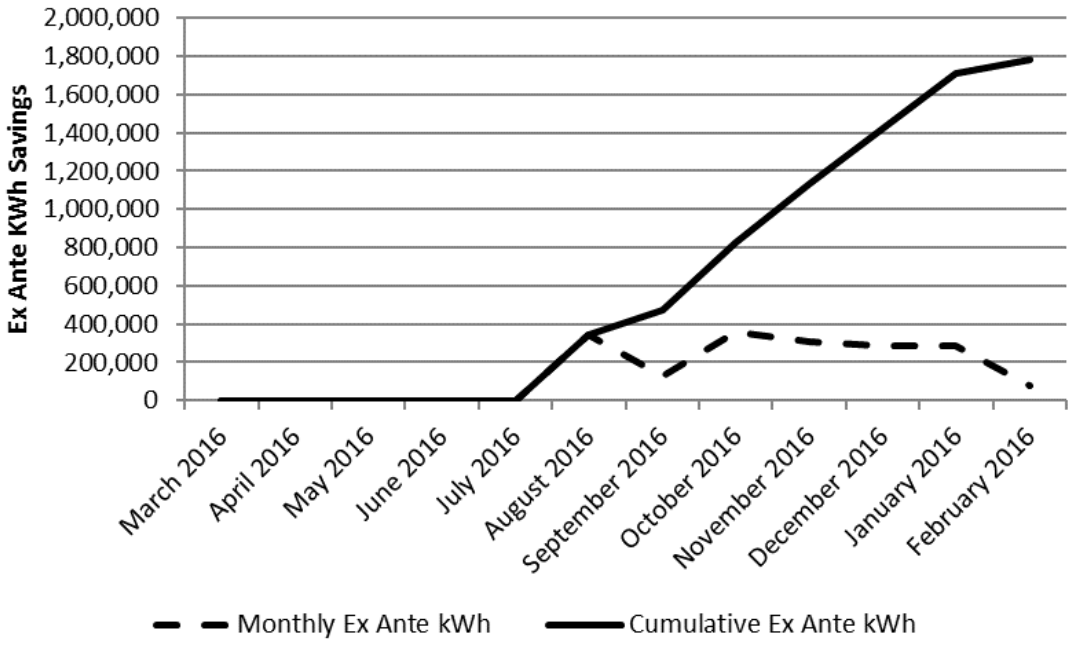


Figure 2-1 Gross Ex Ante Savings by Qualification/Processing Date

Figure 2-2 summarizes gross ex ante savings by program component. As shown, nearly all program savings resulted from the no-cost direct install measures. HVAC measures

(tune-ups/refrigerant recharge, programmable thermostats, and dirty filter whistles) accounted for the largest share of direct install savings. Common area lighting replacements completed through the SBDI component accounted for 0.4% of program savings and HVAC replacements completed through the MFLI Heating and Cooling Component accounted for 1.1% of program savings.

Figure 2-2 Gross Ex Ante Savings by program Component

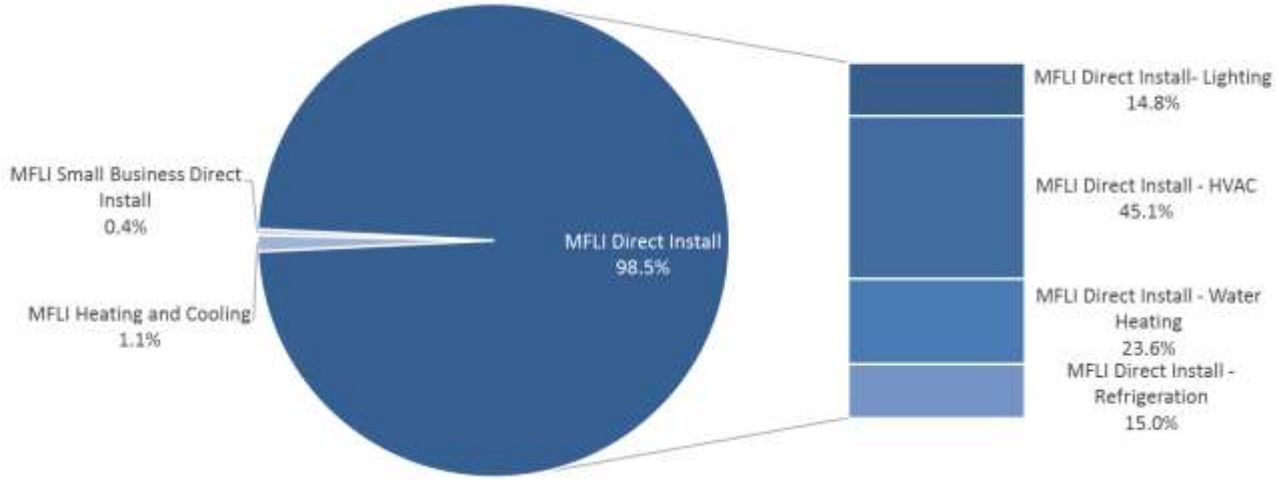
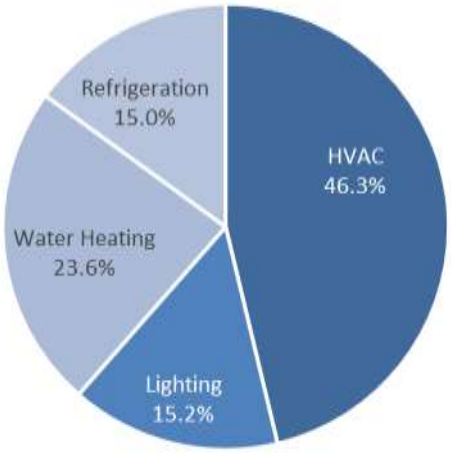


Figure 2-3 summarizes energy savings by end-use. Nearly one-half of gross ex ante savings resulted from HVAC measures (HVAC replacements, tune-ups/refrigerant recharge, programmable thermostats, and dirty filter whistles).

Figure 2-3 Gross Ex Ante Savings by End-Use



2.3. Organization of Report

This report on the impact and process evaluation of the program for the period March 2016 through February 2017 is as follows:

- Chapter 3 presents and discusses the methods used for and the results obtained from estimating net gross ex post savings.
- Chapter 4 presents and discusses the methods used for and results obtained from the process evaluation.
- Chapter 5 presents and discusses the methods used for and results obtained from the cost effectiveness evaluation.
- Chapter 6 presents evaluation conclusions and recommendations.
- Appendix A: ICF Program Manager Interview Guide
- Appendix B: ICF Education and Outreach Coordinator Interview Guide
- Appendix C: ICF Account Manager Interview Guide
- Appendix D: Ameren Missouri Program Manager Interview Guide
- Appendix E: Direct Install Subcontractor Interview Guide
- Appendix F: Property Manager / Owner Survey
- Appendix G: Tenant Survey
- Appendix H: Cost Effectiveness - Critical Technical Data
- Appendix I: Glossary of Terms

3. Estimation of Gross and Net Ex Post Savings

This chapter explains the estimation of gross and net ex post kWh savings and gross and net ex post peak kW savings for PY2016 program participants from measures installed at their properties. ADM performed impact analyses in accordance with evaluation requirement 4 CSR 240-22.070 (8). Section 3.1 describes the methodology used for estimating gross ex post kWh savings. Section 3.2 presents the results of the effort to estimate gross savings.

The net-to-gross (NTG) ratio for the CommunitySavers Program is estimated to be 1.0, in line with common practice for estimation of low-income program net savings.[9] As such, the net energy and demand reduction impacts are equal to the gross energy and demand reduction impacts.

3.1. Methodology for Estimating Gross Ex Post Savings

The methodology used to estimate gross ex post kWh savings is described in this section. The primary data used in the analysis was information collected through a survey of tenants that received efficiency measures through the program.

3.1.1. Tenant Survey

ADM administered a survey to tenants that received energy efficiency measures through the program. The primary objective of the survey was to verify measure installation and collect data on in-service rates. The tenant survey was administered by postal mail during January 2017. A sample of 827 tenant addresses were sent a survey with a stamped return envelope. Tenants were also provided an opportunity to complete the survey online. In total, 132 tenants responded to the survey.

3.1.2. Post-Installation Site Visits and Direct Install Subcontractor Ride Alongs

ADM collected data used for the evaluation of program ex post savings through site visits and direct install subcontractor ride alongs. Data collected during these visits included:

- Verification of installed measures;
- Verification that measures were properly installed;
- Assessment of baseline conditions (e.g., flow rates of existing faucets); and
- Collection of information on programmable thermostat set points.

[9] See Violette and Rathbun, Chapter 17: Estimating Net Savings: Common Practices. The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures, available electronically at http://www.nrel.gov/docs/fy14osti/62678.pdf, p. 50.

During ride alongs, ADM observed implementation procedures and baseline conditions while program MFLI subcontractors implemented program measures at three apartment complexes. Information collected through these ride alongs was used to provide feedback to program staff on implementation procedures.

Tenants were recruited for post-installation site visits through the mail survey administered to verify measure installations and collect information on in-service rates. In total, 16 site visits were performed. By performing site visits for a subset of survey respondents, ADM could compare reported in-service rates with observed in-service rates. For certain measures (e.g., pipe insulation) ADM found that measures reported as not currently installed were in fact installed at the location. In-service rates used to develop gross ex post savings were adjusted based on these findings as discussed in the following sections describing the approach to analyzing savings from program measures.

3.1.3. Procedures for Estimating Energy Savings from Measures Implemented through the Program

The approach ADM employed to determine gross ex post energy saving impacts depended on the measure. The following sections summarize the approach used to estimate ex post kWh savings for the following measure types:

- Lighting;
- Refrigerator Replacements;
- Low-Flow Showerheads;
- Faucet Aerators;
- Water Heater Pipe Wrap;
- Programmable Thermostats;
- Dirty Filter Alarm;
- Central Air Conditioner Replacements; and
- Air Conditioner Tune-Ups.

3.1.3.1. Method for Analyzing Savings from Lighting Measures

Electric energy savings of lighting measures were calculated as follows:

$$kWh\ Savings = Hours \times (W_{Base} - W_{Post}) \times HCIF \times ISR/1000$$

Where,

Hours = Annual hours of use

W_{base} = Baseline watts

W_{post} = Installed watts

HCIF = Heating and cooling interaction factor

ISR = In Service Rate

1000 = W/kW conversion

Table 3-1 summarizes the lighting energy savings equation inputs and their sources. Factors considered in the choice of values for the parameters are as follows:

- ADM determined living unit type based on data collected through site visits and Internet searches.
- ADM referenced data collected during site visits to determine whether common area lighting was operated on a dusk-to-dawn schedule or was continuously operated.
- Lamp specifications were determined through review of program tracking data, equipment invoices, and data collected during site visits.

Table 3-1 Lighting Energy Savings Calculation Inputs

Parameter	*Value*	*Source*
Hours	See Table 3-2	Cadmus PY5 metering study[1]
W_{base}	See Table 3-3	Illinois Technical Reference Manual (IL-TRM)[2]
W_{post}	Per installed lamp type	PY2016 program data
HCIF	See Table 3-4	PY2016 program data
ISR	.94 for in-unit lamps and 1.00 for common area lamps	Tenant survey

1. Ameren Missouri Low Income and Process Evaluation: program Year 2014.
2. Illinois Statewide Technical Reference Manual v. 5.0 http://www.ilsag.info/il_trm_version_5.html

Table 3-2 Lighting Hours of Use

Parameter	*Value*	*Source*
In-Unit Senior Building	365	Cadmus PY5 metering study[1]
In-Unit Family Building	694	Cadmus PY5 metering study[1]
In-Unit, Unknown Type	530	Cadmus PY5 metering study[1]
Common Area	6,541	PY2016 ADM Site Visits
Exterior	4,322	U.S. Naval Observatory dusk to dawn hours for St. Louis[2]

1. Ameren Missouri Low Income and Process Evaluation: program Year 2014, p.26
2. http://aa.usno.navy.mil/data/docs/RS_OneDay.php

Table 3-3 EISA Baseline

A Type and Globe Lamps		
Minimum Lumens	*Maximum Lumens*	*Watts$_{base}$*
5280	6209	300
3000	5279	200
2601	2999	150
1490	2600	72
1050	1489	53
750	1049	43
310	749	29
250	309	25
Directional Lamps		
420	472	40
473	524	45
525	714	50
715	937	65
938	1259	75
1260	1399	90
1400	1739	100
1740	2174	120
2175	2624	150
2625	2999	175
3000	4500	200

Table 3-4 Heating and Cooling Interactive Factors

Location	*Gas Furnace with AC*	*Heat Pump w/ Electric Resistance*	*AC with Heat Pump*	*Building with Gas and Electric Heating*
Cape Girardeau	1.072	0.735	0.877	0.903
Jefferson City	1.087	0.759	0.890	0.923
Kirksville	1.049	0.658	0.794	0.854
St. Louis	1.083	0.746	0.878	0.914

3.1.3.2. Method for Analyzing Savings from Refrigerator Replacements

Electric energy savings of refrigerator replacements were calculated as follows:

$$kWh\ Savings = UEC_{Base} - UEC_{EE}$$

Where,

UEC_{base} = Annual unit energy consumption for baseline equipment

UEC_{ee} = Annual unit energy consumption for efficient equipment

ADM determined base refrigerator annual energy consumption by using the ENERGY STAR calculator, referencing program data for calculator inputs including door configuration, age and size.

A new efficiency standard went into effect in July 2001. The effect of this standard on baseline unit energy consumption is shown in Table 3-6. To more accurately account for the impact on this midyear change on baseline unit consumption, ADM applied the savings value of units manufactured between 1993 and 2000 to replaced units manufactured in 2001 before July.

The efficient consumption was determined by referencing current ENERGY STAR-approved refrigerator data.

Table 3-5 Refrigerator Energy Savings Calculation Inputs

Parameter	*Value*	*Source*
Base Year of Manufacture	Per unit replaced	PY2016 program data
Base doors	Per unit replaced	PY2016 program data
Base size	Per unit replaced	PY2016 program data
Base kWh	See Table 3-6	ENERGY STAR Calculator
Efficient Consumption	Per efficient unit model (348 to 420 kWh)	ENERGY STAR-Approved Data

Table 3-6 Baseline Refrigerator Usage

Age	*Bottom Freezer (16 cu ft)*	*Side-by-Side (14 cu ft)*	*Side-by-Side (15 cu ft)*	*Side-by-Side (16 cu ft)*	*Top Freezer (cu ft 14)*	*Top Freezer (15 cu ft)*	*Top Freezer (16 cu ft)*	*Top Freezer (17 cu ft)*	*Top Freezer (18 cu ft)*
2011-2015	483	592	592	592	374	374	374	412	412
2001 (after July-2010	724	747	747	747	556	556	556	613	613
1993-2001(before June)	962	1,139	1,139	1,139	861	861	861	962	962
1990-1992	1,519	1,617	1,617	1,617	1,272	1,272	1,272	1,432	1,432
1980-1989	1,992	2,119	2,119	2,119	1,668	1,668	1,668	1,877	1,877
Before 1980	2,523	2,684	2,684	2,684	2,112	2,112	2,112	2,377	2,377

3.1.3.3. Method for Analyzing Savings from Low-Flow Showerheads

Electric energy savings of low-flow showerheads were calculated as follows:

$$kWh\ Savings = \left(\frac{People*ShowerTime*Days*\%Days*GPM*(T_{shower}-T_{in})*C_P*Den}{3{,}413*RE*Number\ of\ Showerheads}\right) \text{*ISR}$$

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)

RE = Recovery efficiency of the electric hot water heater

Number of Showerheads = The number of showerheads installed per home

Table 3-7 Showerhead Energy Savings Calculation Inputs

Parameter	*Value*	*Source*
People	2.07	PY6 program Data (field not reported in PY2016)[1]
Shower Time	8.66	Secondary source cited in PY6 Evaluation[2]
Days	365	
%Days	.66	Secondary source cited in PY6 Evaluation[2]
ΔGPM	2.67 – 2.0 = .67	PY2016 program data, IL-TRM[3]
T_{shower}	105	Secondary source cited in PY6 Evaluation[4]
T_{in}	61.3	Ameren Missouri TRM
CP	1	
Den	8.33	
RE	.98	Cadmus PY3 site visits[5]
Number of Showerheads	1	PY2016 program data
ISR	.91	Tenant surveys

1. Ameren Missouri Low Income and Process Evaluation: program Year 2015. p. 20
2. DeOreo, William, P. Mayer, L. Martien, M. Hayden, A. Funk, M. Kramer-Duffield, and R. Davis (2011). "California Single-Family Water Use Efficiency Study."
3. Illinois Statewide Technical Reference Manual v. 5.0 http://www.ilsag.info/il_trm_version_5.html
4 The Bonneville Power Administration measured average shower temperatures as 104–106°F.
5.Cited in Ameren Missouri Low Income and Process Evaluation: program Year 2015. p.20

3.1.3.4. Method for Analyzing Savings from Faucet Aerators

Electric energy savings of faucet aerators were calculated as follows,

$$kWh\ Savings = \left(\frac{People * FaucetTime * Days * \Delta GPM * \left(T_{faucet} - T_{in}\right) * C_P * Den}{3{,}413 * RE * Number\ of\ Faucets}\right) * ISR$$

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)

T_{faucet} = The average water temperature out of the faucet (°F)

T_{in} = The average inlet water temperature (°F)

ΔTemp = The temperature at the tap minus the temperature at the water main.

3,413 = The conversion rate between BTU and kWh (BTU/kWh)

RE = Recovery efficiency of the electric hot water heater

Number of Faucets = The number of faucets installed per home

ISR = In-service rate

Table 3-8 Faucet Aerator Energy Savings Calculation Inputs

Parameter	*Value*	*Source*
People	2.07	PY6 program data (field not reported in PY2016)[1]
Faucet time	3.7	Cadmus PY3 metering study[2]
Days	365	
ΔGPM	2.2 – 1.5 = .67	Site visit data PY2016 program data, IL-TRM[3]
T_{faucet}	80	Secondary source cited in PY6 Evaluation[4]
T_{in}	61.3	Ameren Missouri TRM
CP	1	
Den	8.33	
RE	.98	Cadmus PY3 site visits[5]
Number of Faucets	1.76	PY2016 program data
ISR	1.00	Based on site visits

1. Ameren Missouri Low Income and Process Evaluation: program Year 2015. p.23
2. Cited in Ameren Missouri Low Income and Process Evaluation: program Year 2015. p.23
3. Illinois Statewide Technical Reference Manual v. 5.0 http://www.ilsag.info/il_trm_version_5.html
4. Vermont Technical Reference Manual, 2009.
5. Cited in Ameren Missouri Low Income and Process Evaluation: program Year 2015.

3.1.3.5. Method for Analyzing Savings from Water Heater Pipe Wrap

Electric energy savings of water heater pipe wrap were calculated as follows,

$$kWh\ Savings = \frac{\left(\left(\frac{1}{R_{exist}} - \frac{1}{R_{new}}\right) * L * C * \Delta T * 8{,}760\right)}{3{,}413 * RE} * ISR$$

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 in 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 3-9 Pipe Insulation Energy Savings Calculation Inputs

Parameter	*Value*	*Source*
R_{exist}	1	Secondary source cited in PY6 Evaluation[1]
R_{new}	3.6	PY2016 specifications
L	Per installed foot	PY2016 program data
C	0.196	Cadmus PY3 site visits[2]
ΔT	58.9	Cadmus PY3 site visits[2]
RE	0.98	Cadmus PY3 site visits[2]
ISR	1.00	Site visits

1. Navigant. Measures and Assumptions for DSM Planning; Appendix C Substantiation Sheets. April 2009. p 77.
2. Cited in Ameren Missouri Low Income and Process Evaluation: program Year 2015. p.24

Pipe insulation savings accounted for an in-service rate (ISR) based upon data collected through site visits and surveys. The results of the site visits indicated that tenant survey responses underestimated measure in-service rates at the time of survey administration; therefore, in determining ISR, the in-service rate that was calculated based on survey data alone was upwardly-adjusted to account for the data collected during site visits. Pipe insulation was found installed at all tenant residences, including tenants who reported it was not installed in the survey. The ISR used in estimating ex post savings was 1.0.

3.1.3.6. Method for Analyzing Savings from Programmable Thermostats

Electric energy savings of programmable thermostats installed on central air conditioning units were calculated as follows:

$$kWh\ Savings = \frac{\left(FLHcool * Capacity_{Cooling} * \left(\frac{1}{SEER_{CAC}}\right)\right)}{1000} * SBdegrees * SF * EF$$

Electric energy savings of programmable thermostats installed on air source heat pump tune-ups were calculated as follows:

$$kWh\ Savings = \left(\frac{\left(FLH_{cool} * Capacity_{Cooling} * \left(\frac{1}{SEER_{ASHP}}\right)\right)}{1000} * SBdegrees * SF * EF + \frac{\left(FLH_{heat} * Capacity_{Heating} * \left(\frac{1}{HSPF_{ASHP}}\right)\right)}{1000} * SBdegrees * SF * \mathrm{E}F\right)$$

Where,

FLH_{cool} = Full load cooling hours

FLH_{cool_stat} = Full load cooling hours with setback schedule

$Capacity_{Cooling}$ = Cooling capacity of system in BTU/hr (1 ton = 12,000 BTU/hr)

$SEER_{CAC}$ = SEER efficiency of central air conditioner

$SEER_{ASHP}$ = SEER efficiency of air source heat pump

$HSPF_{ASHP}$ = Heating Season Performance Factor of system

FLH_{heat} = Full load heating hours

FLH_{heat} = Full load heating hours with setback schedule

$Capacity_{Heating}$ = Heating capacity of system in BTU/hr (1 ton = 12,000 BTU/hr)

SBdegrees = weighted sum of setback degrees to comfort temperature

SF = Savings factors from ENERGY STAR calculator

EF = Efficiency ratio from Cadmus metering study

The SBdegrees for heating are the recorded setback temperatures and schedules in the thermostat for the heating schedule based on the sample of site visits after the participant survey. The EF is the value for heating from the Cadmus CoolSavers metering study. This procedure is only done for heating setbacks because site visits were completed during the heating season, i.e., the post-survey follow-up site visits were completed at sites for which the units were installed during the Fall season.

The SBdegrees for cooling are the Energy Star programmable thermostat setback schedules and temperatures and the EF is the value for cooling presented in the Cadmus CoolSavers metering study referenced.

Table 3-10 Programmable Thermostat Energy Savings Calculation Inputs

Parameter	*Value*	*Source*
FLH_{cool}	1,215 (St. Louis region)	ENERGY STAR air-source heat pump calculator[1]
$Capacity_{Cooling}$	Per unit serviced	PY2016 program data
$SEER_{CAC}$	10	IL-TRM (Based on minimum federal standards between 1992 and 2006.)[2]
$SEER_{ASHP}$	10	IL-TRM (Based on minimum federal standards between 1992 and 2006.) [2]
$HSPF_{ASHP}$	6.8	IL-TRM (Based on minimum federal standards between 1992 and 2006.) [2]
FLH_{heat}	2,009 (St. Louis region)	ENERGY STAR air-source heat pump calculator
$Capacity_{Heating}$	Per unit serviced	PY2016 program data
SBdegrees	-8^F heat,4 to 7 cool	ENERGY STAR Setpoints
SF	3%/degree heat, 6%/degree cool	ENERGY STAR Calculator
EF	13% heat, 18% cool	Cadmus metering study[3]

1. https://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/ASHP_Sav_Calc.xls
2. Illinois Statewide Technical Reference Manual v. 5.0 http://www.ilsag.info/il_trm_version_5.html
3. Ameren Missouri Low Income and Process Evaluation: program Year 2014. p. 31

3.1.3.7. Method for Analyzing Savings from Dirty Filter Alarm

Electric energy savings of filter alarms were calculated as follows,

$$kWh\ Heating\ Savings = kW_{motor} * FLH_{heat} * EI * ISR$$

$$kWh\ Cooling\ Savings = kW_{motor} * FLH_{cool} * EI * ISR$$

Where,

kW_{motor} = Average motor full load electric demand

FLH_{heat} = Full load heating hours

FLH_{cool} = Full load cooling hours

EI = Efficiency improvement

ISR = In-service rate

Table 3-11 Dirty Filter Alarm Energy Savings Calculation Inputs

Parameter	*Value*	*Source*
kW_{motor}	.5	Pennsylvania Technical Reference Manual[1]
FLH_{heat}	2,009 (St. Louis region)	ENERGY STAR air-source heat pump calculator[2]
FLH_{cool}	1,215 (St. Louis region)	ENERGY STAR air-source heat pump calculator[2]
EI	15%	Pennsylvania Technical Reference Manual[1]
ISR	.78	Tenant survey, site visits, and information received from program staff

1. 2016 Technical Reference Manual
http://www.puc.pa.gov/filing_resources/issues_laws_regulations/act_129_information/technical_reference_manual.aspx
2. https://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/ASHP_Sav_Calc.xls

3.1.3.8. Method for Analyzing Savings from Central Air Conditioner Replacements

Electric energy savings of early replacement central air conditioners were calculated as follows:

$$kWh\ Savings = FLH_{cool} * \text{ Capacity} * (1/SEER_{exist} - 1/SEER_{ee})/1000$$

Electric energy savings of early replacement central air conditioners at failure were calculated as follows:

$$kWh\ Savings = FLH_{cool} * \text{ Capacity} * (1/SEER_{base} - 1/SEER_{ee})/1000$$

Where,

FLH_{cool} = Full load cooling hours

Capacity = Size of new equipment in Btu/hr (note 1 ton = 12,000 Btu/hr)

$SEER_{exist}$ = Seasonal Energy Efficiency Ratio of existing equipment

$SEER_{base}$ = Seasonal Energy Efficiency Ratio of baseline equipment

$SEER_{ee}$ = Seasonal Energy Efficiency Ratio of efficient equipment

Table 3-12 Air Conditioner Replacement Energy Savings Calculation Inputs

Parameter	*Value*	*Source*
FLH_{cool}	1,215 (St. Louis region)	ENERGY STAR air-source heat pump calculator[1]
Capacity	Per installed unit	AHRI Directory of Product Performance [2]
$SEER_{exist}$	10	IL-TRM - based on minimum federal standards between 1992 and 2006.[3]
$SEER_{base}$	13	Current federal standard
$SEER_{ee}$	Per installed unit	AHRI Directory of Product Performance[2]

1. https://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/ASHP_Sav_Calc.xls
2. Air Conditioning, Heating, and Refrigeration Institute (AHRI) Directory of Product Performance https://www.ahridirectory.org/ahridirectory/pages/home.aspx
3. Illinois Statewide Technical Reference Manual v. 5.0 http://www.ilsag.info/il_trm_version_5.html

3.1.3.9. Method for Analyzing Savings from Air Conditioner Tune-Ups

Electric energy savings of central air conditioner tune-ups were calculated as follows:

$$kWh\ Savings = \left(FLHcool * Capacity_{Cooling} * \left(\frac{1}{SEER_{CAC}} \right) \right) / 1000 * MF_e$$

Electric energy savings of air source heat pump tune-ups were calculated as follows:

$$kWh\ Savings = \frac{\left(FLH_{cool} * Capacity_{Cooling} * \left(\frac{1}{SEER_{ASHP}} \right) \right)}{1000} * MF_e +$$
$$\left(FLH_{heat} * Capacity_{Heating} * \left(\frac{1}{HSPF_{ASHP}} \right) \right) / 1000 * MF_e$$

Refrigerant recharge (RCA10%) savings were isolated from tune-up savings by:

$$kWhSavings_{RCA10\%} = \frac{\sum kWhSavings_{TuneUp+RCA10\%}}{Units} - \frac{\sum kWhSavings_{TuneUp}}{Units}$$

Where,

FLH_{cool} = Full load cooling hours

$Capacity_{Cooling}$ = Cooling capacity of system in BTU/hr (1 ton = 12,000 BTU/hr)

$SEER_{CAC}$ = SEER efficiency of central air conditioner

$SEER_{ASHP}$ = SEER efficiency of air source heat pump

$HSPF_{ASHP}$ = Heating Season Performance Factor of system

FLH_{heat} = Full load heating hours

$Capacity_{Heating}$ = Heating capacity of system in BTU/hr (1 ton = 12,000 BTU/hr)

MF_e = Maintenance energy savings factor, includes refrigerant recharge and other adjustments from tracking data

$kWhSavings_{TuneUp+RCA10\%}$ = kWh savings from units receiving both measures

$kWhSavings_{TuneUp}$ = kWh savings from units receiving only a tune-up.

Table 3-13 Air Conditioner Tune-Up Energy Savings Calculation Inputs

Parameter	*Value*	*Source*
FLH_{cool}	1,215 (St. Louis region)	ENERGY STAR air-source heat pump calculator[1]
$Capacity_{Cooling}$	Per unit serviced	PY2016 program data
$SEER_{CAC}$	10	IL-TRM - based on minimum federal standards between 1992 and 2006.[2]
$SEER_{ASHP}$	10	IL-TRM - based on minimum federal standards between 1992 and 2006. [2]
$HSPF_{ASHP}$	6.8	IL-TRM - based on minimum federal standards between 1992 and 2006. [2]
FLH_{heat}	2,009 (St. Louis region)	ENERGY STAR air-source heat pump calculator[1]
$Capacity_{Heating}$	Per unit serviced	PY2016 program data
MF_e	(1-Pre System Efficiency/Post System Efficiency)	PY2016 program data

1. https://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/ASHP_Sav_Calc.xls
2. Illinois Statewide Technical Reference Manual v. 5.0 http://www.ilsag.info/il_trm_version_5.html

3.1.1. Procedures for Estimating Ex Post Peak Demand Reductions from Measures Implemented through the Program

Peak demand reductions were calculated by factoring first year kWh savings by the applicable stipulated end-use coincident peak demand factor. The factor applied for each measure type is listed in Table 3-14.

Table 3-14 Application of Coincident Peak Demand Factors

Measure Type	*End-Use Category*	*End-Use Category Sector*	*Coincident Peak Demand Factor*
Lighting (Residential/In-unit)	Lighting	Residential	0.0001492529
Lighting (Non-Residential/Common area)	Lighting	Business	0.0001899635
Refrigerator Replacements	Refrigeration	Residential	0.0001285253
Low-Flow Showerheads	Water Heating	Residential	0.0000887318
Faucet Aerators	Water Heating	Residential	0.0000887318
Water Heater Pipe Wrap	Water Heating	Residential	0.0000887318
programable Thermostats	HVAC	Residential	0.0004660805
Dirty Filter Alarm	HVAC	Residential	0.0004660805
Central Air Conditioner Replacements	Cooling	Residential	0.0009474181
Air Conditioner Tune-Ups	HVAC	Residential	0.0004660805

Source: Appendix E of the MEEIA Cycle 2 Stipulation and Agreement

3.2. Results of Ex Post Savings Estimation

To estimate gross ex post kWh savings and gross peak ex post kW reductions for the CommunitySavers Program, data were collected through a tenant verification survey and post-installation site visits.

In total, 132 tenants responded to the survey and 16 site visits were performed. ADM used these data to confirm measure installations, assess current in-service rates, and record information on programable thermostat settings.

Because the net-to-gross (NTG) ratio for the CommunitySavers Program is estimated to be 1.0, the gross savings estimated are equal to the net savings.

3.2.1. Ex Post kWh Savings and kW Reductions by Measure

The following sections present results of the ex post analysis of gross and net kWh savings and kW reductions for each measure type. Section 3.2.1.1 provides a summary of measure-level savings.

3.2.1.1. Lighting

Table 3-15 summarizes ex ante and ex post kWh savings. As shown, the ex post savings for all lighting equaled 89% of ex ante savings, but that this rate varied significantly depending on where the measures was installed (i.e., space type). The ex post savings varied from the ex ante savings because:

- Ex ante savings were based on Ameren Missouri Technical Reference Manual (Ameren Missouri TRM) per unit values that do not vary by hours of use associated with different space types. Ex post savings were based upon estimated hours of use for the space type.

- For in-unit and exterior lamps, an in-service rate of 94% was applied.

Table 3-15 Lighting Ex Post kWh Savings

Space Type	*Ex Ante kWh Savings*	*2017 Ameren Missouri TRM kWh Savings*	*Ex Post Gross kWh Savings*	*Gross kWh Savings Realization Rate*	*Ex Post Net kWh Savings*	*Deemed Net-to-Gross Ratio*
In Unit (Senior Housing)	45,503	35,764	19,716	43%	19,716	100%
In-Unit (Family Housing)	264,823	209,748	239,451	90%	239,451	100%
Exterior (Residential)	496	433	3,520	710%	3,520	100%
Common Area	8,328	8,285	21,918	263%	21,918	100%
Total	319,150	254,230	284,606	89%	284,606	100%

Table 3-16 summarizes the ex post kW savings resulting from lighting measures. The kW realization rate differed from the kWh realization rate because of calculation errors in the Vision system.

Table 3-16 Lighting Ex Post Peak kW Savings

Space Type	*Ex Ante kW Savings*	*2017 Ameren Missouri TRM kW Savings*	*Ex Post Gross kW Savings*	*Gross kW Savings Realization Rate*	*Ex Post Net kW Savings*	*Deemed Net-to-Gross Ratio*
In Unit (Senior Housing)	8.03	5.29	2.94	37%	2.94	100%
In-Unit (Family Housing)	47.72	30.05	35.74	75%	35.74	100%
Exterior (Residential)	0.08	0.06	0.53	662%	0.53	100%
Common Area	1.58	1.57	4.16	263%	4.16	100%
Total	57.42	36.97	43.37	117%	43.37	100%

3.2.1.1. Refrigerator Replacements

Table 3-17 summarizes ex post kWh savings resulting from refrigerator replacements. The ex post kWh savings are 176,590 and equal to 56% of the ex ante savings. Ex ante savings estimates were developed using a per unit savings value of 888 kWh. This value was based on findings from the evaluation of the 2015 program. In 2015, the evaluation found that the average baseline energy use was 1,256 kWh and that the efficient units used an average of 368 kWh.[10] In comparison, the PY2016 evaluation found that the average baseline efficiency was used 889 kWh per year and the average efficient unit energy use equaled 390 kWh per year. Thus, the primary explanation for the difference between ex ante and ex post savings estimates was the estimated baseline usage.

[10] Ameren Missouri Low Income Impact and Process Evaluation: Program Year 2015. p. 18

The difference in baseline usage values found in the 2015 and PY2016 evaluations is a function of two factors:

- The baseline energy use value was developed from the PY2013 ApplianceSavers evaluation.[11] Fifty-two percent of the baseline units used to develop the average per unit savings were manufactured before 1990.[12] In comparison, 5% of the baseline units replaced through CommunitySavers in PY2016 were manufactured before 1990.
- The 2015 evaluation used data from a metering study of units to estimate average baseline usage of 1,256 kWh per year. ADM used the ENERGY STAR website to estimate baseline usage for units of varying ages and configurations (see Table 3-18).

Table 3-17 Refrigerator Ex Post kWh Savings

Ex Ante kWh Savings	*2017 Ameren Missouri TRM kWh Savings*	*Ex Post Gross kWh Savings*	*Gross kWh Savings Realization Rate*	*Ex Post Net kWh Savings*	*Deemed Net-to-Gross Ratio*
314,352	314,352	176,590	56%	176,590	100%

Table 3-18 Baseline and Efficient kWh Usage by Baseline Age

Baseline Refrigerator Age	*Number of Units*	*Average Ex Post Baseline kWh Usage*	*Average Ex Post Efficient kWh Usage*	*Average per Unit Ex Post kWh Savings*
1980-1989	16	1,720	390	1,330
1990-1992	14	1,272	405	867
1993-2000	259	869	387	479
2001-2010	65	556	399	169
Total	354	889	390	499

Table 3-19 summarizes ex post kW savings which totaled 22.70 for PY2016.

Table 3-19 Refrigerator Ex Post kW Savings

Ex Ante kW Savings	*2017 Ameren Missouri TRM kW Savings*	*Ex Post Gross kW Savings*	*Gross kW Savings Realization Rate*	*Ex Post Net kW Savings*	*Deemed Net-to-Gross Ratio*
40.40	40.40	22.70	56%	22.70	100%

[11] Ameren Missouri CommunitySavers Impact and Process Evaluation: Program Year 2013, p. 48.

[12] Ameren Missouri ApplianceSavers Impact and Process Evaluation: Program Year 2013, p. 27.

3.2.1.2. Low-Flow Showerheads

Table 3-20 summarizes ex post kWh savings for low-flow shower heads. Ex post kWh savings totaled 368,797 kWh, which equaled 132% of ex ante kWh savings.

The ex post per unit savings equaled 276 kWh per unit. Two per unit savings values were used to estimate ex ante savings, either 202.4 or 218 kWh per unit. The two values were used because the Ameren Missouri TRM value changed on January 1st, 2017. The former value is consistent with the Ameren TRM value.

Table 3-20 Low-Flow Shower Head Ex Post kWh Savings

Ex Ante kWh Savings	*2017 Ameren Missouri TRM kWh Savings*	*Ex Post Gross kWh Savings*	*Gross kWh Savings Realization Rate*	*Ex Post Net kWh Savings*	*Deemed Net-to-Gross Ratio*
280,001	270,204	368,797	132%	368,797	100%

Table 3-21 summarizes ex post kW savings for low-flow shower heads. Ex post peak kW reductions equaled 32.72 kW, which is 93% of ex ante kW savings. The kW realization rate differed from the kWh realization rate because of calculation errors in the Vision system.

Table 3-21 Low-Flow Shower Head Ex Post kW Savings

Ex Ante kW Savings	*2017 Ameren Missouri TRM kW Savings*	*Ex Post Gross kW Savings*	*Gross kW Savings Realization Rate*	*Ex Post Net kW Savings*	*Deemed Net-to-Gross Ratio*
35.15	24.03	32.72	93%	32.72	100%

3.2.1.3. Faucet Aerators

Table 3-22 summarizes ex post kWh savings for faucet aerators. Ex post kWh savings totaled 127,966 kWh, which equals 120% of ex ante savings. Ex ante savings estimates assumed savings of 39 and 42 kWh per unit (the 2017 Ameren TRM value is 42 kWh per unit). PY2016 per unit savings equaled 49 kWh per unit.

Table 3-22 Faucet Aerator Ex Post kWh Savings

Ex Ante kWh Savings	*2017 Ameren Missouri TRM kWh Savings*	*Ex Post Gross kWh Savings*	*Gross kWh Savings Realization Rate*	*Ex Post Net kWh Savings*	*Deemed Net-to-Gross Ratio*
107,007	110,670	127,966	120%	127,966	100%

Table 3-23 summarizes ex post kW savings for faucet aerators. Ex post kW savings totaled 11.35 and equaled 91% of ex ante kW savings. The kW realization rate differed from the kWh realization rate because of calculation errors in the Vision system.

Table 3-23 Faucet Aerator Ex Post kW Savings

Ex Ante kW Savings	*2017 Ameren Missouri TRM kW Savings*	*Ex Post Gross kW Savings*	*Gross kW Savings Realization Rate*	*Ex Post Net kW Savings*	*Deemed Net-to-Gross Ratio*
12.46	10.54	11.35	91%	11.35	100%

3.2.1.4. Water Heater Pipe Wrap

Table 3-24 summarizes ex post kWh savings for water heater pipe wrap. Ex post kWh savings totaled 105,340, which equaled 98% of ex ante savings.

Table 3-24 Water Heater Pipe Wrap Ex Post kWh Savings

Ex Ante kWh Savings	*2017 Ameren Missouri TRM kWh Savings*	*Ex Post Gross kWh Savings*	*Gross kWh Savings Realization Rate*	*Ex Post Net kWh Savings*	*Deemed Net-to-Gross Ratio*
107,820	106,128	105,340	98%	105,340	100%

Ex post kW savings totaled 9.35 and equaled 95% of ex ante savings.

Table 3-25 Water Heater Ex Post kW Savings

Ex Ante kW Savings	*2017 Ameren Missouri TRM kW Savings*	*Ex Post Gross kW Savings*	*Gross kW Savings Realization Rate*	*Ex Post Net kW Savings*	*Deemed Net-to-Gross Ratio*
9.84	9.65	9.35	95%	9.35	100%

3.2.1.5. Programmable Thermostats

Table 3-26 summarizes ex post kWh savings from the installation of programmable thermostats. Ex post savings totaled 235,600 kWh and are equal to 83% of ex ante savings.

Ex ante savings assumed 234 kWh per unit installed. The PY2015 evaluation noted that this value was developed by the original implementation contractor in PY2010. Ex post savings were equal to 189 kWh per unit installed. This value is notably higher than the PY2015 ex post per unit savings of 40 kWh. The PY2015 evaluation used an estimate of savings based on system type, approximate age, and square feet of conditioned space. This estimate was adjusted by an 14% energy savings factor developed from a study that assessed the degree to which tenants used their unit correctly.

The PY2016 evaluation estimated ex post savings based on a calculated estimate of the controlled systems energy use and the ENERGY STAR setback degrees. Savings were not adjusted by the 14% energy savings factor applied in prior evaluations.

Table 3-26 Programmable Thermostat Ex Post kWh Savings

Ex Ante kWh Savings	*2017 Ameren Missouri TRM kWh Savings*	*Ex Post Gross kWh Savings*	*Gross kWh Savings Realization Rate*	*Ex Post Net kWh Savings*	*Deemed Net-to-Gross Ratio*
283,842	283,842	235,600	83%	235,600	100%

Table 3-27 summarizes the ex post kW savings. Ex post peak savings totaled 109.81 kW and were equal to 83% of the expected kW savings.

Table 3-27 Programmable Thermostat Ex Post kW Savings

Ex Ante kW Savings	*2017 Ameren Missouri TRM kW Savings*	*Ex Post Gross kW Savings*	*Gross kW Savings Realization Rate*	*Ex Post Net kW Savings*	*Deemed Net-to-Gross Ratio*
132.29	132.22	109.81	83%	109.81	100%

3.2.1.6. Dirty Filter Alarm

Table 3-28 summarizes ex post kWh savings for filter alarms. Ex post savings totaled 362,397 kWh and were equal to 172% of the ex ante savings. Both the ex ante savings estimates and the ex ante savings estimates were based on the 2016 Pennsylvania Technical Reference Manual (PA TRM).[13] However, the ex ante savings assumed the 47% in-service rate deemed in the PA TRM, whereas the ex post analysis used the 78% in-service rate developed from the tenant survey.

Table 3-28 Dirty Filter Alarm Ex Post kWh Savings

Ex Ante kWh Savings	*2017 Ameren Missouri TRM kWh Savings*	*Ex Post Gross kWh Savings*	*Gross kWh Savings Realization Rate*	*Ex Post Net kWh Savings*	*Deemed Net-to-Gross Ratio*
210,870	210,870	362,397	172%	362,397	100%

Table 3-29 summarizes the ex post kW savings results. The difference between ex ante and ex post kW savings resulted from the difference in ex ante and ex post kWh savings.

[13] http://www.puc.pa.gov/filing_resources/issues_laws_regulations/act_129_information/technical_reference_manual.aspx

Table 3-29 Dirty Filter Alarm Ex Post kW Savings

Ex Ante kW Savings	*2017 Ameren Missouri TRM kW Savings*	*Ex Post Gross kW Savings*	*Gross kW Savings Realization Rate*	*Ex Post Net kW Savings*	*Deemed Net-to-Gross Ratio*
98.28	97.77	168.91	172%	168.91	100%

3.2.1.7. Central Air Conditioner Replacements

Table 3-30 summarizes ex post kWh savings for central air conditioner replacements. Ex post savings totaled 11,552 kWh and were equal to 49% of ex ante savings.

Table 3-30 Central Air Conditioner Replacements Ex Post kWh Savings

Ex Ante kWh Savings	*2017 Ameren Missouri TRM kWh Savings*	*Ex Post Gross kWh Savings*	*Gross kWh Savings Realization Rate*	*Ex Post Net kWh Savings*	*Deemed Net-to-Gross Ratio*
23,488	11,632	11,552	49%	11,552	100%

ADM identified efficient unit specifications based on a search of Air Conditioning, Heating, and Refrigeration Institute (AHRI) certificate numbers in the AHRI Directory of Product Performance. Although all replacements were identified as SEER 15 units in the tracking data, ADM found that seven of the 13 units were SEER 16.25.

Twelve of the thirteen units were identified as early replacements and one was identified as replaced at failure.

The ex ante savings calculations assumed per unit savings impacts of 1,925 kWh for early replacements and 384 kWh for replacement at failure and are based on the Ameren Missouri TRM values. These values were based on measure specifications for systems installed in single family homes and assumed a system size of 3.4 tons, which resulted in the low realization rate. The 2017 Ameren Missouri TRM savings were nearly equal to the ex post savings results.

The Table 3-31 below summarizes the ex post savings by installed unit type.

Table 3-31 Ex Post kWh Savings by SEER, Replacement Type, and Capacity

SEER	*Replacement Type*	*Capacity*	*Number of Units*	*Ex Post kWh*
15.00	Early replacement	18,000	6	729
16.25	Early replacement	24,000	6	1,122
16.25	Replacement at failure	24,000	1	449

Table 3-32 summarizes ex post kW savings for the air conditioner replacements.

Table 3-32 Central Air Conditioner Replacements Ex Post kW Savings

Ex Ante kW Savings	*2017 Ameren Missouri TRM kW Savings*	*Ex Post Gross kW Savings*	*Gross kW Savings Realization Rate*	*Ex Post Net kW Savings*	*Deemed Net-to-Gross Ratio*
22.25	11.02	10.94	49%	10.94	100%

3.2.1.8. Air Conditioner Tune-Ups and Refrigerant Recharge

Table 3-33 summarizes ex post kWh savings for air conditioner tune-ups and refrigerant recharge. The tune-up realization rate is equal to 198% of ex ante savings and the refrigerant recharge realization rate is equal to 57% of program savings. For the two measures combined the realization rate was 149%.

Table 3-33 Air Conditioner Tune-Ups Ex Post kWh Savings

Measure	*Ex Ante kWh Savings*	*2017 Ameren Missouri TRM kWh Savings*	*Ex Post Gross kWh Savings*	*Gross kWh Savings Realization Rate*	*Ex Post Net kWh Savings*	*Deemed Net-to-Gross Ratio*
Tune-up	296,836	282,997	587,763	198%	587,763	100%
Refrigerant Charge	156,044	346,112	89,232	57%	89,232	100%
Total	452,880	629,109	676,995	149%	676,995	100%

PY2016 ex post savings were developed using MFLI subcontractor measured data from the pre- and post-period during the day of the tune-up. In most cases, the pre- and post-measurements were the same for tune-ups and refrigerant recharge measures completed on the same unit (i.e., separate pre- and post-measurements were not made for tune-ups and refrigerant recharge). To isolate savings for refrigerant recharging from the overall tune-up, ADM compared savings for projects that received tune-ups and refrigerant and those that just received tune ups.

This approach to isolating savings associated with refrigerant recharge from additional tune-up procedures may have differed from the approach used in prior evaluations that informed the ex ante savings estimate. As shown in Table 3-34, the PY2016 kWh savings for tune-ups were higher than what was found in prior evaluations, while the kWh savings for refrigerant recharge were lower.

Table 3-34 Historical Per Unit Ex Ante and Ex Post Savings for Tune-ups and Refrigerant Recharge

PY	Tune-up Ex Ante kWh Savings	Tune-up Ex Post kWh Savings	Per Unit Savings Realization Rate	RCA Ex Ante kWh Savings	RCA Ex Post kWh Savings	Per Unit Savings Realization Rate	Ex Ante Tune-up + RCA kWh Savings	Ex Post Tune-up + RCA Savings	Per Unit Savings Realization Rate
2013	87	131	150%	87	365	420%	174	496	285%
2014	75	154	205%	87	382	439%	162	536	331%
2015	75	143	190%	87	512	589%	162	655	404%
2016	150	297	198%	230	132	57%	380	429	113%

Table 3-35 summarizes the ex post kW savings. The realization rates for kW reductions were consistent with kWh realization rates.

Table 3-35 Air Conditioner Tune-Ups Ex Post kW Savings

Measure	Ex Ante kW Savings	2017 Ameren Missouri TRM kW Savings	Ex Post Gross kW Savings	Gross kW Savings Realization Rate	Ex Post Net kW Savings	Deemed Net-to-Gross Ratio
Tune-up	138.36	132.59	273.94	198%	273.94	100%
Refrigerant Charge	72.47	161.56	41.59	57%	41.59	100%
Total	210.82	294.16	315.53	150%	315.53	100%

3.2.1.1. Summary of Ex Post Savings

PY2016 ex post kWh and kW savings are summarized by program measure in Table 3-36 and Table 3-37.

Table 3-36 Summary of Measure-Level Ex Post kWh Savings

Measure	*Number of Measures*	*Ex Ante kWh Savings*	*Per Unit 2017 Ameren TRM kWh Savings*	*2017 Ameren Missouri TRM kWh Savings*	*Gross Ex Post kWh Savings*	*Per Unit Gross Ex Post kWh Savings*	*Gross kWh Savings as a Percent of 2017 Ameren Missouri TRM Savings*
Dirty Filter Alarm MF	1,917	210,870	110	210,870	362,397	189	172%
Low Flow Faucet Aerator _MF	2,635	107,007	42	110,670	127,966	49	116%
Low Flow Showerhead MF	1,335	280,001	202	270,204	368,797	276	136%
Programmable Thermostat_MF direct install	1,213	283,842	234	283,842	235,600	194	83%
Refrigerator	354	314,352	888	314,352	176,590	499	56%
LED - 12W Dimmable Light Bulb MF	472	12,571	23	10,762	15,672	33	146%
LED - 15W Flood Light PAR30 Bulb MF	381	12,764	32	12,002	7,693	20	64%
LED - 18W Flood Light PAR38 Bulb MF	50	1,675	30	1,490	1,877	38	126%
LED - 8W Globe Light G25 Bulb MF	3,300	79,107	13	42,240	45,052	14	107%
LED 9-10.5W Downlight E26 Light Bulb MF	8,425	204,705	21	179,452	192,393	23	107%
HVAC Maintenance and Tune-up_MF	1,979	296,836	143	282,997	587,763	297	208%
RCA 10% improvement_MF	676	156,044	512	346,112	89,232	132	26%
CAC SEER 15 MF	12	23,104	954	11,442	11,103	925	97%
CAC SEER 15 Replace at Fail	1	384	190	190	449	449	236%
Pipe Insulation MF (per linear ft.)	4,824	107,820	22	106,128	105,340	22	99%
LED (PAR) Reflector Lamp	1	251	210	210	354	354	169%
LED 5-11 Watt A-Line Lamp	95	8,078	85	8,075	21,564	227	267%
Total	**27,670**	**2,099,409**		**2,191,037**	**2,349,841**		**107%**

Table 3-37 Summary of Measure-Level Ex Post kW Savings

Measure	*Number of Measures*	*Ex Ante kW Savings*	*Per Unit 2017 Ameren TRM kW Savings*	*2017 Ameren Missouri TRM kW Savings*	*Gross Ex Post kW Savings*	*Per Unit Gross Ex Post kW Savings*	*Gross kW Savings as a Percent of 2017 Ameren Missouri TRM Savings*
Dirty Filter Alarm MF	1,917	98.28	0.0510	97.77	168.91	0.0881	173%
Low Flow Faucet Aerator _MF	2,635	12.46	0.0040	10.54	11.35	0.0043	108%
Low Flow Showerhead MF	1,335	35.15	0.0180	24.03	32.72	0.0245	136%
Programmable Thermostat_MF direct install	1,213	132.29	0.1090	132.22	109.81	0.0905	83%
Refrigerator	354	40.40	0.1140	40.40	22.70	0.0641	56%
LED - 12W Dimmable Light Bulb MF	472	1.97	0.0030	1.42	2.34	0.0050	165%
LED - 15W Flood Light PAR30 Bulb MF	381	1.90	0.0050	1.90	1.15	0.0030	60%
LED - 18W Flood Light PAR38 Bulb MF	50	0.25	0.0040	0.20	0.28	0.0056	140%
LED - 8W Globe Light G25 Bulb MF	3,300	16.50	0.0020	6.60	6.72	0.0020	102%
LED 9-10.5W Downlight E26 Light Bulb MF	8,425	35.21	0.0030	25.28	28.72	0.0034	114%
HVAC Maintenance and Tune-up_MF	1,979	138.36	0.0670	132.59	273.94	0.1384	207%
RCA 10% improvement_MF	676	72.47	0.2390	161.56	41.59	0.0615	26%
CAC SEER 15 MF	12	21.89	0.9030	10.84	10.52	0.8766	97%
CAC SEER 15 Replace at Fail	1	0.36	0.1800	0.18	0.43	0.4250	236%
Pipe Insulation MF (per linear ft.)	4,824	9.84	0.0020	9.65	9.35	0.0019	97%
LED (PAR) Reflector Lamp	1	0.05	0.0398	0.04	0.07	0.0672	169%
LED 5-11 Watt A-Line Lamp	95	1.53	0.0161	1.53	4.10	0.0431	268%
Total	**27,670**	**618.92**		**656.74**	**724.69**		**110%**

4. Process Evaluation

This chapter presents the results of the process evaluation of the Ameren Missouri CommunitySavers Program during PY2016. The purposes of this process evaluation are to assess the effectiveness of Ameren Missouri's PY2016 CommunitySavers Program in delivering appropriate energy efficiency technologies to low-income multifamily properties served by Ameren Missouri and to identify ways to improve the CommunitySavers Program and inform future program design. The evaluation has been guided by five regulatory research questions specified in 4 CSR 240-22.070(8): to identify the primary market imperfections; to investigate whether the target market segment is appropriately defined, program measures reflect the target market's needs and available technologies, and communication and delivery channels and mechanisms are appropriate; and to investigate whether there are better ways to address market imperfections to increase adoption of program measures.

The remainder of this chapter is organized into eight main sections. The first section presents a summary of evaluation data sources and high-level summaries of process findings. The remaining sections provide details of methods and findings for each data source.

4.1. Summary of Evaluation Sources and Findings

The evaluation team collected or analyzed both qualitative and quantitative data to understand program process and outcomes. As summarized in Table 4-1, the team interviewed or surveyed four staff members of Ameren Missouri and its implementation contractor, ICF International (ICF); 132 tenants; 17 property owners or managers, representatives of the three MFLI subcontractor firms that perform direct installations; and three ride-along site visits. The team also reviewed program documentation to gain a full understanding of plans (e.g., outreach plan) and processes and analyzed the program database to characterize the population of program participants and review data quality. High-level findings follow.

Table 4-1 Evaluation Data Collection Activities

*Data Source**	*Method*	*Dates*	*Research Objective*	*Analysis Type*
Program staff (4), Ameren Missouri (1), ICF (3)	In-depth interview	December 2016 to March 2017	program function; communication; tracking and reporting; quality control	Qualitative
Program documentation	Document review	July 2016 to February 2017	program function; tracking and reporting; quality control	Qualitative

*Data Source**	*Method*	*Dates*	*Research Objective*	*Analysis Type*
Database analysis	Database review	July 2016 to February 2017	Number of projects; project type and details; data quality	Quantitative
Participants (17)	Online/Telephone Survey	January to March 2017	program experiences; satisfaction with program	Quantitative and qualitative
Tenant (132)	Mail	January 2017	Install rates; program experiences; satisfaction with program	Quantitative and qualitative
MFLI subcontractor Interviews (3)	In-depth interview	February to March 2017	Training sufficiency; program procedures; tenant and program staff interactions; satisfaction	Qualitative
Ride-Along Site Visits(3)	On-site M&V	January to March 2017	Observe direct install procedures	Qualitative
Post-install site visit(16 units)	On-site M&V	January to March 2017	Verify baseline operating conditions	Quantitative and qualitative

* Sample sizes in parentheses

4.1.1. Program Staff Feedback

New incentives targeting common area improvements and HVAC system replacements were added to the program in PY2016 as an addition to the previously offered no-cost direct install component. To support project implementation, the program provides a designated account manager who acts as a single point of contact for program participants (i.e., property managers or owners). The program is targeting 40% of its savings from common area improvements.

Key challenges to meeting the program goals identified by program staff are: (1) properties that receive the state LIHTC are ineligible for common area measure incentives under state law, (2) property managers and owners face financial constraints that limit investments in energy efficiency, (3) the program has not re-established its partnership with Laclede Gas which limits the program budget, and (4) the program started late and as a result outreach was not well timed vis-à-vis property budgeting cycles.

Primary program staff include the Ameren Missouri program manager and the ICF program manager, account manager, and education and outreach coordinator. Multiple staff commented on the breadth of the account managers role and attempts have been

made to increase resources available for this function through hiring of an additional account manager) and reviewing program processes and assignments.

Program outreach efforts focus on direct outreach to owners and managers, working through multifamily/low-income associations and other groups, and earned media. Staff stated that identifying unsubsidized housing that does not receive the LIHTC is more difficult because of the lack of available listings of such properties.

The program subcontracts with three firms to complete direct install measures and HVAC tune-ups. These firms received program training that covered measure installation requirements, program processes and customer satisfaction issues, and safety. The program also works with members of the Ameren Missouri trade ally network for common area improvements and will solicit bids from this network on behalf of multifamily property managers and owners if the participant does not have a preferred trade ally.

An objective of the program is to provide education to 85% of the tenants at a participating property. Staff noted that reaching this target is time consuming and challenging. This education is delivered through meetings guided by a PowerPoint presentation, tabling events held at available space on the property such as the rental office or by the swimming pool, or individually with tenants. Tenants also receive a tip sheet with no-cost and low-cost strategies for saving energy.

To verify work performed, the program targets inspections of 5% of direct install unit and 5% of complexes that receive HVAC tune-ups a quarter. Most of the verification work is completed by following the direct installation of measures. Subcontractors installing the efficiency measures and staff performing quality control inspections electronically record information using an application that interfaces with the program tracking system.

4.1.2. Program Database

ADM analyzed program data to characterize the types of projects completed during the year, the property occupancy types (i.e., subsidized, low-income market rate), and the geographic distribution of projects. The findings of the analysis are:

- Nearly all program savings were the result of in-unit direct install measures. Less than 2% of savings resulted from SBDI lighting projects and air conditioner replacements.
- HVAC measures (Tune-ups, refrigerant charge, dirty filter alarms, and programmable thermostats) were most commonly implemented, with 92% of units receiving HVAC measures. In comparison, 43% received lighting measures, 44% received water heating measures, and 10% received refrigerators. The sites that only received HVAC measures received tune-ups and refrigerant recharging. These were sites that received direct install measures during the prior program cycle, but did not receive the tune-up at the time because the weather was too cool to complete the tune-up. A minority of sites received refrigerators because they had either received them during

the prior program cycle or because they did not have units that qualified for replacements.

- The most common occupancy type was HUD Public Housing, which included 46% of the properties. A significant share of properties (38%) had occupants not tied to a housing subsidy that paid affordable fair market rent and 19% of properties received the LIHTC.
- Participating properties were disproportionately located in St. Louis and its suburbs relative to the distribution of multifamily properties, low-income residents, and subsidized housing.

4.1.3. Owner/Manager Surveys

The owner/manager survey collected data on program awareness, barriers to energy efficiency, experience and satisfaction with the program representatives, processes, and measures.

Participants most frequently reported that the program account manager was the source of awareness (cited by 35%) and 24% of respondents stated they learned of the program from internal management staff.

Respondents that did not complete a common area incentive project were largely not aware of the availability of the incentives for these measures. The lack of awareness may have been partly due to a significant share of respondents who learned of the program from internal staff and because some properties received the LIHTC (which disqualifies them from receiving these incentives). Nevertheless, the results indicated that there is potential to increase awareness of these incentives.

Participants were largely satisfied with the field service representatives performing measure installations. Participants were most likely to be dissatisfied with the length of time to complete the installations; 18% of respondents were dissatisfied with the time required to install the measures.

Most survey respondents were satisfied with the steps required to complete the program project and the program overall, and nearly all were satisfied with the efficiency improvements made through the program.

4.1.4. Tenant Surveys

The tenant survey collected information on the measures installed through the program, the perceived benefits of the efficiency improvements, and satisfaction with their complexes' participation in the program.

Nearly three-quarters of tenants reported that the energy efficiency measures resulted in non-energy benefits, most frequently improved home comfort and reliability of appliances or heating and cooling equipment.

Tenant satisfaction with the program processes and measures was fairly high. More than 80% of tenants were satisfied with the installation process and less than 10% were dissatisfied with it. The aspect that tenants were most likely to report dissatisfaction with was the energy efficiency improvements made. Most of this dissatisfaction was due to a dislike of the programable thermostats.

4.1.5. Direct Install (DI) Subcontractor Feedback

Evaluation staff interviewed representatives of the three firms that perform the direct installation of in-unit measures and HVAC tune-ups.

All three respondents confirmed that their staff had received training from ICF on the measure installation process. The two that had personally attended the training stated that the information was clear and detailed. The procedures used by the firms for training new hires differed – one interviewee stated that they send staff to ICF for training, one stated that they train new hires internally, and one stated that they use both ICF for training and provide training internally.

All interviewees stated that the Fulcrum application used to record information about the measures installed was easy to use. Two respondents, however, stated that the application did not provide summary information on the number of installations completed at a site. Not having this information made it difficult to confirm that all work was completed as planned.

DI subcontractors reported different approaches to resolving tenant measure refusals – speaking directly with the property manager or owner, asking ICF to speak with the property owner or manager, and not installing the measure and reporting it to ICF.

Feedback provided on working with ICF was generally positive, although two respondents raised some concerns. Respondents noted some communication issues – that staff were slow to respond to inquiries and that they did not receive all information needed to complete a project. One respondent stated that the payments received for work performed could not be tied to the invoices submitted, however, staff provides contractors a payment ledger that provides the necessary information to link checks to submitted invoices. Despite these concerns, all respondents stated they were satisfied with the program.

4.1.6. DI Subcontractor Ride Alongs

Evaluation staff completed ride alongs for three in-unit direct install projects. Overall, ADM observed that installations were performed consistently with program guidelines. However, two issues were identified:

- A DI subcontractor was installing dirty filter alarms incorrectly. ADM relayed this information to program staff and the issue was corrected.

- A DI subcontractor was observed changing the programmable thermostat setback temperatures from the factory ENERGY STAR defaults. Program staff contacted the DI subcontractor firm and corrected the practice.

4.2. Program Staff Feedback

ADM interviewed the Ameren Missouri program manager, the ICF program manager, the ICF account manager, and the ICF outreach and education coordinator. During the interviews, staff discussed several topics related to program design and operational procedures. The following sections summarize the findings of these interviews.

4.2.1. Program Design and Goals

As in the previous program cycle, the PY2016 CommunitySavers Program offered direct installation of measures in dwelling units, and HVAC tune-ups for systems with electricity supplied to an individually metered residence, at no cost to the participating property and tenant. In addition to these measures, the program offered incentives for air conditioner and heat pump replacements through its residential Heating and Cooling program, common areas lighting retrofits through its BizSavers Small Business Direct Install (SBDI) program, as well as incentives through the Standard and Custom Incentive programs. Incentives provided through the Heating and Cooling, Custom, and Standard programs are 25% higher than the program incentives available to non-low income multifamily property customers. The incentives added in PY2016 are intended to more comprehensively address energy efficiency opportunities at low-income multifamily properties.

Table 4-2 summarizes the incentives added to the program for PY2016, the eligible rate classes, and the measures covered. Staff stated that the SBDI incentives are designed to cover lighting replacements at no-cost to the customer. Common areas must be metered under the 2(M) rate class for the property to qualify for the SBDI incentives. Staff noted that majority of properties fall in the 2(M) rate class although fall under the 3(M) rate class. Additionally, staff stated that most property air conditioning systems are metered under the residential rate class. Those that are not, are eligible for custom incentives for cooling systems.

Table 4-2 Summary of CommunitySavers Incentives (Excluding Direct Install)

	Low-Income Multifamily Heating and Cooling	*Small Business Direct Install*	*Standard Incentives*	*Custom Incentives*
Eligible Rate Classes	1(M) (Residential)	2(M)	2(M), 3(M), 4(M), and 11(M)	2(M), 3(M), 4(M), and 11(M)
Measures				
Heating/Cooling System Replacement	X			X
Ventilation				X
Air compressors				X
Motors				X
Process				X
Lamps/Fixtures		X	X	X
Lighting controls/occupancy sensors		X	X	X
LED exit signs		X	X	
Electric water heating			X	X
Refrigeration			X	X
Swimming pool heaters, pump, timers			X	
Steam cookers			X	
Hot food holding cabinets			X	
Other cooking				X
Building envelope				X

To support project implementation, the program provides a designated account manager who acts as a single point of contact for program participants (i.e., property managers or owners). The account manager assists customers with determining eligibility, completing application materials and navigating the various incentive offers provided (e.g., MFLI Direct Install, SBDI); provides referrals for financing and repairs; and performs walk-through energy assessments to identify energy saving opportunities in tenant units and common areas.

The primary goals of the program are to meet the kWh and utilize the program budget. Staff also stated that they are targeting 40% of program savings from common area improvements. The program also has a target of providing energy education to 85% of tenants at participating properties.

Overall, staff believes that the program is well designed to meet the efficiency needs of the low-income multifamily market. That said, several challenges to achieving program objectives were identified.

A barrier to common area improvements is a state law that disqualifies properties that receive the state Low-Income Housing Tax Credit (LIHTC) from receiving program incentives for common area improvements. Based on a review of PY2016 program applications, a minority of the properties received this credit, but reviews of 2014 and 2015 program activity found that approximately 74% of the participating properties

received the LIHTC. As such, this limits the potential to leverage these existing relationships to develop common area projects. Staff also stated that locating new properties that do not receive the LIHTC was more difficult than identifying subsidized properties.

Another barrier to the common area incentive projects are the financial limitations faced by low income property owners. Staff noted that because of this challenge, a key component to getting uptake of common area measures is facilitating financing partnerships, which takes time and relationship building to develop. More generally, because the common area improvements are a new component of the program, it takes time to develop these projects.

Another factor affecting program activity is that the program has not re-established its partnership with Laclede Gas. The partnership with Laclede Gas expands the program budget through co-funding of dual fuel measures (e.g., programmable thermostats). Staff is working on re-establishing this partnership but noted that the process has been somewhat hampered by staffing limitations.

Lastly, the account manager noted that by the time the program launched, most properties had completed their budgeting for the year, which constrained common area improvements.

4.2.1. Program Staffing and Roles

Ameren Missouri staff provide oversight and support to ICF's program implementation staff. ICF is responsible for implementing the program and performing all associated program activities. This section describes the roles of staff in each organization and their interactions.

4.2.1.1. Ameren Missouri

The energy efficiency program manager provides oversight of program operations, progress toward goals, and the program budget. The manager is also responsible for the home energy reports program, the lighting/efficient products program, and the mass-market multifamily kits program. The program manager reports to manager for residential efficiency and does not have any direct reports.

The program manager also has intermittent interactions with additional Ameren Missouri business program staff, call center staff, and community relations staff.

4.2.1.2. ICF International

The key ICF staff are the program manager, account manager, and education and outreach coordinator.

The program manager is responsible for overseeing all aspects of the program day-to-day operations. This includes collaborations with Ameren Missouri and ICF staff, updating materials, monitoring the daily workflow, tracking program progress, overseeing scheduling of appointments at properties, and participating in providing plaques to participating properties in recognition of completing a project.

The account manager is intended to function as a single point of contact for participants and provides assistance and guidance on completing program paperwork, responds to inquiries, and schedules installations. In addition to this function, the account manager recruits participants, qualifies properties, works with MFLI subcontractors and schedules work, completes energy assessments, develops marketing materials, and develops and maintains relationships with other stakeholders such as lenders and governmental parties.

Multiple staff members commented on the breadth of the account manager's responsibilities and noted that it may be more than one staff person could handle. To address that concern, a second account manager has since been hired. Additionally, staff is reviewing their processes and assignments to reduce the workload for the account manager. For example, staff noted that it may be more appropriate for a different staff person to perform the audits, and with the development of additional marketing materials (such as a sales sheet), other staff may be able to assist more with the outreach. One of the potential consequences of limited staffing for the account manager role is a lack of resources to recruit properties and develop projects for common area SBDI measures and air conditioner replacements.

The education and outreach coordinator's primary role is to provide tenant education, and this aspect of the position takes most of the staff member's time. In addition to providing tenant education, the education and outreach coordinator also performs quality control activities and assists the account manager with account management. The education and outreach coordinator also pre-populates the Fulcrum application for the direct install measures.

4.2.2. Program Communication

Ameren Missouri and ICF staff hold a standing weekly meeting to discuss program status and current issues. During this meeting staff get "down in the weeds" to discuss current program issues that need to be addressed. Additionally, Ameren Missouri and ICF staff meet monthly to discuss the overall program strategy. Regular ad hoc communications between the Ameren Missouri and ICF managers occurs as well.

Internally, Ameren Missouri holds a weekly team meeting to discuss the broader residential portfolio as well as quarterly department meetings to discuss the coordinator. Additional Ameren Missouri staff are informed of relevant issues as needed, for example,

the communications department would be informed when there is an opportunity to have a story about a program or project.

ICF holds standing staff meetings three days a week. The purpose of the meeting is to check in on the status of the program, make sure that applications and invoices are processed in a timely matter, review what is working well and issues that need attention.

4.2.3. Program Marketing and Outreach

The following sections discuss the program marketing and outreach approach. Ameren Missouri's staff primary role in marketing is setting the direction of the marketing approach, although the program manager also presents information along with ICF staff to stakeholder groups. Ameren also ensures continuity between the marketing materials and Ameren corporate branding (e.g., color palettes). ICF is principally responsible for customer recruitment and outreach and the development of marketing materials.

4.2.3.1. Messaging

The program marketing plan identifies the key marketing messages used to promote the incentives to customers. The primary message is that participation will improve the energy efficiency of the property through no-cost direct install measures and cash-back rebates on additional upgrades for tenant units and common areas. The secondary messages include the program assistance with the project and the experience of staff in working with properties like the lead's property, as well as the benefits to tenant comfort and reduced maintenance.

When discussing the program with leads, the account manager described a process that begins with a discussion of the no-cost direct install measures. In this approach, the no cost measures are used to garner initial interest in the program. The account manager stated that the measure that leads are most interested in are the refrigerator replacements. The discussion of the no-cost measures concludes with a review of the benefits of the HVAC tune-ups offered. From there, the account manager and the lead begin a discussion of the additional common area measures, such as lighting. To assist with the outreach process, the account manager developed a tool for presenting the monetary value of the no-cost measures and the annual kWh savings resulting from them.

4.2.3.2. Outreach Strategies

The three outreach strategies used are direct outreach, outreach to groups and presentations made to their members, and earned media.

Direct outreach is the primary approach used to reach eligible properties. Outreach staff stated that this approach begins with internet research to identify potential low income properties. Once properties are identified, additional research is performed to understand the firm's portfolio and identify the area manager. Typically, presentations are made to

the staff onsite at the property location, although they also try to speak with the owner of the property as well. The outreach process can be labor intensive, as time is required to identify and get in touch with the key decision makers, and to make repeated follow-up contacts with leads. However, in some cases staff have already developed relationships with key decision makers and are able to leverage the relationships developed by the account manager during the prior program cycle.

During the prior program cycle, staff worked with subsidized housing lists to identify potential program participants. This approach has worked well for the in-unit direct install measures, but because many of those properties receive the LIHTC, they are not eligible for common area measures. Staff noted that this is a key challenge to promoting common area improvements. Staff also noted that utility data on customers receiving energy assistance has not been available for use in identifying potentially qualifying properties.

Another challenge in PY2016 is that the program launched after properties had completed their annual budgets. Staff noted that it is critical that outreach efforts align with budgeting cycles so that the measures can be financed.

The program also targets outreach to groups such as housing authorities, community development corporations, and working with agencies such as Housing and Urban Development (HUD) and the U.S. Department of Agriculture (USDA). Staff noted that they have received support from stakeholder groups during the program year and have been afforded opportunities for disseminating information about the program to property managers. For example, the National Housing Trust put together a webinar on energy efficiency and provided program representatives an opportunity to present at this. As another example, program staff reached a group of property managers by working with the Tower Grove Neighborhood Development Corporation.

Earned media is the third component of program outreach. Staff reported that they have discussed this but have not issued a press release during PY2016.

4.2.3.1. Marketing Materials

Program staff provided ADM with electronic copies of marketing materials used to promote the program services and incentives. The materials provided were:

- A PowerPoint Presentation to property owners and managers;
- A customer contact card for collecting information from interested customers;
- A program brochure; and
- A window cling for properties that completed a program project.

The presentation describes the qualifications, benefits of participation, and a description of the direct install measures and available incentives. The presentation also describes

the services provided by the account manager to assist properties with the completion of program projects.

The program brochure (see Figure 4-1) describes the direct install measures available and benefits such as energy and cost savings, reduced maintenance costs, improved tenant satisfaction, and environmental benefits. These benefits largely align with the reasons property managers gave for participating in the program (see Section 4.4), which suggests the messaging is appropriate for the market. The brochure also notes that participants will receive help from knowledgeable staff. The availability of knowledgeable staff may also address another barrier identified by survey respondents, namely, a lack of staff resources to make efficiency improvements. The program brochure references the availability of incentives in addition to the direct install measures on the back side, but the primary focus is on the direct install measures.

Figure 4-1 Program Brochure

4.2.3.2. Market Response

Program staff noted that developing common area projects has been challenging during the program year and tracking data indicates that the program fell well short of its target of achieving 40% of program savings through these improvements. Additionally, the program launched later than anticipated, which limited the time frame to develop projects and may have contributed to the previously noted misalignment with property budgeting cycles.

4.2.4. DI Subcontractors and Trade Allies

CommunitySavers direct install measures are installed by three different firms subcontracted with the program. Two of these firms worked with the previous program implementation contractor during the prior cycle. The third was added for the current cycle. Additionally, the program works with ARCA to replace refrigerators.

Direct install (DI) subcontractors that provide direct installation services receive program training that covers program processes as well as standards and procedures for installing the program measures. Additionally, contractors receive training on safety procedures. Staff stated that there have not been significant customer service or measure installation issues, but that some follow-up training on tune-up procedures was held.

Assignments are made to subcontractors on a rotating basis. Subcontractors are instructed to call the property 2-3 days before the installation to confirm the installation and introduce the company.

Property managers can implement common area projects by working with any of the Ameren Missouri BizSavers trade allies. Additionally, each of the three DI subcontractors are part of the network. Program staff stated that they will assist with developing bids from trade allies for common area improvements if the property does not have a preferred contractor.

4.2.5. Program Participation Process

The participation process is described below in terms of project initiation, project implementation, tenant education procedures, and quality control and verification procedures.

4.2.5.1. Project Initiation

Program participation is initiated with the completion of the application form. This is a paper document that requires an inked signature. The account manager assists with the completion of the application and its entry into the program data system.

An important component of the initiation of participation is qualifying the building based on tenant income levels. To do this, the account manager requests a rent roll that includes the unit, the number of tenants in the unit, and the income level. Staff stated that this process is relatively quick for subsidized housing units because property managers

typically have this information. The process can be lengthy for unsubsidized properties because the information needs to be compiled.

Program staff assess the potential for direct install measures by performing a walkthrough assessment of a limited number of units that typify the types of units in the building.

When discussing the direct install measures with decision makers, staff emphasizes that it's an "all or nothing" package. That is, decision makers are strongly encouraged to accept all qualifying measures for the property. The measure that property managers most strongly resist is the programmable thermostats. Staff stated that this measure requires additional education on how it saves energy and the benefits.

4.2.5.2. Project Implementation

Once a property agrees to a direct install project, the account manager schedules the installation with the property and the DI subcontractor. Prior to installation, program staff engage in a pre-installation education process to inform tenants of the work to be performed. This education is accomplished by bringing pre-installation letters to the property for property staff to distribute to tenants as well as placing door hangers on about 20 -25 units per day. Program staff encourage property staff to place the door hangers on the units receiving the measures on the following day, but properties do not always have the staff available for this. As an alternative, program staff or the MFLI DI subcontractors will place them.

DI subcontractors typically complete work on 20-25 installations a day. The ICF education and outreach coordinator stated that he typically tries to attend the first day of installation to verify that the Fulcrum application used to record measure installations and perform quality checks is set up correctly, and to be available to handle any other issues that arise at the beginning of the project.

During the installation process, DI subcontractor staff use the Fulcrum application to record information about the measures installed. At the completion of the installation work, the project is submitted. Once submitted, the project record is accessible for quality control review.

4.2.5.3. Tenant Education

As stated previously, an objective of the program is to educate tenants on their energy use and strategies they can use to save energy. Staff use a multi-pronged approach to provide this education and strive to reach 85% of the residents. The approaches used are as follows.

- Education Meeting: Education meetings are typically held a few days before the start of the project. Staff sends materials to the property to recruit tenants. Small "thank you" gifts are offered to attract tenants. Staff stated that senior housing

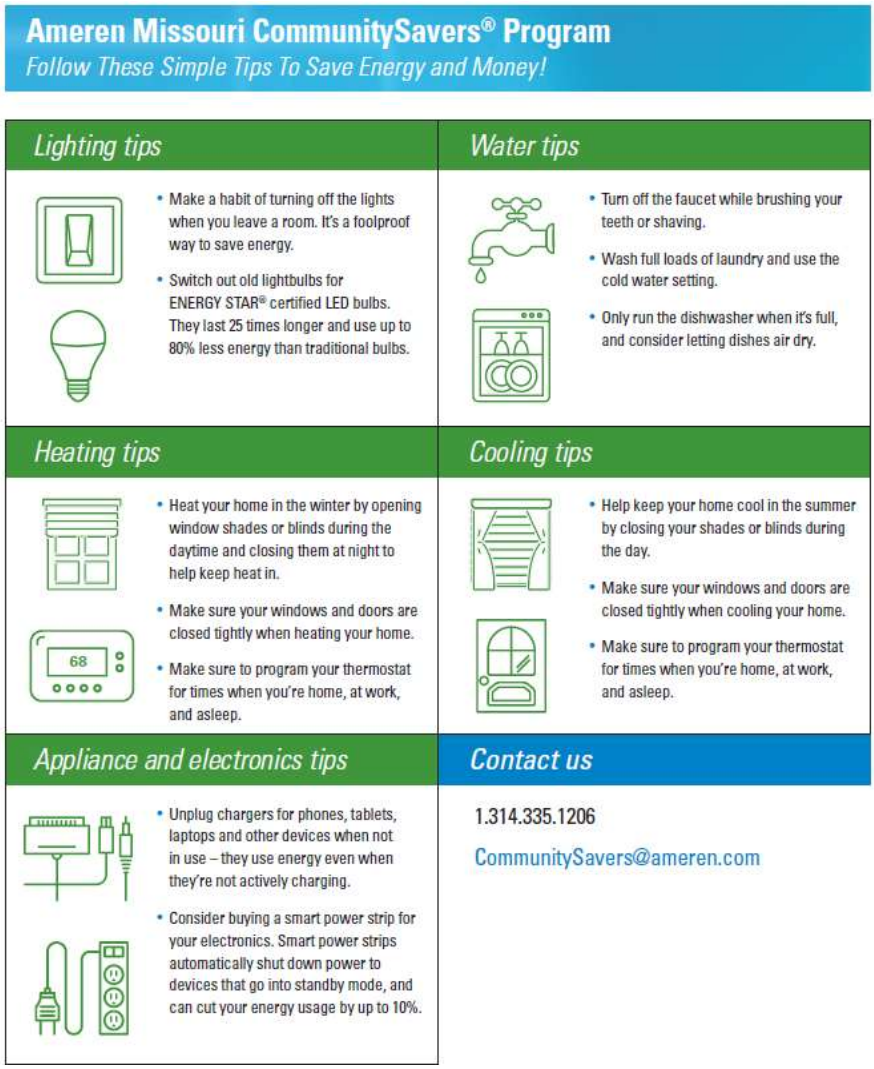
properties typically have a community room and that holding meetings in these rooms and providing donuts and coffee is generally effective. These meetings are guided by a PowerPoint presentation.

- Tabling: Some properties do not have a good space for a meeting. In some instances, staff will set up a table in a pool area, for example, and provide educational materials to tenants and discuss the improvements made and ways they can save energy. At other properties, staff will use a similar set up in the property office.
- Door-to-door: Typically, the meeting and tabling approaches do not result in reaching 85% of the tenants at the property. To achieve that target, program staff go door-to-door during the installation process to educate tenants. Depending on the tenants' availability, staff may provide a short "elevator speech" or spend more time discussing ways to save energy with the tenants.

The education and outreach coordinator asks tenants to provide a signature on a sign-in sheet to verify that they were spoken with. To track progress on the goal of speaking with 85% of the tenants at a property, program staff provide tenants a tips sheet to support the program education component.

A tip sheet is provided to tenants that covers no-cost and low-cost strategies for saving energy (see Figure 4-2).

Figure 4-2 CommunitySavers Tip Sheet



Staff commented that achieving the 85% education target is time consuming and suggest that other approaches to delivering the tenant education such as providing educational online videos (for tenants with internet access) or asking subcontractors to deliver the education during the direct installation process, may facilitate reaching the target with fewer staff resources. During the prior cycle, subcontractors delivered the education component and as noted in Section 4.6, one subcontractor stated that they are currently discussing energy use with the tenants during the direct installation process.

4.2.5.4. Quality Control and Verification

Program guidelines state that 5% of direct install units and 5% of complexes that receive HVAC tune-ups will be inspected per quarter for quality assurance and control purposes. The primary quality control approach for direct install and tune-up projects is for ICF staff to observe the subcontractor performing the work and to directly follow the subcontractor

and inspect completed installations. The education and outreach coordinator performs a share of these reviews during the first day of installation. During this review, he checks that the quantities installed are consistent with the reported amount and that thermostats are set correctly. Part of the quality control process is to also discuss the thermostat settings with tenants and discuss any concerns or issues they have with the measures. Any issues found are noted in the Fulcrum system. Once the installation and quality control work is finished, staff match the work to account numbers and submit the information to the Vision system, which is used to invoice for the project. The information is reviewed for completeness before moving it to the qualified status.

The account manager also performs post-installation inspections. The account manager stated that he essentially “drops in” on a property and asks to look at a subset of units at the property and to speak with tenants about the installed measures and installation process. Both staff stated that few issues have been identified and when they are encountered they are corrected.

Ameren Missouri staff also performs quality control functions. Most notably, Ameren Missouri staff review all submitted invoicing for completeness and accuracy. Additionally, Ameren Missouri requires that the products used meet quality standards and monitors ICF’s performance on customer satisfaction metrics.

4.2.6. Program Reporting and Project Tracking

Program activity is tracked in the Vision database system. This system captures information about the building, applicant, and the measures installed. A report is set-up that provides detailed measure information, and summary reports for the program overall and program sub-components (e.g., in-unit direct install, SBDI) are available as well.

Ameren Missouri staff stated that the tracking and reporting system was largely meeting management needs, but that some pipeline reporting is still in the process of being set up. During the prior cycle, staff tracked pipeline reporting outside of the primary data system because different residential program implementation contractors were using different systems. The objective for the current cycle is to set up pipeline reports in Vision that can be run as needed. The lack of the pipeline report was not considered a critical issue because ICF staff provides reporting upon request.

The Vision system electronically interfaces with the Fulcrum application used to capture on-site measure installation work and information from quality control verification visits. Subcontractors manually enter information into the tool to record work performed and measurements from the HVAC tune-ups. ICF staff also use the tool to review the work completed and use it to enter notes about the work done and capture photographs as needed.

4.3. Database Analysis

Nearly all the PY2016 program savings resulted from direct install projects. The evaluation team carried out an analysis of the participant database to identify characteristics of participating participants and the projects completed.

Analysis was also completed to identify any structural or data-entry issues with the database.

4.3.1. Analysis of Completed Projects

The following subsections provide an overall analysis of projects and participants and show analyses of program participation by program subcomponent, measures implemented, property occupancy type, and geographic location of completed projects.

4.3.1.1. Overall Analysis of Projects and Participants

In total, 36 properties and 3,462 tenant units received efficiency measures through CommunitySavers in PY2016.

Figure 4-3 displays program savings by program component. As shown, 98.5% of program savings resulted from direct install measures. As shown in Figure 4-4 ex ante savings were distributed across the four end-uses, with HVAC savings accounting for the largest share of program savings (46.3%). The remaining ex ante savings were distributed across refrigeration, water heating, and lighting measures in roughly equal shares.

Figure 4-3 Ex Ante kWh Savings by Program Component

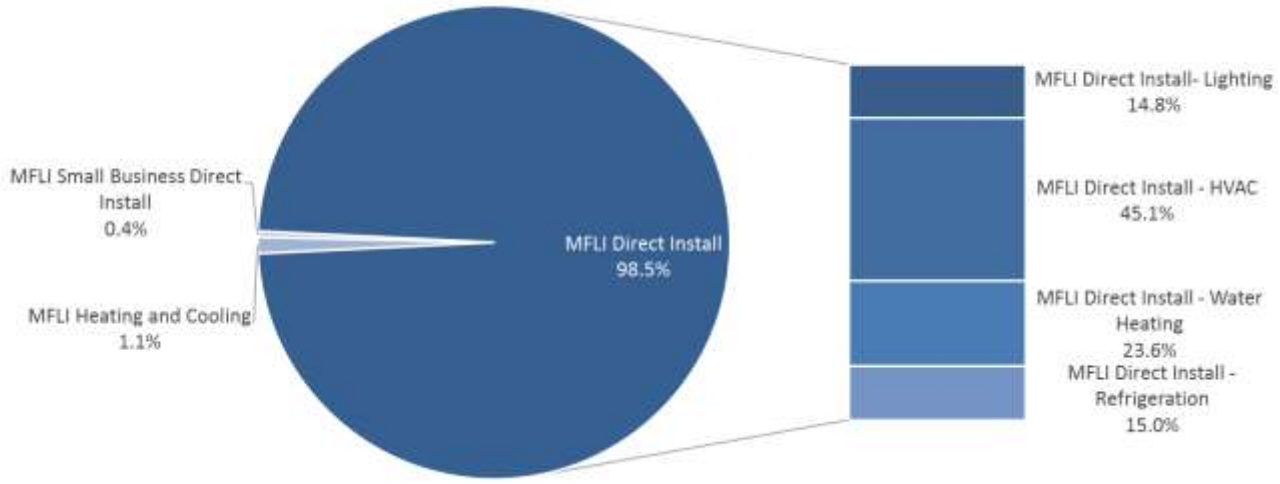
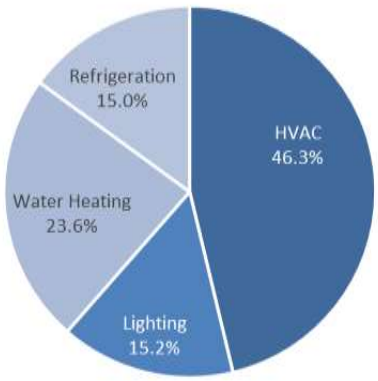


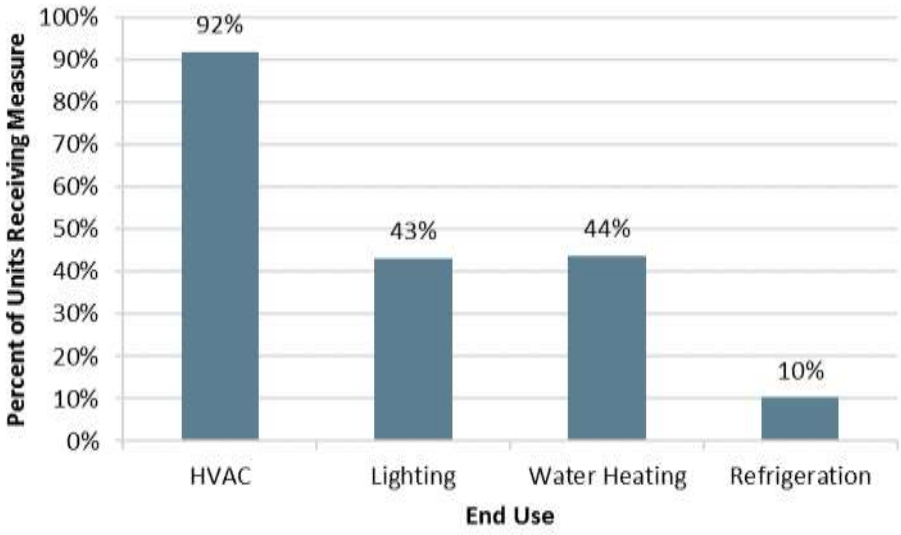
Figure 4-4 Ex Ante kWh Savings by End Use



4.3.1.1. Direct Install Projects

Figure 4-5 summarizes the share of units receiving measures within the four end-uses. As shown, most units received HVAC measures (e.g., furnace whistle, tune-ups, or programmable thermostats). Nearly one-half received lighting measures and nearly one-half received water heating measures, while 10% received refrigerator replacements.

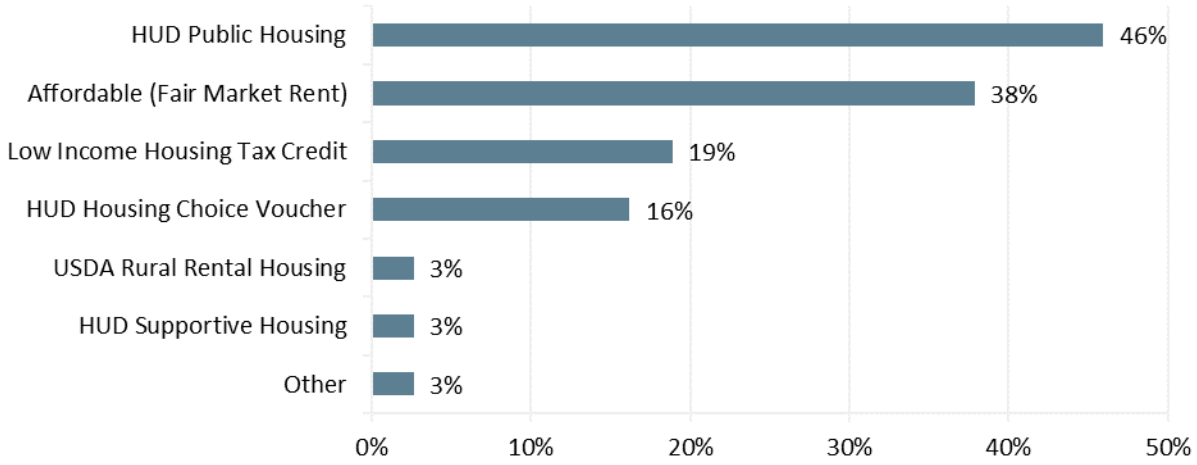
Figure 4-5 Percent of Units Receiving End-Use



4.3.1.2. Property Occupancy Type

Figure 4-6 displays the share of participating properties by occupancy type. Some properties have tenants that fall under multiple occupancy types, and as a result, the totals exceed 100%.

Figure 4-6 Property Occupancy Type



Note: The sum exeeds 100% because some properties have tenants that fall into multiple occupancy types
Source: Program application forms

4.3.1.3. Geographic Area

About two-thirds of participants, buildings, and projects were in St. Louis and its near suburbs, and most of the remainder where in the outer suburbs (Table 4-3). To put these values in context, the table also displays the distribution of multifamily housing, lower-income rental customers, and locations of subsidized housing. While all three indicators are imperfect proxies for the low-income multifamily property target market, they all suggest that program activity is more heavily concentrated in the St. Louis region than low-income multifamily properties are.

Most of the project savings came from within St. Louis and its near suburbs. The areas outside of St. Louis and its suburbs are responsible for less savings compared to the rate of participation.

Table 4-3 Geographical Distribution of Completed Projects

Area[1]	*Tenant Units (N = 3,462)*	*Properties (N = 36)*	*Ex Ante kWh Savings*	*Multifamily Housing*[2]	*Household Income of < $50,000*[3]	*Subsidized Housing Properties*[4]
St. Louis and near suburbs[5]	67%	72%	76%	49%	41%	38%
Outer suburbs[6]	31%	22%	21%	25%	24%	12%
All other areas	3%	6%	2%	26%	35%	48%
Total	100%	100%	100%	100%	100%	98%

1. Excludes refrigeration replacements which are tracked outside of the primary data system. The properties that received these measures overlapped with properties receiving other efficiency improvements.
2. Defined as structures with three or more attached units. U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates
3. $50,000 threshold used as proxy for 200% of Federal Poverty Level (2017 200% FPL for a four-person household is $49,200) U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates
4. National Housing Preservation Database. http://www.preservationdatabase.org/
4. ZIP codes 63100-63199.
5. ZIP codes 63000-63099 and 63300-63399.

4.3.1. Database Structural and Data-Entry Issues

In analyzing the program participation data, a few issues were identified that limit the analyses that can be performed and potentially introduce errors in the results of the analysis.

4.3.1.1. No Space Heating Type Field for Apartment Units

Space heating type was not available for individual units that received program measures. The space heating type was available from the property application form, but for some properties, these applications indicated multiple space heating fuel types. Accurate data on individual unit space heating will improve the estimation of savings resulting from programmable thermostats and LED lighting. Recommended space heating categories include: electric resistance heating, natural gas furnace, heat pump.

4.3.1.2. Missing Information on Space Cooling Type

Space cooling type was missing for 3% of HVAC tune-up projects and not recorded in program data for most LED projects (data was available from the program applications). Information on cooling type is needed to accurately estimate savings for tune-ups and to accurately estimate HCIF for lighting savings.

4.3.1.3. SEER and Capacity for HVAC Replacements

Program data currently does not include SEER or system capacity for HVAC replacements. This data is available attainable through a search of the AHRI certificate number but including it in the project data would facilitate analysis of program savings.

4.3.1.4. Inconsistent Use of Premise Address Fields

The Premise Address field contained the street address, the building number, the unit number, or some combination of the above. ADM suggests reserving the Premise Address field for the street address and the Premise Address Cont field for unit and building information.

4.3.1.5. Missing Contact Information

The primary contact field should contain the information for project contact. Review of this data found that it was missing in most cases. The data was available upon request from ICF but should be tracked in the data system. Specifically,

- The primary contact telephone number was either missing or not an actual telephone number (e.g., 00000000000) for approximately two-thirds of records.
- Primary contact email was missing for approximately one-third of records.
- Primary contact phone number was missing for approximately two-thirds of records.

Providing complete contact information will facilitate administration of the owner/manager survey.

4.4. Owner/Manager Survey

ADM contacted 24 owners and managers that completed projects through the program in 2017 and 17 responded to the survey, for a response rate of 71%. Participants were initially contacted by email to complete the survey online. Non-respondents were contacted by telephone to complete the survey. Seven respondents completed the survey online and the remaining 10 completed the survey by telephone.

4.4.1. Description of Sample

Four of the 17 respondents completed MFLI Heating and Cooling projects or Small Business Direct Install lighting projects, and 16 completed in-unit direct install projects.

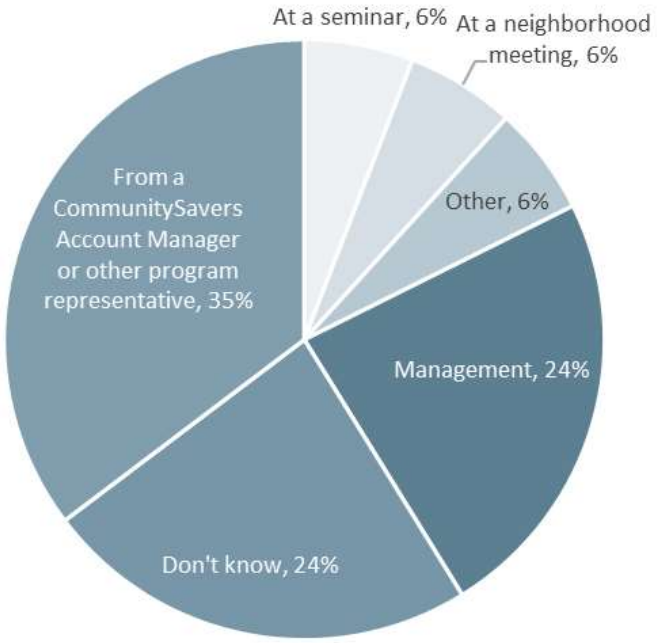
A majority of respondents (69%) reported that their organization both owned and managed the property that received efficiency improvements through the program, and another 25% stated that the organization only managed the property. The remainder were unsure if their organization owned or managed the property.

4.4.2. Program Awareness

Respondents were most likely to report that they learned of the program from a program account manager (35%) (see Figure 4-7). The account manager is the primary staff

person responsible for program outreach and so it is to be expected that this person would be the primary source of program awareness. Another 24% of the respondents stated that they learned of the program from someone in a managerial position in their organization (e.g., “boss”). Twelve percent of the respondents learned of the program through a neighborhood meeting – another channel through which staff seek to inform owners and managers about the program.

Figure 4-7 Source of program Awareness



4.4.3. Awareness of Common Area Incentives

A majority of respondents (77%) that did not receive incentives for common area improvements were not aware that these incentives were available. One factor that may have generated this result is that some of these survey respondents may not have been the individual involved in the program decision making and outreach process (as noted previously, 24% stated they learned of the program through management staff). However, all five of the respondents that learned of the program through the program account manager or through a neighborhood meeting were not aware of the common area incentives. Moreover, review of the applications for these properties indicated that two of them had common areas and were not low-income housing tax credit (LIHTC) properties, which would disqualify them from receiving common area incentives. Of the remainder, one was an LIHTC property and the others were missing information on if there was a

common area. Taken as a whole, these results suggest that there is room to improve awareness of the common area incentives.

Two-thirds of the six respondents that were aware of the common area incentives stated that the available incentives completely met their needs (Table 4-4). One of the two respondents that stated that incentives did not completely meet their needs indicated that the common area project that they completed was not fully completed. This response suggests that the issue that caused the respondent to provide a relatively low rating of the adequacy of the incentives may have been a project implementation issue rather than an issue with the available incentives. The other respondent did not elaborate on why the incentives did not fully meet the needs of the property.

Table 4-4 Common Area Measures

How well did the types of common area equipment for which incentives are offered fit your needs?	*Percent of Respondents (n=6)*
1 - Not at all	0%
2	33%
3	0%
4	0%
5 - Completely	67%

4.4.4. Barriers to Efficiency and Reasons for Participating in the program

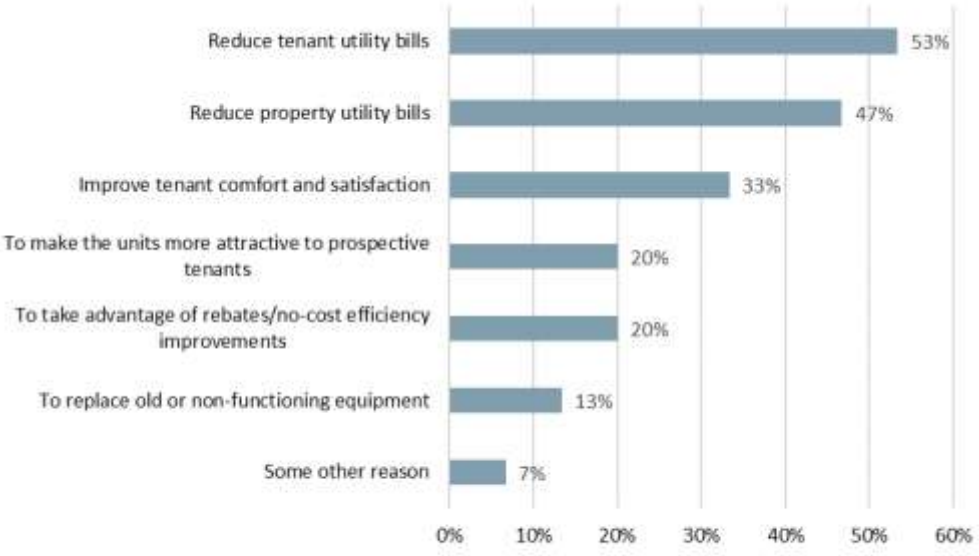
Respondents discussed some of the challenges they face in making efficiency improvements to their buildings. The challenges they noted are as follows:

- Financial challenges: One respondent noted that they manage a few old buildings and do not have a lot of income available to improve the properties.
- Lack of staffing resources: A respondent stated that it was difficult to have staff involved in the improvements.
- Residents not cooperating with the process: A respondent noted that residents do not always want to cooperate with the improvement process.
- State law that prevents recipients of LIHTC to receive incentives: One respondent noted that they could not receive the incentives for the common area improvements because of the LIHTC.

Respondents provided a variety of reasons for participating in the program (Figure 4-8). The most commonly noted motivation was to reduce tenant bills (cited by 53% of respondents). Another often noted motivation was to reduce property utility bills (47%). Six of the eight respondents that stated their motivation was to reduce property utility bills did not receive common area improvements through the program. The program may have lowered the property utility bills if the utility costs were included in the rents. Other

considerations included an interest in improving tenant comfort (33%) and making the rental units more appealing to prospective tenants (20%).

Figure 4-8 Reasons for Competing In-Unit Efficiency Improvements



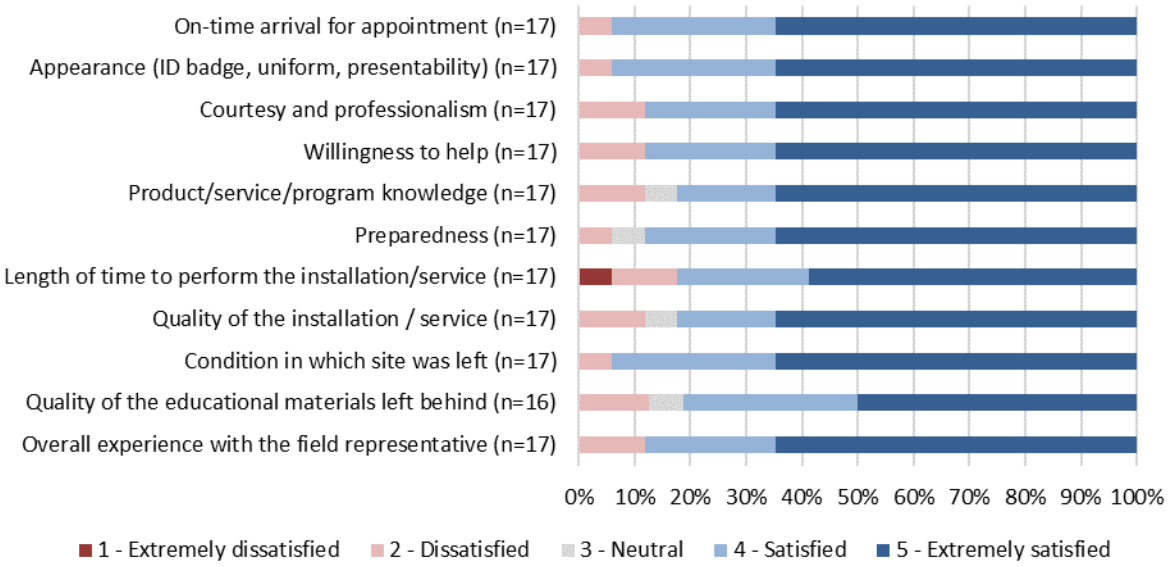
** Total sums to more than 100% because respondents could select multiple reasons for participating.*

4.4.5. Experiences with Field Service Representatives

As shown in Figure 4-9, respondents were very consistent with how positively they rated each aspect of their experience with the field service representatives with between 81-94% of respondents rating that they were satisfied or very satisfied with each rated aspect of their experience with the field service representative.

Respondents were most satisfied with the condition the site was left in, the appearance of the service representative, and the timeliness of the representative, with 94% of respondents stating they were satisfied or very satisfied with these aspects. Eighty-eight percent of respondents stated they were satisfied or very satisfied with the courtesy and professionalism of the representatives, the representatives preparedness, willingness to help, and the overall experience with the service representative's. Eighty-two of respondents stated they were satisfied or very satisfied with the quality of the installation, length of time to perform the installation, and the knowledge of the installation staff. Owners/managers were least satisfied with the quality of the equipment, with 81% stating that they were satisfied or very satisfied.

Figure 4-9 Satisfaction with Field Service Representatives



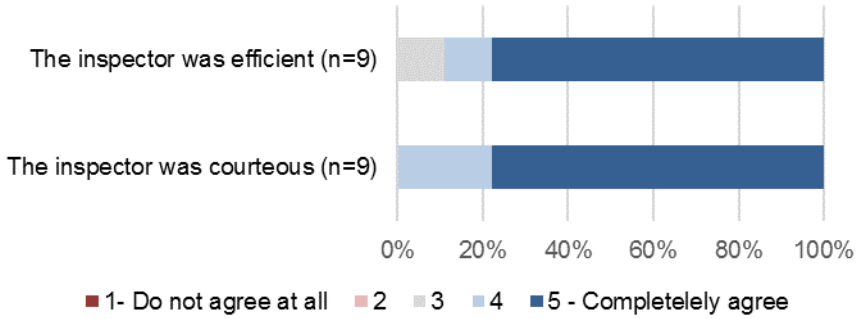
Four respondents provided additional comments on their experience with the field staff. Two of these comments provide praise for the program account manager. One of these comments praised the account manager's role in working with the participant's board members to explain the program and discuss the benefits of it. This individual remarked that the account manager "should receive some type of award." The other respondents stated that the account manager was a "dedicated professional who cares about his job and the mission of the program."

The other two responses were more critical. One respondent stated that the measures were not installed correctly. The other respondent stated that the installer was not as knowledgeable as they would have hoped, that they were slow, and had made an inappropriate comment.

4.4.6. Interactions with Program Staff

Nine of the 17 total respondents (53%) reported that a program representative inspected the work done through the program at their location. All nine respondents either agreed or strongly agreed that the inspector was courteous, and all but one stated they agreed or completely agreed that the inspector was efficient (Figure 4-10).

Figure 4-10 Satisfaction with Inspector



Ameren Missouri provides a dedicated account manager to assist property managers and owners with completing energy efficiency improvements if desired. Five respondents reported working with an Ameren Missouri account manager. Given the central role of the account manager in the program participation process, the relatively small share of respondents that reported working with an account manager may be due to misunderstanding the term in the survey question or that some respondents did not have direct interactions with the account manager. Those respondents that recalled working with the account manager were satisfied with the service provided.

4.4.7. Overall Satisfaction

Overall, respondents were satisfied with the program. As seen in Table 4-5, 82% of respondents stated that they agreed or strongly agreed with the statement "Overall I am satisfied with the services provided by the CommunitySavers Program," and 12% stated that they strongly disagreed with the statement.

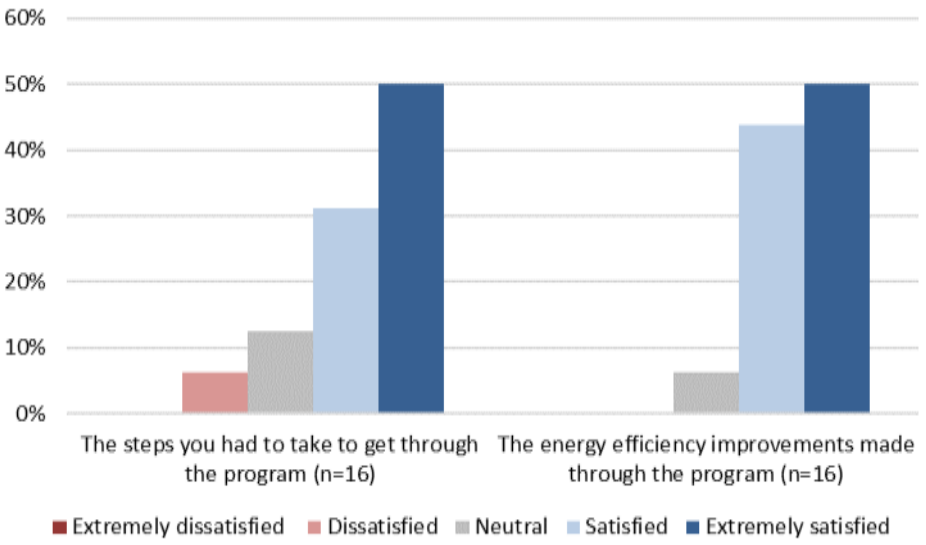
Table 4-5 Overall Satisfaction with CommunitySavers

Overall, I am satisfied with the services provided by the CommunitySavers Program.	*Percent (n = 17)*
1 (Strongly disagree)	12%
2 (Disagree)	0%
3 (Neutral)	6%
4 (Agree)	24%
5 (Strongly agree)	59%

Respondents were also generally satisfied with the participation steps and measures installed, as shown in Figure 4-11. Almost all respondents (94%) stated that they were satisfied or extremely satisfied with the improvements made through the program, and 81% stated they were satisfied or very satisfied with the steps it took to get through the

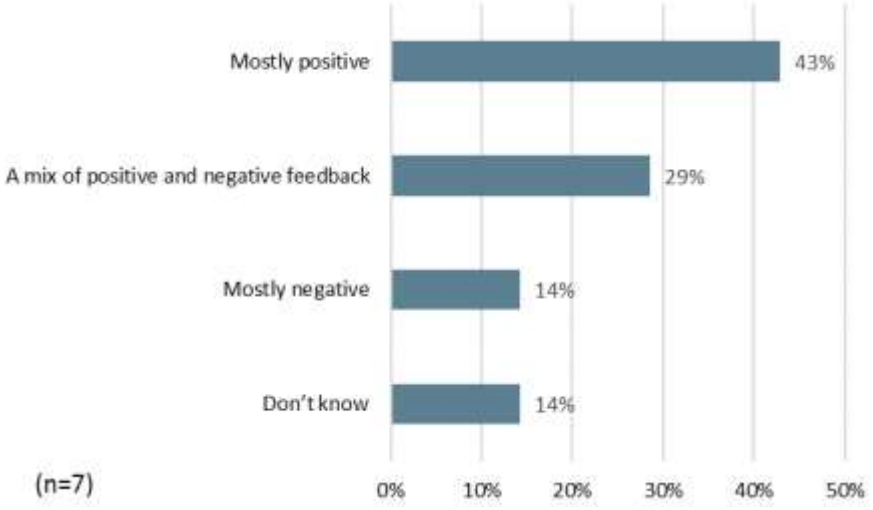
program. One respondent who was dissatisfied with the steps required of the program stated that it “was a lot of up front work for the property management staff.”

Figure 4-11 Satisfaction with Elements of the Program



Of the respondents who had heard feedback from tenants about energy efficiency improvements (n = 7), slightly less than half (43%) stated they heard mostly positive feedback from tenants, 29% stated that they heard a mix of positive and negative feedback, and 14% stated that they heard mostly negative feedback (Figure 4-12).

Figure 4-12 Feedback from Tenants



The types of positive feedback that respondents said tenants had provided were:

- The team was very nice;
- They loved the showerheads and new refrigerators; and
- Residents received information on controlling the temperature in their apartments.

The types of negative feedback that respondents provided were:

- Seniors had a hard time;
- Tenants did not know how to work thermostats; and
- Thermostats do not work.

4.5. Tenant Survey

ADM mailed surveys to 827 tenant addresses listed in the program tracking data and received 132 responses. Participants either returned a paper survey using a stamped and addressed envelope or completed the survey online. The overall response rate was 16%.

In addition to collecting information used for the analysis of program energy savings, the tenant survey was designed to collect information on tenants perceived benefits of the efficiency improvements and satisfaction with multiple aspects of the program.

4.5.1. Perceived Impacts on Energy Costs

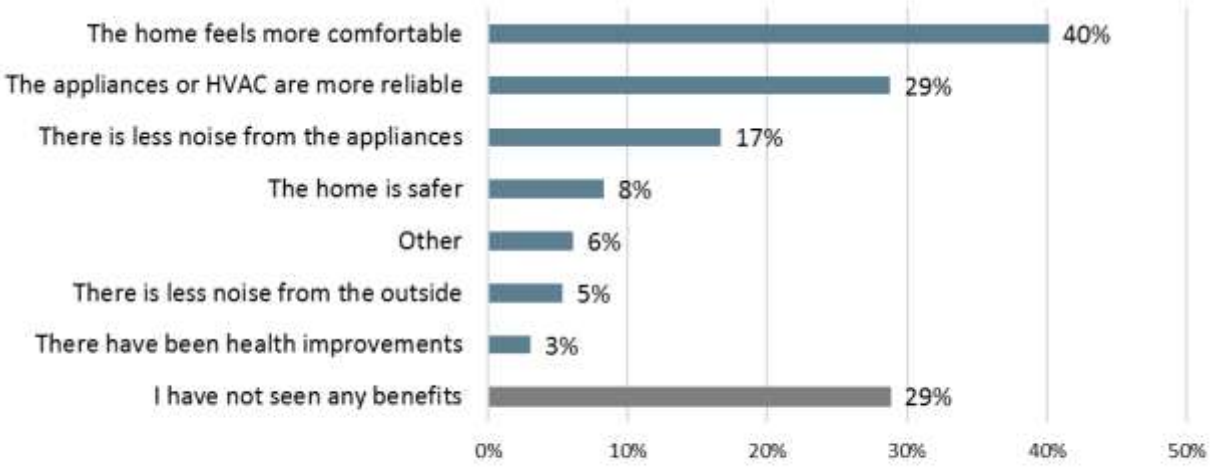
Thirty-nine percent of respondents reported that they had noticed a reduction in their home energy costs, while the remainder either had not noticed a reduction or were not sure if their costs had decreased.

Table 4-6 Participant Reported Reduction in Energy Cost

Would you say that the energy efficiency improvements made to your home have reduced your electricity costs?	*Percent of Respondents (n=129)*
Yes	39%
No	22%
Don't Know	39%

Seventy-one percent of respondents reported that they had realized one or more non-energy benefits from the measures implemented through the program (Figure 4-13). The most frequently reported benefit, noted by 40% of respondents, was that their home felt more comfortable. Other more frequently noted benefits were improved reliability of appliances or the heating and cooling system (noted by 29%) and quieter operations of appliance (17%).

Figure 4-13 Non-Energy Benefits from Energy Efficiency Improvements



** The sum of the responses totals to more than 100% because some respondents reported more than one benefit.*

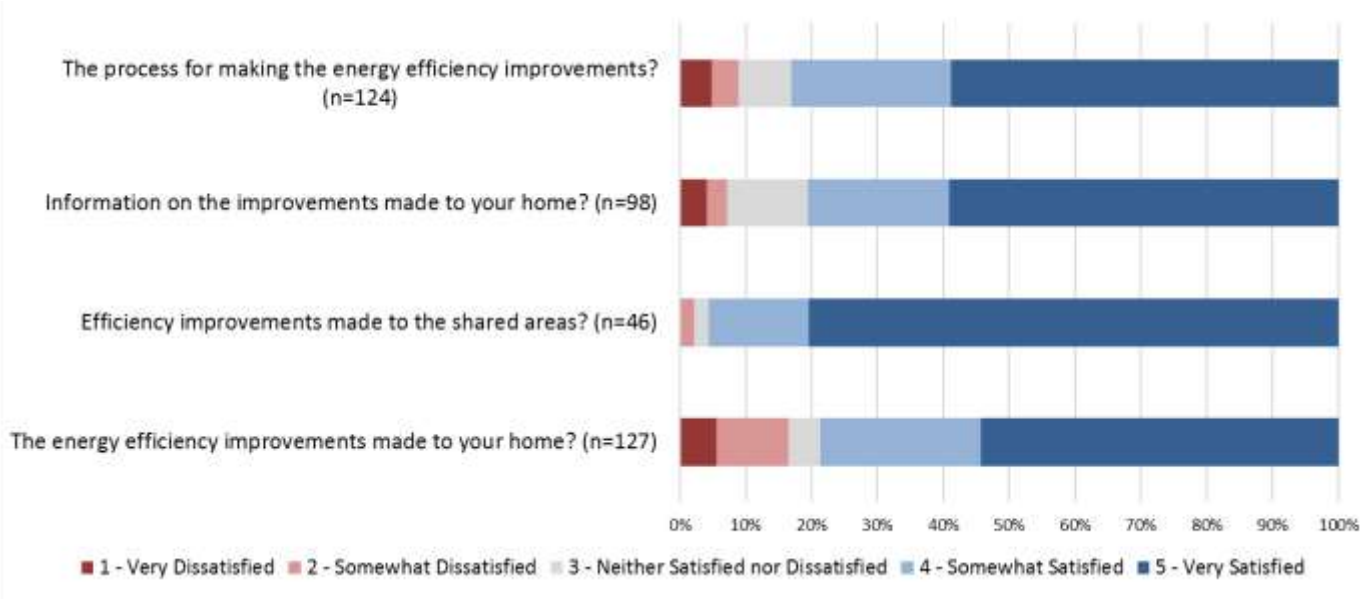
4.5.2. Overall Program Satisfaction

Tenants were generally satisfied with each of the program elements they were asked to rate (Figure 4-14). Approximately four-fifths of respondents were somewhat or very satisfied with the process for making improvements (83%), the information provided (81%), and the measures installed in their homes (79%). However, a sizable share of respondents (17%) reported that they were dissatisfied with the efficiency improvements made. Of the 21 respondents that commented on the reason for their dissatisfaction with the efficiency improvements, 15 disliked the thermostats. The most frequently noted reason for disliking the thermostat was that they are less comfortable in their home with the new settings. Additionally, a few respondents stated that the unit malfunctioned or that it resulted in increased energy use. A few respondents were dissatisfied with the aerators or thought that the pipe insulation was not effective at keeping their water hot.

The reasons given for dissatisfaction with the installation process and the information provided also focused on dissatisfaction with the thermostats.

Of the 37% of respondents that recalled energy efficiency improvements being made to common spaces of their building, the majority (96%) stated that they were satisfied or very satisfied with the improvements made to the common areas.

Figure 4-14 Tenant Satisfaction with Program Elements



4.6. DI Subcontractor Interviews

The CommunitySavers Program subcontracted with three firms to perform direct installations of the in-unit measures and HVAC tune-ups during PY2016. ADM interviewed representatives of each of these firms to collect their feedback on program processes.

Two subcontractors worked with the CommunitySavers Program during the prior program cycle. Subcontractors reported that they had five to six staff performing program work.

4.6.1. Training

All three contractors reported that staff members who worked on-site attended trainings provided by ICF staff. One firm reported that all staff members that perform program work attended the training while the remaining two indicated that not all of their staff had attended training. The topics covered during the training included safety, protocols for performing installations, use of the Fulcrum application for recording measure installation information, and HVAC tune-up processes.

Both contractors that attended the training themselves stated that the information was presented clearly, and that they were in-depth and covered all aspects of the installation process. Neither attendee reported concerns or criticisms with any aspect of the training. Two of the respondents did not recommend any additional training, but one respondent reported that their staff was attending a refresher training course.

The procedures used to train new staff hired to perform program work varied by firm and included both internal training and sending staff to ICF for training. Specifically, one contractor stated their staff train new staff within their company, one stated they send their staff to ICF trainings, and one contractor stated that their company uses both ICF and internal staff to training new employees.

4.6.2. Program Processes

Respondents discussed the process by which work is scheduled, the use of the Fulcrum application, discussions of energy savings with tenants, and information provided on program guidelines and statements of work.

When scheduling work to be performed, all respondents stated that ICF provides them with a tentative schedule that includes the number of jobs, the location, and the anticipated project start and end dates. Two respondents stated this information is communicated to them by email and one stated they typically receive a phone call about the work. All respondents stated that ICF sends them a statement of work by email, all contractors stated that the information provided was clear. Typically, the DI subcontractors are given the schedule for work a week before the work is to begin, although two stated that they may receive it in as few as two days before the work is scheduled.

Two of the DI subcontractors noted that there were some challenges with the scheduling of the work. One stated that they would prefer to receive statements of work a month or two in advance because one week of notification for work to be performed at a single property made it difficult to plan for upcoming work. Another DI subcontractor stated that on occasion, scheduled work would be rescheduled.

Information on the direct installation is recorded using the Fulcrum application. All three of the DI subcontractors stated that the application was user-friendly. Two interviewees, however, stated that information was not provided on the total number of installations completed at a site. Both interviewees stated that not having information on the total number of installations at a job site made it difficult to verify that all planned work was completed.

Although the DI subcontractors stated that it is not common for tenants to refuse measures being installed, all stated that this does happen occasionally. DI subcontractors stated that the most common measure refused is showerheads, and one DI subcontractor stated that a few tenants had refused thermostats. The three DI subcontractors reported slightly different methods of resolving the situation of a tenant refusing a measure being installed. One stated that they speak with the property manager or owner as the issue is usually related to a misunderstanding about the work being performed, one stated that they make a note of the situation and have ICF contact the property manager or owner, and one stated that they abide by the tenant's wishes and report the situation to ICF.

Although these three approaches are similar, staff should consider developing a standard process for handling measure refusals.

During the prior cycle, the subcontractors provided education on saving energy to tenants, but this is currently a function performed by ICF. Nevertheless, one of the subcontractors stated that they are currently educating tenants on energy use while the other two are not.

All three interviewees reported that a program representative is onsite during installation. One stated that they see the program representative about once a week during the installation, one stated that they are onsite at the beginning of every installation, and one stated that they see them often but did could not provide a better estimate of the frequency with which ICF is onsite during installations.

Interview respondents were asked to discuss how they handle aspects related to setting schedules on programmable thermostats. All interview respondents stated that they have a specific temperature setting that they set the thermostats to when installing. Two contractors stated that they have had tenants request different settings when they are installing thermostats, however, they did not explain clearly if they set the thermostat to the tenant's desired setting.

If energy efficient aerators are already installed at a location, all DI subcontractors stated that they do not replace the aerators if they satisfy the efficiency level required through the program.

Overall, the interview respondents were satisfied with the resources provided on the program guidelines and none noted any shortcomings of the information provided.

4.6.3. Working with Program Implementer

All contractors reported that they are generally satisfied with working with ICF as the program implementer. Below are quotes from the contractors regarding their satisfaction with ICF and Ameren Missouri.

"Yes they [ICF] have been great"

"Satisfied, love working with Ameren"

"I think everyone at ICF is very nice and easy to get along with…"

Two of the three DI subcontractors worked with the program under the previous implementation contractor, and both mentioned some changes in practice under the current program. Both respondents stated that they receive shorter advanced notice for work performed. Additionally, both stated that there were some communication issues with ICF, namely, they did not always get all needed information, and that some staff at ICF were not always responsive to inquiries (the account manager was noted as responsive to inquiries). Lastly, one respondent stated that at the time of the interview,

they had received payment for work performed but that they could not link the payments to invoices. However, program staff provides that a leger is sent to all contractors that contains check and project information. As such, this concern may be best address by reminding contractors that this information is available and clarifying that that they understand how it can be used to link payments to projects.

4.6.4. Overall Satisfaction

All three DI subcontractors stated that they were satisfied with the program overall. Below are quotes from the three contractors about their satisfaction with the program.

"Great program"

"Very happy"

"…we are thrilled to work with Ameren and ICF and satisfied the program will bring efficiency to low income housing"

4.7. DI Subcontractor Ride Alongs

During the December 2016 – February 2017 period, ADM attended measure installations at three different properties. These visits afforded an opportunity to observe installation practices in place during the direct installation of program measures. Overall, ADM observed that installations were performed consistently with program guidelines. However, two issues were identified:

- A DI subcontractor was installing dirty filter alarms incorrectly. ADM relayed this information to program staff and the issue was corrected.
- A DI subcontractor was observed changing the programmable thermostat setback temperatures from the factory ENERGY STAR defaults. Program staff contacted the DI subcontractor firm and corrected the practice.

5. Cost Effectiveness Evaluation

This chapter summarizes the results of the cost effectiveness evaluation of the Ameren Missouri CommunitySavers Program.

Cost effectiveness analysis was completed using DSMore software. Developed and licensed by Integral Analytics based in Cincinnati Ohio, the DSMore cost-effectiveness modeling tool takes hourly prices and hourly energy savings from the specific measures/technologies being used in the Ameren Missouri program, and correlates both price and savings to weather. The software references over 30 years of historic weather variability to appropriately model weather variances. In turn, this allows the model to account for low probability, high impact weather events and apply appropriate value to them. Thus, a more accurate view of the value of the efficiency measure can be captured in comparison to other alternative supply options. Appendix H: Cost Effectiveness - Critical Technical Data provides additional information on the data sources test formulas, inputs, and methodology

Table 5-1 shows the resulting cost benefit scores for the program. Any score above one signifies cost effectiveness. The following table also summarizes the present value of the UCT net lifetime benefits (net avoided costs minus program costs). CommunitySavers passes the UCT and TRC tests.

Table 5-1 Results of Cost Effectiveness Evaluation (expressed in 2016 dollars)

Variable	*Value*
UCT	1.11
TRC	1.96
RIM	.43
PCT	176.55
SCT	2.46
UCT Net Lifetime Benefits	$1,656,108

6. Conclusions and Recommendations

The following section summarizes conclusions and recommendations that resulted from the evaluation activities. They are organized to present impact and process findings separately. Below is a list of conclusions that characterize key trends from the impact and cost effectiveness analyses.

6.1. Impact Conclusions

Below is a summary of conclusions that characterize key trends from the impact analyses.

- The overall program realization rate was 112% but this varied by measure. Reasons for why ex ante savings differed from ex post savings are discussed in Section 3.2. Key findings include:
    - The refrigerator realization rate was 54% and the PY2016 per unit savings were considerably less than PY2015 ex post savings. Fifty-two percent of the baseline units used to develop the average per unit savings were manufactured before 1990.[14] In comparison, 5% of the baseline units replaced through CommunitySavers in PY2016 were manufactured before 1990. Additionally, three replaced units were manufactured after 2001, contrary to program guidelines.
    - The realization rate for HVAC replacements was 49%. The primary reason for the difference between ex ante and ex post savings was that ex ante calculations were based on an average capacity of 3.4 tons – larger than the average 1.77 ton unit installed through the program. The ex ante savings values were developed for use in estimating savings for single-family systems. Staff have subsequently developed values for multifamily systems, which are comparable to the PY2016 ex post savings.
    - HVAC tune-up and refrigerant recharge rates were 198% and 57%, respectively. The realization rate of the combined measure savings was 149%, and were generally consistent with the combined tune-up and recharge ex post savings from the prior three program evaluations.
- During the completion of site visits, ADM found that some dirty filter alarms were oriented incorrectly by the installing subcontractor. Tenants and maintenance technicians could have similar difficulty with correctly orienting the filter alarms during filter replacements and this may negatively impact the persistence of the savings.

[14] Ameren Missouri ApplianceSavers Impact and Process Evaluation: Program Year 2013, p. 27.

- CommunitySavers fell short of its program goal and did not achieve the targeted 40% of savings from common area improvements. The late launch of the program contributed to both results, as did the process of transitioning to a new implementation contractor.

6.2. Impact Recommendations

Based on the above conclusions, the evaluation team offers the following impact recommendations for consideration in planning future program cycles.

- Include fields in program tracking data for HVAC replacement unit SEER and capacity. Currently, information on SEER is built into the measure name and capacity level is not recorded in the data. Staff reported that this information is being added to the program data.
- Include information on unit space heating and cooling type for LED projects. Space conditioning equipment information is used to appropriately apply heating and cooling interactive factors in the estimate of lighting savings. Space heating and cooling type was available from project applications but some applications indicated that the properties had multiple heating types.
- To improve average savings for refrigerator replacements, consider limiting year of manufacture to 2000 or earlier, as was the case in PY2015. ADM recognizes that multiple factors should be considered when setting the year of manufacture, including the value of refrigerator replacements as a measure that may be entice property managers to complete a program project that includes additional efficiency measures.
- Improve screening of refrigerator replacements. Although the three refrigerators replaced that were manufactured after 2001 comprise less than 1% of refrigerator replacements, staff should review screening protocols to prevent additional units not qualified for the program from being replaced in the future.
- Although Ameren Missouri applies the correct coincident factor when reporting kW savings, a calculation error within Vision resulted in incorrect ex ante kW reduction estimates. Staff should correct calculations made within the Vision data system so that ex ante kW estimates tracked in the system are correct.
- Provide tenants and building maintenance staff with instructions on how to correctly install the dirty filter alarm. ADM observed instances where the filter alarms were oriented incorrectly by the installing subcontractor and tenants or maintenance technicians may have similar difficulty installing the device correctly.

6.3. Regulator Research Questions – Process Conclusions and Recommendations

Below, conclusions and recommendations are organized according to the five regulatory research questions specified in 4 CSR 240-22.070(8). The conclusions address the first four questions; the fifth question speaks to recommendations.

Research Question 1: What are the primary market imperfections common to target market segment?

- Multiple market imperfections were identified that may prevent low-income multifamily property owners from investing in energy efficiency improvements either through the CommunitySavers Program or outside of it. The identified market imperfections are: cost, state policy, multifamily property budgeting cycles, geography, lack of property staff resources, and split incentives.
- Cost. The cost of energy efficient equipment is a barrier to completing efficiency improvements through the program and outside of it. Program staff that work with multifamily property owners and managers noted that cost is a significant barrier to efficiency improvements in the properties managed. This sentiment was echoed by a survey respondent who noted that the properties generate limited income from which efficiency improvements could be financed. Additionally, securing financing for property improvements can be challenging for low-income multifamily property owners and program staff recognize that assistance in securing financing is an important service that the program can provide.[15]
- State Policy. Missouri state law disallowed properties that received Missouri state Low-Income Housing Tax Credits (LIHTC) from receiving incentives for energy efficiency improvements made to common areas of the properties.[16] Program staff stated that this is a significant barrier to common area projects and historical data on program participation indicates that a significant share of prior participants received the LIHTC. Staff appeared to have made progress in reaching properties that do not receive the LIHTC in PY2016, as approximately one-fifth of the participating properties were identified as LIHTC recipients. Additionally, review of the National Housing Preservation database on subsidized housing indicates that approximately 40% of subsidized properties in Ameren Missouri's service territory do not receive the LIHTC, suggesting that there is a sizable market of low-income properties that are qualified to receive common area measures. That said, the prohibition against properties that receive the LIHTC was an important barrier to participation in the program.

[15] Energy Efficiency for All (2015). Program design guide: Energy efficiency programs in multifamily affordable housing. Energy Efficiency for All Project.

[16] Although it is likely less impactful, buildings that receive Historic Tax Credits are also ineligible for common area incentives.

- Budget Cycle. Budgeting cycles create barriers to participation to the extent that program outreach efforts are misaligned with these cycles. Program staff indicated that this misalignment was an issue during PY2016 because of the program's late start. Future years should not be impacted by this issue so long as outreach efforts take these budget planning processes into consideration.
- Geography. Analysis of the program activity in comparison to the location of multifamily properties, lower income customers, and subsidized multifamily properties found that program activity was disproportionately concentrated in St. Louis and its surrounding suburbs.
- Insufficient Property Staff. Multifamily property operators may not have staff available to implement efficiency measures. One survey respondent stated that they did not have the staff available to implement efficiency improvements at the property.[17] CommunitySavers is designed to minimize the time required by property managers and owners through the assistance provided by the account manager who will assist with program paperwork and the scheduling of the work completed.
- Split Incentives: One form of split incentives in multifamily occurs when the tenant pays the cost of the electricity use, but the owner is responsible for choices that affect how efficiently the equipment and building utilizes electricity. This issue is most likely to occur for equipment and building characteristics that affect tenant energy use. The program addresses the barrier to efficiency resulting from the split incentives between owners and occupants by providing the direct install measures and HVAC tune-ups at no cost to the building operator or the tenant. The program measure that is likely most affected by the impact of split incentives between owners and occupants are HVAC replacements that are metered under 1(M) residential rate class. Split incentives are not a factor common area improvements for which the building operator is responsible for the cost of the equipment and the cost of electricity service.

Research Question 2: Is target market segment appropriately defined, or does it need further subdivision or merging with other segments?

- The target market is appropriately defined. The program targets subsidized multifamily properties and properties with tenants residing in non-subsidized housing with an income of at or below 200% federal poverty level.

  The current evaluation found that the PY2016 participating properties included both subsidized housing and low-income market rate housing. Within the subsidizing housing properties, the program reached HUD housing, LIHTC housing, and USDA properties. Moreover, staff discussions of outreach approaches and challenges

[17] Prior evaluations of CommunitySavers also identified staffing issues as a barrier to program participation. Ameren Missouri Low Income and Process Evaluation: program Year 2015.

demonstrated a recognition that subsidized housing and fair market affordable housing are different sub-segments of the low-income multifamily housing market.

- Because providing services to the low-income multifamily market requires a sufficiently specialized set of outreach and project implementation processes, maintaining the focus on this market is likely preferable to expanding the program to target single family low-income housing or mass-market multifamily housing.

Research Question 3: Do program measures reflect the diversity of end-use needs and available technologies for target segment?

- The program offers measures that cover all major multifamily in-unit end-use needs: lighting, appliances, space cooling and heating, and water heating. Additionally, the Standard and SBDI incentives available for common areas cover lighting, commercial refrigeration and kitchen equipment, and pool pumps. Building envelope improvements are eligible for Custom incentives.
- Survey respondents did not identify any additional measures that should be included in the program. Two-thirds of participant survey respondents aware of the common area incentives stated that these incentives completely met their needs for efficiency improvements (the remaining one-third did not elaborate on why their needs were not met). Additionally, 94% of property managers were satisfied with the equipment installed through the program.
- One potential opportunity is the addition of standard incentives for clothes washers. Review of the participant applications found that several of the participating properties had laundry rooms on the premises. A limitation on effectively targeting washing machines is that many multifamily properties lease laundry equipment from a third party.[18] Targeting equipment leasers would require the development of additional outreach approaches and require additional resources. Moreover, split incentives between leasers that own the equipment and properties that pay for the energy costs would need to be addressed. As such, targeting this measure may not be worth the cost required to do it effectively.

Research Question 4: Are communication and delivery channels/mechanisms appropriate for the target market segment?

- The program uses three strategies for reaching the target market: direct outreach; outreach to building management groups (e.g., HUD, Public Housing Authorities), and other multifamily housing groups such as Community Development Corporations and neighborhood associations; and earned media. Direct outreach and repeated contact

[18] Shaaf, R. and Shah, R. (2017). Efficiency opportunities in multifamily common area laundry facilities. Stewards of Affordable Housing for the Future.

is important for this market segment because this segment is typically viewed as unresponsive and difficult to reach.[19] The outreach performed and staff's activities in working with building management groups and other stake holders is also a recommended practice for reaching multifamily property decision makers.[20] Earned media may be effective at generating broader awareness of the program but the program did not focus on this outreach tactic during PY2016.

- Program messaging focuses on the availability of incentives and no-cost measures and secondarily on the assistance provided by knowledgeable program staff and the benefits to tenants are likely. These messages are likely to resonate with property managers as they address barriers to energy efficiency improvements, such as insufficient financial and staff resources, and are consistent with motivations for participating noted by participant survey respondents.
- There may be an opportunity to improve the awareness of common area incentives. Survey responses suggest that some qualified direct install participants may not be aware of common area incentives, although program staff stated that they discuss the program incentives for common area improvements with eligible participants. It may be the case that while the information is presented to the participants, it has not garnered their interest.

Research Question 5: Are there better ways to address market imperfections to increase adoption of each program measure?

- Additional staffing resources to identify qualified unsubsidized housing, cultivate relationships with potential participants, financers, multifamily property groups, and trade allies should assist with customer recruitment. Program staff reported that a second account manager has been hired to better meet staffing needs.
- Continue to develop relationships with financing institutions. Staff recognizes that facilitating financing is key to developing common area improvement projects that require properties to fund a portion of the measure cost. Additionally, financial organizations may also be an important source of referrals and may direct property managers and owners to the program when they are in the process of seeking financing for building improvements.
- Develop marketing materials focused on common area improvements. The program brochure focuses on direct install measures, although it does reference the availability

[19] Energy Efficiency for All (2015). Program design guide: Energy efficiency programs in multifamily affordable housing. Energy Efficiency for All Project.

[20] CNTenergy and American Council for an Energy-Efficient Economy (2013). Engaging as partners in energy efficiency: A primer for utilities on the energy efficiency needs of multifamily buildings and their owners.

of other incentives. Staff should consider developing marketing materials that focus on common area improvements such as SBDI lighting projects that can be completed at no cost to the owner.

- Develop case studies based on common area projects. A few common area projects have been completed in PY2016 and early PY8. Staff should look to these successes to develop case studies to promote these projects with other property managers and owners. Case studies that illustrate the cost savings, ease of participation, and service provided by program staff should be effective at addressing concerns related to project costs and time commitments. Other important messages include the financial benefits of reduced maintenance and equipment longevity (i.e., for LED lighting in particular).
- Focus trade ally outreach on HVAC suppliers and contractors. Split-incentives between owners and occupants are most likely to adversely impact decisions to install efficient air conditioner and heat pump replacement projects. For this reason, replacements are most likely to occur when units burn out. HVAC contractors and suppliers are positioned to effectively intercede on behalf of the program to encourage multifamily properties to install efficient equipment when systems are replaced.

6.4. Additional Process Evaluation Recommendations

The following summarizes additional recommendations and associated findings of the process evaluation of the CommunitySavers Program:

- Provide guidance to direct install subcontractors on how to handle cases where residents refuse program measures. Direct install subcontractors reported differences in procedures for how to handle cases where tenants refuse program measures. Although these differences were minor, staff should consider providing guidance on how these procedures will be handled to ensure consistency.
- Provide guidance on training of direct install subcontractor new hires. Direct install subcontractors reported differences in procedures for training of new staff performing program work. Communication of procedures for training new hires should help to ensure that program procedures are consistently followed.
- Clarify how to properly install dirty filter alarms in the program training materials. Ride alongs during direct install projects found that dirty filter alarms were installed incorrectly. Program staff reported that the practice has been corrected, but this is not currently covered in the training presentation and should be to prevent future incorrect installations.
- Include recommended thermostat settings in the tip sheet. The program tip sheet reminds participants to program thermostat setbacks for sleeping and working hours. Providing additional information on ENERGY STAR recommended temperature settings may be beneficial to maintaining energy savings from this measure.

Appendix A: ICF Program Manager Interview Guide

Roles and Responsibilities

1. To begin with, can you tell me a little bit about your role?
2. Do you support other programs or clients?

Program Management

3. Are there ICF staff other than the Account Manager and the Education Outreach Coordinator that you interact with for this program?
4. Is there support that the program receives from other ICF divisions or departments (e.g., marketing support)?

Program Design and Goals

5. Aside from the numeric kWh and kW goals, are there other intended outcomes of the program?
6. How well do you think the program is designed to meet its goals? Why do you say that?
7. What barriers to energy efficiency in affordable housing do you think the program is addressing well?
8. Are there any additional barriers that you think are not currently being addressed well?
9. [IF NOT MENTIONED] To what extent do budgetary concerns limit investments in common areas of the property? What types of multifamily properties are most affected by budget factors?
10. Are there any portions of the multifamily low-income market that you think the program could reach better?
    a. (If any) What changes are needed to address those opportunities?
11. Is there additional information or other support from Ameren that would help the program achieve its goals?

Internal Communications

12. What, if any, regularly scheduled program communication do you have with other ICF staff regarding the program?

Communication with Utility

13. What, if any, regularly scheduled program communication do you have with Ameren regarding the program? Anything else?
14. Do you have informal communications with any Ameren staff regarding the CommunitySaver program?

Trade Allies & Other Program Partners

15. Now I have a few questions about the program partners and subcontractors for the program.
    a. Do the direct install contractors have any role in recruiting property managers?
    b. Have there been any quality of work, customer relations, or other issues with the firms? How have these been addressed?
    c. Do you have a contractor manual that guides the work these contractors do during DI?
16. Do you have a set list of contractors that provide the SBDI lighting measures?
17. Does the program work with other groups of trade allies to deliver the heating/cooling measures or custom/standard measures?
18. Can you tell me about the process by which contractors are assigned work?

Marketing

Now, I'd like to hear about marketing activities for the program.

19. What marketing and outreach activities do you think are most important for driving program activity?
20. Can you speak about the programs outreach efforts to various stakeholder groups (e.g., community development corporations, community housing agencies)?
21. Has the program solicited any earned media such as releasing press releases?

Participation Process

22. What documentation is collected to verify that a property meets the income eligibility requirements?
23. The eligibility requirements state that LIHTC recipients are only eligible to the extend allowed under the law. Are they only eligible for in-unit measures?

24. If an owner/manager calls the main telephone number or uses the email, who do they get?

25. The program works with managers and operators. Are managers typically authorized to make decisions about efficiency improvements? Does that authority only cover low-cost and no-cost measures?

Tracking & Reporting

26. My understanding is that program is currently using a paper based process with project information being input manually into the tracking database is that correct?

27. How well is the current tracking and reporting process working to meet your needs for managing the implementation of the program?

28. My understanding is that 5% of direct install units are inspected each quarter and that 5% of complexes receiving AC tune-ups are inspected. Can you tell me about that process?

29. Which staff at ICF review data entry?

30. What types of quality issues have been identified? How were they resolved?

Conclusion / Wrap Up

31. What would you say are the greatest strengths of the program?

32. What would you say most needs to be changed about the program?

33. Are you aware of opportunities to streamline any of the program activities? If so, which activities, and what changes would you like to see, and what would have to occur for those changes to be implemented?

34. Is there anything else about the program that we have not discussed that you feel should be mentioned?

35. Is there anything in particular that you are interested in learning about from the evaluation?

Appendix B: ICF Education and Outreach Coordinator Interview Guide

Roles and Responsibilities

1. Can you tell me about your role and responsibilities as the Education and Outreach Coordinator?
2. Do you support any other efficiency programs?
3. Do you think ICF's current staffing is sufficient for supporting the implementation needs of the program?

Program Management

4. Are there ICF staff other than the program Manager and the Account Managers that you interact with for this program?
5. Do you have interactions with Ameren staff? What is the purpose of these interactions?

Program Design and Goals

6. In your view, what are the objectives of the education and outreach component of the program?
7. How well do you think the program is designed to meet these objectives? Why do you say that?

Educational Process

8. My understanding is that the first step in meeting the programs educational goals is to hold a town hall style meeting. Is that correct?
    a. Are these always held? When might such a meeting not occur?
    b. Do these tenants receive any handouts? Which ones?
    c. What share of tenants typically attend?
        i. How is their attendance tracked and recorded?
9. The second step is to try to reach tenants during the DI process, correct?
    a. The program manual says that these tenants are enticed with gift cards, snacks, or other promotional material. Can you clarify how that works?
    b. What information do you discuss with tenants reached during the DI process?

c. Do these tenants receive handouts?

d. What share of tenants are typically reached this way? If the tenant attended a town hall, you do not provide the one on one communication correct?

10. Do you have a sense if the one-on-one or the town hall meeting format is better at engaging tenants?

11. Have there been any properties where the program hasn't met the 85% KPI target?

Measure Installation Process

12. How often are you onsite during the installation of the measures?

13. Can you describe your activities during the installation process?

14. Can a tenant refuse the measures? Has this happened while you were present? How was it handled?

15. What information is given to contractors and how?

16. What records/documentation are they required to submit?

Conclusion

17. What would you say are the greatest strengths of the program?

18. What would you say most needs to be changed about the program?

19. Is there anything else about the program that we have not discussed that you feel should be mentioned?

Appendix C: ICF Account Manager Interview Guide

Roles and Responsibilities

1. How would you describe your role in delivering this program? What are the key functions that you perform?
2. About what percent of time is spent on various functions?
3. A second account manager was hired correct?
    a. When did this person start?
    b. Are your roles the same or do they differ?

Program Management

4. Who do you interact with at ICF? What is the purpose of those interactions?
5. Do you have interactions with Ameren staff? What is the purpose of these interactions?

Program Design and Goals

Now I'd like to hear about program goals, and the types of properties it works with.

6. How well do you think the program is designed to meet its goal of making efficiency improvements to common areas of the properties? Why do you say that?
    a. [If indicates any issues:] What particular issues or concerns do you have about the design of the programs?
    b. [If not obvious] What needs to change to address those concerns?
    c. What might prevent those changes?
    d. How and when might changes to address those concerns occur?
7. What challenges are there in getting managers/owners to from direct install measures to common area improvements?
8. [IF NOT MENTIONED] To what extent do budgetary concerns limit investments in common areas of the property? What types of multifamily properties are most affected by budget factors?
9. Are there any portions of the multifamily low-income market that you think the program could reach better?
10. Is there additional information or other support from Ameren that would help the program achieve its goals?

Project Assistance and Completion Process

11. Now I have a few questions about your role in the participation process. To begin, with how does a property manager or owner typically initiate participation in the program?
12. Who are the decision makers that you need to work with to gain commitment to completing a project? How do you get in touch with them?
    a. Are there any challenges in getting owner approvals?
13. Could you tell me about the process of how measures get identified for installation? Do owners/managers refuse some measures? If so, how is this handled?
14. How often are you onsite during the installation process? What do you do during that time?

Marketing

Now, I'd like to hear about marketing activities for the program.

15. Can you tell me about your outreach activities and the process of recruiting participants?
16. What marketing and outreach activities do you think are most important for driving program activity?
17. What challenges are there in recruiting participants? Are there different challenges for recruiting participants for DI vs. common area improvements?
18. Are there any aspects of the marketing and outreach approach that you think are not currently effective?
19. Has the program solicited any earned media such as releasing press releases? Have these resulted in any success?

Quality Control

Next, I'd also like to hear about tracking and reporting.

20. I would like to talk about quality control and verification. What is your role in quality control and verification of work completed through the program?
21. Can you describe the process for quality control inspections?
22. At what share of properties/units do you verify the measure installations?

Conclusions

23. What would you say are the greatest strengths of the program?
24. What would you say most needs to be changed about the program?
25. Is there anything else about the program that we have not discussed that you feel should be mentioned?

Appendix D: Ameren Missouri Program Manager Interview Guide

Roles and Responsibilities

1. What is your job title?
2. How long have you managed the CommunitySavers Program?
3. Briefly, what are your responsibilities at Ameren Missouri overall, including the management of the program?
4. Has your role changed since the previous cycle?

Program Management

5. I would like to understand how Ameren's staffing for this program is organized. Who do you report to for this program?
6. Do you have any direct reports?
7. Who else at Ameren Missouri do you interact with relating to the CommunitySavers Programs, and what are their roles?
8. What support does the program need from other Ameren Missouri departments or divisions to make it successful?

Program Design and Goals

9. Aside from the numeric kWh and kW goals, are there other intended outcomes of the program?
10. How well do you think the program is designed to meet its goals? Why do you say that?
11. How do program goals and processes differ from the last program cycle?
12. What barriers to energy efficiency in low income multifamily properties do you think the program is addressing well?
13. Are there any additional barriers that you think are not currently being addressed well?
14. Are there any portions of the multifamily low-income market that you think the program could reach better?
15. How, if at all, did the program hiatus since last cycle affect the program?
16. So far, have ICF's efforts met your expectations? If not, in what way do they fall short of expectations

17. What, if any, regularly scheduled program communication do you have with other Ameren Missouri staff regarding the program? Anything else?

Communication

18. What, if any, regularly scheduled program communication do you have with other Ameren Missouri staff regarding the program? Anything else?
19. What, if any, regularly scheduled program communication do you have with ICF regarding the program? Anything else?
20. Do you have informal communications with any ICF staff regarding the CommunitySaver program?

Trade Allies & Other Program Partners

21. What interaction, if any, do Ameren Missouri staff have with trade allies and other program partners?
22. In your view, how well has the outreach and engagement of trade allies and other program partners gone?
23. From your perspective, how well is ICF managing trade allies or other program partners?
24. Do you have any suggestions for ways to improve the program with regard to trade allies and program partners?

Marketing

25. What responsibilities for marketing does …
    a. Ameren Missouri have?
    b. ICF have?
26. What marketing and outreach activities do you think are most important for driving program activity?
27. Are there any aspects of the marketing and outreach approach that you think are not currently effective?
28. What success or challenges are partners and implementers having with developing common area measure projects?

Tracking & Reporting

Next, I'd also like to hear about tracking and reporting.

29. How well is the current tracking and reporting process working to meet your needs?
30. From your perspective, how adequate are ICF's procedures for ensuring quality control?
31. What do you think Ameren's role is in quality control?

Conclusion

32. What would you say are the greatest strengths of the program?
33. What would you say most needs to be changed about the program?
34. Is there anything else about the program that we have not discussed that you feel should be mentioned?
35. Is there anything you are interested in learning from the evaluation of the CommunitySavers Program?

Appendix E: Direct Install Subcontractor Interview Guide

Background

1. To begin with can you briefly tell me about your role in the CommunitySavers Program?
2. How many staff from your company provide services through the program?

Training

3. Has ICF provided you and your staff with any training on the program processes or implementation requirements?
   a. What topics were covered?
   b. Was the information presented clearly?
   c. Was there any aspect of the measure installation process that wasn't covered or could have been covered more clearly?
   d. Is there anything about the training that you received that could be improved?
   e. Is there any additional training that you think your company would benefit from?
4. How many of your staff attended the training provided by ICF?
   a. If a new staff person begins working on program projects, do they receive training from ICF or is that done within your company?

Program Process and Tools

5. Can you tell me about the process through which work is scheduled for your company to perform?
   a. How do you learn of the work?
   b. Are you assigned a date to complete the work on? How much notice do you get?
   c. Is the statement of work provided through the Fulcrum app or through some other means?
   d. Overall, is there anything that you think ICF could improve about the process of scheduling work for your company?
6. Can you tell me about how the Fulcrum app is used during the direct installation process?

a. What information is provided through the app?
b. What information do you record with the app?

7. What is your opinion of the usability of the Fulcrum app in the direct installation process?
   a. Is the app user friendly?
   b. Are there benefits over a paper-based process?
   c. Are there any disadvantages of using the app over a paper based process?
8. Is there any aspect of the description of the work that is to be performed that is unclear?
9. Do tenants ever ask that measures not be installed?
   a. What happens when they do that?
   b. Which measures do they refuse?
   c. What reasons do they give?
10. When completing the installations, do you talk to tenants about how they use energy and/or ways they can save energy?
    a. What sort of discussions do you have?
    b. Does ICF provide guidance on what to discuss with tenants in terms of how to use energy?
11. How often is there a program representative at the site during installation? (Ask them to estimate the percent of time there is a representative onsite during installations)
12. When replacing thermostats, what temperature settings do you set the thermostat to?
    a. Factory default?
    b. Do tenants ever request different settings? How is that handled?
    c. When a programmable thermostat is already installed, do you replace it? Do you set it?
13. Do you replace a faucet aerator if one is already installed? (If yes, do you always replace it?)
14. Overall, are there any tools or resources that ICF could provide you that you think would clarify program guidelines or help you comply with guidelines?

15. Are there any aspects of the process of scheduling of installations, completing the installations, or providing information on the installations that you think could be streamlined?

Program Satisfaction and Tenant Feedback

16. How satisfied are you with the CommunitySavers Program?
17. How satisfied are you with ICF?
18. What type of feedback, if any, do you hear from tenants?
19. Are there any measure types tenants are asking for or that you think would be a good fit for this program that are not included?
20. Do you have any other feedback regarding the CommunitySavers Program?

Appendix F: Property Manager / Owner Survey

Overall Satisfaction

To begin with, please select the number that indicates the degree to which you agree with the following statement:

1. Overall, I am satisfied with the services provided by the CommunitySavers Program.
    a. 1 – Strongly Disagree
    b. 2 – Disagree
    c. 3 – Neutral
    d. 4 – Agree
    e. 5 – Strongly Agree

Awareness

[NOTE: These questions are only asked the first time the contact completes a survey during the program year]

[DISPLAY Q2 IF ADMIN = 1]

2. How did you first learn about Ameren Missouri's energy efficiency improvements for multi-family properties?
    a. At a seminar
    b. At a neighborhood meeting
    c. From a CommunitySavers Account Manager or another program representative
    d. From a search engine (Google, Yahoo, Bing)
    e. Other (Please specify)
    f. Don't know

[DISPLAY Q3 IF ADMIN = 1]

3. Could you briefly describe challenges, if any, you face in making energy efficiency improvements to low income multifamily properties you manage and/or own?

In-Unit Direct Install

[DISPLAY Q4 IF IN_UNIT = 1]

4. What were the main reason(s) for deciding to complete the in-unit efficiency improvements at the property? (Select all that apply) [MULTISELECT]

   a. Improve tenant comfort and satisfaction

   b. Reduce tenant utility bills

   c. Reduce property utility bills

   d. To take advantage of rebates/no-cost efficiency improvements

   e. To replace old or non-functioning equipment

   f. To make the units more attractive to prospective tenants

   g. Some other reason – please describe: _____

   h. Don't know

[DISPLAY Q5 IF COMMON_AREA = 0]

5. In addition to the no-cost energy efficiency improvements offered, did you know that Ameren Missouri also offers financial incentives for making energy efficiency improvements to common areas of your property?

   a. Yes

   b. No

   c. Don't know

[DISPLAY Q6 IF Q5 = 1]

6. How likely are you to complete energy efficiency improvements in the common areas of the property located at [LOCATION]?

   a. 1 – Very likely

   b. 2 – Somewhat likely

   c. 3 - Neither likely nor unlikely

   d. 4 – Somewhat unlikely

   e. 5 - Very unlikely

   f. Don't know

[DISPLAY Q7 ONLY IF Q6 > 3]

7. Why are you unlikely to make energy efficiency improvements in the common areas of your property?

Common Area Direct Install

[DISPLAY Q8 IF COMMON_AREA= 1 OR Q5 = 1]

8. How well did the types of common area equipment for which incentives are offered through the CommunitySavers Program fit your needs?

   a. 1 – Not at all

   b. 2

   c. 3

   d. 4

   e. 5 – Completely

   f. Don't know

[DISPLAY Q9 ONLY IF Q8 < 4]

9. Why did the range of incentivized equipment options for common areas not completely meet your needs?

Energy Audit/Custom/Prescriptive Measures

[DISPLAY IF CUST_STAND = 1]

10. Did a CommunitySavers Program representative provide a free energy assessment of your property?

    a. Yes

    b. No

    c. Don't Know

[DISPLAY Q11 IF Q10 = 1]

11. Using the scale provided, please indicate your agreement with the following statements regarding the program representative that completed the assessment.

	1-Do not agree at all	2	3	4	5-Completely agree	Don't know
a. The representative was courteous and knowledgeable						
b. The assessment was completed efficiently						

c. The assessment was comprehensive						
d. The recommendations based on the energy assessment were appropriate for my property						

[DISPLAY Q12 IF Q10 = 1]

12. Were there any recommended property improvements or equipment replacements that you did not implement?

    a. Yes

    b. No

    c. Don't Know

[DISPLAY Q13 IF Q12=1]

13. Which recommended property improvements or equipment replacements did you not implement and why?

Satisfaction with Field Service Representative

14. Based on your recent experience with the CommunitySavers Program, please rate your level of satisfaction with the Field Service Representative who performed work at your property. Please select N/A if an item is not applicable to you.

	Extremely Dissatisfied	Dissatisfied	Neutral	Satisfied	Extremely Satisfied	N/A
a. On-time arrival for appointment						
b. Appearance (ID badge, uniform, presentability)						
c. Courtesy and professionalism						
d. Willingness to help						
e. Product/service/program knowledge						
f. Preparedness (i.e., came with all tools/parts needed)						

g. Length of time required to perform the installation/service						
h. Quality of the installation / service						
i. Condition in which site was left						
j. Quality of the educational materials left behind						
j. Your overall experience with the field representative						

15. Please use this space to share any additional thoughts on your Field Service representative.

16. Based on this experience, how likely are you to recommend CommunitySavers Program to a colleague?

    a. 1 – Very likely

    b. 2 – Somewhat likely

    c. 3 - Neither likely nor unlikely

    d. 4 – Somewhat unlikely

    e. 5 - Very unlikely

    f. Don't know

Measurement and Verification

17. After your project was completed, did a program representative inspect the work done through the program?

    a. Yes

    b. No

    c. Don't know

[DISPLAY Q18 IF Q17=1]

18. Using the scale provided, please rate your agreement with the following statements:

	1-Do not agree at all	2	3	4	5-Completely agree	Don't know

a. The inspector was courteous						
b. The inspector was efficient						

Customer Satisfaction

19. Ameren Missouri provides a dedicated account manager to assist property managers and owners with completing energy efficiency improvements. During your most recent experience with the CommunitySavers Program, did you have any interactions with an account manager?

    a. Yes

    b. No

    c. Not sure

[DISPLAY Q20 IF Q19 = 1]

20. How satisfied are you with the service provided by your account manager?

    a. 1 – Extremely Dissatisfied

    b. 2 – Dissatisfied

    c. 3 – Neutral

    d. 4 – Satisfied

    e. 5 – Extremely Satisfied

    f. Don't know

[DISPLAY Q21 IF Q20 = "Extremely dissatisfied" or "Dissatisfied"]

21. Why are you dissatisfied with the service provided by the account manager?

22. Thinking about your most recent experience with the program, how satisfied are you with:

	Extremely Dissatisfied	Dissatisfied	Neutral	Satisfied	Extremely Satisfied	Don't know
a. the steps you had to take to get through the program						
b. the energy efficiency improvements made through the program						

[DISPLAY Q23 IF Q22A OR B = 1 OR 2]

23. Please describe the ways in which you were not satisfied with the aspects of the program mentioned above.

24. Have you heard any feedback from tenants about the energy efficiency improvements made?

    a. Yes

    b. No

    c. Don't know

[DISPLAY Q25 IF Q24 = 1]

25. Would you describe the feedback you heard as mostly positive, mostly negative, or mixed?

    a. Mostly positive

    b. A mix of positive and negative feedback

    c. Mostly negative

    d. Don't know

[DISPLAY Q26 IF Q25 = 1 OR 2]

26. What positive feedback have you heard?

[DISPLAY Q27 IF Q25 = 2 OR 3]

27. What negative feedback have you heard

28. How can the CommunitySavers Program implementation team provide you with better service?

Firmographic

29. Does your organization manage, own, or own and manage the property located at [LOCATION]?

    a. Own it only

    b. Manage it only

    c. Both own and manage it

    d. Not sure

Appendix G: Tenant Survey

This survey is about your experience with the energy efficiency improvements made to your home through Ameren Missouri's CommunitySavers® Program.

Please mark your answer to the questions with an **X**.

When you have completed the survey, please mail it using the included stamped and addressed envelope.

1. Our records indicate that the following energy saving improvements were made to your residence through Ameren Missouri's CommunitySavers® Program. Can you confirm that the following improvements were made?

	Yes, this improvement was made	No, this improvement was not made	Don't know
<IMP1>	( )	( )	( )
<IMP2>	( )	( )	( )
<IMP3>	( )	( )	( )
<IMP4>	( )	( )	( )
<IMP5>	( )	( )	( )
<IMP6>	( )	( )	( )
<IMP7>	( )	( )	( )

2. We would also like to know if you have removed and are no longer using any of the equipment that was installed through Ameren Missouri's CommunitySavers® Program.

   For each of the following, please indicate if you have removed and are no longer using that equipment. Also, please write the number of items removed, if applicable.

	No, have not removed equipment	Yes, removed equipment	Number of items removed **(Write Number)**
<MEAS1>	( )	( ) →	_____
<MEAS2>	( )	( ) →	_____
<MEAS3>	( )	( ) →	_____
<MEAS4>	( )	( ) →	_____
<MEAS5>	( )	( ) →	_____
<MEAS6>	( )	( ) →	_____
<MEAS7>	( )	( ) →	_____

→ Go to Page 2

[PASSWORD]

3. Overall, how satisfied are you with the energy efficiency improvements made to your home?
   ( ) Very satisfied → **Go to Q5**
   ( ) Somewhat satisfied → **Go to Q5**
   ( ) Neither satisfied nor dissatisfied → **Go to Q5**
   ( ) Somewhat dissatisfied
   ( ) Very dissatisfied
   ( ) Don't know → **Go to Q5**

4. What improvements are you dissatisfied with and why are you dissatisfied with them?

   _____

   _____

   _____

5. How satisfied are you with the process for making the energy efficiency improvements to your home?
   ( ) Very satisfied → **Go to Q7**
   ( ) Somewhat satisfied → **Go to Q7**
   ( ) Neither satisfied nor dissatisfied → **Go to Q7**
   ( ) Somewhat dissatisfied
   ( ) Very dissatisfied
   ( ) Don't know → **Go to Q7**

6. Why are you dissatisfied with the process?

   _____

   _____

7. How satisfied are you with the information on the improvements made to your home provided through the CommunitySavers® Program?
   ( ) Not aware or any information provided through the program → **Go to Q9**
   ( ) Very satisfied → **Go to Q9**
   ( ) Somewhat satisfied → **Go to Q9**
   ( ) Neither satisfied nor dissatisfied → **Go to Q9**
   ( ) Somewhat dissatisfied
   ( ) Very dissatisfied
   ( ) Don't know → **Go to Q9**

8. Why are you dissatisfied with the information provided?

   _____

   _____

   _____

→ **Go to Page 3**

9. Are you aware of any energy efficiency improvements made to the shared areas (for example, hallways, stairways) of your building through Ameren Missouri's CommunitySavers® Program?
   ( ) Yes
   ( ) No → **Go to Q12**

10. How satisfied are you with the efficiency improvements made to the shared areas?
    ( ) Very satisfied → **Go to Q12**
    ( ) Somewhat satisfied → **Go to Q12**
    ( ) Neither satisfied nor dissatisfied → **Go to Q12**
    ( ) Somewhat dissatisfied
    ( ) Very dissatisfied
    ( ) Don't know→ **Go to Q12**

11. Why are you dissatisfied with the improvements made to the shared areas?

    _____

    _____

12. Would you say that the energy efficiency improvements made to your home have reduced your electricity costs?
    ( ) Yes
    ( ) No
    ( ) Don't know

13. Have you seen any benefits from the energy efficiency improvements made to your home?

    Please mark as many as apply
    ( ) The home feels more comfortable
    ( ) There is less noise from the outside
    ( ) There is less noise from the appliances
    ( ) There have been health improvements
    ( ) The home is safer
    ( ) The appliances and heating or cooling equipment are more reliable
    ( ) Other (Please describe)_____

    ( ) No, I have not seen any benefits
    ( ) Don't know

14. We are performing in-home inspections of the energy efficiency improvements made through the program. If selected, you would receive a $50 gift card to Walmart for an approximately 30 minute visit. Would you be interested in allowing ADM Associates to complete one of these inspections of the efficiency improvements made inside your home?

    ( ) Yes → **Please provide your name and telephone number:** _____
    _____
    ( ) No
    → **Go to Page 4**

15. Do you have any other comments about the Ameren CommunitySavers® Program or the improvements made to your home?

_____

_____

_____

Thank You!

Please use the included stamped and addressed envelope to return the survey

[PASSWORD]

Appendix H: Cost Effectiveness - Critical Technical Data

The following appendix presents the critical technical data used to develop the cost effectiveness test results for the program.

One of the key objectives of the economic modeling was to assure that the analysis was comparable to the Ameren Missouri's planning analysis. This allows Ameren Missouri to compare evaluated results with the expected numbers within the plan. First, the same analysis tool was used, DSMore. Second, the economic and financial assumptions used for developing the model were from Ameren Missouri. Some of those assumptions include:

- Discount Rate = 6.46%
- Line losses = Nonresidential customers 4.84%, 5.72% for M1 residential customers.
- Summer Peak would occur during the 16th hour of a July day on average
- Avoided Electric T&D = $23.03/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.
- Cost Escalation Rate = 2%

The model assumptions are driven by measure loadshapes, which tells the model when to apply the savings during the day. This assures that the loadshape for that end use matches the system peak impacts of that end use and provides the correct summer coincident savings.

A number of portfolio-level costs are reflected in the program-level cost effectiveness analysis. These portfolio-level costs include those for EM&V, education and outreach, portfolio administration, and data tracking. Portfolio costs were allocated by the program's share of the net present value (NPV) of the utility cost test (UCT) benefits. The NPV of the UCT benefits and the apportionment factor are shown in Table H-1.

Table H-1 Portfolio Apportionment Factor

NPV of UCT Benefits	*Apportionment Factor*
$1,656,108	1.39%

Table H-2 summarizes program UCT costs by cost category. The values presented below are inclusive of the allocated portfolio costs.

Table H-2 UCT Program Costs

Administration Costs	*Incentive Costs*	*Other / Miscellaneous Costs*	*Total*
$813,646	$662,104	$12,855	$1,488,604

Each cost test provides a benefit-cost ratio that reflects the net benefit or cost to a specific stakeholder. For example, the Utility Cost Test (UCT) takes into account all program costs and benefits from the utility (or program administrator) perspective, to demonstrate how the program impacts the utility relative to other program stakeholders. If the ratio is less than one, the costs outweigh the benefits; if the ratio is greater than one, the benefits outweigh the costs. Table H-3 below is a summary of benefit and cost inputs for each cost test performed.

Table H-3 Summary of Benefits and Costs Included in each Cost Effectiveness Test[21]

Test	Benefits	Costs
UCT	Perspective of utility, government agency, or third party implementing the program	
	▪ Energy-related costs avoided by the utility, ▪ Capacity-related costs avoided by the utility, including generation, transmission, and distribution	▪ Program overhead costs ▪ Utility/program administrator incentive costs, ▪ Utility/program administrator installation costs
TRC	Benefits and costs from the perspective of all utility customers (participants and non-participants) in the utility service territory	
	▪ Energy-related costs avoided by the utility, ▪ Capacity-related costs avoided by the utility, including generation, transmission, and distribution, ▪ Additional resource savings	▪ Program overhead costs, ▪ Program installation costs, ▪ Incremental measure costs (Whether paid by the customer of utility)

[21] EPA, Understanding Cost-Effectiveness of energy efficiency programs: Best Practices, Technical Methods, and Emerging Issues for Policy-Makers, 2008. http://www.epa.gov/cleanenergy/documents/suca/cost-effectiveness.pdf, pg. 3-2

Test	Benefits	Costs
	▪ Applicable tax credits	
RIM	Impact of efficiency measure on non-participating ratepayers overall	
	▪ Energy-related costs avoided by the utility, ▪ Capacity-related costs avoided by the utility, including generation, transmission, and distribution	▪ Program overhead costs, ▪ Utility/program administrator incentive costs, ▪ Utility/program administrator installation costs, ▪ Lost revenue due to reduced energy bills
PCT	Benefits and costs from the perspective of the customer installing the measure	
	▪ Bill savings, ▪ Incremental installation costs ▪ Applicable tax credits or incentives	▪ Incentive payments, ▪ Incremental equipment costs
SCT	Benefits and costs from the perspective of society	
	▪ Energy-related costs avoided by the utility, ▪ Capacity-related costs avoided by the utility, including generation, transmission, and distribution, ▪ Additional resource savings ▪ Non-monetized benefits (and costs) such as cleaner air or health impacts (not quantified in this analysis)	▪ Program overhead costs, ▪ Program installation costs, ▪ Incremental measure costs (Whether paid by the customer of utility)

The following sections provide a detailed review of the cost test results at the portfolio and program levels.

CommunitySavers Cost Test Inputs and Results

Table H-4 summarizes the key financial benefit and cost inputs for the CommunitySavers Program Utility Costs Test (UCT). Ameren Missouri's avoided cost of energy is $1,656,108 (energy savings). Incentives and overhead totaled $1,488,604 which yields a benefit-cost ratio of 1.11.

Table H-4 Utility Cost Test (UCT) Inputs and Results

UCT Calculations		
Category	*Benefits*	*Costs*
Avoided Electric Production	$954,575	
Avoided Electric Capacity	$549,366	
Avoided T&D Electric	$152,167	
Administration Costs		$813,646
Implementation / Participation Costs		$0
Other / Miscellaneous Costs		$12,855
Incentives		$662,104
Total	$1,656,108	$1,488,604
TRC Benefit - Cost Ratio	1.11	

The TRC test results, shown in Table H-5, reflect the CommunitySavers Program impacts on participating and non-participating customers in the Ameren Missouri service territory. The participant measure costs and overhead make up the total costs of $843,712. The benefits consist of the utility's total avoided costs of $1,656,108, which yields a benefit-cost ratio of 1.96.

Table H-5 Total Resource Cost Test (TRC) Inputs and Results

TRC Calculations		
Category	*Benefits*	*Costs*
Avoided Electric Production	$954,575	
Avoided Electric Capacity	$549,366	
Avoided T&D Electric	$152,167	
Administration Costs		$813,646
Implementation / Participation Costs		$0
Other / Miscellaneous Costs		$12,855
Participant Costs		$17,212
Total	$1,656,108	$843,712
TRC Benefit - Cost Ratio	1.96	

The RIM test reflects the program impacts on utility rates. Table H-6 summarizes key inputs for the RIM test. The net benefits include the avoided utility costs of $1,656,108,

and the costs of $3,865,264. The same costs are included in the RIM, as they are in the UCT; however, lost revenues from reduced energy bills are also included. The financial data for the RIM test yields a benefit-cost ratio of .43. The ratio suggests that rates have potential to increase over time. However, a RIM < 1 does not always mean that rates will increase, in the long term. Energy efficiency programs are designed to reduce the capacity needs of the system, which may increase or decrease rates depending on the level of capital costs saved.[22]

Table H-6 Ratepayer Impact Measure Test (RIM) Inputs and Results

RIM Calculations		
Category	*Benefits*	*Costs*
Avoided Electric Production	$954,575	
Avoided Electric Capacity	$549,366	
Avoided T&D Electric	$152,167	
Administration Costs		$813,646
Implementation / Participation Costs		$0
Other / Miscellaneous Costs		$12,855
Incentives		$662,104
Lost Revenue		$2,376,659
Total	$1,656,108	$3,865,264
RIM Benefit - Cost Ratio	0.43	

Table H-7 summarizes the key financial inputs to the PCT, which reflects the program impacts on the participants. The benefits include the program incentives and energy bill savings, which total $3,038,763. The costs include gross participant costs, totaling $17,212 and yielding a benefit-cost ratio of 176.55.

Table H-7 Participant Cost Test (PCT) Inputs and Results

PCT		
Category	*Benefits*	*Costs*
Bill Savings	$2,376,659	
Incentives	$662,104	
Participant Costs		$17,212
Total	$3,038,763	$17,212
PCT Benefit - Cost Ratio	176.55	

The SCT reflects the program impacts on society; the key financial inputs are displayed in Table H-8. The benefits include the avoided utility costs of $2,077,341 and the costs totaled $843,712. The financial data for the SCT test yields a benefit-cost ratio of 2.46.

[22] EPA, Understanding Cost-Effectiveness of energy efficiency programs: Best Practices, Technical Methods, and Emerging Issues for Policy-Makers, 2008. http: //www.epa.gov/cleanenergy/documents/suca/cost-effectiveness.pdf, pg. 3-6

Table H-8 Societal Cost Test (SCT) Inputs and Results

SCT		
Category	*Benefits*	*Costs*
Avoided Electric Production	$1,212,718	
Avoided Electric Capacity	$685,554	
Avoided T&D Electric	$179,070	
Administration Costs		$813,646
Implementation / Participation Costs		$0
Other / Miscellaneous Costs		$12,855
Participant Costs		$17,212
Total	$2,077,341	$843,712
SCT Benefit - Cost Ratio	2.46	

Appendix I: Glossary of Terms

Adjustments: Modifications on ex ante analysis conditions (e.g. hours of lighting operation) because of observations made by ADM field technicians during the measurement and verification (M&V) on-site visit, which change baseline energy or energy demand values.

Baseline: The projected scenario where the subject project or program was not implemented. Baseline conditions are sometimes referred to as “business-as-usual” conditions. Baselines are defined as either project-specific baselines or performance standard baselines.

Confidence (level): A confidence level is a value that indicates the reliability of a calculated estimate from a sample. A higher confidence level indicates a stronger estimate that is more likely to lie within the population parameter. It is an indication of how close an estimated value derived from a sample is to the true population value of the quantity in question. The confidence level is the likelihood that the evaluation has captured the true impacts of the program within a certain range of values (i.e., precision).

Cost-effectiveness: The present value of the estimated benefits produced by an energy efficiency program compared to the estimated total costs to determine if the proposed investment or measure is desirable (e.g., whether the estimated benefits exceed the estimated costs from a societal perspective). It is an indicator of the relative performance or economic attractiveness of any energy efficiency investment or practice.

Deemed Savings: An estimate of the gross energy savings or gross energy demand savings for a single unit of an installed energy efficiency measure. This estimate (a) comes from data sources and analytical methods that are widely accepted for the particular measure and purpose, and (b) is applicable to the situation being evaluated.

Demand: The time rate of energy flow. Demand usually refers to electric power measured in kW (equals kWh/h) but can also refer to natural gas, usually as Btu/hr., kBtu/hr., therms/day, etc.

Effective Useful Life: An estimate of the median number of years that the efficiency measures installed under a program are still in place and operable.

Energy Efficiency: The use of less energy to provide the same or an improved level of service to the energy consumer in an economically efficient way, or using less energy to perform the same function. “Energy conservation” is a term that has also been used, but it has the connotation of doing without a service in order to save energy rather than using less energy to perform the same function.

Energy Efficiency Measure: Installation of equipment, subsystems or systems, or modification of equipment, subsystems, systems, or operations on the customer side of

the meter, for the purpose of reducing energy and/or demand (and, hence, energy and/or demand costs) at a comparable level of service.

Engineering Model: Engineering equations used to calculate energy usage and savings. These models are usually based on a quantitative description of physical processes that transform delivered energy into useful work such as heat, lighting, or motor drive. In practice, these models may be reduced to simple equations in spreadsheets that calculate energy usage or savings as a function of measurable attributes of customers, facilities, or equipment (e.g., lighting use = watts × hours of use).

Evaluation: The performance of studies and activities aimed at determining the effects of a program. This includes any of a wide range of assessment activities associated with understanding or documenting program performance, assessing program or program-related markets and market operations; any of a wide range of evaluative efforts including assessing program-induced changes in energy efficiency markets, levels of demand or energy savings, and program cost-effectiveness.

Ex Ante: The saving calculated by the implementation contractor, Lockheed Martin, per the TRM. These numbers are developed prior to ADM's analysis.

Ex Post: The savings that have been verified by the EM&V contractor. This includes adjustments for equipment that may not have been installed, calculation errors, and differences in assumptions.

Free Rider: A program participant who would have implemented the program measure or practice in the absence of the program incentive. Free riders can be total (who would have implemented all of the same measures without the incentives), partial (who would have implemented some of the same measures without the incentives), or deferred (who would have implemented the measures, but at some time in the future).

Ex Ante kWh Savings: The estimation of electrical energy (kWh) expected to be saved by implementing energy efficiency measures, calculated by the implementation contractor before measures are enacted and without considering externalities like free ridership and spillovers. Savings are typically reported as annual savings.

Ex Ante Peak kW Savings: The estimation of electrical energy demand (kW) expected to be saved by implementing energy efficiency measures, calculated by the implementation contractor before measures are enacted and without considering externalities like free ridership and spillovers. Savings are typically reported as annual savings.

Ex Post Gross kWh Savings: The estimation of electrical energy (kWh) saved by implementing energy efficiency measures, calculated by ADM, after measures were enacted, and without considering externalities like free ridership and spillovers. Savings are typically reported as annual savings.

Ex Post Gross Peak kW Savings: The estimation of electrical energy demand (kW) saved by implementing energy efficiency measures, calculated by ADM, after measures were enacted, and without considering externalities like free ridership and spillovers. Savings are typically reported as annual savings.

Gross kWh Savings Realization Rate: The ratio of ex post (or "realized") gross kWh savings over ex ante gross kWh savings.

Gross Peak kW Savings Realization Rate: The ratio of ex post (or "realized") gross kW savings over ex ante gross kW savings.

Gross Realization Rate: The ratio of ex post gross energy savings over ex ante gross energy savings

Gross Savings: The change in energy consumption and/or demand that results directly from program-related actions taken by participants in an efficiency program, regardless of why they participated.

Impact Evaluation: An evaluation of the program-specific, directly induced changes (e.g., energy and/or demand usage) attributable to an energy efficiency program.

Interaction Factors: Changes in energy use or demand occurring beyond the measurement boundary of the M&V analysis.

kWh Savings Target: The goal of energy savings for programs and their components set by utility companies before the programs began.

Measure: Energy efficient equipment or service that is implemented to conserve energy.

Measurement: A procedure for assigning a number to an observed object or event.

Measurement and Verification (M&V): The data collection, monitoring, observations, and analysis by field technicians used for the calculation of ex post gross energy and demand savings for individual sites or projects. M&V can be a subset of program impact evaluation.

Metering: The collection of energy-consumption data over time through the use of meters. These meters may collect information with respect to an end-use, a circuit, a piece of equipment, or a whole building (or facility). Short-term metering generally refers to data collection for no more than a few weeks. End-use metering refers specifically to separate data collection for one or more end-uses in a facility, such as lighting, air conditioning or refrigeration. Spot metering is an instantaneous measurement (rather than over time) to determine an energy-consumption rate.

Monitoring: Gathering of relevant measurement data, including but not limited to energy-consumption data, over time to evaluate equipment or system performance. Examples include chiller electric demand, inlet evaporator temperature and flow, outlet evaporator temperature, condenser inlet temperature, and ambient dry-bulb temperature and relative

humidity or wet-bulb temperature, for use in developing a chiller performance map (e.g., kW/ton vs. cooling load and vs. condenser inlet temperature).

Net Ex Post kWh Savings: The estimation of electrical energy (kWh) savings from programs or measures after the measures have been installed and after adjusting for possible externalities, such as free ridership and spillovers.

Net Ex Post Peak kW Savings: The estimation of electrical energy demand (kW) savings from programs or measures after the measures have been installed and after adjusting for possible externalities, such as free ridership and spillovers.

Net Savings: The amount of energy reduced based on the particular project after subtracting the negative free ridership effects and adding the positive spillover effects. Therefore, net savings equal gross savings, minus free ridership, plus the summation of participant spillovers, and non-participant spillovers. It is a better estimate of how much energy reductions occurred particularly because of the program incentive(s).

Net-to-Gross-Ratio (NTGR): A factor representing net program savings divided by gross program savings. It is applied to gross program impacts to convert gross program impacts into net program load impacts that are adjusted for free ridership and spillover. Net-to-Gross-Ratio (NTGR) = (1 – Free-Ridership % + Spillover %), also defined as Net Savings / Gross Savings.

Non-participant: A consumer who was eligible but did not participate in the subject efficiency program in a given program year. Each evaluation plan should provide a definition of a non-participant as it applies to a specific evaluation.

Participant: A consumer who received a service offered through the subject efficiency program in a given program year. The term “service” is used in this definition to suggest that the service can be a wide variety of services, including financial rebates, technical assistance, product installations, training, energy efficiency information or other services, items, or conditions. Each evaluation plan should define “participant” as it applies to the specific evaluation.

Peak Demand: The maximum level of metered demand during a specified period, such as a billing month or a peak demand period.

Peak kW Savings Target: The goal of energy demand savings set by the utility company for their program or program component before the program time frame begins.

Portfolio: Either (a) a collection of similar programs addressing the same market (e.g., a portfolio of residential programs), technology (e.g., motor-efficiency programs), or mechanisms (e.g., loan programs) or (b) the set of all programs conducted by one organization, such as a utility (and which could include programs that cover multiple markets, technologies, etc.).

Primary Effects: Effects that the project or program are intended to achieve. For efficiency programs, this is primarily a reduction in energy use per unit of output.

Process Evaluation: A systematic assessment of an energy efficiency program's process. The assessment includes documenting program operations at the time of the examination, and identifying and recommending improvements to increase the program's efficiency or effectiveness for acquiring energy resources while maintaining high levels of participant satisfaction.

Program: A group of projects, with similar characteristics and installed in similar applications. Examples could include a utility program to install energy-efficient lighting in commercial buildings, a developer's program to build a subdivision of homes that have photovoltaic systems, or a state residential energy efficiency code program.

Project: An activity or course of action involving one or multiple energy efficiency measures, at a single facility or site.

Ratepayer Impact Test (RIM): RIM tests measure the distributional impacts of conservation programs from the viewpoint of all of the utility's customers. The test measures what happens to average price levels due to changes in utility revenues and operating costs caused by a program. A benefit/cost ratio less than 1.0 indicates the program will influence prices upward for all customers. For a program passing the TRC but failing the RIM, average prices will increase, resulting in higher energy service costs for customers not participating in the program.

Regression Analysis: A statistical analysis of the relationship between a dependent variable (response variable) to specified independent variables (explanatory variables). The mathematical model of their relationship is the regression equation.

Reporting Period: The time following implementation of an energy efficiency activity during which savings are to be determined.

Secondary Effects: Unintended impacts of the project or program such as rebound effect (e.g., increasing energy use as it becomes more efficient and less costly to use), activity shifting (e.g., movement of generation resources to another location), and market leakage (e.g., emission changes due to changes in supply or demand of commercial markets). These secondary effects can be positive or negative.

Spillover: A positive externality related to a participant or non-participant enacting additional energy efficiency measures without an incentive because of a participant's experience in the program.. There can be participant and/or non-participant spillover rates depending on the rate at which participants (and non-participants) adopt energy efficiency measures or take other types of efficiency actions on their own (i.e., without an incentive being offered).

Stipulated Values: See "deemed savings."

Total Resource Cost Test (TRC): This test compares the program benefits of avoided supply costs against the costs for administering a program and the cost of upgrading equipment. This test examines efficiency from the viewpoint of an entire service territory. When a program passes the TRC, this indicates total resource costs will drop, and the total cost of energy services for an average customer will fall.

Uncertainty: The range or interval of doubt surrounding a measured or calculated value within which the true value is expected to fall with some degree of confidence.

Utility Cost Test (UCT): Also known as the Program Administrator Test (PACT), this test measures cost-effectiveness from the viewpoint of the sponsoring utility or program administrator. If avoided supply costs exceed program administrator costs, then average costs will decrease.