EVERGREEN ECONOMICS

Independent EM&V Audit of the Ameren Missouri PY2016 Program Evaluations

Final Report

July 31, 2017

MichaelsEnergy

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1 Executive Summary

In early 2016, the Missouri Public Service Commission (PSC) approved MEEIA Cycle 2 DSM programs for Ameren Missouri (Case No. EO-2015-0055). All Cycle 2 programs were implemented no later than the second quarter of 2016 and will all terminate no later than February 28, 2019.[1] The MEEIA Cycle 2 Programs are:

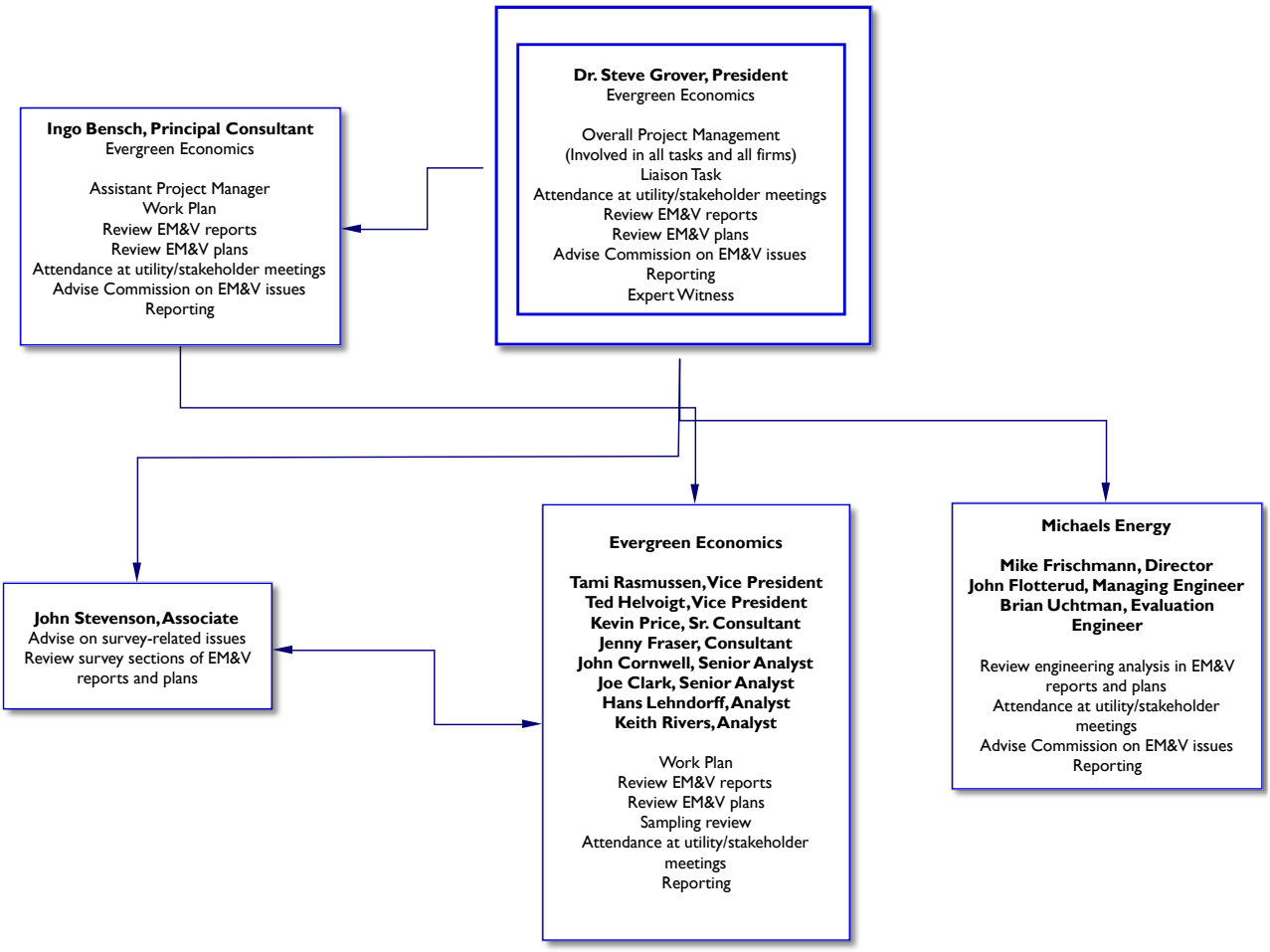
- **BizSavers –** Designed to help businesses identify and implement energy saving projects the BizSavers Program includes the Custom, Standard, Energy Management System (EMS) Pilot, New Construction, Retro-Commissioning, and Small Business Direct Install programs
- **Community Savers –** Provides financial incentives and services to encourage energy efficiency improvements in income-eligible multifamily properties
- **Efficient Products** - Provides incentives to encourage customers to purchase technologies that can save money, improve comfort, and save energy.
- **Efficiency Kits –** Provides energy efficiency kits to residential customers through two separate delivery channels – schools and multifamily property managers
- **Heating and Cooling -** offers customers living in single-family homes, condos, or townhomes incentives for installing high-efficiency central air conditioners, heat pumps, and other heating and cooling measures through participating program contractors.
- **Home Energy Reports -** Provides mailed home energy reports that encourage customers to reduce their energy consumption through behavioral changes
- **Lighting -** Seeks to increase sales of highly efficient LEDs through mainstream retail channels across Ameren Missouri's territory.

Ameren Missouri contracted with two Evaluation, Measurement & Verification (EM&V) contractors, The Cadmus Group, Inc. (Cadmus) and ADM Associates, Inc. (ADM), to conduct comprehensive impact and process evaluations of Ameren Missouri's energy efficiency portfolio for Program Year (PY2016). Cadmus conducted evaluations of the residential energy efficiency programs and ADM conducted evaluations of the energy efficiency programs covering the non-residential sector.

In 2017, the Missouri PSC contracted with Evergreen Economics to serve in the capacity of EM&V Auditor. Figure 1 shows the audit team members and organization, the individual team members by firm, and the associated audit responsibilities.

[1] Some Cycle 2 long-lead projects are expected to continue after February 28, 2019 as a result of the Commission's July 20, 2017 *Order Approving Stipulation and Agreement*.

Figure 1: Evergreen Audit Team Organization



The audit team is required to review program evaluation activities and provide comments on compliance with 4 CSR 240-22.070(8) and the overall quality, scope and accuracy of the program evaluation reports, as well as recommendations to improve the evaluation and reporting process. Key findings of the Evergreen team's review are summarized below.

A review of PY2016 evaluation reports indicates that all evaluation reports are well written, complete, and meet the minimum requirements for impact and process evaluations stipulated in 4 CSR 240-22.070(8). These reports are also generally consistent with the best practices established for the industry. During the course of the audit, we have identified areas where we believe that the evaluations can be improved, and these recommendations are detailed throughout this report.

Cadmus and ADM provided a total of 37 recommendations on ways in which Ameren Missouri can improve its residential and commercial and industrial (C&I) programs going

forward. Nine of these recommendations related to the impact evaluation and 28 recommendations were related to the program processes.

Cadmus and ADM also reviewed previous year recommendations and tracked if the recommendations have been adopted. Of sixteen recommendations tracked from the previous year, fifteen had been adopted.

Our audit conclusions for the PY2016 Ameren Missouri program evaluations are presented below along with recommendations where appropriate for future evaluation work. We discuss several overarching issues first relating to spillover and free ridership, followed by some program-specific recommendations that affect both PY2016 and future evaluation activities.

1.1 Residential Non-participant Spillover (NPSO)

Non-participant spillover comprises a significant share (20 percent) of the total residential portfolio savings, which is higher than what is typically reported for similar residential program portfolios. Due to the unusually high amount of NPSO claimed, we believe that more supporting information needs to be provided to confirm that:

1. The NPSO measure is truly energy efficient; and
2. Ameren had a significant influence on the decision to install the measure in question.

Given that the NPSO claimed is very large and the ultimate sample used for the estimate is quite small (less than 30 customers), a significant amount of proof is required to show that these measures should truly be counted as spillover.

We reviewed survey responses for the 27 customers that were used to calculate NPSO and found several issues that argue for a lower spillover number. To qualify as NPSO, the 27 customers who adopted measures that were not incentivized had to meet the following six criteria:

1. They were familiar with at least one Ameren Missouri program, rebate, or discount;
2. At least one element of Ameren Missouri's program marketing and outreach motivated them to adopt the measure;
3. They had a valid reason for considering the adopted measure to be energy efficient;
4. For a "like" measure, they had not received a rebate from Ameren Missouri and had not already tried to receive a rebate from Ameren Missouri, and stated a valid reason why they did not apply for an Ameren Missouri rebate for the measure;
5. They had a valid reason for why they decided to install the measure; and
6. The adopted measure generated electric savings, not gas savings.

In our review, we found several instances of customers that failed one or more of these criteria or had missing or "NA" values but were still assessed as meeting the criteria. In addition multiple responses clearly indicated that measures were adopted for reasons other than saving energy but were still considered to be NPSO, even though it appears that the motivation for adopting the measure was primarily from something other than Ameren Missouri's program and outreach efforts.

We believe that a more stringent process be used in order to qualify for NPSO. To achieve this, we recommend the following:

- **For the questions used to address Criterion #2 (Ameren Missouri influenced the adoption), only responses that said that Ameren Missouri was "very influential" would be counted.** Currently, responses are also given a 50 percent savings if they said Ameren was "somewhat influential", but given all the other factors influencing the decision, we do not believe this is strong enough.
- **Questions and response analysis for Criterion #5 (have a valid reason for adopting the measure) should be changed to count only those respondents that provide a reason relating to energy efficiency (and therefore can more plausibly be considered as influenced by Ameren Missouri)**.

We applied these recommended changes to the current residential NPSO calculations, which reduced 'like' NPSO from 5,050 to 2,988 kWh (a 41% reduction) and 'non-like' spillover from 14,396 to 6,697 kWh (a 53% reduction). Overall, this resulted in a decrease in the total NPSO from 19,446 to 9,685 kWh (a 50% reduction). We recommend that this adjustment be made for PY2016 and that the change in question scoring be continued in PY2017 and beyond.

Additionally, we have the following recommendations for the spillover calculations for all programs:

- **If NPSO is going to be claimed, we recommend that it be allocated evenly across all programs (similar to the recommendation made by the previous auditor) rather than by the current allocation method using a combination of savings and marketing costs**. This should be done for PY2016 and for future program years.
- **For all spillover calculations (participant and non-participant), savings should only be claimed for measures that would qualify for the program**. We recommend this for future evaluations beginning with PY2017.
- **The self-report responses should be done consistently for participant and non-participant spillover for all programs**. Currently, it appears that for the Ameren Missouri influence/importance questions, responses of "very influential" and "somewhat influential" are used in the non-participant spillover, while only the "very Important" responses are used for participant spillover. We recommend that for these questions, only "very influential" responses be used in the scoring

algorithm. We recommend this change be made for all programs beginning in PY2017.

1.2 Residential Free Ridership

A separate but related issue involves how the free ridership scores are calculated from the phone survey responses. For all the residential programs, we believe that the scoring algorithm used is too generous in reducing the level of free ridership. In the Heating and Cooling Program report, for example, across all the response tallies included in Appendix B, only a single respondent was scored as being a 100 percent free rider. When respondents answer "don't know" to one of the free ridership questions, they receive a reduction of 25 percent from their free ridership score, even though this particular response provides no information (and therefore provides no justification for changing the free ridership score). Similarly, when they are asked to rate the importance of the Ameren Missouri rebate (FR7) or the contractor (FR8), if they respond "not very important," the free ridership score is still reduced by 25 percent in both cases. Neither of these responses provides enough information on the influence of the Ameren Missouri program to justify a reduction in the free ridership score.

We recommend that for the free ridership calculations for all programs, the self report scoring algorithm be changed so that 'don't know' and 'not very important' responses have a reduction value of 0 percent. We have made this change for the Residential Heating and Cooling program for PY2016 (where data were available) and recommend that this change be made for all programs beginning with PY2017.

1.3 Individual Program Report Comments

The audit team made several comments on draft versions of the evaluation reports, many of which have been addressed in the final report. A few of the issues that we believe still need to be resolved are discussed below.

BizSavers Program

With the free ridership method, the question "Would you have been financially able to install the equipment or measures without the financial incentive from the BizSavers Program?" may be too restrictive in that customers that answer 'no' are automatically scored as a net participant based solely on their response to a single question. The report should have included a table showing how many of the respondents were scored as net participants based on this question alone. The rest of the respondents (i.e., those that answer 'yes' to the initial question) were then subjected to a battery of questions designed to provide a more nuanced estimate of free ridership, one that has a series of consistency checks. A comparison of the responses to this initial question with the very next question "If the financial incentive from the BizSavers Program had not been available, how likely is it that you would have installed the measure at the location anyway?" should have been included in the report and maybe used in the scoring methodology as a consistency check.

In the revised final report, ADM added tables showing how many of the respondents were scored as net participants based on the question "Would you have been financially able to install the equipment or measures without the financial incentive from the BizSavers Program?" as well as sensitivity analysis of the overall free rider scores if the financial ability screen was removed.

Heating and Cooling Program

The Heating and Cooling Program evaluation reports an early replacement rate of 97.1 percent based on program data. While this value is based on program data, it appears to be very high in comparison with the Ameren Missouri TRM recommended early replacement rate of 14 percent (or 40 percent if the CAC unit is a secondary unit in a CSR project). The high early replacement rate is potentially further problematic because savings for early replacement measures are as much as five times higher than replace-on-burnout measures.[2] If the Ameren Missouri TRM value for early replacement is applied project savings reduce by approximately 69 percent.

Although Ameren reports that the program is specifically targeting early replacements, there are some indications from other parts of the evaluation that the early replacement numbers claimed from the program are too high. Of the ten contractors interviewed, for example, only seven were familiar with the early replacement criteria used for the program. Of these, only one contractor said they used the correct criterion by measuring for a temperature drop across the coil. Similarly, when customers were asked about their reasons for contacting their contractor about their systems, responses such as "system stopped working" (33%) and "system had problems" (37%) are more suggestive of replace-on-burnout systems rather than early replacements. All of this suggests that the early replacement numbers are less than the 97 percent identified in the program tracking data.

Cadmus attempts to correct for some of these issues in the net impact analysis by re-categorizing some of the installations based on their responses to survey questions. This results in a split of 86 percent early replacement and 14 replace-on-burnout. While this is a step in the right direction, it still is much higher than the split assumed in the Ameren Missouri TRM. We also recommend that these types of adjustments be made during the gross impact analysis, rather than as part of the net impact calculations.

[2] The larger number claimed for early replacements also increases the impact estimates substantially compared to a similar HVAC program offered by Ameren Illinois. When the claimed savings from Ameren Missouri CAC measures are compared with the same program in Ameren Illinois, for example, the average savings per measure type for the Missouri program is 2.03 times greater than for the same measures in Illinois. (1,779 kWh average per measure in Missouri versus 875 kWh in Illinois). See *Impact and Process Evaluation of 2015 (PY8) Ameren Illinois Company HVAC Program* by Opinion Dynamics (February 23, 2017).

In future evaluations, we recommend that more verification be done to confirm these units are actually early replacements rather than replace-on-burnout units. This could be accomplished by increasing QA/QC processes for the program to ensure that the contractors are taking temperature readings from the coil and the values are being tracked in the participant tracking data. Additional survey questions for both participants and contractors may also help this effort. Alternatively, the evaluation team could do ride alongs for a sample of projects, confirm the coil temperature readings, and calculate the program share that is early replacements. Another option would be to have a single savings value used for all replacements, which could be calculated as a blend of the early replacement and replace-on-burnout savings values based on the Ameren Missouri TRM.

Early Replacement Cooling Savings

In addition to the number of systems that are categorized as early replacements, we also have an issue with the baseline assumed for these units. For all units, energy savings are calculated as the difference between the energy consumption of the new energy efficient equipment compared to an assumed baseline energy use. For early replacements, the evaluation uses a baseline energy efficiency for early replacement units is based on the load profile of a SEER 7.2 unit, which we believe is too low. The most common baseline efficiency for this type of measure in other jurisdictions is SEER 10.

Cadmus has developed separate baseline assumptions for early replacement and replace-on-burnout scenarios. In each case, the baseline units are assumed to operate identically to the new equipment, but at a lower efficiency level. The evaluation baseline energy use for all HVAC measures is based on an analysis conducted in the 2013 evaluation for this program. As part of that process, Cadmus metered a large set of new central air conditioners (CAC) and air source heat pumps that had been installed during the 2013 program year. This provided the evaluator with an accurate estimate of how much energy consumption the new energy efficient equipment was using.

We believe that the appropriate baseline for early replacement units is the energy use based on a tuned up unit, which is a more reasonable counterfactual scenario than the existing 7.2 SEER baseline currently used in the evaluation. To estimate this baseline, the audit team used the metered energy consumption from the 2013 evaluation for CAC tune-ups for early replacement units. Using these values also brings the savings for CAC retrofits in line with the savings for other jurisdictions.

The result of using this new baseline is a reduction of approximately 10,000,000 kWh or 22 percent of savings for the program.

ASHP And Ductless Heating Savings For Electric Resistance Baseline Replacements

A separate issue for this program relates to using a consistent value of the effective full load hours (EFLH) when calculating the heating savings for air-source heat pumps and

ductless heat pumps. For both measures, the savings were estimated using metered data collected on equipment installed during PY2016. The EFLH was also estimated using the operating efficiency observed during the equipment metering, and the operating efficiency value was lower than the nameplate efficiency of the units.

To calculate the savings, Cadmus used the EFLH related to the lower operating efficiency to the nameplate efficiencies of the new units. Doing this under-estimated the savings for some measures, and increased them for others. For the audit we recalculated the saving for these measures using consistent EFLH (based on the metered operating efficiency) and the assumed operating efficiency of the equipment in the field. This was done by applying the heating seasonal performance factor (HSPF) correction found on p. 69 of the evaluation report. The result of this recalculation is a decrease in savings of approximately 1,000,000 kWh or approximately two percent of total program savings.

ECM fan double counting of continuously operating fans savings

Finally, our review of the savings calculation identified an issue where a portion of the savings relating to ECM's may be double counted. In the evaluation, the savings for ECM fans are based on a 2003 report for the state of Wisconsin and metered data collected during the 2013 evaluation of the Ameren Missouri program. The savings algorithm separates fan use into three components: 1) fan operation when the air conditioner is on, 2) fan operation when the furnace is on, and 3) fan operation to provide circulation when the other HVAC equipment is not in use.

The evaluated savings do not appear to use an operating hours criterion that is consistent with the stated algorithm. Specifically, it appears that the calculations may double count a portion of the ECM savings that is related to both general circulation and ECM use when the furnace is operating. The audit team recalculated the savings using the same methodology, but without the use of the correction factor related to the hours of fan operation that may double count time when the fans are in heating mode. The result is a decrease in savings of approximately 900,000 kWh.

Savings Calculations

When all the changes discussed above are incorporated into the calculations, the savings for the Heating and Cooling Program decrease by 28.1 percent, as shown in Table 1. This includes small changes in savings (0.1%) due to rounding errors between the evaluation and audit calculations. We recommend that these adjustments be made to the PY2016 savings and the changes in impact methodology be adopted in PY2017 and beyond.

Table 1: Heating and Cooling Program Savings Adjustments (kWh)

Measure	Evaluation Gross Savings (kWh)	Audit Recommended Gross Savings (kWh)	% Change
ASHP	11,194,435	9,200,622	-17.8%
Ductless	750,235	698,885	-6.8%
DFHP	70,457	80,020	13.6%
GSHP	4,931,677	4,638,703	-5.9%
CAC	19,776,034	10,446,005	-47.2%
ECM	7,951,222	7,065,055	-11.1%
Total	**44,674,060**	**32,129,292**	**-28.1%**

Home Energy Report Program

For the Home Energy Report Program evaluation report, the comparison between the treatment and control groups in the pre-period should have included a comparison of participation rates in the other Ameren Missouri energy efficiency programs. Differences between the groups in program participation in the pre-period could have affected the savings estimates in two ways. First, if there were differences in program participation rates, then some of the observed savings from the home energy reports in the post-period should have been attributed to the other efficiency programs. Second, the estimate of program uptake in the post-period would also have been affected if there were already unequal levels of program participation in the pre-period (i.e., there was less opportunity for participation in the post-period if there were already unequal levels of participation in the pre-period). Since the evaluation did not use this model to estimate the final savings numbers for PY2016, we recommend that these changes be included beginning with the PY2017 evaluation of this program.

Residential Lighting Program

For the net impacts, 'like' spillover was calculated as the difference between the estimated program-induced lighting sales obtained from 1) the elasticity model, and 2) survey responses from lighting participating retailers and manufacturers regarding program influence. While it may be encouraging that the two methods produced similar estimates of program effects, more justification is needed as to why the entire difference in the estimates should have been credited to the program as spillover.

The evaluator Cadmus indicated that the current free ridership method that is recommended in the Uniform Methods Project (UMP) recommends incorporating information obtained from upstream lighting distributors. While the UMP does

recommend that upstream programs incorporate information from the supply side to estimate net impacts for upstream programs, the guidance provided is a very general recommendation that the supply side be examined – there are no specific details provided in the UMP as to how the supply side actor interview results should be incorporated into a quantitative net impact estimate. While the approach used by Cadmus was generally consistent with the broad outlines contained in the UMP, more justification is needed as to why their specific interview methods and scoring algorithm provided a reliable estimate of impacts.

Energy Efficient Kits Program

For the participant spillover estimates, additional questions should have been asked about some of the larger contributors—particularly smart thermostats (19% of spillover) and refrigerator replacement (13% of spillover)—to determine how much influence the program or Ameren Missouri actually had on these decisions. It may have been that the largest motivating factor was that a new refrigerator was purchased for non-energy related reasons and the old one was simply hauled away as part of the purchase, for example. Questions regarding the influence by Ameren Missouri were already included in the non-participant survey and should have been added here for participant spillover. In both cases, the measures only should have been counted as spillover if the response to the Ameren Missouri influence questions clearly indicated that energy savings was a primary reason for the installation (as opposed to a non-energy related purchase decision) and that Ameren Missouri was very influential to the decision.

Our review did identify one issue with the improper savings calculation for water heater pipe wrap, and correcting the calculation lowers the savings for this measure by 67 percent. The heater pipe wrap algorithm assumes that the heat loss from the pipe decreases by 75 percent based on changing the R-value from 1 to 4. However, the heat loss is proportional to the exterior surface area of the pipe or pipe plus insulation. The current calculation assumes that the circumference of the pipe and the pipe plus insulation are the same, which is incorrect. The Ameren Missouri TRM uses the correct formula that properly accounts for the increased surface area of the pipe once insulation is added. Using the correct algorithm and the other inputs from the evaluation reduces the per unit savings from 26 kWh to 8.6 kWh. The overall impact on the EE Kits Program from this correction is a savings reduction of 3.9 percent. We recommend that this adjustment be applied to the PY2016 savings.

1.3.1 Portfolio Level Findings

The recommended changes to the residential PY2016 program savings estimates are shown in the following tables. Table 2 shows the original energy savings reported by the evaluation while Table 3 shows the energy savings recommended by the audit for each program. Table 4 and Table 5 show similar information for the demand savings.

To summarize, these tables reflect the following changes to residential program savings:

- Nonparticipant spillover for the residential programs is reduced from 19,446 to 9,685 kWh (50% reduction), and evenly distributed across programs;
- Gross savings for the Residential Heating and Cooling Program are recalculated to address the issues described above, resulting in a reduction of gross savings of 28 percent;
- Free ridership is recalculated for the Heating and Cooling Program to reflect our recommended scoring, which increases free ridership by one percent; and
- Efficiency kits program savings is reduced by 3.9 percent to account to the changes to the pipe insulation savings calculations.

Table 2: Evaluation Reported Savings (MWh) – Residential Programs

Program	Ex Post Gross Savings (MWh/Yr)	Participant Net Savings (MWh/Yr)	NPSO (MWh/Yr)	Evaluated Total Net Savings (MWH/Yr)	NTG Ratio
Efficient Products	2,940	2,004	190	2,195	75%
Smart Thermostats	3,732	3,071	130	3,201	86%
Energy Efficiency Kits	5,478	4,212	5	4,217	77%
Heating and Cooling	44,661	40,463	17,977	58,443	131%
Lighting	38,439	24,409	1,144	25,562	67%

Table 3: Audit Recommended Savings (MWh) - Residential Programs

Program	Ex Post Gross Savings (MWh/Yr)	Participant Net Savings (MWh/Yr)	NPSO (MWh/Yr)	Audit Total Net Savings (MWh/Yr)	NTG Ratio	% Change from Evaluated Net Savings
Efficient Products	2,940	2,004	1,937	3,941	134%	80%
Smart Thermostats	3,732	3,071	1,937	5,008	134%	56%
Energy Efficiency Kits	5,264	4,048	1,937	5,985	114%	42%
Heating and Cooling	32,129	28,736	1,937	30,673	95%	-48%
Lighting	38,439	24,409	1,937	26,346	69%	3%

Table 4: Evaluation Reported Savings (MW) – Residential Programs

Program	Ex Post Gross Savings (MW)	Evaluated Net Savings (MW)	NTG Ratio
Efficient Products	0.748	0.537	72%
Smart Thermostats	3.535	2.964	84%
Energy Efficiency Kits	0.995	0.811	82%
Heating and Cooling	30.332	34.088	112%
Lighting	5.782	4.115	71%

Table 5: Audit Recommended Savings (MW) - Residential Programs

Program	Audit Ex Post Gross Savings (MW)	Audit Net Savings (MW)	NTG Ratio	% Change from Evaluated Net Savings
Efficient Products	0.748	1.003	134%	87%
Smart Thermostats	3.535	4.744	134%	60%
Energy Efficiency Kits	0.956	1.087	114%	34%
Heating and Cooling	21.821	20.832	95%	-39%
Lighting	5.782	3.963	69%	-4%

Finally, Table 6 and Table 7 show the overall effect of the audit recommendations on the entire PY2016 program portfolio. As there were no recommended changes for PY2016 for the BizSavers and CommunitySavers, the savings revisions are limited to the residential programs as discussed above. Overall, the recommended changes from the audit result in a reduction of 11 percent for the PY2016 portfolio-level energy savings and 14 percent for demand savings.

Table 6: Summary of Audit Recommended PY2016 Savings (MWh) – All Programs

Program	Ex Post Gross Savings (MWH/Yr)	Total Net Savings (MWh/Yr)	NTG Ratio	% Change from Evaluation Savings
Efficient Products	2,940	3,941	134%	80%
Smart Thermostats	3,732	5,008	134%	56%
Energy Efficiency Kits	5,264	5,985	114%	42%
Home Energy Reports	32,292	32,292	100%	0%
Heating and Cooling	32,129	30,673	95%	-48%
Lighting	38,439	26,346	69%	3%
Residential Total	**114,796**	**104,245**	91%	**-17%**
BizSavers	76,914	75,228	98%	0%
CommunitySavers	2,350	2,350	100%	0%
Non-residential Total	**79,264**	**77,578**	98%	**0%**
Portfolio Total	**194,060**	**181,823**	94%	**-11%**

Table 7: Summary of Audit Recommended PY2016 Savings (MW) – All Programs

Program	Audit Ex Post Gross Savings (MW)	Audit Total Net Savings (MW)	NTG Ratio	% Change from Evaluation Savings
Efficient Products	0.748	1.003	134%	87%
Smart Thermostats	3.535	4.744	134%	60%
Energy Efficiency Kits	0.956	1.087	114%	34%
Home Energy Reports	15.051	15.051	100%	0%
Heating and Cooling	21.821	20.832	95%	-39%
Lighting	5.782	3.963	69%	-4%
Residential Total	**47.893**	**46.679**	**97%**	**-19%**
BizSavers	18.979	18.228	96%	0
CommunitySavers	0.725	0.725	100%	0
Non-residential Total	**19.704**	**18.953**	**96%**	**0**
Portfolio Total	**67.597**	**65.632**	**97%**	**-14%**

2 Introduction

The Missouri Energy Efficiency Investment Act (MEEIA) was passed in 2009, launching a new era for energy efficiency programs in Missouri. The Missouri Public Service Commission (the PSC) adopted four administrative rules (4 CSR 240-3.163, 4 CSR 240-3.164, 4 CSR 240-20.093 and 4 CSR 240-20.094) referred to as "MEEIA rules") to implement MEEIA.[3] MEEIA directs the PSC to permit electric corporations to implement Commission-approved demand side management (DSM) programs, with a goal of achieving cost-effective demand-side savings.

In 2009, the State of Missouri and Ameren Missouri reached an agreement to create Ameren Missouri's suite of residential and commercial energy efficiency programs, which began in 2013 as MEEIA Cycle 1. The MEEIA Cycle 1 programs ended on December 31, 2015, for Ameren Missouri (Case No. EO-2012-0142). In early 2016, the PSC approved MEEIA Cycle 2 DSM programs for Ameren Missouri (Case No. EO-2015-0055). All Cycle 2 programs were implemented no later than the second quarter of 2016, and all will terminate no later than February 28, 2019.[4] The MEEIA Cycle 2 programs are:

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[3] The PSC is currently in the process of revising the MEEIA rules.
[4] Some Cycle 2 long-lead projects are expected to continue after February 28, 2019 as a result of the Commission's July 20, 2017 Order Approving Stipulation and Agreement.
[5] The EMS Pilot Program did not have any projects in PY2016 and is excluded from our analysis.

To ensure that programs comply with Missouri's rules regarding electric utility resource planning, the PSC has long-term resource planning rules that contain requirements for impact evaluations and process evaluations. The goal of the impact and process evaluations is "to develop the information necessary to evaluate the cost-effectiveness and improve the design of existing and future demand-side programs and demand-side rates, to improve the forecasts of customer energy consumption and responsiveness to demand-side programs and demand-side rates and to gather data on the implementation costs and load impacts of demand-side programs and demand-side rates for use in future cost-effectiveness screening and integrated resource analysis."[6]

Key requirements of the evaluations as outlined in 4 CSR 240-22.070(8) include the following:

- Utilities are expected to complete annual full process and impact evaluations for each DSM program.
- At a minimum, impact evaluations should
    1. "develop methods of estimating the actual load impacts of each demand-side program" using one or both of the following methods:
        a. "Comparisons of pre-adoption and post-adoption loads of program participants, corrected for the effects of weather and other intertemporal differences"; and
        b. "Comparisons between program participants' loads and those of an appropriate control group over the same time period".
    2. "develop load-impact measurement protocols that are designed to make the most cost-effective use of the following types of measurements, either individually or in combination: monthly billing data, load research data, end-use load metered data, building and equipment simulation models, and survey responses or audit data on appliance and equipment type, size and efficiency levels, household or business characteristics, or energy-related building characteristics".
    3. Develop protocols to collect data regarding demand-side program market potential, participation rates, utility costs, participant costs and total costs.
- At a minimum, process evaluations should address the following five questions:
    1. What are the primary market imperfections that are common to the target market segment?
    2. Is the target market segment appropriately defined or should it be further subdivided or merged with other segments?

[6] 4 CSR 240-22.070(8) Evaluation of Demand-Side Programs and Demand–Side Rates

3. Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target segment?
4. Are the communication channels and delivery mechanisms appropriate for the target segment?
5. What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation of each end-use measure included in the program?

Ameren Missouri contracted with two Evaluation, Measurement & Verification (EM&V) contractors, The Cadmus Group, Inc. (Cadmus) and ADM Associates, Inc. (ADM), to conduct comprehensive impact and process evaluations of Ameren Missouri's energy efficiency portfolio. Cadmus conducted evaluations of the residential energy efficiency programs and ADM conducted evaluations of the business energy efficiency and multi-family programs.

In 2017, the PSC contracted with Evergreen Economics and Michaels Energy (the Evergreen team) to serve in the capacity of EM&V Auditor to review program evaluation activities. The audit involves verifying compliance with 4 CSR 240-22.070(8) in addition to assessing the overall quality, scope and accuracy of the program evaluation reports. The following report presents the Evergreen team's review of the Ameren Missouri program evaluations for program year 2016 (PY2016).

To conduct this review, the Evergreen team conducted the following activities:

- Reviewed each program's evaluation report in its entirety, including impact, process and cost effectiveness methodologies and results;
- Reviewed the evaluation survey instruments and responses (where available) to confirm the methodologies used were reasonable and consistent with best practices and that reported findings aligned with the data collected; and
- Reviewed specific evaluation tools and methodologies used for calculating program savings, including selected measure-level savings calculations, and survey methods for developing net program impacts.

The remainder of this report presents the results of the PY2016 audit.

3 Impact Evaluation Summary

This section summarizes the key findings and recommendations from the impact evaluations of Ameren Missouri's residential and business energy efficiency program portfolio.

3.1 Summary of Impact Evaluation Methods and Results

The evaluation teams conducted an array of impact evaluation approaches summarized by program below.

Efficient Products Program

In program year (PY) 2016, the Efficient Products Program provided downstream mail-in and online rebates for the following measures:

- ENERGY STAR®-certified room air conditioners (RACs)
- ENERGY STAR–certified heat pump water heaters (HPWHs)
- ENERGY STAR–certified room air purifiers
- ENERGY STAR-certified multi-speed pool pumps
- ENERGY STAR-certified variable-speed pool pumps
- Smart thermostats (selected models)

A total of 10,886 rebates were delivered to Ameren Missouri participants for the Efficient Products Program in PY2016.

Using the Vision database,[7] Cadmus reviewed program-tracking data to identify variables needed for the impact calculations. Cadmus used customer feedback from two online surveys (the first administered directly after the customer received the rebate and the second six months after) to evaluate various aspects of the Efficient Products Program. This feedback included measure and program satisfaction, program free ridership, and demographic and household characteristics. Cadmus estimated gross savings for most program measures using engineering algorithms established in the Efficient Products Evaluation Plan. Cadmus then compared the deemed per-unit savings, provided in the Ameren Missouri TRM, to Cadmus' gross savings estimates.

Energy Efficiency Kits Program

Ameren and ICF International collaborated to implement the PY2016 Energy Efficiency Kits program, which provides energy efficiency kits through two separate delivery channels: schools and multifamily property managers. The school kits provide participating teachers with classroom curriculum and energy savings kits to distribute to

[7] The Vision database is the Ameren Missouri demand side management program tracking system.

their students. The kits contain various home energy efficient products, including one energy-efficient showerhead, one energy-efficient kitchen faucet aerator, one energy-efficient bathroom faucet aerator, one furnace filter alarm, three feet of water heater pipe wrap and four LEDs. Multifamily kits include similar products, with minor differences. Using the Vision database, Cadmus tracked shipments of school kits from Ameren Missouri to the implementer. The Vision database was also used to track shipments of multifamily kits from Ameren Missouri to the one participating program manger. Cadmus used *ex ante* savings values from the Ameren Missouri TRM and the evaluated *ex post* savings to estimate a per-unit gross realization rate for all Energy Efficiency Kits measures.

Our review did identify one issue with the improper savings calculation for water heater pipe wrap, and correcting the calculation lowers the savings for this measure by 67 percent. The heater pipe wrap algorithm assumes that the heat loss from the pipe decreases by 75 percent based on changing the R-value from 1 to 4. However, the heat loss is proportional to the exterior surface area of the pipe or pipe plus insulation. The current calculation assumes that the circumference of the pipe and the pipe plus insulation are the same, which is incorrect. The Ameren Missouri TRM uses the correct formula that properly accounts for the increased surface area of the pipe once insulation is added. Using the correct algorithm and the other inputs from the evaluation reduces the per unit savings from 26 kWh to 8.6 kWh. The overall impact on the EE Kits Program from this correction is a savings reduction of 3.9 percent. We recommend that this adjustment be applied to the PY2016 savings.

Heating and Cooling Program

For the impact evaluation, Cadmus began reviewing program-tracking data that had been recorded in the Vision database in order to identify variables necessary for impact calculations. To update gross kWh savings estimates, Cadmus metered 16 new air source heat pumps and installed home energy monitors on main electrical panels inside the participating households. Furthermore, customers were asked to complete two surveys similar to those sent to solicit feedback on the Efficient Products program. These surveys sought to collect answers to questions regarding measure and program satisfaction, as well as program free ridership and customer demographics. Additionally, numerous contractors and distributors were interviewed to provide information regarding the heating and cooling system market and to inform nonparticipant spillover in Missouri.

Home Energy Report Program

Using a randomized sample of customers, Cadmus assigned 225,000 customers to a treatment group and 75,000 to a control group. Three home energy reports were mailed to the treatment group, which contained information about customers' home energy consumptions with the hope that this would motivate participants to adopt energy-saving home improvements and behaviors. Additionally, Cadmus surveyed the two groups through either telephone or online surveys. Furthermore, due to partial year

implementation of the Home Energy Report Program, Cadmus did not report an annual savings value.

Lighting Program

Using the Vision database, Cadmus reviewed the Lighting reports to ensure all information was collected to inform the impact analysis. Additionally, Cadmus facilitated surveys in high-volume stores to create a sample that represented the greatest number of program sales possible. The purpose of the survey was to record information that would help calculate leakage and nonresidential usage rates, as well as customers' awareness of programs. Additionally, interviews were conducted with various retailers and manufacturers to collect information on the total amount of efficient bulb sales in 2016. Furthermore, using a series of algorithms, Cadmus was able to calculate program LED lighting savings.

CommunitySavers Program

Through a process of reviewing program materials, on-site inspections and interviews with Ameren Missouri staff, the evaluation team was able to collect data for the CommunitySavers program evaluation. In order to collect data on participants' experience and satisfaction with the program, the evaluation team conducted surveys with participating property manager and owners. Furthermore, a tenant survey was also developed, which surveyed tenants of participating buildings to help verify measure installations and develop in-service rates, as well as to provide information on the satisfaction with the measures that had been installed in their buildings and the process of the installation of the measures.

BizSavers Programs

To estimate the programs' *ex post* gross kWh savings and *ex post* gross peak savings, ADM selected a stratified sample of completed projects for each program. Using this sample, ADM performed an estimation of savings using a ratio estimate that allowed the verified and measured sample to accurately calculate the annual *ex post* gross savings for all projects. Upon completion of the sampling, ADM then reviewed each project's incentive measure documentation using the Vision database maintained by Ameren Missouri. Additionally, trained staff conducted on-site visits to collect and verify data at the participants' facilities and implemented energy efficiency measures. Furthermore, interviews were conducted with facility representatives to collect any additional information that would guide the calculation of the *ex post* energy savings.

3.1.1 Portfolio Level Findings

In this section, we provide a summary of the energy savings goals and accomplishments across Ameren Missouri's PY2016 energy efficiency program portfolio, as reported by the evaluation teams. Note that some audit recommendations for revising the PY2016 savings are discussed in Section 6 of this report.

Table 8 and Table 9 show Ameren Missouri's energy efficiency targets, *ex ante* gross values, *ex post* gross values, the evaluated *ex post* net savings (evaluated) and net achievement compared to the targets for energy savings (kWh) and demand reductions (kW), respectively. To ensure clarity, these terms are defined as follows:

- **PSC-Approved Targets:** Annualized savings targets for the residential and commercial and industrial (C&I) sectors.
- ***Ex Ante* Gross Savings:** Annualized savings reported by Ameren Missouri, or calculated using tracked program activity and the Ameren Missouri TRM savings values.
- ***Ex Post* Gross Savings:** Annualized savings calculated and provided by the evaluation team.
- ***Ex Post* Net Savings:** *Ex post* gross savings multiplied by the net-to-gross ratio, accounting for free ridership, participant spillover, and non-participant spillover.
- **Net-to-Gross (NTG) Ratio:** *Ex post* net savings divided by *ex post* gross savings.

Table 8: Ameren Missouri Portfolio Energy Savings in PY2016, MWh

Program	PSC – Approved Targets	Ex Ante Gross Savings	Ex Post Gross Savings	Ex Post Net Savings	NTG Ratio	% of Target Reached
Efficient Products*	6,847	6,671	6,672	5,396	81%	79%
Energy Efficiency Kits	6,194	4,773	5,478	4,217	77%	68%
Home Energy Report	33,750	33,750	NA	NA	NA	NA
Heating and Cooling	31,399	49,539	44,661	58,443	131%	186%
Lighting	24,923	27,810	38,439	25,562	67%	103%
Total Residential Portfolio	**103,113**	**122,543**	**95,250**	**93,618**	**98%**	**91%**
CommunitySavers	5,399	2,099	2,350	2,350	100%	44%
Total Multifamily Portfolio	**5,399**	**2,099**	**2,350**	**2,350**	**100%**	**44%**
BizSavers Custom	59,269	41,568	41,412	39,410	95%	66%
BizSavers Standard	28,652	29,681	31,144	31,712	102%	111%
BizSavers New Construction	4,980	1,838	1,573	1,415	90%	28%
BizSavers RCx	6,742	113	24	24	100%	0.4%
BizSavers SBDI	6,000	2,366	2,762	2,667	97%	44%
Total C&I Portfolio	**105,643**	**75,566**	**76,915**	**75,228**	**98%**	**71%**
Total**	**214,155**	**200,208**	**174,515**	**171,196**	**98%**	**80%**

*Smart thermostat totals are included in the Efficient Products Program. Smart thermostats have an approved energy target of 2,087 MWh and have an *ex post* gross savings of 3,732 MWh.
**Totals may not sum due to rounding

The residential portfolio fell short of the target savings goal, achieving 91 percent of the net savings target. The Heating and Cooling Program had the highest savings relative to its target, surpassing Ameren Missouri's savings target with 186 percent of its goal achieved. In part, the good performance of the Heating and Cooling Program is due to the non-participant spillover allocation approach used in the evaluation. The non-participant spillover approach assigned estimated spillover proportional to a combination of program savings and marketing costs. The Heating and Cooling Program accounted for the majority of marketing expenses in PY2016 (75%). As a result, 92 percent of estimated non-participant spillover was allocated to the Heating and Cooling Program. The Home Energy Report Program evaluation did not calculate a net-to-gross ratio or report annual net savings for the 2016 program year due to the program not beginning until March 1,

2016, missing the summer months when savings are predicted to ramp up. Both the Efficient Products Program and Energy Efficiency Kits Program were unable to reach their targets, achieving 79 percent and 68 percent of their goals, respectively.

The 2016 C&I portfolio fell short of its approved targets, in contrast to the 2015 program year, in which all programs exceeded their targets. Of the five 2016 program areas, the BizSavers Standard Program was the only one to meet its savings target, achieving 111 percent of its goal. All other BizSavers programs significantly missed their target goals, with the Small Business Direct Install (SBDI) Program achieving 44 percent of its goal, the New Construction Program achieving 28 percent and the Retro-Commissioning (RCx) Program achieving the lowest, at 0.4 percent of its target savings.

Similar to Table 8, Table 9 displays approved targets for demand savings. The residential portfolio fell short of demand targets, achieving 97 percent of target savings. The Heating and Cooling Program performed best, achieving 170 percent of demand goals. Both the Lighting and Efficient Products Programs accomplished their goals, achieving 111 percent and 104 percent target savings, respectively. The Energy Efficiency Kits Program fell short of its target savings, obtaining 80 percent of its goal.

The 2016 C&I portfolio underperformed compared to the 2015 program year, achieving 79 percent of its target demand savings. Similar to energy savings (MWh), the BizSavers Standard Program was the only C&I program to accomplish its demand savings goal. Three of the five programs fell significantly below their approved targets; the SBDI, New Construction and Retro-commissioning Programs accomplished 44 percent, 16 percent and 0.2 percent of their targets, respectively.

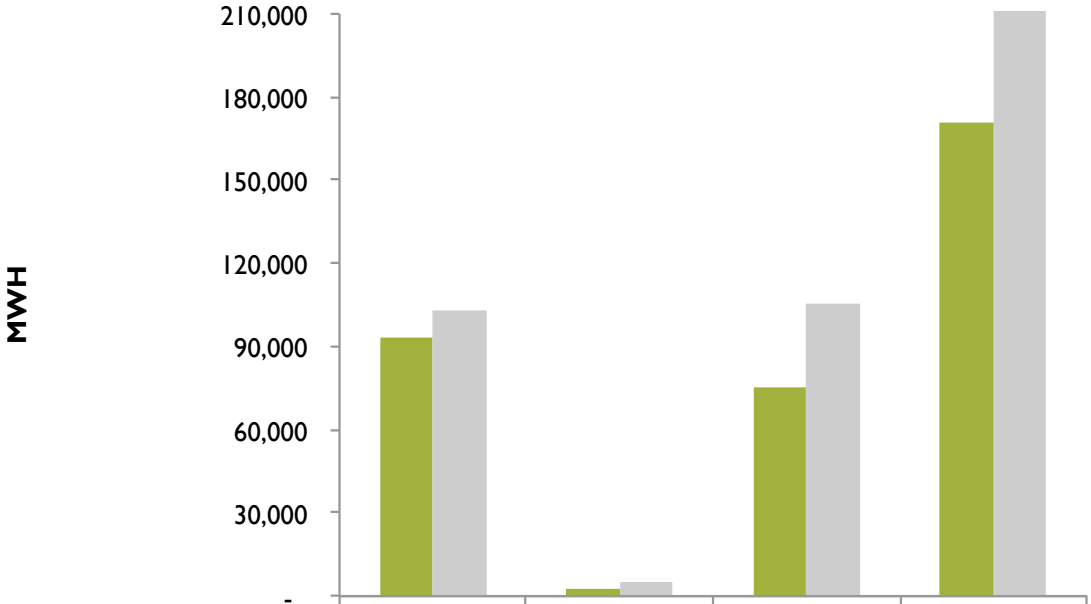
Table 9: Summary of PSC-Approved Targets for Demand Savings, MW

Program	PSC – Approved Targets	Ex Ante Gross Savings	Ex Post Gross Savings	Ex Post Net Savings	NTG Ratio	% of Target Reached
Efficient Products*	3.38	4.244	4.283	3.497	82%	103%
Energy Efficiency Kits	1.017	1.201	0.995	0.81	82%	80%
Home Energy Report	15.72	15.72	NA	NA	NA	NA
Heating and Cooling	20.032	32.578	30.332	34.079	112%	170%
Lighting	3.711	4.151	5.782	4.13	71%	111%
Total Residential Portfolio	**43.86**	**57.874**	**41.392**	**42.515**	**103%**	**97%**
CommunitySavers	1.261	0.6189	0.7246	0.7247	100%	57%
Total Multifamily Portfolio	**1.261**	**0.6189**	**0.7246**	**0.7247**	**100%**	**57%**
BizSavers Custom	13.294	12.185	12.292	11.486	93%	86%
BizSavers Standard	5.544	5.596	5.865	5.971	102%	108%
BizSavers New Construction	1.643	0.347	0.297	0.264	89%	16%
BizSavers RCx	1.528	0.016	0.003	0.003	100%	0.2%
BizSavers SBDI	1.136	0.449	0.522	0.504	97%	44%
Total C&I Portfolio	**23.145**	**18.593**	**18.979**	**18.228**	**96%**	**79%**
Total	**68.266**	**77.086**	**61.096**	**61.468**	**101%**	**90%**

NB: Totals may not sum due to rounding
*Smart thermostat totals are included in the Efficient Products Program. The smart thermostat approved demand target is 1.981 MW and has an ex post gross savings of 3.535 MW.

The following figures present summaries of program achievements in comparison with program goals. **Figure 2** and **Figure 3** display the PY2016 energy and demand savings targets and achievements by sector, as reported by evaluators.

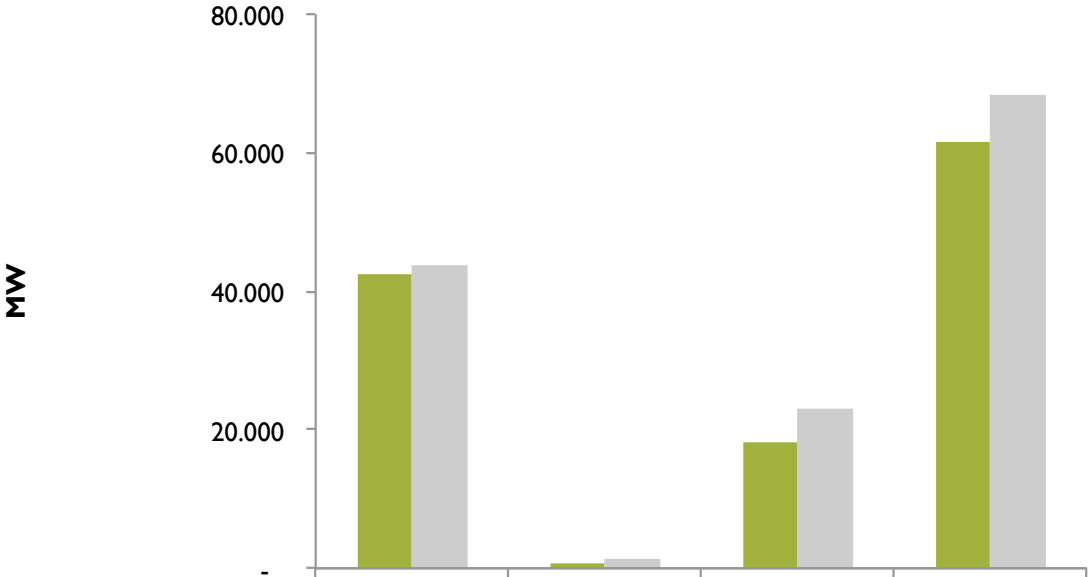
Figure 2: Energy Savings and Achievements by Sector: PY2016 MWh



	Residential	Multifamily	C&I	Total
MWH ExPost Net Savings	93,618	2,350	75,228	171,196
MWH 2016 Target Savings	103,113	5,399	105,643	214,155

The PY2016 portfolio had a target energy savings goal of 214,155 MWh and an actual net savings of 171,196 MWh, equating to approximately 80 percent of the program year energy goal. Although the entire portfolio fell short of the 2016 energy savings target, the Residential portfolio outperformed the Multifamily Residential and C&I portfolios, achieving 91 percent compared with 44 and 71 percent, respectively, of their 2016 energy goals.

Figure 3: Demand Savings Targets and Achievements by Sector: PY2016 MW

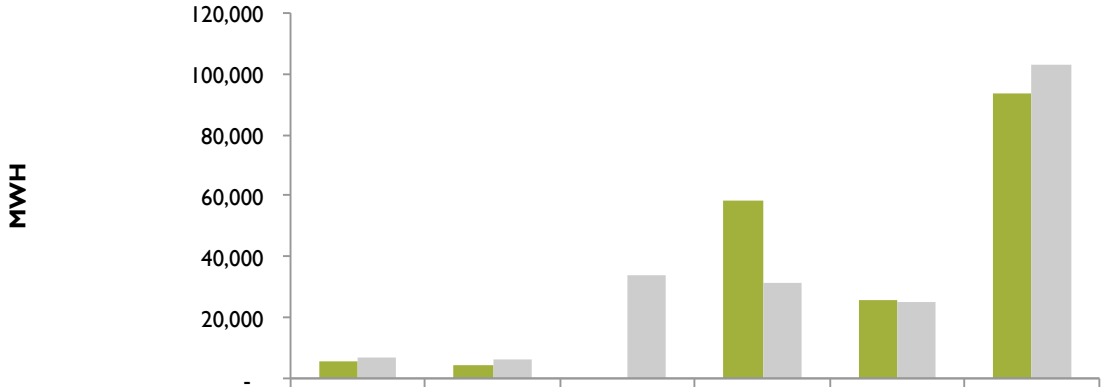


	Residential	Multifamily	C&I	Total
MW ExPost Net Savings	42.515	0.7247	18.23	61.47
MW 2016 Target Savings	43.86	1.261	23.15	68.27

PY2016 had a target demand savings goal of 67.01 MW and an actual net savings of 60.74 MW, equating to approximately 91 percent of the year's demand goal. All three portfolios fell short of their demand goals, with the C&I portfolio achieving 79 percent of the 2016 goal, the Residential portfolio reaching 97 percent of target savings and the Multifamily Residential portfolio achieving 57 percent of its goal.

Figure 4 and Figure 5 present the findings for the 2016 energy target and demand savings goals and accomplishments across all six residential programs.

Figure 4: Residential Programs Planned and Evaluated Savings: PY2016 MWh



	Efficient Products	Energy Efficiency Kits	Home Energy Report	Heating and Cooling	Lighting	Total Residential
MWH ExPost Net Savings	5,396	4,217	-	58,443	25,562	93,618
MWH 2016 Target Savings	6,847	6,194	33,750	31,399	24,923	103,113

*Cadmus did not calculate annual net savings or the NTG ratio for home energy reports due to partial year implementation.

Figure 5: Residential Programs Planned and Evaluated Savings: PY2016 MW

	Efficient Products	Energy Efficiency Kits	Home Energy Report	Heating and Cooling	Lighting	Total Residential
MW ExPost Net Savings	3.497	0.81	-	34.079	4.13	42.517
MW 2016 Target Savings	3.38	1.017	15.72	20.032	3.711	43.86

*Cadmus did not calculate annual net savings or the NTG ratio for home energy reports due to the program beginning on March 1, 2016, missing months in the summer in which peak savings are predicted to occur.

At the portfolio level, the Residential sector fell short of energy and demand savings goals, achieving 91 percent of its net energy savings target of 103,113 MWh, and 97 percent of its net demand savings target of 43.86 MW.

The 2016 Heating and Cooling Program significantly surpassed its energy goal of 31,399 MWh and demand targets of 20.032 MW, achieving 186 percent and 170 percent of the goals, respectively. Furthermore, the Heating and Cooling Program recorded a saving-weighted NTG ratio of 90.6 percent, which was a decrease from PY2015, which had an overall weighted NTG of 111 percent.

The Lighting Program surpassed its 24,923 MWh net energy savings target as specified in Ameren Missouri's residential tariff, achieving 103 percent of its goal, and 111 percent of its net demand savings target of 3.711 MW. Additionally, all measures in the Lighting Program achieved realization rates of between 90 and 96 percent, which compares the evaluated per-unit gross savings to the estimated per-unit gross savings in the Ameren Missouri 2017 TRM.

The 2016 Efficient Products Program did not accomplish its net energy savings goal of 6,847 MWh/year as specified in Ameren Missouri's residential tariff, achieving 79 percent of the target. However, the program exceeded its net demand savings goal of 3.38 MW/year, achieving 103 percent of the target.

Virtually all measures in the Efficient Products Program achieved gross realization rates close to 100 percent, with only two measures not making the 100 percent mark. Those two measures were HPWHs and RACs, achieving realization rates of 88 and 90 percent, respectively. Furthermore, PY2016 saw a 20 percent increase in the overall gross savings realization rate compared to that of PY2015, achieving a 76.1 percent overall savings-weighted NTG ratio.

The 2016 Energy Efficiency Kits Program significantly missed its net energy and demand savings goals of 6,194 MWh and 1.017 MW, achieving 68 percent and 80 percent, respectively. However, using Ameren Missouri's *ex ante* savings from the Ameren Missouri TRM and Cadmus *ex post* savings, Cadmus estimated the per-unit gross realization rates for the 2016 program measures. For the school kit, energy-efficient kitchen faucet aerators achieved a very high realization rate of 314 percent. Additionally, energy-efficient bathroom faucet aerators and energy-efficient showerheads also achieved high realization rates of 184 and 182 percent, respectively. For multifamily kits, the energy-efficient kitchen faucet aerator achieved a high realization rate of 148 percent. The overall gross savings realization rate for Energy Efficiency Kits, combining both school and multifamily kits, is 132 percent.

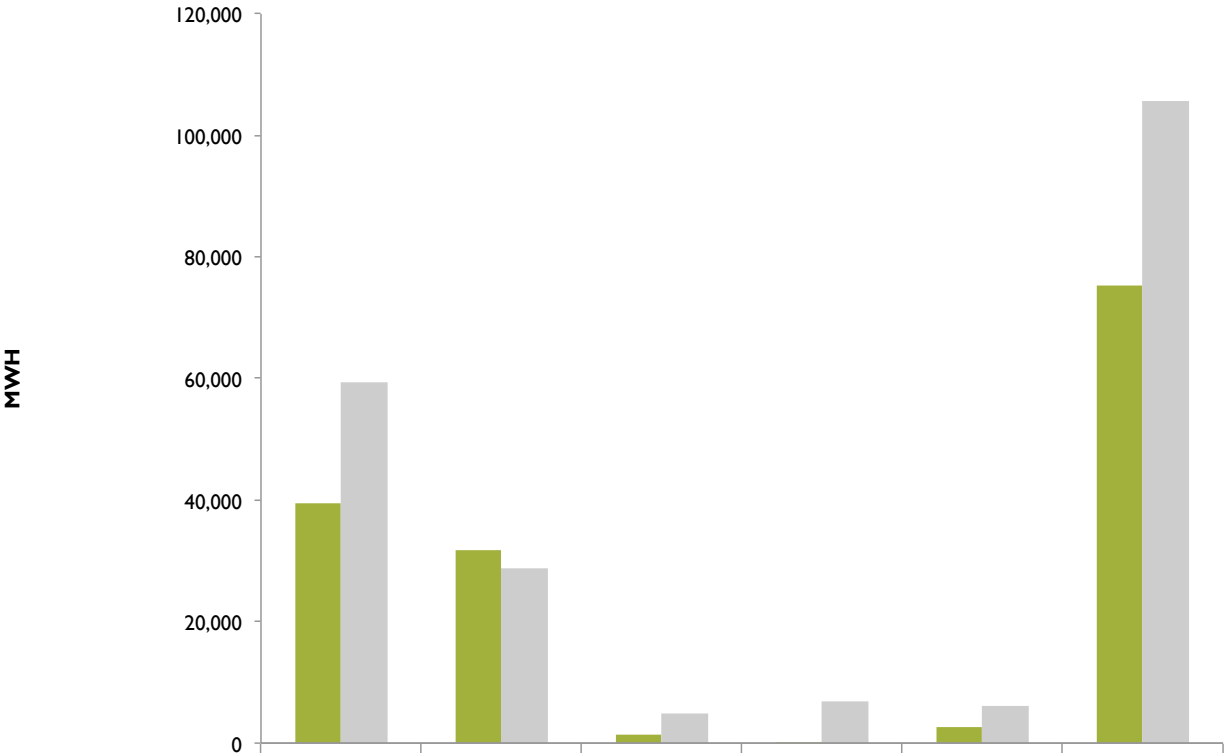
Due to the partial year implementation of the Home Energy Report Program, Cadmus did not report annual savings values for this program. Based on the Ameren Missouri TRM

assumptions, which assume a full program year that includes all seasons, the program is expected to save 150kWh per year per customer. Furthermore, the annual net energy and demand savings targets were 33,750 MWh and 15,720 MWh, respectively.

The PY2016 CommunitySavers Program significantly missed its net energy and demand savings goals of 5,399 MWh and 1.261 MW, achieving 44 percent and 57 percent, respectively. However, a realization rate of 112 percent was achieved for the overall CommunitySavers Program.

Figure 6 and Figure 7 summarize the planned and evaluated savings for each C&I sector program for the 2016 program year.

Figure 6: Planned and Evaluated Savings: PY2016 MWh



	Custom	Standard	New Construction	Retro-Commissioning	SBDI	BizSavers Programs (5)
MWH ExPost Net Savings	39,410	31,712	1,415	24	2,667	75,228
MWH 2016 Target Savings	59,269	28,652	4,980	6,742	6,000	105,643

*No EMS Pilot Program projects were completed during PY7 (2016).

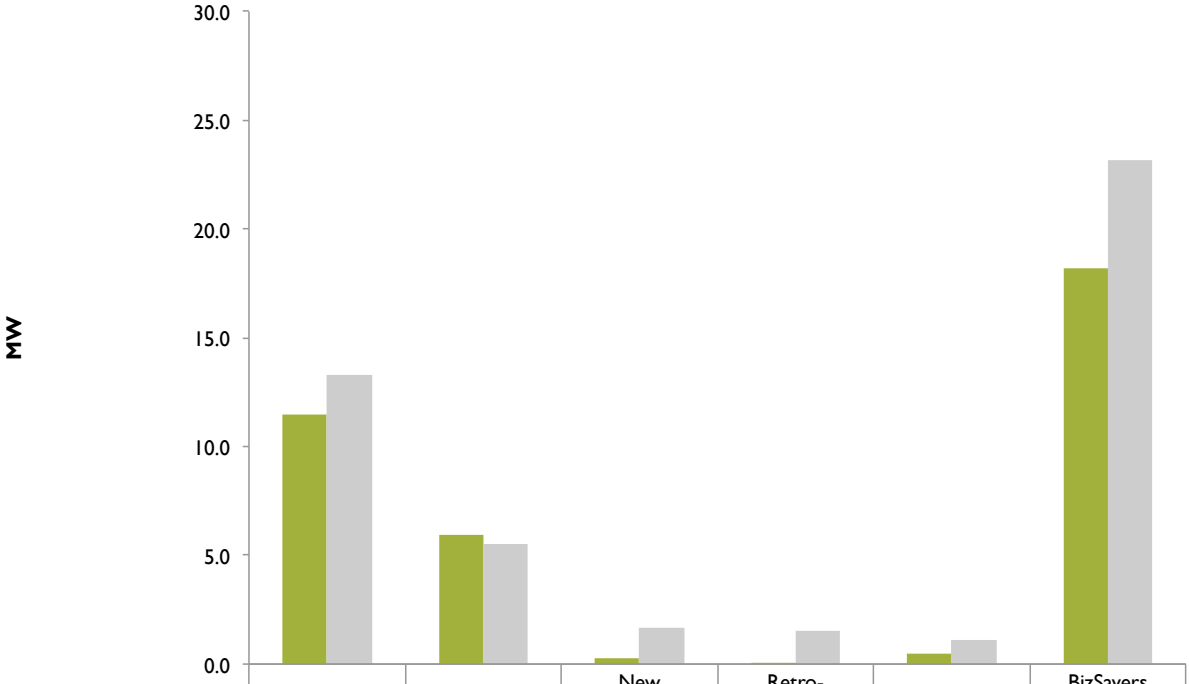
The BizSavers Program is comprised of five separate programs: the Custom Program, Standard Program, New Construction Program, Retro-commissioning Program and the Small Business Direct Install (SBDI) Program.[8]

Based on the five active programs, the C&I portfolio had a target savings goal of 105,643 MWh, of which 71 percent of the goal was achieved. The Standard Program performed the best among the five programs, achieving 111 percent of its net energy target savings. The Custom Program had an energy savings target of 59,269 MWh and an *ex post* net MWh savings of 39,410, accounting for only 66 percent of its 2016 target. Three BizSavers programs significantly missed their targets: SBDI, New Construction and Retro-commissioning, which achieved 44 percent, 28 percent and 0.4 percent of their goals, respectively.

The Custom Program accounts for the largest portion of the 2016 overall target savings, accounting for approximately one-half (52 percent) of the C&I portfolio savings. However, the program fell short of its C&I portfolio target of 56 percent. The Standard Program also accounts for a large portion (42 percent) of total savings, which was greater than its target of 27 percent.

[8] The EMS Pilot Program had no projects in PY2016 and is excluded.

Figure 7: BizSavers Planned and Evaluated Savings: PY2016 MW*



	Custom	Standard	New Construction	Retro-Commissioning	SBDI	BizSavers Programs (5)
MW ExPost Net Savings	11.5	6	0.264	0.003	0.504	18.2
MW 2016 Target Savings	13.3	5.5	1.6	1.5	1.1	23.1

*No EMS Pilot Program projects were completed during PY2016.

Based on the five BizSavers programs that were active at the time of the evaluation, the C&I portfolio had a target savings goal of 23.145 MW, of which 79 percent of the goal was achieved. The Standard Program performed the best among the five BizSavers programs, achieving 108 percent of its net energy target savings.

The Custom Program accounts for approximately two-thirds of the overall demand net savings, which surpassed the target of 58 percent. The Standard Program accounted for the second largest percentage of savings, at 33 percent, surpassing the goal of 24 percent.

3.2 Summary of Key Impact Evaluation Recommendations

3.2.1 Recommendation Adoption Tracking

A list of PY2015 recommendations and adoption status is included in Table 4.

Table 10: PY2015 Impact Evaluation Recommendation Tracking

EM&V PY2015 Recommendations	Program Response
To improve the *ex ante* calculation for ENERGY STAR® ice machines, the program implementer should consider collecting information on the efficiency of the replaced ice machine and baseline data.	The recommendation is no longer applicable, since ENERGY STAR® ice machine incentives are not offered under the Standard Program during PY7 (2016).
The program implementer should consider revising implementation protocols to improve the accuracy of the measure-level "Unit" data field. The inconsistencies are easily identified, as the quantity of units is often a value of one with conspicuously high kWh savings. These weighted values produce uncertainty in measure-level cost effectiveness	The recommendation has been addressed. During PY7 (2016), Standard Program incentives were offered for a number of measures that during previous program years had been incentivized through the Custom Program. For the impacted measures, this change has heightened the usefulness of quantity of units' information in program tracking data. This shift in incentives from the Custom Program to the Standard Program has impacted the distribution of savings between the two programs; during PY7 (2016), standard measures accounted for 52 percent of combined custom/standard savings, whereas during PY6 (2015), standard measures accounted for 29 percent of combined custom/standard savings.
The program implementer should consider a solution to improve operational protocols or system technical enhancements that would ensure all project documentation is available in the program tracking system for evaluator review.	During the PY7 (2016) evaluation effort, the evaluation team did not face significant obstacles in obtaining necessary data from the program tracking system. Lockheed Martin created new comprehensive measure-level reports that may be downloaded from the data management system. The comprehensive measure-level reports facilitated the evaluation effort.
To improve the *ex ante* savings estimates for screw-in general illumination lighting, the program team should consider adjusting the baseline wattage as well as the lumen equivalence to align with the federal standard – EISA Act of 2007.	This recommendation was addressed. The wattage of pre-existing incandescent lighting is factored by 0.7 for purposes of *ex ante* kWh savings estimation. The application of this factor provides *ex ante* savings estimates that approximately accounted for EISA 2007 federal lighting regulations.

Future evaluations should not track the presence of incandescent bulbs in the marketplace and instead should adopt the corresponding halogen wattage as the base line for EISA impacted bulbs.	The shelf stocking study in the prior MEEIA cycle showed the majority of stores with no incandescent bulbs but a larger presence of halogen bulbs. However, we have noticed a few isolated retailers with large quantities of incandescent bulbs, and we documented these with photos and forwarded that information to Cadmus.

3.2.2 PY2016 Recommendations

The evaluation team provided the following recommendations, which seek to guide and improve future impact evaluations. To assist readers, we have included the source evaluation document in parentheses where appropriate.

Home Energy Report Program

- Ameren Missouri should consider monitoring savings over time as the Home Energy Report Program matures and consider incorporating new strategies into the program (Home Energy Report, PY2016, p. 47-48).
- The program implementer should consider adding more detail to the home energy report energy savings tips. Customers are interested in the specific return on investment for implementing an energy saving tip which would mean showing not only the savings but balancing the savings against the cost of implementation. This will provide the customer a tangible piece of information that they can track themselves (Home Energy Report, PY2016, p. 1-5).

Lighting Program

- Ameren Missouri should explore conducting a randomized control trial of select promotional activities, in order to determine the level of impact from these activities. A randomized control trial requires that certain participating locations do not engage in the target activity, so that sales can be compared across test and control stores. For some aspects of the program, such as available models and discount levels, it is difficult to construct the control due to retailers' preference to keep stores consistent. However, for promotional activities such as in-store events and product placement, there is the possibility to structure participation to allow for more rigorous analysis of overall impacts (Lighting, PY2016, p. 1-8).

CommunitySavers Program

- Ameren Missouri should include fields in program tracking data for HVAC replacement unit Seasonal Energy Efficiency Rating (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 (CommunitySavers, PY2016, p. 1-4).

BizSavers Program

- To allow for more accurate estimation of energy savings of lighting implemented in lodging facilities, the program implementer should consider allowing applicants to distinguish between guest rooms and lodging common areas (BizSavers, PY2016, p. 1-7).
- The program implementer should consider reviewing the EISA adjustment factor to ensure that the adjustment factor is not incorrectly applied to EISA-exempt incandescent reflector lamps (e.g.: Lamp types ER/BR 30/40 50W or less; BR 30/40 65W and R20 45W or less). These lamps are both EISA 2007 exempt and also DOE 2009 exempt (BizSavers, PY2016, p. 1-7).
- ADM recommended ex-ante savings estimation for projects with multiple HVAC measures rely upon calibrated energy simulation.
- For small projects with a single HVAC measure and/or one or more non-HVAC, non-lighting measure, ADM recommends that *ex ante* energy savings estimation rely upon algorithms in secondary literature (e.g., Ameren Missouri TRM), with energy savings equation variable values determined by facility-specific and equipment-specific information, where appropriate. The utilization of such algorithms may provide more accurate energy savings estimates compared with those provided by deemed estimates such as those found in the Ameren Missouri TRM or those provided by building energy simulation premised upon assumed values rather than facility-specific and project-specific data.
- The Custom and Standard Incentive Application form should be revised to further direct applicants to provide unique lighting operating hours, where applicable.

4 Process Evaluation Summary

This section summarizes key methods and findings from the PY2016 process evaluations of Ameren Missouri's residential and business energy efficiency program portfolio. The first subsection summarizes the process evaluation methods applied by the evaluation team, and includes an assessment of how the process evaluations align with the minimum requirements for demand-side process evaluations set forth by the Missouri Code of State Regulations (CSR). The second subsection reviews the status of the program evaluation recommendations from the PY2015 evaluations. Lastly, the final subsection summarizes the PY2016 process evaluation overall findings and recommendations.

In general the audit team found that the process evaluations were thorough and followed best practices established for the industry. As noted below, the process evaluations were generally able to provide substantive answers to the required CSR questions. One possible area for improvement is to conduct additional non-participant customer surveys, which we recommend for PY2017. Currently the non-participant surveys are mostly focused on determining spillover for the impact evaluation. These surveys could be expanded to supplement the process evaluation and provide additional insights into program participation drivers, market barriers, customer segmentation and the effectiveness of program outreach and marketing efforts.

4.1 Summary of Process Evaluation Methods and Alignment with Missouri CSR Minimum Requirements

The residential and C&I program evaluations adopted a wide range of process evaluation methods. Table 11 below summarizes the process evaluation methods applied for each program.

Table 11: Process Evaluation Method Summary

Program	Methods	Description
Efficient Products	Tracking Data Review	Determined completeness of Vision database
	Stakeholder Interviews	Interviews with two program stakeholders from Ameren and ICF International
	Participant Surveys	Two online surveys with 1,223 participants
	Retailer Interviews	Interviews with 15 retailer staff
	Marketing Material Review	Marketing material and strategy review
Energy Efficiency Kits	Stakeholder Interviews	Interviews with five program stakeholders from Ameren Missouri, ICF International and the National Energy Foundation (NEF)
	School Administration Interviews	Interviews with eight teachers to understand motivations for participation in and awareness of the program
	Student Participant Surveys	Online surveys with 404 school kit participants (12.5% of population)

Program	Methods	Description
	Marketing Material Review	Marketing material and strategy review
Heating and Cooling	Tracking Data Review	Determined completeness of Vision database
	Stakeholder Interviews	Interviews with four program stakeholders from Ameren and ICF International
	Participant Surveys	Two online surveys with 1,044 participants
	Non-Participant Surveys	Telephone survey with 200 non-participant Ameren customers to calculate non-participant spillover (NPSO)
	Contractor Surveys	Interviews with 10 contractors
	Marketing Material Review	Marketing material and strategy review
Home Energy Report	Tracking Data Review	Determined completeness of Vision database
	Stakeholder Interviews	Interviews with two program stakeholders from Ameren and ICF International
	Customer Surveys	An online survey (n=815) and telephone survey (n=360) with Ameren customers in treatment and control groups
Lighting	Tracking Data Review	Determined completeness of Vision database
	Stakeholder Interviews	Interviews with four program stakeholders from Ameren and ICF International
	Store Intercept Surveys	458 completed surveys at 29 retail locations
	Retailer / Manufacturer Interviews	Interviews with eight representatives of retailer-manufacturer partnerships that accounted for 84 percent of PY2016 sales
BizSavers (Custom, Standard, New Construction, RCx, and SBDI Programs)	Program Staff Interviews	In-depth interviews with two Ameren Missouri and six Lockheed Martin staff
	Program Document Review	Review of key program documentation and databases
	Participant Surveys and Interviews	Online survey with 240 Standard and Custom Program participants and telephone survey with 93 non-participants; Fifty-six telephone interviews with "near-participants" in Standard and Custom Programs (10); SBDI Program participants (10); New Construction Program participants (6); trade allies for all programs (20); SBDI Program service providers (10)
CommunitySavers	Tenant Survey	Mail survey of 132 tenants aimed at understanding program experiences and satisfaction
	Participant Online and telephone Survey	Survey with 17 property managers to understand program experiences and satisfaction with the program
	Program Staff Interviews	In-depth interviews with one Ameren Missouri and three ICF International staff members

Program	Methods	Description
	Subcontractor Interviews	Three in-depth subcontractor interviews aimed at understanding training sufficiency, program procedures, and description of interactions with tenants and program staff
	Site Visits	Nineteen site visits (three ride-along visits and 16 post-install visits)

The Public Service Commission set minimum requirements for the program process evaluations in 4 CSR 240-22.070(9).[9] At a minimum, process evaluations should answer the following five key questions:

- **Question 1:** What are the primary market imperfections common to the target market segment?
- **Question 2:** Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?
- **Question 3:** Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?
- **Question 4:** Are the communication channels and delivery mechanisms appropriate for the target market segment?
- **Question 5:** What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation of each end-use measure included in the program?

Each program evaluation provided a response to all five questions, and the full text response to these questions is provided as Appendix A to this report. Evergreen reviewed each text response to determine if the process evaluations provided a substantive response to each question. Across the program evaluations, we found that most provided a thoughtful, substantive response to each question, although in some cases the response was largely similar or identical to previous year evaluations. Table 12 below presents an assessment of the responses to the five key questions across the program evaluations. For each question, we assign a score of 1, 2 or 3:

- **1** indicates an updated, substantive response clearly linked to process evaluation findings.
- **2** indicates a response that is different from the previous program year evaluation but is not linked to process evaluation findings or is not substantive in nature.

[9] *Rules of Department of Economic Development, Division 240 - Public Service Commission, Chapter 22 - Electric Utility Resource Planning*. 2011. https://www.sos.mo.gov/cmsimages/adrules/csr/current/4csr/4c240-22.pdf

- **3** indicates that the response has not changed at all from the previous year process evaluation.

In general, the evaluations provide substantive, updated responses to the five key questions that are clearly linked to the most recent evaluation findings. On the residential side, the Energy Efficiency Kits, Home Energy Report, and Lighting Programs provide comprehensive, substantive responses to the five key questions. The Heating and Cooling Program responses to questions 1, 2 and 3 are identical to the previous year evaluations. The BizSavers Program evaluation provides comprehensive, substantive responses to all five key questions.

Table 12: Assessment of Response to Minimum Required Process Evaluation Questions

Program	Question 1: Primary Market Imperfections	Question 2: Target Market Segment	Question 3: Diversity of End-Use Needs	Question 4: Communication Channels and Delivery Mechanisms	Question 5: Overcoming Market Imperfections
Efficient Products	2	2	1	1	3
Energy Efficiency Kits	1	1	1	1	1
Home Energy Report	1	1	1	1	1
Heating and Cooling	3	3	3	1	1
Lighting	1	1	1	1	1
CommunitySavers	1	1	1	1	1
BizSavers Programs	1	1	1	1	1

* **1:** updated, substantive linked to process evaluation findings. **2:** different from the previous program year evaluation but is not linked to process evaluation or not substantive in nature. **3:** response has not changed at all from the previous year process evaluation.

4.2 Summary of 2016 Process Evaluation Findings and Recommendations

This subsection present overall program process evaluation findings and evaluator recommendations.

4.2.1 Efficient Products

Program Design

In 2015, the Efficient Products Program provided mail-in and online rebates for eight product categories and two energy kits. In 2016, rebates for water coolers and electric storage water heaters were eliminated, reducing the number of rebated product categories to six. Additionally, the energy kits became the basis for a separate program in PY2016: the Energy Efficiency Kits Program.

In 2016, Ameren Missouri replaced the Efficient Products Program's previous, third-party implementation contractors with ICF International. ICF International processed rebates on Ameren Missouri's behalf and managed the network of retail partners that sold qualifying equipment.

Customer Satisfaction

Customers reported high satisfaction with the Efficient Products Program, according to the evaluator. Across all survey respondents, the Efficient Products Program received very high ratings; 99 percent said they were "very satisfied" or "somewhat satisfied" with the performance of measures that they purchased; 99 percent gave similar satisfaction ratings for the program overall, and 99 percent said they would recommend the program to others. These ratings remained consistent between participants surveyed immediately after receiving rebates and participants surveyed six months later.

Program Participation

In 2016, the Efficient Products Program delivered 10,886 rebates to Ameren Missouri participants. The evaluator found that participants who purchased various measures differed in notable ways, including in their motivations for purchases, the retail channels they used, and their purchase decision-making processes for the various measures. Some key participation findings included:

- Smart thermostats were the most popular measure in the program in 2016, and awareness of smart thermostats arose from the broadest variety of sources.
- Smart thermostats were the only program measure that participants primarily purchased to save energy (63%).
- Seventy-four percent of participants purchasing a smart thermostat knew which model they wanted before going shopping, and overwhelmingly chose Nest and Ecobee models.
- Pool pumps were exclusively installed in single-family homes (100%). Single-family homes with pools tended to be much larger than average homes.

- Over half (59%) of pool pump purchases resulted from replacing a failed or aging pool pump; one-third (33%) cited energy savings as their primary motivation for purchasing a new pool pump.
- Pool pump participants most frequently purchased their equipment from a contractor (38%), and contractors also most frequently served as a source of program awareness (37%).
- HPWHs were almost always installed in single-family homes (99%). Single-family homes with HPWHs tended to be newer than average homes.
- HPWH units often replaced failed or aging equipment (52%), though one-third (34%) cited energy savings as their primary motivation for purchasing a new HPWH.
- Participants purchased 90 percent of HPWHs from retail stores, though contractors installed 48 percent of the units (with stores providing referrals to most of these installation contractors).
- Room air conditioner participants tended to live in smaller, older homes (73% built before 1980). Room air conditioner participants were also the least likely to live in single-family homes (though a majority of room air conditioner participants lived in single-family homes, at 73%).
- Participants purchased nearly half of the Efficient Products measures to replace failed or aging equipment (45%).
- Forty-five percent of participants purchasing RACs stated it was to make their homes more comfortable (45%); only 3 percent of respondents mentioned energy savings as a motivation.
- Participants purchasing RACs were the least satisfied with the rebate amount they received, and surveyed retail staff thought customers would buy ENERGY STAR RACs without the program incentive.
- Participants who purchased room air purifiers primarily purchased room air purifiers to improve home comfort (67%), followed by improving health and safety (14%); few cited replacing failed or aging equipment (9%) or energy savings (6%).

Program Marketing

Ameren Missouri markets the Efficient Products Program directly and through participating retailers, which utilize Ameren Missouri's program marketing materials and co-branded materials. The evaluator reported that program management credited effective marketing campaigns for good program outcomes.

Program Delivery

The evaluator reported the program was delivered according to program design, despite the delay of the PY2016 program's launch. The program manager reported that ICF

International's Vision database performed more smoothly than its previous implementation contractor's database.

Program Implementation Challenges

The evaluator noted the following challenges and areas for future exploration:

- RACs fell far short of PY2016's goal of 1,000 units, rebating only about one-third of that number. ICF International staff reported being surprised by the retail availability of RACs that lacked ENERGY STAR certification. In PY2017, program managers plan to increase this measure's incentive to reverse this trend.
- Program management expressed concerns over high free ridership levels for certain measures. As Efficient Products operates as a downstream retail program, many participants did not learn about program rebates until already shopping for equipment, and the rebate may not be the major influence in product choice.
- The program cycle lagged the filing and evaluation cycles, presenting challenges in updating program design and incentive amounts in a rapidly changing marketplace.

4.2.2 Energy Efficiency Kits

Program Design

The Energy Efficiency Kits Program was a new program in 2016. The program provided energy efficiency kits through two separate delivery channels:

- **School-Based Delivery Channel.** Participating teachers receive classroom curriculum and energy saving kits to distribute to their students.
- **Multifamily Delivery Channel.** This delivery channel provides energy saving kits to property managers of eligible multifamily homes. To become eligible, properties must have three or more rental units with electric water heaters. The property manager (or staff) installs multifamily kit items in each of the property's units.

For the 2016-2018 program cycle, Ameren Missouri contracted with ICF International to implement the program. ICF International implements the multifamily and school-based delivery channels, with support from the National Energy Foundation (NEF) for delivery of the school-based delivery channel.

Customer Satisfaction

The evaluation reported that both teachers and participating families expressed enthusiasm about the school-based delivery channel. Every teacher interviewed would (or already did) recommend the program to other teachers and would participate again in the future. A majority of surveyed families (99% of the 397 families that were surveyed) wanted Ameren Missouri's school-based delivery channel continued in local schools.

Program Participation

The evaluation noted that the program exceeded the participation goal for the school-based delivery channel. NEF implementer staff reported having a waiting list of schools that sought to participate in the program in subsequent years.

Program Marketing

The evaluator found that marketing materials for both school-based and multifamily delivery channels follow best practices; however, some visual elements could be improved (e.g., the school kit fall invite e-mail's design, and the large amount of open space on the multifamily kit brochure).

Program Implementation Challenges

Program stakeholders identified two main challenges to program implementation. First, the initial delivery of the multifamily kit was delayed, hurting its ability to meet program goals in PY2016. ICF International implementation staff admitted it was a challenge to launch the multifamily kit delivery channel at the same time as other programs in the portfolio. Second, program staff said that partnering with gas and/or a water utility is a potential change for the future delivery of this program, stating that it is a challenge to align program years and budgets with other companies.

4.2.3 Home Energy Report

Program Design

The Home Energy Report Program was a new program in 2016. The program provides mailed home energy reports encouraging customers to reduce their energy consumption through behavioral changes and comparing energy consumption in customers' homes to energy consumption in similar houses. Ameren Missouri designed the program so that a sample of residential customers receives home energy reports using a randomized control trial experimental design. The design of the program is similar to other Home Energy Report programs.

Customer Satisfaction

The evaluator reported high customer satisfaction with the Home Energy Report Program, with over 90 percent of surveyed customers in the treatment group reporting they were very or somewhat satisfied. The treatment group customers gave a variety of suggestions regarding program improvements, including suggesting more frequent reports, making reports available via email or online, providing more detail on customer energy usage, adding detail to the energy savings tips (e.g., the typical return on investment for the energy-saving actions in the home energy report), making the reports easier to understand, changing the similar homes comparison, and providing a list of local resources for energy efficiency services.

Program Delivery

The evaluation reported the following findings about aspects of the program that worked particularly well, according to stakeholder feedback:

- The program implementer reported that the draft home energy reports, shared with a panel of Ameren Missouri customers in July of 2016, received a positive response.
- The program manager cited a low opt-out rate (ICF International reported that nine customers opted out of receiving the home energy reports) as a positive sign that customers did not want to opt out of the program.
- The program implementer targeted customers with information about additional relevant Ameren Missouri programs. For example, the fall home energy report publicized smart thermostat rebates to customers most likely to buy a smart thermostat.

Program Implementation Challenges

The evaluation noted the following challenges in the implementation of the Home Energy Report Program:

- The Home Energy Report Program launched later than planned; the first home energy report was sent in August of 2016, later than the initially planned spring launch. The later launch date meant the program missed the summer energy usage peak.
- The report timing was not always optimal. Specifically the program implementer noted that sending the second home energy report in November of 2016 might have been too late to impact the treatment group's energy-saving behaviors during winter. The report's timing, however, was constrained by a strategic decision to not send the home energy report before the November 2016 election.
- The home energy reports did not include a customer-specific progress tracker in PY2016. The program implementer reported that they would in PY2017.

4.2.4 Heating and Cooling Program

Program Design

Ameren Missouri's Heating and Cooling Program provides its residential customers with rebates to install energy-efficient heating and cooling equipment through participating contractors. Between 2015 and 2016, Ameren Missouri made limited changes to the program including removal of the tune-up measure, addition of ductless heat pump measures, a streamlined application process, introduction of an app for tablets and smartphones allowing contractors to submit applications, and hiring a new program implementer, ICF International.

Customer Satisfaction

The evaluator reported that the Heating and Cooling Program was well received by participants and contractors. Eighty-eight percent of participants were very satisfied with the program, and 91 percent of the participants were very satisfied with equipment they installed. Participants most frequently cited energy and costs savings resulting from the installation of new efficient central air conditioners or ground source heat pumps as contributing to their satisfaction with their new, efficient equipment. For participants installing air source heat pumps, energy savings from their new equipment was the second most frequently cited reason for participants' satisfaction with their equipment.

Program Participation

Sixty-nine percent of participants heard about the Heating and Cooling Program from a contractor, and participants most frequently made contact with contractors to resolve technical issues with their existing equipment. Participants also learned about the program via Ameren Missouri's marketing efforts (i.e., 11% from Ameren Missouri mailings, 8% from monthly energy statements, 7% via Ameren Missouri's website), and contacted their contractors for reasons other than addressing maintenance issues (e.g., lowering their energy consumption [33%]; taking advantage of rebates [9%]).

Program Marketing

The evaluator found that the Heating and Cooling Program's marketing effectively promoted the program to its target audience. However, marketing messages focused on highlighting rebate levels, and did not focus on the benefits of upgrading to efficient heating and cooling equipment. Participants pointed to energy savings resulting from installing their new equipment as a key driver of satisfaction with their new equipment. Additionally, participants most frequently recommended that Ameren Missouri increase or improve program marketing, including emphasizing energy savings from installing new equipment.

Program Delivery

The evaluator found that Ameren Missouri's pool of registered contractors effectively promoted and delivered the Heating and Cooling Program to participants.

Program Implementation Challenges

The evaluation reported the following challenges to implementation of the Heating and Cooling Program:

- Keeping the participating contractors' network engaged;
- Not allowing tune-up offers due to the compressed program launch period in PY2016; and
- Potentially missing marketing opportunities at the beginning of the program year.

Other than restarting the Heating and Cooling system tune-up measure in PY2017, stakeholders did not identify additional planned program changes. While they did not anticipate the tune-up measure's rollout to present a significant challenge, stakeholders noted it would require changes to marketing materials, new contractor training and new tools for contractors.

4.2.5 Lighting

Program Design

In 2016, the Lighting Program underwent three key changes:

- Transition to an all-LED program;
- Transition to a new implementer, ICF International; and
- Discontinuation of two minor delivery channels, the coupon channel for small retailers lacking the infrastructure to manage the point-of-sale system; and the social marketing distribution channel that distributed free bulbs to lower-income populations through area food banks.

Customer Satisfaction

The evaluator reported that retail partners understand the program well, with no respondents reporting obstacles to program participation. All eight interviewed retail partners wanted the program to be "bigger" in some way. One respondent noted that while in the past, the program did not approve all SKUs she wanted to offer, in PY2016, most SKUs were accepted. Three respondents requested an increased budget to offer incentives for more products. Another requested the ability to combine program rebates with manufacturer rebates.

Program Marketing

In-store signage and promotional events were the primary marketing activities in 2016 for the Lighting Program. The evaluation reported that between September and December of 2016, ICF International conducted in-store promotions in high-volume retailer locations, averaging 33 promotions per month (per the program manager). Decreased sales targets, decreased incentives as a percentage of the retail price, and a different approach to managing retail partners resulted in less interest in supporting the program from partner retailers and manufacturers. As a consequence, partners placed less emphasis on product placement than during previous program years.

Program Implementation Challenges

According to the evaluator, the program implementer faced several operational challenges in 2016, including:

- Navigating the transition to the ENERGY STAR 2.0 Luminaire Specifications for certification; and
- Monitoring the program's progress during the year. This proved difficult due to invoicing delays, resulting from manufacturers and retailers adjusting to new partnerships and new invoicing processes. Over 45 percent of program sales were not invoiced until the final quarter, although many of those sales occurred in previous quarters. Some sales—including all sales through the online store—were not invoiced in PY2016 and will apply to PY2017.

4.2.6 CommunitySavers Program

Program Design

The CommunitySavers Program provides financial incentives and services to encourage comprehensive energy efficiency improvements in income-eligible multifamily properties. 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 one of the two following tenant income requirements are eligible.

- Reside in federally-subsidized housing units and fall within that program's 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.

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.

The ADM evaluation found that the target market was appropriately defined and offers appropriate measures that cover "all major multi-family end-use needs".

Program Participation

The evaluation reported that, 36 properties and 3,462 tenant units received efficiency measures through CommunitySavers in PY2016. Of these participants the majority benefited from Direct Install efficiency measures that account for 98.5 percent of program savings. Common area incentives only made up 0.4 percent of program savings. 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 Low Income Housing Tax

Credit which disqualifies them from receiving these incentives. The evaluator found that the results indicated that there is potential to increase awareness of these incentives.

Customer Satisfaction

Property managers participating 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 property manager 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.

Surveyed tenants reported generally high satisfaction. 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 programmable thermostats. 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.

Program Marketing

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 was more difficult because of the lack of available listings of such properties.

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.

Program Delivery

The program subcontracts with three firms to complete direct install measures and HVAC tune-ups. 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.

Program Implementation Challenges

The evaluation noted the following key challenges noted by program staff

- Properties that receive the state LIHTC are ineligible for common area measure incentives under state law.
- Property managers and owners face financial constraints that limit investments in energy efficiency.
- The program has not re-established its partnership with Laclede Gas, which limits the program budget.
- The program started late and as a result outreach was not well timed vis-à-vis property budgeting cycles.

The evaluation also reported challenges faced by property managers in making efficiency improvements to their buildings. The challenges they noted are as follows:

- Financialchallenges:Onerespondentnotedthattheymanageafewoldbuildings 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.
- 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.

4.2.7 BizSavers Program

Program Design

The BizSavers Program helps businesses identify and implement energy saving projects. The programs evaluated were:

- **Standard Program:** Prescriptive incentives are made available for purchasing and installing efficient equipment.
- **Custom Program:** Incentives are determined by a custom savings calculation comparing the base case to the efficient case, paid at a rate by technology.
- **New Construction Program:** New construction is incentivized with increased energy efficient design and equipment.
- **Retro-Commissioning Program:** Incentives are based on estimated energy savings. The study incentive is up to 100 percent of the program-approved study cost.
- **Small Business Direct Install (SBDI) Program:** Launched in August of 2016, the SBDI Program assists participants classified under the Ameren Missouri 2M Small General Service electric rate category with energy efficiency measure installation. SBDI incentives are capped at $2,500 per electric account. The service provider purchases and installs the lighting equipment as well as handles the application process.

- **Energy Management System (EMS) Pilot Program:** Launched in 2016, the EMS Pilot Program provides incentives for the installation of EMS equipment and software designed to control, monitor and log real-time energy consumption. Incentives to eligible public and private schools and tax-exempt organizations can cover 50 percent of the total EMS project cost.

Customer Satisfaction

The evaluation reported that participants and trade allies were largely satisfied with the BizSavers offerings, with 94 percent of participants reporting high satisfaction with the overall program. According to the evaluator, participant surveys and interviews showed satisfaction with the range of program-eligible equipment, delivery time for ordered equipment, and the quality of the equipment and the installation. While the evaluator reported that program participants were largely satisfied with program processes, they also reported that a large minority of interviewed trade allies suggested the application process was overly burdensome, requiring information that sometimes was hard to obtain. In addition, more than one-quarter of surveyed participants with custom projects had to resubmit or provide supporting documentation for their applications.

Program Participation

The evaluation noted that program awareness among nonparticipants is less than half the level identified in 2013. This finding could not be attributed to differences in the makeup of the surveyed nonparticipants. The evaluator explained that one possible factor is that awareness previously was assessed in the middle of the program cycle, while the current evaluation assessed it nine months after the program restarted following a three-month suspension. Another possible factor noted by the evaluator is that fewer customers are learning about the program from contractors and vendors, which conceivably could be related to a reduction in the size of the trade ally network and the program's movement away from distribution of printed collateral to trade allies and toward downloadable online material.

Program Marketing

The evaluation thoroughly documented marketing and outreach activities. According to the evaluation, staff reported that marketing and outreach activities closely followed the marketing plan and were going well. Program marketing efforts were focused on informing the general market about program offerings, customer success stories and easy ways to save. Program staff reported they were moving away from the development and distribution of printed case studies and fact sheets and toward greater use of online distribution of program information.

4.3 Summary of Key Process Evaluation Recommendations

Based on the evaluation findings, Cadmus and ADM provided overall evaluation conclusions and recommendations. Table 13 below presents the conclusions and associated recommendations by program.

Table 13: 2016 Program Conclusions and Recommendations

Program	Conclusions	Recommendations
Efficient Products	RAC rebates do not seem to be driving sales of efficient measures. Very few customers who received rebates for RACs knew about the rebate before they were in a store shopping, and they were also the least satisfied with the rebate they received. About half of these participants were replacing failed or aging equipment and only 3% mentioned energy savings as a reason for their purchase. This measure had high free ridership (73%), and accounted for only a fraction of 1% of Efficient Products program net savings.	As already planned by Ameren Missouri, we recommend increasing the incentive for RACs. Additional marketing should also be considered. Program management reported they plan to increase the RAC incentive to $50 for PY17.
	Swimming pool retailers and contractors are crucial for driving participation for pool pump measures. Program records showed that customers usually purchased pool pumps from companies that specialized in swimming pools, while customers purchased most of the other program measures from general retailers.	Track residential pool companies in Ameren Missouri territory, and prioritize developing and nurturing relationships with these companies.
	Successful marketing is important for driving efficient equipment sales. Based on the review of available program documentation, Cadmus found Ameren Missouri's Efficient Products program employs a well-structured marketing strategy, using industry best practices to inform customers—at key times throughout the year—about available incentives for efficient products.	Marketing materials can be improved. The marketing strategy could be further enhanced by incorporating a promotional strategy - using targeted media and engagement tactics - to spur program interest and activity.
		Try to increase awareness of rebates through online retailers (including the websites of local retail stores). The online retail channel accounted for a significant amount of equipment sales (for smart thermostats in particular), though very few participants learned of Ameren Missouri rebates from retailer websites.

	The Efficient Products program currently has limited offerings. The program offered rebates for five types of equipment during PY16. Possible additional equipment that could be rebated, if cost effective, are ENERGY STAR refrigerators, freezers, dishwashers, clothes washing machines, or clothes dryers.	Explore adding rebates for residential kitchen or laundry equipment, if cost effective. The program does not currently offer rebates on any kitchen equipment (ENERGY STAR refrigerators, freezers, and dishwashers) or laundry equipment (ENERGY STAR clothes washers and dryers).
Energy Efficiency Kits	Teachers influence student's completion of the Home Energy Worksheet (HEW).	Encourage teachers to integrate completion of the HEW into their curriculum. Provide examples of how other teachers have successfully encouraged completion of the HEW.
	Teacher interviews and participant surveys found some households had trouble installing certain kit measures such as the efficient showerheads, furnace filter whistles, and pipe insulation wrap.	Include clearer instructions on how to install showerheads, furnace filter whistles, and pipe insulation wrap.
	Schools can participate once per school year, but allowing schools to participate more often may provide them with more opportunities to engage with the program.	Consider options for allowing teachers to choose between fall or spring participation.
	Participants may not have clearly understood that they could return unused kit items. The schools returned none of the school kit items.	Allow schools to return unused kit items, and publicize this option to them.
	School kits are inevitably distributed to non-Ameren Missouri customers. Because it is problematic to verify student account information prior to school kit delivery, some school kits are distributed to non-Ameren Missouri homes.	Consider partnering with a gas or water utility to distribute school kit costs. Partnering with another utility would help mitigate costs of school kits, which are inevitably distributed to non-Ameren Missouri customers.
	Energy Efficiency Kits program marketing material included visual elements that could be improved and the material did not always adhere to the overall Ameren Missouri branding guidelines.	Ensure all marketing material matches Ameren Missouri branding.
Home Energy Report	Ameren Missouri sent fewer HER reports and at non-optimal times of the year. With constraints due to the election and a later start than anticipated, the first and second HER reports were sent out after summer peak energy consumption and, perhaps, after the beginning of the heating season.	Update the HER report schedule. Ameren Missouri could consider sending more HER reports at strategic times of year. For example, it could send HER report in consecutive months during peak energy usage periods and once between peak periods.

	The HER reports do not include a customer-specific progress tracker. Other benchmarked utility programs with demonstrated success do include the customer-specific progress tracker.	Include a customer-specific progress tracker in the HER reports.
	Ameren Missouri's HER program uses a subset of the channels that other utility programs use.	Launch an email channel to deliver HER reports in addition to the mailed version.
	Customers were satisfied with the HER reports but suggested adding more detail.	Add more detail to the HER report energy savings tips. Customers are interested in the specific return on investment for implementing an energy saving tip which would mean showing not only the savings but balancing the savings against the cost of implementation.
	Ameren Missouri's HER report design is internally inconsistent and differs from other utility program HER reports.	Ameren Missouri should consider updating the photos to align with the tip more closely and studying the impact of the HER report design on customer satisfaction and energy savings.
Heating and Cooling	Ameren Missouri's program marketing messages reach its target audience, emphasizing available rebates.	In addition to highlighting rebates, the Heating and Cooling program should emphasize the benefits of efficient equipment and encourage customers to take advantage of the program by calling contractors.
	In approximately 5% to 10% of participating ASHPs, control systems more often than necessary rely exclusively on electric resistance heating at warmer temperatures.	Educate customers about the advantages of operating their heat pumps at the lowest possible temperature.
	The program stipulates complex qualification requirements and uses confusing measure names. Most installed measures incorporate varying incentive levels and qualifying baseline characteristics, even among similar measures. This leads to confusing measure names and participant qualifications.	Clarify measure qualifications and provide comprehensive measure mapping.
	Contractors experience difficulty looking up AHRI numbers, which is a necessary step for participating in the program.	Engage contractors to understand the reasons for their problems with AHRI numbers and take further steps to make the process easier for contractors.

Lighting	Invoicing speed and frequency is an area for improvement.	Cadmus supports the program manager's intention to prioritize faster invoicing in the coming year.
	A focus on more expensive LEDs will make marketing more expensive on a $/bulb basis.	We suggest an emphasis on targeted engagement with retailers to prioritize the aspects of in-store marketing and placement that can have the most impact.
		Ameren Missouri should explore conducting a randomized control trial of select promotional activities, in order to determine the level of impact from these activities.
	Savings from nonresidential usage are near zero, and likely to remain that way.	Make the minor adjustments to savings forecasts needed to account for continued near-zero participation from nonresidential purchasers.
	The increasing prevalence of lower priced, non-program LEDs will likely lead to lower observed changes in demand for program bulbs.	Focusing on retail channels and bulbs that face less direct competition from non-ENERGY STAR LEDs may help reduce free-ridership.
BizSavers		The program implementer should work to increase awareness of the new construction program rules among contractors and vendors.
		The program implementer should consider increasing the size of the trade ally network and re-introduce distribution of printed collateral to trade allies for use in marketing the program to customers.
		Ameren Missouri should consider adding customer type information to its customer database to make it easier for programs to identify any under-served segments and improve reach into those segments and improve assessments of program reach to various business and building types.

4.4 Status Of 2015 Process Evaluation Recommendations

The evaluators tracked and reported Ameren Missouri's response to process evaluation recommendations made in the 2015 evaluation reports. During the audit review we found that ten of eleven recommendations across all programs have been adopted. Table 14 below presents the PY2015 process evaluation recommendations by project and the evaluators' assessment of Ameren Missouri's response.

Table 14: PY2015 Process Evaluation Recommendation Tracking

Program	Recommendation	Adopted	Comments
Efficient Products	Work with the evaluator and implementer to review data currently not recorded in Vision, and identify any changes that could improve program and evaluation activities.	Yes	Ameren Missouri coordinated with evaluator to collect and report all data fields per measure identified by the evaluator.
Heating and Cooling	Perform targeted marketing, especially to customers with high electric energy consumption during the heating season and who are eligible for an HP early-replacement measure.	Yes	Ameren Missouri continued to incorporate targeting to all-electric customers.
	Continue regular communications with contractors, even prior to launching new energy efficiency program offerings.	Yes	During the PY2015 shutdown, hiatus, and PY2016 startup the program provided ongoing communication to participating contractors.
Lighting	Future evaluations should not track the presence of incandescent bulbs in the marketplace and should adopt the corresponding halogen wattage as the baseline for EISA impacted bulbs.	Unclear	Isolated retailers with large quantities of incandescent bulbs exist. Ameren documented and forwarded information to Cadmus.
	Program should create more distinction between CFLs and LEDs.	Yes	Current program is LED only.
	Adopt bulb models that meet the new ENERGY STAR Lamps Specification 2.0, which will go into effect Jan. 2, 2017.	Yes	The current Lighting program incorporated ENERGY STAR® Lamp Specification 2.0 in its MOU contracts when made available by manufacturers.
	Continue to incorporate a diverse set of retail partners.	Yes	Ameren Missouri continued to incorporate a diverse set of retail partners
BizSavers Custom	To increase the accuracy of peak demand impacts, revise data collection and data entry protocols.	Yes	This recommendation has been addressed.
	Revise implementation protocols to improve the accuracy of the measure-level "Unit" data field.	Yes	This recommendation has been addressed.

	Ensure all project documentation is available in the program tracking system for evaluator review.	Yes	Lockheed Martin created new comprehensive measure-level reports that may be downloaded from the data management system.
	Adjust baseline wattage as well as the lumen equivalence to align with the federal standard—EISA Act of 2007.	Yes	This recommendation was addressed.

5 Review of Cost-Effectiveness

The Evergreen team reviewed residential and commercial summary findings from the portfolio reports and the appropriate DSMore output files. The Evergreen Team reviewed the residential and commercial program DSMore aggregate files to confirm that calculations were performed correctly. Input files were subject to random spot checks of inputs, however, due to the complexity of the inputs a thorough review was not feasible. This review was similar to those conducted in prior audits, with specific tasks including the following:

- Confirm that the reported summary values matched those in the DSMore results file;
- Confirm values reported for the portfolio matched the sum of the values reported individually by program;
- Confirm that the reported costs matched the costs included in the DSMore input files (both incentive and overhead);
- Confirm that a sample of measures received appropriate cost-effectiveness input values from the Ameren Missouri TRM (i.e., kWh savings, EUL, incremental cost), and;
- Report current (PY2016) program results and compare against previous year results (PY2015).

Confirm summary values reported matched the values in the DSMore results files

The Evergreen team reviewed the reported summary cost-effectiveness values, as well as the net lifetime benefit and cost of conserved energy values to confirm the reported values matched the DSMore aggregate file results. The review consisted of checking all five cost-effectiveness tests for both the residential and commercial portfolio files. The Evergreen team did not find any errors between the reported and DSMore files for the residential portfolio. The Evergreen team did find errors in the reported values and DSMore files for the BizSavers evaluation. The following tables present the errors found.

Table 15: BizSavers Discrepancies Between Report and DSMore Files – Cost Effectiveness Values

Program	TRC		RIM		PCT		SCT	
	DSMore	Report	DSMore	Report	DSMore	Report	DSMore	Report
BizSavers Custom	2.26	2.42	-0.78	0.7	2.94	4.23	3.52	3.12
BizSavers Standard	3.18	3.19	-0.61	0.78	6.62	3.52	4.03	2.94
BizSavers New Construction	-0.83	-0.84	NA	NA	NA	NA	NA	NA

Table 16: Table 17: BizSavers Discrepancies Between Report and DSMore Files – Reported Net Benefits

Program	Reported Net Benefit (DSMore)	Reported Net Benefit (Report)
BizSavers Custom	$33,752,844.68	$27,240,745
BizSavers Standard	$20,045,642	$16,267,313
BizSavers New Construction	$979,346.36	$627,625
BizSavers RCx	$10,238.80	-$157,723
BizSavers SBDI	$1,237,907.69	$729,456

Confirm that the reported costs matched the costs input into the DSMore cost-effectiveness input files (both incentive and overhead);

The Evergreen team reviewed the costs reported in each DSMore aggregate file for each program and compared them against the reported costs in the evaluation reports. No discrepancies were found.

Confirm a random selection of measures received appropriate cost-effectiveness input values from the Ameren Missouri TRM.

The Evergreen Team reviewed Lighting, Efficient Products, and Heating and Cooling programs to validate the correct TRM values were applied. No discrepancies for the residential or commercial programs were found.

The following tables present the PY2016 cost effectiveness results against the PY2015 values. Table 18 presents the reported cost of conserved energy values, the BizSavers

Programs had low Cost of Conserved energy (CCE) - all approximately $0.01 per kWh, showing approximately the same results as the PY2015 program results. Similarly, residential CCE across programs performed similarly between PY2015 and PY2016.

Table 18: Cost of Conserved Energy

Program	Cost of Conserved Energy ($/kWh) 2015	Cost of Conserved Energy ($/kWh) 2016
Efficient Products	$0.02	0.03
Efficient Products – Smart Thermostats	NA	0.03
Energy Efficiency Kits	NA	0.01
Home Energy Report	NA	0.02
Heating and Cooling	$0.02	0.01
Lighting	$0.01	0.01
BizSavers Custom	NA	0.01
BizSavers Standard	$0.01	0.01
BizSavers New Construction	$0.01	0.01
BizSavers RCx	$0.01	0.01
BizSavers SBDI	NA	0.51

Table 19 presents the total net lifetime benefits from residential and commercial programs reported in the PY2016 EM&V reports and compares the current (PY2016) net benefits to previously reported PY2015 net benefits totals. Residential programs showed an increase in the total net benefits, with the Heating and Cooling Program showing a very large increase. New programs such as the Energy Efficiency Kits and Home Energy Report Programs have no prior data to compare with but show positive net lifetime benefits.

Table 19: Net Lifetime Benefits per Program

Program	Net Lifetime Benefit (Reported) 2015	Net Lifetime Benefit (Reported) 2016
Efficient Products	$1,051,330	$1,314,304
Efficient Products – Smart Thermostats	N/A	$3,957,191
Energy Efficiency Kits	N/A	$3,114,420
Home Energy Report	N/A	$1,622,880
Heating and Cooling	$13,292,564	$84,742,921
Lighting	$14,594,132	$23,090,820
BizSavers Custom	N/A	$1,656,108
BizSavers Standard	$98,507,036	$27,240,745
BizSavers New Construction	$18,713,713	$16,267,313
BizSavers RCx	$19,087,827	$627,625
BizSavers SBDI	N/A	-$157,723

Table 20 compares the results of the five cost effectiveness tests between PY2015 and PY2016. The most significant change from 2015 is that the New Construction and Retro-Commissioning programs are no longer cost effective in 2016 according to some tests, most notably the TRC.

Table 20: Cost Effectiveness Test Results

Program	UCT		TRC		RIM		PCT		SCT	
	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
Efficient Products	1.58	1.41	1.05	1	0.39	0.44	1.25	3.66	3.36	1.36
Efficient Products – Smart Thermostats	N/A	3.42	N/A	1.98	N/A	0.8	N/A	2.92	N/A	2.55
Energy Efficiency Kits	N/A	3.57	N/A	5.73	N/A	0.52	N/A	N/A	N/A	11.14
Home Energy Report	0.74	2.68	0.55	2.68	0.32	0.48	0.7	N/A	1.91	2.68
Heating and Cooling	2.19	7.47	1.05	4.01	0.46	0.86	1.2	5.74	2.64	5.56
Lighting	3.49	5.91	1.27	5.91	0.42	0.49	1.66	N/A	3.02	8.83
CommunitySavers	N/A	1.11	N/A	1.96	N/A	0.43	N/A	176.55	N/A	2.46
BizSavers Custom	6.2	5.18	1.47	2.42	0.6	0.7	2.46	4.23	1.76	3.12
BizSavers Standard	6	5.3	1.48	3.19	0.57	0.78	2.77	3.52	1.79	2.94
BizSavers New Construction	7.21	2.78	5.2	0.84	0.68	0.56	9.87	1.59	6.25	1.08
BizSavers RCx	4.66	0.06	4.7	0.06	0.67	0.06	11.55	2.6	5.23	0.07
BizSavers SBDI	N/A	2.43	N/A	2.08	N/A	0.53	N/A	5.57	N/A	2.53

6 Conclusions

Our audit conclusions for the PY2016 Ameren Missouri program evaluations are presented below along with recommendations where appropriate for future evaluation work. We discuss several overarching issues first relating to spillover and free ridership, followed by some program-specific recommendations.

6.1 Residential Non-participant Spillover

Non-participant spillover comprises a significant share (20 percent) of the total residential portfolio savings, which is higher than what is typically reported for similar program portfolios. Due to the unusually high amount of NPSO claimed, we believe that more supporting information needs to be provided to confirm that:

3. The NPSO measure is truly energy efficient; and
4. Ameren had a significant influence on the decision to install the measure in question.

Given that the NPSO claimed is very large and the ultimate sample used for the estimate is quite small (less than 30 customers), a significant amount of proof is required to show that these measures should truly be counted as spillover.

As part of the audit process, we reviewed the survey responses for the 27 customers that were used to calculate NPSO and found several issues that argue for a lower spillover number. To qualify as NPSO, the 27 customers who adopted measures that were not incentivized had to meet the following six criteria:

1. They were familiar with at least one Ameren Missouri program, rebate, or discount;
2. At least one element of Ameren Missouri's program marketing and outreach motivated them to adopt the measure;
3. They had a valid reason for considering the adopted measure to be energy efficient;
4. For a "like" measure, they had not received a rebate from Ameren Missouri and had not already tried to receive a rebate from Ameren Missouri, and stated a valid reason why they did not apply for an Ameren Missouri rebate for the measure;
5. They had a valid reason for why they decided to install the measure; and
6. The adopted measure generated electric savings, not gas savings.

In our review, there was one customer that failed Criterion #6 and was still included in the spillover calculation. There were an additional 16 responses that had "NA" or similar non-responses for Criterion #5 that were still included as meeting the criterion and included in the spillover calculation.

Additionally, in response to the question "why was the measure installed" (used for Criterion #5), there were multiple responses that clearly indicated that the measures were adopted for reasons other than saving energy, even though some of these same respondents indicated that Ameren Missouri also had some influence on their decision. Examples of responses that were judged to have met this criterion include:

- "(The measure was installed as) Part of the replacement for the faucet."(faucet aerator)
- "The one we had was too small." (efficient room air conditioner)
- "It's just a matter of economy, I've always done it." (thermostat programmed)
- "They just checked it while at my home, I didn't request it." (thermostat setting)
- "It was part of the service agreement, they just check it every year." (AC tune up)
- "'Cause the refrigerator went bad." (refrigerator recycle)

All of these responses were still considered to be NPSO, even though it appears that the motivation for adopting the measure was primarily from something other than Ameren Missouri's program and outreach efforts. These responses are analogous to adoptions that are counted as free riders among participants.

We recommend that a more stringent process be used in order to qualify for NPSO. To achieve this, we recommend that for the questions used to address Criterion #2 (Ameren Missouri influenced the adoption), only responses that said that Ameren Missouri was "very influential" would be counted. Currently, responses are also given a 50 percent savings if they said Ameren was "somewhat influential", but given all the other factors influencing the decision, we do not believe this is strong enough.

We also recommend that the questions and response analysis for Criterion #5 (have a valid reason for adopting the measure) be changed to count only those respondents that provide a reason relating to energy efficiency (and therefore can more plausibly be considered as influenced by Ameren Missouri).

We applied these recommended changes to the current NPSO calculations, which reduced 'like' NPSO from 5,050 to 2,988 kWh (a 41% reduction) and 'non-like' spillover from 14,396 to 6,697 kWh (a 53% reduction). Overall, this resulted in a decrease in the total NPSO from 19,446 to 9,685 kWh (a 50% reduction). We recommend that this adjustment be made for PY2016 and that the change in question scoring be continued in PY2017 and beyond.

Additionally, we have the following recommendations for the spillover calculations for all programs:

- If NPSO is going to be claimed, we recommend that it be allocated evenly across all programs (similar to the recommendation made by the previous auditor) rather

than by the current allocation method using a combination of savings and marketing costs. We recommend that this be done for PY2016 and for future program years.

- For all spillover calculations (participant and non-participant), savings should only be claimed for measures that would qualify for the program. We recommend that this change be adopted beginning in PY2017.
- The self-report responses should be done consistently for participant and non-participant spillover for all programs. Currently, it appears that for the Ameren Missouri influence/importance questions, responses of "very influential" and "somewhat influential" are used in the non-participant spillover, while only the "very Important" responses are used for participant spillover. We recommend that for these questions, only "very influential" responses be used in the scoring algorithm. We recommend that this change be adopted beginning in PY2017.

6.2 Residential Free Ridership

A separate but related issue involves how the free ridership scores are calculated from the phone survey responses. For all the residential programs, we believe that the scoring algorithm used is too generous in reducing the level of free ridership. In the Heating and Cooling Program report, for example, across all the response tallies included in Appendix B, only a single respondent was scored as being a 100 percent free rider. When respondents answer "don't know" to one of the free ridership questions, they receive a reduction of 25 percent from their free ridership score, even though this particular response provides no information (and therefore provides no justification for changing the free ridership score). Similarly, when they are asked to rate the importance of the Ameren Missouri rebate (FR7) or the contractor (FR8), if they respond "not very important," the free ridership score is still reduced by 25 percent in both cases. Neither of these responses provides enough information on the influence of the Ameren Missouri program to justify a reduction in the free ridership score.

We recommend that for the free ridership calculations for all programs, the self report scoring algorithm be changed so that 'don't know' and 'not very important' responses have a reduction value of 0 percent. We have made this change for the Residential Heating and Cooling program for PY2016 (where data were available) and recommend that this change be made for all programs beginning with PY2017.

6.3 Individual Program Report Comments

The audit team made several comments on draft versions of the evaluation reports, many of which have been addressed in the final report. A few of the issues that we believe still need to resolved and should be addressed as part of future evaluations are discussed below.

BizSavers Program

With the free ridership method, the question "Would you have been financially able to install the equipment or measures without the financial incentive from the BizSavers Program?" may be too restrictive in that customers that answer 'no' are automatically scored as a net participant based solely on their response to a single question. The report should have included a table showing how many of the respondents were scored as net participants based on this question alone. The rest of the respondents (i.e., those that answer 'yes' to the initial question) were then subjected to a battery of questions designed to provide a more nuanced estimate of free ridership, one that has a series of consistency checks. A comparison of the responses to this initial question with the very next question "If the financial incentive from the BizSavers Program had not been available, how likely is it that you would have installed the measure at the location anyway?" should have been included in the report and maybe used in the scoring methodology as a consistency check.

In the revised final report, ADM added tables showing how many of the respondents were scored as net participants based on the question "Would you have been financially able to install the equipment or measures without the financial incentive from the BizSavers Program?" as well as sensitivity analysis of the overall free rider scores if the financial ability screen was removed.

Heating and Cooling Program

The Heating and Cooling Program evaluation reports an early replacement rate of 97.1 percent based on program data. While this value is based on program data, it appears to be very high in comparison with the Ameren Missouri TRM recommended early replacement rate of 14 percent (or 40 percent if the CAC unit is a secondary unit in a CSR project). The high early replacement rate is potentially further problematic because savings for early replacement measures are as much as five times higher than replace-on-burnout measures.[10] If the Ameren Missouri TRM value for early replacement is applied project savings reduce by approximately 69 percent.

Although Ameren reports that the program is specifically targeting early replacements, there are some indications from other parts of the evaluation that the early replacement numbers claimed from the program are too high. Of the ten contractors interviewed, for example, only seven were familiar with the early replacement criteria used for the program. Of these, only one contractor said they used the correct criterion by measuring for a temperature drop across the coil. Similarly, when customers were asked about their

[10] The larger number claimed for early replacements also increases the impact estimates substantially compared to a similar HVAC program offered by Ameren Illinois. When the claimed savings from Ameren Missouri CAC measures are compared with the same program in Ameren Illinois, the average savings per measure type for the Missouri program is 2.03 times greater than for the same measures in Illinois. (1,779 kWh average per measure in Missouri versus 875 kWh in Illinois). See *Impact and process Evaluation of 2015 (PY8) Ameren Illinois Company HVAC Program* by Opinion Dynamics (February 23, 2017).

reasons for contacting their contractor about their systems, responses such as "system stopped working" (33%) and "system had problems" (37%) are more suggestive of replace-on-burnout systems rather than early replacements. All of this suggests that the early replacement numbers are less than the 97 percent identified in the program tracking data.

Cadmus attempts to correct for some of these issues in the net impact analysis by re-categorizing some of the installations based on their responses to survey questions. This results in a split of 86 percent early replacement and 14 replace-on-burnout. While this is a step in the right direction, it still is much higher than the split assumed in the Ameren Missouri TRM. We also recommend that these types of adjustments be made during the gross impact analysis, rather than as part of the net impact calculations.

In future evaluations, we recommend that more verification be done to confirm these units are actually early replacements rather than replace-on-burnout units. This could be accomplished by increasing QA/QC processes for the program to ensure that the contractors are taking temperature readings from the coil and the values are being tracked in the participant tracking data. Additional survey questions for both participants and contractors may also help this effort. Alternatively, the evaluation team could do ride alongs for a sample of projects, confirm the coil temperature readings, and calculate the program share that is early replacements. Another option would be to have a single savings value used for all replacements, which could be calculated as a blend of the early replacement and replace-on-burnout savings values based on the Ameren Missouri TRM.

Early Replacement Cooling Savings

In addition to the number of systems that are categorized as early replacements, we also have an issue with the baseline assumed for these units. For all units, energy savings are calculated as the difference between the energy consumption of the new energy efficient equipment compared to an assumed baseline energy use. For early replacements, the evaluation uses a baseline energy efficiency for early replacement units is based on the load profile of a SEER 7.2 unit, which we believe is too low. The most common baseline efficiency for this type of measure in other jurisdictions is SEER 10.

Cadmus has developed separate baseline assumptions for early replacement and replace-on-burnout scenarios. In each case, the baseline units are assumed to operate identically to the new equipment, but at a lower efficiency level. The evaluation baseline energy use for all HVAC measures is based on an analysis conducted in the 2013 evaluation for this program. As part of that process, Cadmus metered a large set of new central air conditioners (CAC) and air source heat pumps that had been installed during the 2013 program year. This provided the evaluator with an accurate estimate of how much energy consumption the new energy efficient equipment was using.

We believe that the appropriate baseline for early replacement units is the energy use based on a tuned up unit, which is a more reasonable counterfactual scenario than the existing 7.2 SEER baseline currently used in the evaluation. To estimate this baseline, the audit team used the metered energy consumption from the 2013 evaluation for CAC tune-ups for early replacement units. Using these values also brings the savings for CAC retrofits in line with the savings for other jurisdictions.

The result of using this new baseline is a reduction of approximately 10,000,000 kWh or 22 percent of savings for the program.

ASHP And Ductless Heating Savings For Electric Resistance Baseline Replacements

A separate issue for this program relates to using a consistent value of the effective full load hours (EFLH) when calculating the heating savings for air-source heat pumps and ductless heat pumps. For both measures, the savings were estimated using metered data collected on equipment installed during PY2016. The EFLH was also estimated using the operating efficiency observed during the equipment metering, and the operating efficiency value was lower than the nameplate efficiency of the units.

To calculate the savings, Cadmus used the EFLH related to the lower operating efficiency to the nameplate efficiencies of the new units. Doing this under-estimated the savings for some measures, and increased them for others. For the audit we recalculated the saving for these measures using consistent EFLH (based on the metered operating efficiency) and the assumed operating efficiency of the equipment in the field. This was done by applying the heating seasonal performance factor (HSPF) correction found on p. 69 of the evaluation report. The result of this recalculation is a decrease in savings of approximately 1,000,000 kWh or approximately two percent of total program savings.

ECM fan double counting of continuously operating fans savings

Finally, our review of the savings calculation identified an issue where a portion of the savings relating to ECM's may be double counted. In the evaluation, the savings for ECM fans are based on a 2003 report for the state of Wisconsin and metered data collected during the 2013 evaluation of the Ameren Missouri program. The savings algorithm separates fan use into three components: 1) fan operation when the air conditioner is on, 2) fan operation when the furnace is on, and 3) fan operation to provide circulation when the other HVAC equipment is not in use.

The evaluated savings do not appear to use an operating hours criterion that is consistent with the stated algorithm. Specifically, it appears that the calculations may double count a portion of the ECM savings that is related to both general circulation and ECM use when the furnace is operating. The audit team recalculated the savings using the same methodology, but without the use of the correction factor related to the hours of fan

operation that may double count time when the fans are in heating mode. The result is a decrease in savings of approximately 900,000 kWh.

Savings Calculations

When all the changes discussed above are incorporated into the calculations, the savings for the Heating and Cooling Program decrease by 28.1 percent, as shown in Table 21. This includes small changes in savings (0.1%) due to rounding errors between the evaluation and audit calculations. We recommend that these adjustments be made to the PY2016 savings and the changes in impact methodology be adopted in PY2017 and beyond.

Table 21: Heating and Cooling Program Savings Adjustments (kWh)

Measure	Evaluation Gross Savings (kWh)	Audit Recommended Gross Savings (kWh)	% Change
ASHP	11,194,435	9,200,622	-17.8%
Ductless	750,235	698,885	-6.8%
DFHP	70,457	80,020	13.6%
GSHP	4,931,677	4,638,703	-5.9%
CAC	19,776,034	10,446,005	-47.2%
ECM	7,951,222	7,065,055	-11.1%
Total	**44,674,060**	**32,129,292**	**-28.1%**

Home Energy Report Program

For the Home Energy Report Program evaluation report, the comparison between the treatment and control groups in the pre-period should have included a comparison of participation rates in the other Ameren Missouri energy efficiency programs. Differences between the groups in program participation in the pre-period could have affected the savings estimates in two ways. First, if there were differences in program participation rates, then some of the observed savings from the home energy reports in the post-period should have been attributed to the other efficiency programs. Second, the estimate of program uptake in the post-period would also have been affected if there were already unequal levels of program participation in the pre-period (i.e., there was less opportunity for participation in the post-period if there were already unequal levels of participation in the pre-period). Since the evaluation did not use this model to estimate the final savings numbers for PY2016, we recommend that these changes be included beginning with the PY2017 evaluation of this program.

Residential Lighting Program

For the net impacts, 'like' spillover was calculated as the difference between the estimated program-induced lighting sales obtained from 1) the elasticity model, and 2) survey responses from lighting participating retailers and manufacturers regarding program influence. While it may be encouraging that the two methods produced similar estimates of program effects, more justification is needed as to why the entire difference in the estimates should have been credited to the program as spillover. It is to be expected that these two very different estimation methods would have produced different results, and attributing the entire difference to spillover was too generous.[11] Some discussion should have been included on the confidence intervals associated with each estimate, as the interview results in particular were qualitative in nature and likely would have had wide error bands. For these reasons, we do not recommend that spillover be estimated using this approach.

In our earlier discussions regarding this report, Cadmus had indicated that the current free ridership method that is recommended in the Uniform Methods Project (UMP) that incorporated information obtained from upstream lighting distributors. While the UMP does recommend that upstream programs incorporate information from the supply side to estimate net impacts for upstream programs, the guidance provided is a very general recommendation that the supply side be examined – there are no specific details provided in the UMP as to how the supply side actor interview results should be incorporated into a quantitative net impact estimate. While the approach used by Cadmus was generally consistent with the broad outlines contained in the UMP, more justification is needed as to why their specific interview methods and scoring algorithm provided a reliable estimate of impacts.

The current method first asks the retailers/manufacturers to allocate a percentage influence rating on several factors that might affect a consumer's lighting purchase decisions. This is followed by asking respondents to provide a percentage estimate of the amount of the influence Ameren Missouri is having on each of the first set of influencing factors. The product of these two percentage ratings is then used to estimate the overall market share of lighting sales that are attributable to the program. It is this last step that needs more justification, as it is not at all clear that the combined responses should be interpreted as market shares.

The results of this method could also be corroborated from other available sources where possible. The influence of the program on lighting price, for example, can be calculated directly from the known information on bulb prices and upstream rebate amounts. This can then be compared with the responses from the retailers/manufacturers on the

[11] This approach yields the same result as simply choosing the more favorable of the two estimates and then setting 'like' spillover equal to zero.

influence the program has on price. Additionally, the retailers can be asked directly how much of their lighting sales are attributable to the upstream lighting program. These responses can then be compared (or used in place of) the estimate obtained using the current method.

Finally, there was no explanation provided regarding how the results of the elasticity model were used to calculate free ridership rates. The model was discussed, and then the free ridership rates were just presented, but it is not possible to understand from the text provided how the model results were used in the free rider calculation. This information needed to be included in the report, along with the detailed model results (e.g., coefficient estimates, standard errors, significance tests).

Energy Efficient Kits Program

For the participant spillover estimates, additional questions should have been asked about some of the larger contributors—particularly smart thermostats (19% of spillover) and refrigerator replacement (13% of spillover)—to determine how much influence the program or Ameren Missouri actually had on these decisions. It may have been that the largest motivating factor was that a new refrigerator was purchased for non-energy related reasons and the old one was simply hauled away as part of the purchase, for example. Questions regarding the influence by Ameren Missouri were already included in the non-participant survey and should have been added here for participant spillover. In both cases, the measures only should have been counted as spillover if the response to the Ameren Missouri influence questions clearly indicated that energy savings was a primary reason for the installation (as opposed to a non-energy related purchase decision) and that Ameren Missouri was very influential to the decision.

For participant spillover, a single customer reported installing a heat pump water heater; this accounted for 26 percent of the participant spillover estimate. Given the relative scarcity of this measure, additional follow up should have been done to confirm that this equipment was actually installed, that the primary driver for this purchase was energy-related, that there was no rebate paid for it, and that Ameren had significant influence on this purchase decision.

Our review did identify one issue with the improper savings calculation for water heater pipe wrap, and correcting the calculation lowers the savings for this measure by 67 percent. The heater pipe wrap algorithm assumes that the heat loss from the pipe decreases by 75 percent based on changing the R-value from 1 to 4. However, the heat loss is proportional to the exterior surface area of the pipe or pipe plus insulation. The current calculation assumes that the circumference of the pipe and the pipe plus insulation are the same, which is incorrect. The Ameren Missouri TRM uses the correct formula that properly accounts for the increased surface area of the pipe once insulation is added. Using the correct algorithm and the other inputs from the evaluation reduces the per unit savings from 26 kWh to 8.6 kWh. The overall impact on the EE Kits Program from this

correction is a savings reduction of 3.9 percent. We recommend that this adjustment be applied to the PY2016 savings.

6.3.1 Portfolio Level Findings

The recommended changes to the residential PY2016 program savings estimates are shown in the following tables. Table 22 shows the original energy savings reported by the evaluation while Table 23 shows the energy savings recommended by the audit for each program. Table 24 and Table 25 show similar information for the demand savings.

To summarize, these tables reflect the following changes to residential program savings:

- Nonparticipant spillover for the residential programs is reduced from 19,446 to 9,685 kWh (50% reduction), and evenly distributed across programs;
- Gross savings for the Residential Heating and Cooling Program are recalculated to address the issues described above, resulting in a reduction of net savings of 48 percent;
- Free ridership is recalculated for the Heating and Cooling Program to reflect our recommended scoring, which increases free ridership by one percent; and
- Efficiency kits program savings is reduced by 3.9 percent to account to the changes to the pipe insulation savings calculations.

Table 22: Evaluation Reported Savings (MWh) – Residential Programs

Program	Ex Post Gross Savings (MWh/Yr)	Participant Net Savings (MWh/Yr)	NPSO (MWh/Yr)	Evaluated Total Net Savings (MWH/Yr)	NTG Ratio
Efficient Products	2,940	2,004	190	2,195	75%
Smart Thermostats	3,732	3,071	130	3,201	86%
Energy Efficiency Kits	5,478	4,212	5	4,217	77%
Heating and Cooling	44,661	40,463	17,977	58,443	131%
Lighting	38,439	24,409	1,144	25,562	67%

Table 23: Audit Recommended Savings (MWh) - Residential Programs

Program	Ex Post Gross Savings (MWh/Yr)	Participant Net Savings (MWh/Yr)	NPSO (MWh/Yr)	Audit Total Net Savings (MWh/Yr)	NTG Ratio	% Change from Evaluated Net Savings
Efficient Products	2,940	2,004	1,937	3,941	134%	80%
Smart Thermostats	3,732	3,071	1,937	5,008	134%	56%
Energy Efficiency Kits	5,264	4,048	1,937	5,985	114%	42%
Heating and Cooling	32,129	28,736	1,937	30,673	95%	-48%
Lighting	38,439	24,409	1,937	26,346	69%	3%

Table 24: Evaluation Reported Savings (MW) – Residential Programs

Program	Ex Post Gross Savings (MW)	Evaluated Net Savings (MW)	NTG Ratio
Efficient Products	0.748	0.537	72%
Smart Thermostats	3.535	2.964	84%
Energy Efficiency Kits	0.995	0.811	82%
Heating and Cooling	30.332	34.088	112%
Lighting	5.782	4.115	71%

Table 25: Audit Recommended Savings (MW) - Residential Programs

Program	Audit Ex Post Gross Savings (MW)	Audit Net Savings (MW)	NTG Ratio	% Change from Evaluated Net Savings
Efficient Products	0.748	1.003	134%	87%
Smart Thermostats	3.535	4.744	134%	60%
Energy Efficiency Kits	0.956	1.087	114%	34%
Heating and Cooling	21.821	20.832	95%	-39%
Lighting	5.782	3.963	69%	-4%

Finally, Table 26 and Table 27 show the overall effect of the audit recommendations on the entire PY2016 program portfolio. As there were no recommended changes for PY2016 for the BizSavers and CommunitySavers, the savings revisions are limited to the residential programs as discussed above. Overall, the recommended changes from the audit result in a reduction of 11 percent for the PY2016 portfolio-level energy savings and 14 percent for demand savings.

Table 26: Summary of Audit Recommended PY2016 Savings (MWh) – All Programs

Program	Ex Post Gross Savings (MWH/Yr)	Total Net Savings (MWh/Yr)	NTG Ratio	% Change from Evaluation Savings
Efficient Products	2,940	3,941	134%	80%
Smart Thermostats	3,732	5,008	134%	56%
Energy Efficiency Kits	5,264	5,985	114%	42%
Home Energy Reports	32,292	32,292	100%	0%
Heating and Cooling	32,129	30,673	95%	-48%
Lighting	38,439	26,346	69%	3%
Residential Total	**114,796**	**104,245**	91%	**-17%**
BizSavers	76,914	75,228	98%	0%
CommunitySavers	2,350	2,350	100%	0%
Non-residential Total	**79,264**	**77,578**	98%	**0%**
Portfolio Total	**194,060**	**181,823**	94%	**-11%**

Table 27: Summary of Audit Recommended PY2016 Savings (MW) – All Programs

Program	Audit Ex Post Gross Savings (MW)	Audit Total Net Savings (MW)	NTG Ratio	% Change from Evaluation Savings
Efficient Products	0.748	1.003	134%	87%
Smart Thermostats	3.535	4.744	134%	60%
Energy Efficiency Kits	0.956	1.087	114%	34%
Home Energy Reports	15.051	15.051	100%	0%
Heating and Cooling	21.821	20.832	95%	-39%
Lighting	5.782	3.963	69%	-4%
Residential Total	**47.893**	**46.679**	**97%**	**-19%**
BizSavers	18.979	18.228	96%	0
CommunitySavers	0.725	0.725	100%	0
Non-residential Total	**19.704**	**18.953**	**96%**	**0**
Portfolio Total	**67.597**	**65.632**	**97%**	**-14%**

Appendix A: Full Process Evaluation Responses to Minimum Question Requirements

The following appendix provides a summary of the detailed responses to minimum process evaluation requirement questions.

Table 28: Minimum Process Evaluation Questions

Issue Number	Question
Issue 1	What are the primary market imperfections common to the target market segment?
Issue 2	Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?
Issue 3	Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?
Issue 4	Are the communication channels and delivery mechanisms appropriate for the target market segment?
Issue 5	What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation of each end-use measure included in the program?

Table 29: Issue 1 - What are the primary market imperfections common to the target market segment?

Program	2015 Summary Response	2016 Summary Response
Efficient Products	Prior research has indicated that lack of energy-efficiency awareness and the higher upfront cost of energy-efficient products are common barriers to this market segment. The PY2015 evaluation did not determine that these imperfections have been addressed and it is assumed that the primary market has remained stable across the PY2013-PY2015 period.	Less-efficient equipment is available at lower price points. Customers may not understand that more-efficient equipment can cost less to operate in the long run, or they may not be willing or able to pay the higher upfront costs of more efficient equipment.
Energy Efficiency Kits		For the school-based kit delivery channel, the primary market imperfection common to the target market was inadequate information and/or knowledge regarding the energy saving benefits of high-efficiency household items provided through the school kits. For the multifamily kit delivery channel the market imperfection is the possible disconnect between the person paying the electricity bill and the person receiving the energy savings benefit from installing high-efficiency household items provided through the multifamily kit. For example, if a multifamily property resident doesn't pay their own electricity bill, they have less incentive to install the high-efficiency household items because they don't realize the energy savings. For another example, if a resident pays their own electricity bills, the property manager has less incentive to install high-efficiency household items (again, as they do not realize the energy savings).
Home Energy Report	The primary market imperfection common to the target market remains largely unchanged from PY2013: customers have inadequate information and/or knowledge regarding the benefits of increasing energy efficiency within existing homes.	The HER program's target market segment is randomly sampled from the population of residential Ameren Missouri customers. Primary market imperfections that behavioral programs address include varied human responses to education, engagement, and motivation to perform household energy savings actions.
Heating and Cooling	The primary market imperfection common to the target market was inadequate information and/or knowledge regarding the energy-saving benefits of proper HVAC maintenance and, high-efficiency heating and cooling systems for cooling and electric heating, and the use of electric resistance heating. Additionally, the investment/cost of installing a new HVAC unit deterred customers from ultimately making the decision to purchase until absolutely necessary. Further, when customers replaced a system, the greater upfront cost of high-efficiency systems could cause them to purchase a lower-efficiency unit, even if the lifetime operating costs of the system were greater.	The primary market imperfection common to the target market was inadequate information and/or knowledge regarding the energy saving benefits of high-efficiency HVAC systems for cooling and electric heating, and the use of electric resistance heating. Additionally, the investment/cost of installing a new HVAC unit can deter customers from ultimately making the decision to purchase until absolutely necessary. Further, when customers replaced a system, the greater upfront costs of high-efficiency systems could cause them to purchase lower-efficiency units, even if system incurred greater lifetime operating costs.
Lighting	The rapid pace of change in the lighting sector means	The market continues to transition rapidly. CFLs—an

	customers continue to face an information barrier. The PY2015 resident survey indicates customers are becoming more familiar with different technology types, such as halogens, LEDs and CFLs. However, the typical lighting customer probably still does not recognize or understand the variety of options in lighting products currently on the market. Further complicating this issue is the fact that new products, such as non-ENERGY STAR LEDs, are emerging on shelves. As a result, customers fall back on price to determine which products they buy, and less efficient options continue to be less expensive than high efficiency bulbs.	innovative new product but a few years ago—are being phased out. The swift pace of change creates an information barrier for consumers. Most consumers do not understand the differences between the incandescent bulbs that they were used to (and are no longer available as general-purpose bulbs) and the halogens and LEDs now widely available. Most LEDs remain far more expensive than other, less-efficient bulb types. LEDs remain cost-effective due to their much longer lifespans than normal bulbs, but consumers do not always know of this long life or do not value it.
BizSavers	Findings from this evaluation point to several possible types of "market imperfections" or structural factors that may affect the ability of Ameren Missouri customers to undertake energy efficiency upgrades (on their own or through the BizSavers programs). The previous evaluation identified three of these: cost, lack of program awareness, and busy-ness size. This evaluation provided evidence that other factors may include geography and possibly the level of preparation of retro-commissioning service providers. Several of these factors are to some degree interrelated.	Findings from previous evaluations pointed to three types of "market imperfections" or structural factors that may affect the ability of Ameren Missouri customers to undertake energy efficiency upgrades on their own or through the BizSavers programs: cost, lack of program awareness, business size, and geography. The current evaluation suggest that low program awareness may constitute the primary market imperfection, or barrier, while business size and geography do not appear to be major barriers. Awareness. The level of program awareness among nonparticipants is less than half the level identified three years ago, a finding that cannot be attributed to differences in the make-up of the surveyed nonparticipants. One possible factor is that awareness previously was assessed in the middle of the program cycle while the current evaluation assessed it nine months after the program started up again following a three-month suspension. Another possible factor is that fewer customers are learning about the program from contractors and vendors, which conceivably could be related to a reduction in the size of the trade ally network and the program's movement away from distribution of printed collateral to trade allies and toward downloadable online material. Awareness of the new EMS pilot program was low among interviewed trade allies who reported doing relevant work and among surveyed program-eligible nonparticipants. Cost. Even though energy efficient equipment pays for itself in the long term, the first cost must compete with other priorities and so the higher upfront cost of energy efficient equipment may be a barrier. The high NTG ratios for the BizSavers Program, together with feedback from participants about the value of the incentives, emphasized the importance of incentives in driving the efficiency upgrades. Business size. While businesses in the small rate class comprise a lower percentage of program participants and projects than of Ameren Missouri business customers as a whole, their share of energy savings is

	slightly higher than their share of annual kWh usage. Geography. Similarly, the St. Louis metro area and outer suburban areas comprise a higher percentage of BizSavers participants and projects than of business customers, but the share of energy savings across parts of the Ameren Missouri service territory is consistent with the distribution of total energy consumption across those areas. This reflects a greater concentration of larger businesses in the St. Louis metro areas and suburban areas compared to the rest of the service territory.

Community Savers	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 disallows properties that receive 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 PY7PY2016, 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 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. 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 PY7PY2016 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 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.

Table 30: Issue #2 - Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?

Program	2015 Summary Response	2016 Summary Response
Efficient Products	PY2013 findings indicated the target market of all residential customers is appropriate for the equipment rebate programs. The target market segments remain unchanged from PY2013 and it was determined that a market study would not be completed in PY2014 or PY2015. .	The program appropriately targets all residential customers who purchase qualified energy-saving items for use in their homes.
Energy Efficiency Kits		The school-based delivery channel and the multifamily delivery channel's target market segments are appropriately defined. The target market segment for school-based delivery channel is schools within Ameren Missouri's service territory. The target market segment for multifamily delivery channel is Ameren Missouri customers living in multifamily units with electric water heating. The educational component of the school-based delivery channel is designed to lessen the market imperfection of inadequate information or knowledge regarding the energy savings benefits of high-efficiency household items. This added benefit of the school-based delivery channel outweighs the fact that school kits cannot be limited to customers of Ameren Missouri with electric water heating.
Home Energy Report	The program may have benefitted from focusing on additional segments within its target market of dual fuel customers. Moreover, the is an appropriate market segment. The program could have potentially increased overall uptake if the target market had not been limited to dual fuel customers, however, single fuel customers may provide less savings per home.	The target market is appropriate because the majority of residential customers should be able to change energy usage behaviors to decrease energy consumption.
Heating and Cooling	The target market segment was appropriately defined and comprehensively served for the single-family residential market. The program could be expanded in 2015 to include multi-family homes to increase participation. "rowhouses" (townhouse-style buildings with more than four units). Specifically, the Heating and Cooling Program was designed to help customers maintain the efficiency of operable systems (through tune-ups) and offered tiered incentives for customers replacing a failed and functional system (early retirement).	The target market segment was appropriately defined and comprehensively served for the single-family residential market. The target market included: customers living in single-family homes; multifamily buildings of four units or fewer; or in row houses. Specifically, the Heating and Cooling Program offered tiered incentives for customers replacing a failed but functional heating and cooling system (i.e., early retirement).
Lighting	The target market for the Lighting pro- gram is determined by measure. For standard lighting measures, the program targets the subsets of the general residential lighting market that have had less exposure or access to high- efficiency lighting. For specialty light-in measure, the program targets the residential lighting market more broadly. This is appropriate as the general customer base is becoming more familiar with high-efficiency	The program appropriately targets the entire residential lighting market, given the low saturation of LEDs in the territory.

BizSavers	As was found in the previous evaluations, the range of business types in Ameren Missouri territory were well represented among standard and custom retrofit projects, suggesting that the pro- gram is effectively reaching the main segments of the target market. As noted above, small businesses are somewhat under-represented in terms of savings. The current evaluation found evidence that awareness of the retro- commissioning program may vary among busy-ness types, being greatest among those that typically employ in- house facility managers, such as hospitals, large hotels and casinos, and universities. Some evidence suggests that there may be greater awareness of the retro-commissioning compressed air option than the building optimization among industrial customers, resulting from that fact that one RSP that specializes in compressed air service serves a high share of the industrial market. Such findings do not necessarily suggest a need to alter the way the target market segment is defined, but rather to adjust some aspects of program delivery	For most building end uses, the distribution of program participants matches relatively well with the distribution of businesses in the population. The offices and healthcare segments appear to be somewhat underrepresented in the program population, while the retail, food & beverage service, and lodging segments appear to be overrepresented, but this may in part be a function of the method used to estimate the population proportions. Evaluation findings support the establishment of the SBDI Program to serve small businesses. Feedback from program participants indicated that they would do relatively few energy efficiency upgrades without the program, and just more than half of nonparticipants indicated they likely would participate in the program if approached by an SBDI contractor. So far, the evaluation findings do not strongly support the need for special EMS incentives targeting tax-exempt entities. Even after being told about the Ameren EMS incentives, fewer than one in six program-eligible nonparticipants said they were likely to apply for the incentives. However, this pilot program is still young and awareness is still low. Two-third of interviewed trade allies who do pertinent work said they would likely do program-incented EMS projects in the coming year, generally five or fewer such projects.
CommunitySavers		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. 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. 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.

Table 31: Issue 3 - Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?

Program	2015 Summary Response	2016 Summary Response
Efficient Products	The Efficient Products program continues to be a highly diverse program, offering 13 energy-efficient home technologies Include in HVAC, lighting, plug-load, pumps, and water heating end-uses. This is a highly diverse program dynamic, responsive program, as demonstrated by the addition of multiple measures in PY2014 and the discontinuation of measures in PY2014 and PY2015.	Yes. For equipment other than smart thermostats, the program rebates solely require that equipment has been ENERGY STAR-certified (i.e., the only requirement is energy efficiency). For smart thermostats, equipment is limited to the necessary technological features (i.e., it must be a "learning" model with geofencing capabilities) and includes the most popular models in this emerging market. The program includes rebates for a variety of equipment targeting a variety of end-uses (water heating, air conditioning, swimming pools, heating) that were cost-effective. The program does not currently offer rebates for kitchen or laundry appliances. Other cost-effective end-use technologies are targeted through other programs.
Energy Efficiency Kits		Cadmus compared the school-based kit delivery channel and the multifamily kit delivery channel to similar utility programs to establish whether the kit contents represented standard practice or if other measures could be considered. For the multifamily delivery channel, all four benchmarked programs offered CFL light bulbs, showerheads, and kitchen and bathroom aerators to multifamily units. Compared to other programs, Ameren Missouri's multifamily kit delivery channel contained most of the common measures provided by utilities, along with measures not typically offered by other similar programs (e.g., LED light bulbs, pipe wrap). The measures not offered by Ameren Missouri but offered by the other programs included CFL lightbulbs and showerheads. The Ameren Missouri school kits included a range of lightweight measures that students could bring home and easily install. All programs included in the benchmarking offered showerheads, aerators, and LED or CFL light bulbs to students and their families. Compared to five other school kit programs, Ameren Missouri's school kits contained all of the most common measures (e.g., light bulbs, showerheads, aerators, a filter alarm), except for an LED night light, which five other benchmarked programs offered.

Home Energy Report	The mix of end-use measures offered through the program was appropriate in PY2015 with the addition of electric water heater measures.	This program does not incent end-use measures directly but does promote measures, as well as other Ameren Missouri programs, using tips in the HER reports. The tips include measures that are short term and easy to implement as well as measures that are more complex or longer term investments. They included information on LEDs, programmable and smart thermostats, efficient equipment replacements, and weatherization –all applicable to the residential customer segment.
Heating and Cooling	The program targeted the primary end- use technologies within the targeted market segment. When given the opportunity to offer suggestions for program changes or improvements, participating contractors and participants did not suggest that the program precluded any type of end-use measure. Thermostat with internet connectivity and adaptive temperature control strategies are relatively new to the market. The program could include incentives for this type of measure.	The program targeted primary end-use technologies within the targeted market segment, offering incentives for all broad measure categories (note: the Efficient Products program offered smart thermostats via the Efficient Products program). For customers who have/or plan to install GSHPs and have electric water heaters, the program could offer de-super heaters in conjunction with GSHPs, if determined to be cost-effective.
Lighting	For the most part, yes. The program offers a diversity of products both LEDs and CFLs that represent the majority of common consumer lighting needs, including a range of wattages, and specialty bulbs such as dimmables, globes, decorative shapes, three-way and four-way bulbs and reflectors, and LED bulbs. However, the emergence of non-ENERGY STAR® bulbs that offer the same energy savings at a fraction of the price (as a result of limiting non- energy features) may be meeting customer demand for high efficiency at an even lower price than available from the program.	Yes. The program continues to offer a diverse array of bulb models that meet most household lighting needs.
BizSavers	The interviewed new construction participants generally indicated that the range of program-eligible equipment met their needs, but this must be viewed in the context that the program reached most of these participants after the design phase, when their "equipment needs" largely consisted of lighting. The interviewed new construction trade allies reported that the modeling requirements for doing custom measures in new construction projects took too long to fit within the construction timelines; earlier program involvement in new construction projects could reduce the time pressure that may limit savings from custom measures. As previous evaluations found, participant and trade ally surveys showed satisfaction with the range of program-eligible equipment, delivery time for ordered equipment, and the quality of the equipment and the installation. Findings from the trade ally survey from this year's evaluation suggest that T-12 lighting makes up more than one-third of tube lighting in Ameren Missouri service, which	Participant surveys and interviews showed satisfaction with the range of program-eligible equipment, delivery time for ordered equipment, and the quality of the equipment and the installation. The standard incentive application covered the equipment needs of most participants who used that option, although a notable minority of interviewed trade allies suggested the program did not provide a wide enough range of standard incentive options. The primary concern with measures related to the elimination of incentives for exterior lighting, which reportedly had a largely adverse impact on trade allies. The adverse effects came not just from the loss of the exterior lighting sales themselves, but because inability to include exterior lighting in projects affected overall project cost-effectiveness, resulting in the loss of entire projects. The evaluation team understands that Ameren Missouri and the program implementer have decided to re-introduce exterior lighting to the list of incented measures for the new program year.

	suggests that the program-eligible tube lighting types remain viable replacements options. Retro-commissioning participants continue to be highly satisfied with the services they received, the cost savings, and the performance of the program measures. Industrial customers, however, may not be completely aware of the full range of retro-commissioning options available to them because one RSP that specializes in compressed air service serves a high share of the industrial market.	
CommunitySavers		• 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.

Table 32: Are the communication channels and delivery mechanisms appropriate for the target market segment?

Program	2015 Summary Response	2016 Summary Response
Efficient Products	Unchanged from PY2014, the delivery channels are appropriate and reach customers through retail and direct-mail efforts, including in-store advertisements, bill inserts, contractors, postcards, and Ameren Missouri's website. In PY2015, outreach to multifamily property owners resulted in increased installation of kit products.	Yes. Customers may purchase qualified items from any retailer, within or outside of Ameren Missouri's service territory, including online purchases. Ameren Missouri markets the program directly through a variety of channels and also through the several large national retail chains that serve differing, broad, cross-sections of the population. Reviews of program marketing materials found Ameren Missouri follows marketing best practices.
Energy Efficiency Kits		For school kits, communication flowed to and from Ameren Missouri, the implementers (ICF and NEF), school administrators and teachers, and students and families. Communication between these groups was clear and appropriate for the delivery channel. For the multifamily kits communication flowed to and from Ameren Missouri, the implementer ICF, the property managers, and their tenants. Cadmus did not assess this communication channel in PY16, due to the later program startup.

Home Energy Report	Yes, communication and delivery channels were appropriate. Future program design should consider the impact of the audit fee on recruitment and overall program performance.	The communication channel for HER reports is mailing paper reports. Surveyed customers read (89%) and either somewhat or strongly agreed that they were satisfied with the HER reports (95%), indicating that the mailed HER reports functioned as intended and were appropriate for the target market segment. Benchmarking, however, suggests that HER reports should be sent with higher frequency and in combination with an email channel and/or web portal where participants could access their customer-specific information.
Heating and Cooling	Current communication channels were appropriate. The program expanded marketing efforts in PY2015 and communicated information through high-propensity direct marketing, television advertisements and banners, website and internet radio advertisements and also increased its outreach to equipment distributors. Participating contractors contributed to marketing strategies during contractor advisory group sessions.	Current communication channels proved appropriate. The program benefitted from a broad marketing campaign, which sought to raise customer awareness about the Heating and Cooling program. The campaign included mailings, television, and radio advertisements. Contractors served as the primary driver of customer awareness about incentives for upgrading to efficient equipment, and served as the program's primary "ambassador" to the public.
Lighting	Retailers report Ameren Missouri signage is effective. As the big box stores that typically partnered with the program in the past are now carrying and selling more high-efficiency product on their accord, the program has shifted a greater percentage of sales to non-big- box retailers. The placement-based marketing techniques that were effective at driving very high volumes through big box stores are no longer available for lower-volume measures still sold through big box stores, or for more common measures sold through non big box outlets. The program has identified some new marketing techniques, but in general relies less on placement marketing than in the past. This is appropriate for the lower sales targets in the current year relative to PY2013 and PY2014.	Yes. The program operates in several large national retail chains that serve differing, broad, cross-sections of the population. The program also operates in smaller, local discount stores that serve customers that might not frequent large chains. The online store serves customers that do not live in easy driving range of a participating brick-and-mortar location. A review of program marketing materials found that Ameren Missouri follows marketing best practices.
BizSavers	The BizSavers program exceeded savings goals for 2015. The implementer introduced some new outreach approaches in 2015, including conducting targeted outreach to decision makers representing customer account aggregates or "towers." Evidence suggests that this approach has been effective within St. Louis and suburbs but not as effective in outer areas. There is still evidence of low awareness of BizSavers incentives in general and of new construction incentives in particular. Even participants with past BizSavers program experience did not seek out new construction incentives prior to designing their building. There is some evidence that some RSPs may not provide detailed explanations of retro- commissioning to prospective customers. Retro-commissioning does not appear to be a core part of the business of many approved RSPs. The implementer's general outreach to trade allies does not encompass specific work with RSPs, which may limit the program's ability to ensure that RSPs are	The program implementer reported using a wide range of marketing outreach channels and methods to reach end-use customers and service providers (e.g., contractors, vendors, and distributors). The implementer continued to conduct targeted outreach to decision makers representing customer account aggregates or "towers." This appears to be an effective approach, as one-third of projects were completed by customer accounts identified as "towers," who completed twice as many projects per customer, on average, as those not in towers. As indicated above, there is evidence of decreased awareness of BizSavers incentives in general and of EMS incentives targeting tax-exempt entities in particular. Moreover, there continues to be poor awareness of the new construction program requirement to apply for incentives before incorporating equipment into a project's plan.

	appropriately prepared to provide information on the range of retro-commissioning options and benefits.	While surveyed program participants were largely satisfied with program processes, a large minority of interviewed trade allies suggested the application process was overly burdensome, requiring information that sometimes was hard to obtain, and more than one-quarter of surveyed participants with custom projects had to resubmit or provide supporting documentation for their applications. One potential program delivery concern is the fact that the new SBDI Program has relied so far on a single contractor to deliver three-quarters of the projects. This may be particularly a concern given a significant decline in the number of project starts from December to February, although program staff have reported that project starts have since increased again, partly as a result of increased program incentives.

CommunitySavers	• 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. 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 PY7PY2016. • 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.

Table 33: What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation of each end-use measure included in the program?

Program	2015 Summary Response	2016 Summary Response
Efficient Products	Program promotions that provide program and energy education can help to overcome market imperfections. Timing product promotions so that they coincide with seasons of high use may also help implementation, as demonstrated by the higher participation in the pool pump rebate in PY2015.	Program promotions that provide program and energy education can help to overcome market imperfections. Timing product promotions so that they coincide with seasons of high use for a given measure also helps implementation. Higher incentives and additional marketing for RAC's may improve participation and lower free ridership.
Energy Efficiency Kits		For the school delivery channel, the evaluation analysis found that while Ameren Missouri's kit installation rates were among the highest of benchmarked peer programs, some households need additional installation instructions, the opportunity to return unused products, and suggestions for alternative options if the product doesn't fit the household's equipment. For the multifamily delivery channel the team did not perform this assessment in PY16, due to the later program startup.
Home Energy Report	Additional customer education and awareness was needed regarding the benefits—financial and nonfinancial—of that the program's major measures contribute by increasing the efficiency and comfort of their homes. Future programs should focus more resources on case studies to be especially communicated with regard to air sealing. Communicate the benefits of the major measures.	Ameren Missouri should continue to monitor savings over time as the HER program matures, and should consider strategies that have worked for similar programs (e.g., increasing the number of reports sent; adding a customer-specific progress tracker to the HER report, adding email and web-portal channels; and improving the format of their HER reports).
Heating and Cooling	The marketing materials allocated a significant proportion of resources specific to the targeted market. In the first program year, the most common suggestion for improvement from program participants surveyed was the need to increase program awareness and benefits, an indication that marketing efforts should continue or increase. The program could continue to perform billing data analysis to market to customers with relatively high apparent heating and cooling energy consumption.	Marketing messages primarily focused on rebates available to target market customers when upgrading to efficient heating and cooling equipment. Expanding messaging to highlight the additional benefits of efficient heating and cooling equipment could further motivate customers to upgrade to efficient equipment.
Lighting	Ameren Missouri continues to reach out to more retailers and audiences and to expand the list of eligible measures. As the volume of the program falls, it is more difficult to find an appropriate place and time in store front locations for the educational promotion activities that help customers learn to navigate new lighting options. Ameren Missouri should shift educational focus as well as marketing focus to more online activity, as a lower cost alternative to face-to-face	LED prices continue to present major barriers, as consumers do not understand LED bulbs' added value. Store intercept results found in-store promotions highly effective at driving sales and at producing more comments about understanding LED bulbs' energy savings benefits and long life. Ameren Missouri and its implementer should continue emphasizing in-store promotions, and should consider placing greater emphasis on the online store and

	interaction.	increasing educational marketing online.
BizSavers	Any future program implementer should work to increase promotion of the new construction and retro-commissioning incentives to customers doing standard and custom retrofit projects. Any future program implementer should intensify outreach to architects and design engineers to improve new construction program uptake. Any future program implementer should work with RSPs to ensure that they are appropriately prepared and understand the value of fully explaining all aspects of retro- commissioning to prospective participants, focusing on equipment optimization and monitoring. Ameren Missouri and any future implementer should continue and expand outreach efforts in parts of the Ameren Missouri service territory outside of St. Louis and its suburbs, particularly to small businesses in those areas. Ameren Missouri should consider adding customer type information to its customer database.	The program implementer should work to increase awareness of the new construction program rules among contractors and vendors. In particular, increasing the awareness of the importance of involving the program staff early in the design phase is important for maximizing savings. One thing to consider may be to include providing some form of recognition to contractors who attend specific training on, and demonstrate knowledge of, new construction program rules and processes—for example, identifying such contractors as "new construction program specialists" on the trade ally website and providing special new construction program co-branding. The program implementer should consider increasing the size of the trade ally network and re-introduce distribution of printed collateral to trade allies for use in marketing the program to customers. The program implementer should continue to monitor the project delivery of all SBDI service providers and, if necessary, attempt to recruit more SBDI service providers capable of delivering reasonably large numbers of projects and/or work with existing service providers to increase the number of projects they deliver to decrease the risk of relying on a single provider to deliver most program savings. Ameren Missouri should consider adding customer type information to its customer database to make it easier for programs to identify any under-served segments and improve reach into those segments and improve assessments of program reach to various business and building types.
CommunitySavers		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. Continue to develop relationships with financing institutions. Staff recognizes that facilitating financing is key to developing common area improvement projects that 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. 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 PY7PY2016 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.