FINAL Annual Report on Evaluation, Measurement & Verification Findings for Ameren Missouri Program Year 2013

Prepared by:

EM&V Auditor

Dr. Katherine Johnson, President

Johnson Consulting Group

1033 Lindfield Drive, Frederick, MD 21702

Email:kjohnson@johnsonconsults.com

with

Final Report

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Executive Summary

As a result of the Missouri Public Service Commission's (PSC) approval of a Stipulation and Agreement in File No. EO-2012-0142, Ameren Missouri launched eleven new demand-side management (DSM) programs on January 2, 2013. Ameren Missouri is required to complete process and impact evaluations[1] to assess the progress of its DSM programs towards meeting the energy savings targets[2] established by the PSC for these programs

To meet these requirements, Ameren Missouri contracted with two Evaluation, Measurement & Verification (EM&V) contractors: The Cadmus Group, Inc. (Cadmus) and ADM Associates, Inc. (ADM) to conduct comprehensive program evaluations of its energy efficiency portfolio. Cadmus conducted evaluations of the residential energy efficiency programs, while ADM conducted the evaluations of the business energy efficiency programs.

The goal of these evaluations is to comply with the requirements of Section 4 CSR- 240-22.070(8):[3]

> *"The purpose of these evaluations shall be 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" (p. 18).*

In 2012, the PSC contracted with Johnson Consulting Group to serve as its EM&V Auditor[4] (Auditor) to review and comment on compliance with 4 CSR 240-22.070(8) and on the overall quality, scope and accuracy of the Cadmus and ADM draft reports. The EM&V Auditor Team Members' roles and responsibilities are summarized in Table E-1.

[1] 4 CSR 240-20.093(7) and 4 CSR 240-3.163(7)

[2] 4 CSR 240-20.094(3)(A).

[3] A more complete citation of the requirements of 4 CSR 240-22.070(8) is in the Introduction section of this Report.

[4] 4 CSR 240-20.093(7) Evaluation, Measurement, and Verification (EM&V) of the Process and Impact of Demand-Side Programs. Each electric utility shall hire an independent contractor to perform and report EM&V of each commission-approved demand-side program in accordance with 4 CSR 240-20.094 Demand-Side Programs. The commission shall hire an independent contractor to audit and report on the work of each utility's independent EM&V contractor.

Table E-1: Roles and Responsibilities of the EM&V Auditor's Team

Member	Role	Primary Areas of Responsibility
Dr. Katherine Johnson	Project Manager	Overall Report and Process Evaluations Review and Analysis
Mr. Scott Dimetrosky	Subject Matter Expert: Lighting and Market Effects	LightSavers Review, Market Effects Model Review, Statistical Review and Analysis
Dr. Jim Bradford	Subject Matter Expert: M&V Issues and TRM	Lead of Impact Evaluations for BizSavers Programs, Construction Savers and Performance Savers
Mr. Gregg Eisenberg	Principle Investigator	Summarize and Analyze Key Findings for Impact Analysis and Cost Effectiveness
Ms. Gwen Mizell	Principle Investigator	Summarize and Analyze Key Findings for Remaining Residential Program Portfolio

EM&V Auditor Team completed its review and assessment of these reports in several ways. The Team reviewed each report's key findings, recommendations, and analytical techniques. Next, the key findings and recommendations were organized by topic areas to identify high-level themes and draw conclusions about the overall progress of the Ameren Missouri's program portfolio.

Based on this review, the EM&V Auditor Team developed both short-term and long-term recommendations on ways to improve the evaluation reporting process. This analysis and the recommendations for improvement are based on the EM&V Auditor Team's collective experience with utility energy efficiency programs, EM&V best practices and professional judgment.

However, the Commission Staff may have additional comments concerning the regulatory issues related to the inclusion of any energy savings due to market effects in the calculation of net-to-gross (NTG) for PY2013.[5] The EM&V Auditor Team's review of and recommendations concerning market effects are from a technical EM&V perspective.

Overall Conclusion

Overall, the Cadmus and ADM PY2014 program evaluation reports conform to industry best practices and provided a comprehensive review of all aspects of the program. However, the EM&V Auditor notes that the critical information regarding Ameren Missouri's program progress towards reaching the PSC-approved energy savings target for PY2013 were not presented in a transparent manner, consistent with EM&V best practices.

In addition, the EM&V Auditor identified significant concerns regarding the use of market effects in the LightSavers program evaluation and the application non-participant spillover results across the entire program portfolio. These concerns are explained more fully in Section 4.

[5] January 2, 2013 through December 31, 2013.

Recommended Adjustments to the PY2013 EM&V Reports

The evaluators should make the following modifications in the PY2013 EM&V Reports for Ameren Missouri's energy efficiency program portfolio to ensure that these reports comply with accepted industry practices and provide results in a clear and transparent manner.

The savings from LightSavers estimates need to be revised downward. Regarding the spillover and market effects estimates, the findings provide limited additional evidence of qualitative or quantitative indicators of market effects (i.e., a preponderance of evidence approach). The program also appears to target large, "big-box" retailers that are the most likely to have high free ridership and limited market effects, and use limited broad scale marketing and outreach (the smallest marketing budget of any residential program).

In addition, the reported NTG ratio for the LightSavers program is likely substantially understating the true error bound. For example, the free ridership estimate is only based on sales data at program prices, and the actual retail prices are substantially higher (up to 100% greater in some cases).

Furthermore, the error bound for the spillover and market effects estimates would be greater, as there is additional uncertainty (and thus additional propagation of error) regarding the other parameters that are used to estimate the market effects, including the average number of sockets per home, CFL saturation over two time periods, and stocking practices.

The evaluator's analysis also assumes that naturally occurring adoption from CFLs purchased outside the program is nearly equal to the free ridership estimated from the price-elasticity model, an assumption that can lead to wide swings in the market effects estimates.

Finally, the EM&V Auditor believes any impacts due to potential spillover and market effects should incorporate the sales pattern of non-program bulbs, not just program bulbs. The data analysis in Appendix A provides strong evidence that sales of CFLs and LEDs were extremely high in 2012, despite the lack of program activity. This could be due to a "momentum effect" of prior program activity Making this adjustment, the proportion of spillover and market effects attributable to the 2013 program drops to 18.8 percent, a downward revision from the 26.3 percent as presented in the LightSavers report. This then drops the NTG with spillover to 87 percent, and with spillover and market effects to 94 percent.

The non-participant spillover calculations for the residential programs should be revised to be allocated evenly among programs. Cadmus used a general population survey (GPS) to identify customers that reportedly installed energy efficient measures, credited the Ameren MO programs for driving this measure installation, yet did not apply for a program rebate. Cadmus uses an allocation method based on a combination of program marketing spending and energy savings. This leads to exceptionally high non-participant spillover for some programs (e.g., over 20% for CoolSavers). The non-participant spillover measures, however, do not match these same allocations (e.g., the qualifying CoolSavers measures such as CAC and CAC tune-up represent only about 20% of the NPSO, yet 62% of the NPSO is assigned to CoolSavers). A more appropriate approach would have been to apply the three percent non-participant spillover across all programs; in this way one program is not being given preference over another in terms of the final savings calculations and cost-effectiveness analysis.

The EM&V Auditor also recommends applying the reported three percent non-participant spillover value to each program, as opposed to the original methodology of allocating the non-participant spillover based on program spending as a proportion of total portfolio costs (marketing, incentives, etc.). The rational for this change stems from the fact that the current program percentages used to allocate the non-participant spillover do not align with the portfolio level savings percentages associated with each program.

Table E-2 presents the recommended net-to-gross values for each program after incorporating the three percent non-participant spillover value.

Table E-2: Recommended Non-Participant Spillover and NTG for Each Program

	Non-Participant Spillover		Net-to-Gross	
Program	**Original NPSO**	**Recommended NPSO**	**Original NTG**	**Recommended NTG**
ApplianceSavers	12.6%	3.0%	74.2%	64.8%
CoolSavers	19.2%	3.0%	95.4%	79.2%
CommunitySavers	0.0%	3.0%	95.8%	98.8%
ConstructionSavers	0.0%	3.0%	28.3%	31.3%
LightSavers	0.9%	3.0%	125.0%	94.0%
PerformanceSavers	1.7%	3.0%	90.3%	91.6%
RebateSavers*	1.7%	3.0%	92.7%	94.0%
BizSavers Custom**	N/A	N/A	93.0%	93.0%
BizSavers Standard**	N/A	N/A	95.0%	95.0%
BizSavers New Construction**	N/A	N/A	94.0%	94.0%
BizSavers RCx**	N/A	N/A	67.0%	67.0%

(Source: Evaluation reports submitted by Cadmus and ADM, February 2014)

* For RebateSavers, free ridership and non-participant spillover were estimated using a weighted average of program sub-components.

** BizSavers did not compute non-participant spillover

Table E-3 reports the recommended net savings *ex post* and the percent of target achieved for the portfolio energy savings in PY2013 using only the revised net-to-gross value.

Table E-3: Recommended Ameren Missouri Portfolio Energy Savings in PY2013, MWh

	Net Savings Ex Post: 2013		% of Target Achieved	
Program	**Original Net Savings Ex Post: 2013**	**Recommended Net Savings Ex Post: 2013**	**Original % of Target Achieved**	**Recommended % of Target Achieved**
ApplianceSavers	5,170	4,512	44%	38%
CoolSavers	23, 941	19878	139%	115%
CommunitySavers	5,890	6075	102%	105%
ConstructionSavers	67	74	10%	11%
LightSavers	279,127	227,132	230%	188%
PerformanceSavers	285	289	27%	27%
RebateSavers	7,793	7,905	104%	105%
BizSavers Custom	43,875	43,876	90%	90%
BizSavers Standard	23,899	23,899	111%	111%
BizSavers New Construction	204	204	8%	8%
BizSavers RCx	224	224	10%	10%
Total	390,475	335,431	162%	140%

(Source: 2013 Program Evaluation Reports from ADM and Cadmus)

Table E-4 shows the same updates for demand reductions in PY2013.

Table E-4: Recommended Ameren Missouri Demand Reductions in PY2013, kW

	Net Peak Savings Ex Post 2013		Revised Net Peak	
Program	**Original kW Ex Post**	**Recommended kW Ex Post**	**Original % of Target Achieved**	**Recommended % of Target Achieved**
ApplianceSavers	992	866	61%	53%
CoolSavers	13,833	11486	112%	93%
CommunitySavers	484	499	63%	64%
ConstructionSavers	23	26	28%	32%
LightSavers	21,057	16,106	577%	542%
PerformanceSavers	20	20	6%	6%
RebateSavers	723	732	57%	58%
BizSavers Custom	9,479	9,487	73%	73%
BizSavers Standard	4,088	4,090	90%	90%
BizSavers New Construction	43	43	5%	5%
BizSavers RCx	48.39	49	9%	9%
Total	50,763	44,511	130%	114%

(Sources: 2013 Program Evaluation Reports from ADM and Cadmus, Ameren Missouri Tariff Filings)

The EM&V Auditor's feedback led to significant improvements in reporting the final EM&V reports. Specifically, the final reports now document progress to approved goals are now stated and presented clearly in each report. The free ridership equation is also now displayed consistently for each report. In addition, the evaluators presented the findings in the recommended template provided in the draft report.

The process evaluation findings also improved significantly based on feedback from the EM&V Auditor. Specifically, the CoolSavers process evaluation now includes interviews with the contractors, examples of marketing and outreach materials were included in the PerformanceSavers process evaluation and the BizSavers report now includes a process flow diagram. All of these additions improved the overall analysis and quality of these reports.

Critical terms should be properly defined and used consistently throughout these reports. The key definitions such as *ex ante*, *ex gross*, achieved, and other terms were used inconsistently both throughout the reports as well as differently between the ADM and Cadmus evaluations. The terminology needs to be clearly defined and used consistently throughout the reports in order to ensure that these reports conform to industry best practices by presenting key findings in a clear and transparent manner.

The evaluators should provide clearer descriptions of the methodologies used to arrive at their findings. Many important technical results of these impact evaluations and cost-effectiveness calculations were not reported in a complete manner. For example, the background formulas and tables used to derive conclusions were not clearly presented. In addition, other important information regarding the confidence intervals for the non-participant spillover studies and key output from the regression analysis should be provided in a technical appendix. This will ensure that the proper level of details are provided so the

EM&V Auditor and other interested stakeholders will be able to independently review the findings and have a greater degree of confidence in these results.

The findings from the non-participant surveys should be provided as a standalone appendix in the final report. Given the importance associated with the findings for spillover, these findings should be provided in an appendix to facilitate understanding and conform to industry best practices for both process and impact evaluations. This recommendation was not included in the final reports filed by Cadmus, the residential program evaluator.

In addition, the EM&V Auditor has developed the following recommendations to improve future EM&V reports.

Provide additional technical information in the report. When showing confidence and precision values, the evaluators should explain in greater detail how it was calculated and how the information was used. These findings can either be part of a technical appendix or included in footnotes for specific program findings. But in any case, these findings need to be clearly provided in future reports.

Provide guidance regarding TRM updates and priorities. The evaluators should provide additional guidance regarding the effects of the erroneous TRM values on realization rates. In addition, it is not sufficient to recommend changes to the TRM, but rather it is more useful to prepare a prioritized list so Ameren Missouri can allocate resources accordingly, and hopefully support the development of a Statewide TRM.

Because of the significant number issues and resulting savings estimates, Ameren Missouri should complete a third -party review of the TRM and then update it in advance of the next planning cycle.

Calculate and present impacts by measure type. The evaluators should calculate and present impacts by measure type. For example, a table showing total impact for lighting, AC replacement, motor saving, envelope measures, etc. should be developed.

The findings from the non-participant surveys should be provided as a standalone appendix in the final report. Given the importance associated with the findings for spillover, these findings should be provided in an appendix to facilitate understanding and conform to industry best practices for both process and impact evaluations.

There were also some lost opportunities in the deployment of the non-participant surveys. Although this was a critical element in the program evaluation, the non-participant survey focused primarily on ways to estimate non-participant spillover and did not gather critical data regarding overall satisfaction with Ameren Missouri. Although the non-participant results were “sprinkled” throughout the various program evaluations, a standalone summary report in an Appendix would be a preferred method of conveying these results. However, the PowerPoint Presentation provided by Cadmus and the frequency counts (via data request) did provide additional background and context; these should have been provided in a standalone report.

ConstructionSavers: The evaluator should conduct the participant survey with home buyers in 2014, as described in the process evaluation report (ConstructionSavers 2013, p 25), as this will provide additional insight regarding barriers to program participation.

Non-participant Surveys: Future surveys should include critical process evaluation issues including customer satisfaction questions as a way to compare differences participants and non-participants.

Organization of This Report

This report is organized into the following sections to guide the reader through this summary of the key results:

- Section 1: Summary of Key Findings and Recommendations from the Impact Evaluations
- Section 2: Summary of Key Findings and Recommendations from the Process Evaluations
- Section 3: Cost-Effectiveness Findings
- Section 4: EM&V Auditor's Findings and Recommendations

Introduction

With the passage of the Missouri Energy Efficiency Investment Act in 2009, the State of Missouri and the stipulated agreement reached with Ameren Missouri and stakeholders signaled a new beginning of energy efficiency program offerings to all customer classes. These programs were launched in 2013. In accordance with 4 CFR- 240-22.070(8), the electric utilities are required to complete process and impact evaluations to assess the progress towards meeting the energy savings targets.

To meet these requirements, Ameren Missouri contracted with two Evaluation, Measurement & Verification (EM&V) contractors: The Cadmus Group, Inc. (Cadmus) and ADM Associates, Inc. ADM) to conduct comprehensive program evaluations of its energy efficiency portfolio. Cadmus conducted evaluations of the residential energy efficiency programs, while ADM conducted the evaluations of the business energy efficiency programs.

According to 4 CFR- 240-22.070(8), the electric utilities are required to complete process and impact evaluations.

> *…The purpose of these evaluations shall be 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.*
>
> *(A) Process Evaluation. Each demand-side program and demand-side rate that is part of the utility's preferred resource plan shall be subjected to an ongoing evaluation process which addresses at least the following questions about program design.*
>
> *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 market segments?*
>
> *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?*
>
> *4. Are the communication channels and delivery mechanisms appropriate for the target market 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?*
>
> *(B) Impact Evaluation. The utility shall develop methods of estimating the actual load impacts of each demand-side program and demand-side rate included in the utility's preferred resource plan to a reasonable degree of accuracy.*
>
> *1. Impact evaluation methods. At a minimum, comparisons of one (1) or both of the following types shall be used to measure program and rate impacts in a manner that is based on sound statistical principles:*
>
> *A. Comparisons of pre-adoption and post-adoption loads of program or demand-side rate participants, corrected for the effects of weather and other intertemporal differences; and*
>
> *B. Comparisons between program and demand-side rate participants' loads and those of an appropriate control group over the same time period.*
>
> *2. The utility shall develop load-impact measurement protocols that are designed to make the most cost-effective use of the following types of measurements, either individually or in combination:*
>
> *A. Monthly billing data, hourly load data, load research data, end-use load metered data, building and equipment simulation models, and survey responses; or*
>
> *B. Audit and survey data on appliance and equipment type, size and efficiency levels, household or business characteristics, or energy-related building characteristics.*
>
> *(C) The utility shall develop protocols to collect data regarding demand-side program and demand-side rate market potential, participation rates, utility costs, participant costs, and total costs.*

In 2012, the Missouri Public Service Commission (PSC) contracted with Johnson Consulting Group to serve as its EM&V Auditor[6] (Auditor Team) to review and comment on compliance with 4 CSR 240-22.070(8) and on the overall quality, scope and accuracy of these reports.

This review consisted of the following components. The EM&V Auditor Team Members read each program's draft evaluation report in its entirety, and summarized the key findings and recommendations made by program by topic area. Organizing the findings at this level allows for a comprehensive review of the important trends among the programs and identifies issues that are important at both the program and portfolio level. The EM&V Auditor Team Members also made additional recommendations based on the EM&V Auditor Team's collective experience with utility energy efficiency programs' EM&V best practices and professional judgment.

Lastly, the EM&V Auditor Team Members assessed the overall quality of the program evaluations completed by the two contractors: Cadmus and ADM.

This report is organized into the following sections, to help guide the reader through this summary of the key results:

- Section 1: Summary of Key Findings and Recommendations from the Impact Evaluations
- Section 2: Summary of Key Findings and Recommendations from the Process Evaluations
- Section 3: Cost-Effectiveness Findings
- Section 4: EM&V Auditor's Findings and Recommendations

To facilitate the reader, the specific program evaluations are referenced in the text by the program name, year of evaluation and specific page number (i.e., ApplianceSavers 2013, p.1) since all of the reports are for Ameren Missouri for the PY2013. A full list of all reports cited is located in the References Section of this report.

In addition, percentages cited in parenthesis (%) are used to denote particular or significant findings from a particular evaluation finding and follow standard industry reporting conventions.

[6] 4 CSR 240-20.093(7) Evaluation, Measurement, and Verification (EM&V) of the Process and Impact of Demand-Side Programs. Each electric utility shall hire an independent contractor to perform and report EM&V of each commission-approved demand-side program in accordance with 4 CSR 240-20.094 Demand-Side Programs. The commission shall hire an independent contractor to audit and report on the work of each utility's independent EM&V contractor.

Section 1: Summary of Key Findings and Recommendations from the Impact Evaluations

Both Cadmus and ADM conducted comprehensive impact evaluations to determine the savings estimates attributable to each program or measure. ***This section summarizes the findings from these impact evaluations,*** while Section 4 provides the EM&V Auditor Team's assessment of the appropriateness of these savings estimates.

As part of the EM&V Auditor' review, Team Members summarized the data from the individual program evaluations. However, the critical metric of assessing progress relative to program goals was not clearly stated in any of the program evaluation reports. Therefore the EM&V Auditor Team had to calculate these results. This is a significant departure from industry standards and reporting practices.

The program evaluation duties were divided among the two evaluation firms. Cadmus completed the residential programs evaluations, while ADM conducted the evaluation for the commercial and industrial programs, which is the integrated offering for the commercial and industrial sectors. Table 1 summarizes the types of impact evaluation activities that were completed for Ameren Missouri's energy efficiency program portfolio.

Table 1: Summary of Impact Evaluation Methodologies Used in the EM&V Reports

Program	Measure Verification		Review Program Databases	Verify Correct Use of TRM Values	Estimate gross energy/demand impacts at measure category level	Estimate Net Impacts at a Program Level
	Prescriptive Measure Verification (On-Site/ Surveys)	Custom Measure Verification				
ApplianceSavers	N/A	N/A	✓	✓	✓	✓
CoolSavers	✓	✓	✓	✓	✓	✓
CommunitySavers	✓	✓	✓	✓	✓	✓
ConstructionSavers	✓	✓	✓	✓	✓	✓
Cross-Cutting Evaluation Plan	✓	✓	✓	✓	✓	✓
LightSavers	✓	✓	✓	✓	✓	✓
PerformanceSavers	✓	✓	✓	✓	✓	✓
RebateSavers	✓	✓	✓	✓	✓	✓
Custom	✓	✓	✓	✓	✓	✓
Standard	✓	✓	✓	✓	✓	✓
New Construction	✓	✓	✓	✓	✓	✓
RetroCommissioning (RCx)	✓	✓	✓	✓	✓	✓

1.1 Summary of Impact Evaluation Findings

Portfolio Level Findings

This section summarizes the key energy savings estimates for both demand kilowatts (kW) and energy kilowatt-hours (kWh) across Ameren Missouri's energy efficiency program portfolio.

Figures 1 and 2 summarize the energy savings goals by sector for both kWh and kW for PY2013. The total goals for PY2013 are 240,397,411 kWh and 39,015 kW. More than two-thirds (69%) of total energy goals in 2013 were in the residential sector while the demand goals were more evenly split with 52% in the residential sector.

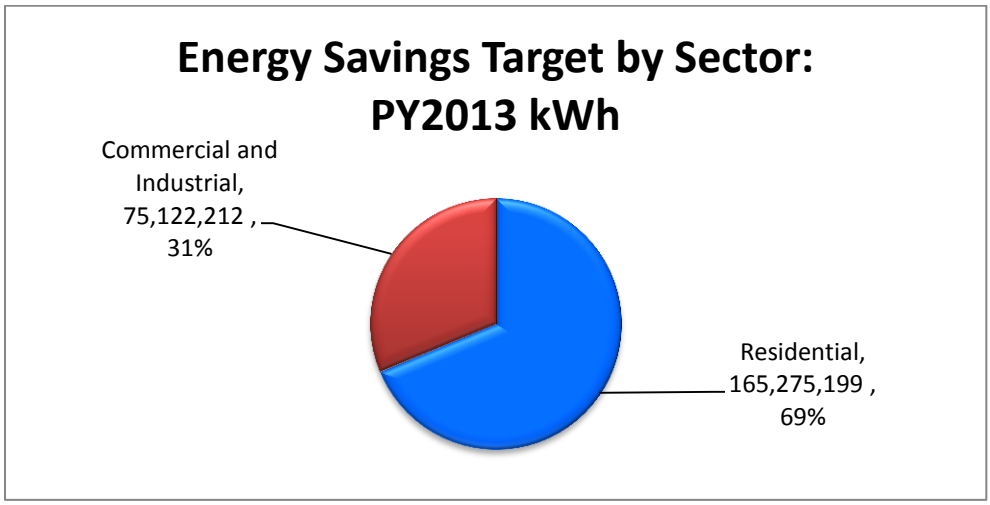
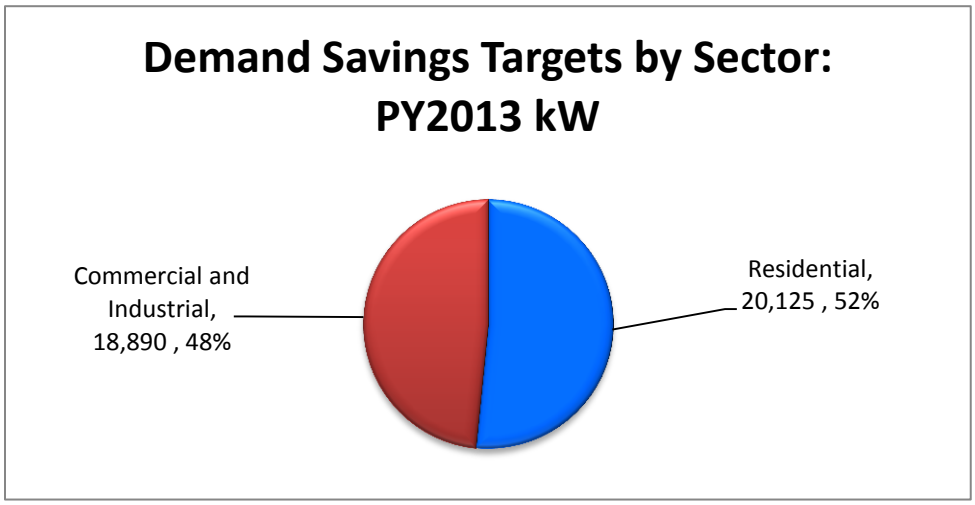


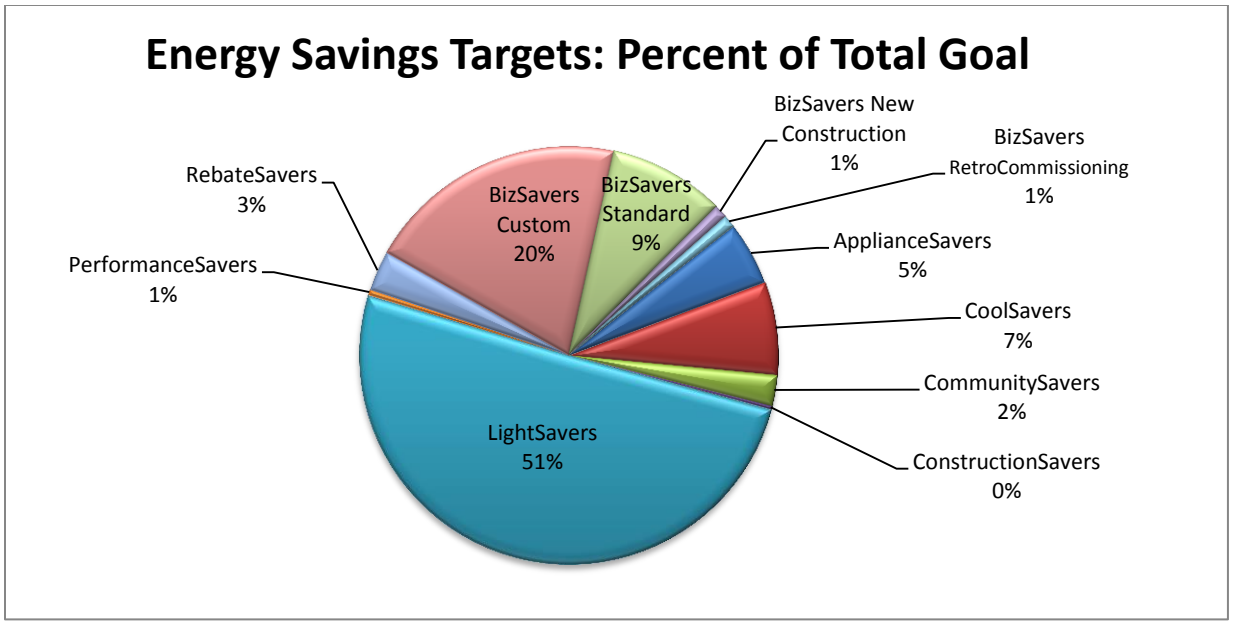
Figure 1: Energy Savings Target by Sector: PY2013 kWh



(Source: Ameren Missouri tariff sheets 191

Figure 2: Demand Savings Targets by Sector: PY2013kW

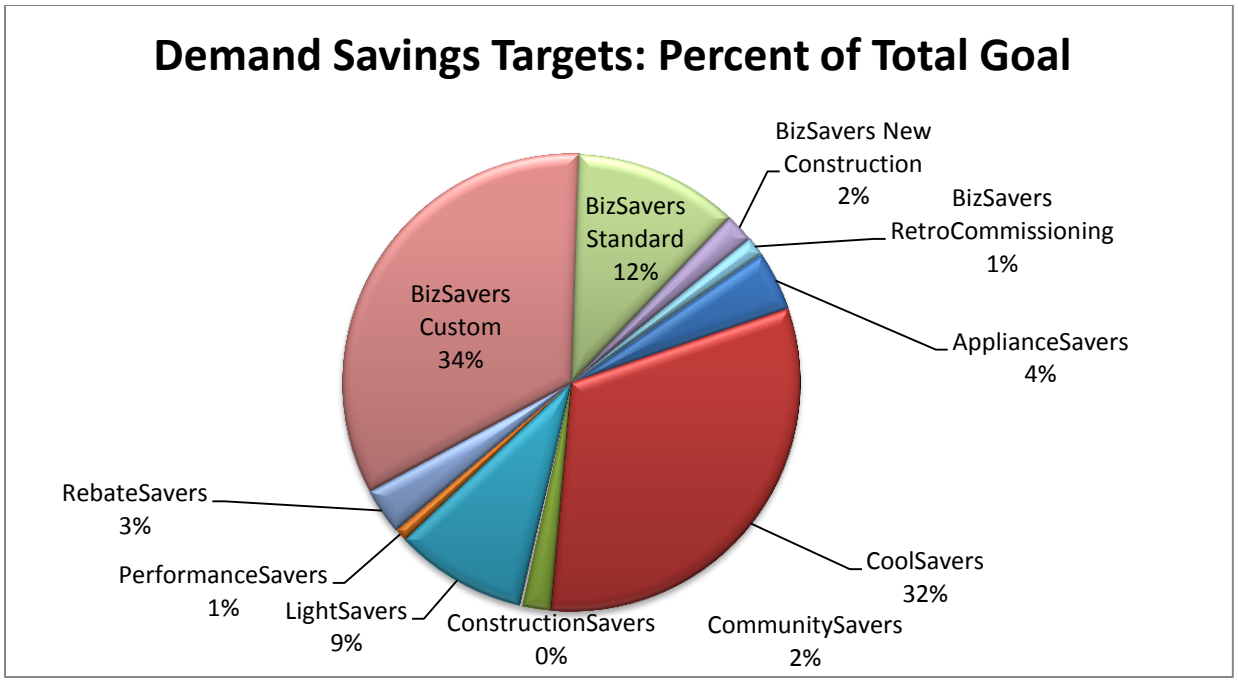
The LightSavers program accounts for more than half of total energy savings target in 2013. BizSavers, which represents the entire commercial and industrial (C&I) offering, has the second highest goals, accounting for almost one-third of all savings targets. These results are summarized in Figure 3.



(Source: Ameren Missouri Tariff Sheets 191)

Figure 3: Energy Saving Targets: Percent of Total

The distribution among sectors of demand reduction targets is different than energy savings targets, presumably because of the difference in residential and C&I load profiles. As Figure 4 shows, the BizSavers demand reduction targets account for almost half of the total demand reductions in 2013, and CoolSavers account for roughly one-third.



(Source: Ameren Missouri Tariff Filings)

Figure 4: Demand Reduction Targets by Program

Tables 2 and 3, show the Ameren Missouri energy efficiency target, *ex ante* gross values, *ex post* gross values, *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** – Target values are annualized savings targets for the residential, commercial, and industrial sectors. The residential goals are as presented in MO P.S.C. Schedule number 6, sheets 191 through 191.4 and dated May 31, 2013.
- **Ex Ante Gross Savings** – *Ex ante* gross savings are annualized savings either reported by Ameren Missouri, or as calculated by applying tracked program activity to TRM savings values. In the evaluation reports, the *ex ante* gross values are known variously as "expected gross savings," "expected kWh savings," "Ameren Missouri's *ex ante* savings".
- **Ex Post Gross Savings** – *Ex post* gross savings are annualized savings as calculated and presented by the evaluators. In the evaluation report, this is known variously as "Realized Gross kWh Savings," "Achieved Gross Peak," and "Team's evaluated Savings".
- **Net Savings Ex Post** – *Ex post* net savings is the *ex post* savings multiplied by the net-to-gross (NTG) ratio, which accounts for free ridership, spillover effect, and market effects. In the evaluation reports, this was known variably as "Realize Net kWh Savings," and "Achieved Net Peak".

Table 2: Ameren Missouri Portfolio Energy Savings in PY2013, MWh

Program	PSC Approved Targets	Gross Savings Ex Ante	Gross Savings Ex Post	Net Savings Ex Post: 2013	% of Target Achieved
ApplianceSavers	11,740	9,897	6,963	5,170	44%
CoolSavers	17,218	27,876	25,098	23,941	139%
CommunitySavers	5,798	7,472	6,149	5,890	102%
ConstructionSavers	679	435	238	67	10%
LightSavers	121,258	198,735	227,132	279,127	230%
PerformanceSavers	1,070	428	316	285	27%
RebateSavers	7,513	21,473	8,409	7,794	104%
Custom	48,682	51,535	47,421	43,875	90%
Standard	21,573	23,793	25,081	23,899	111%
New Construction	2,513	168	218	204	8%
RCx	2,351	316	336	224	10%
Total	**240,395**	**342,129**	**347,361**	**390,476**	**162%**

(Source: 2013 Program Evaluation Reports from ADM and Cadmus)

As Table 2 shows, the total gross savings reported *ex ante* is 342,129 MWh. The evaluation studies report a total gross savings of 347,361 MWh, implying a gross realization rate of 102 percent. The total savings estimated, after accounting for free rider, spillover and market effects, is 390,476 MWh. The net achieved savings is higher than gross savings *ex post* primarily because of the high spillover and market effects reported and applied for the LightSavers program.

Table 2 also shows total net energy saved (after accounting for free ridership, spillover and market effects) relative to the 2013 targets, by sector. Across all programs, the portfolio exceeded its targets in terms of net (evaluated) savings, achieving 230 percent of its target, again largely due to the evaluated savings attributed to the LightSavers program.

Some of the smaller programs, such as ConstructionSavers and PerformanceSavers, (which account for a fairly small portion of total goals), under-achieved relative to their targets (i.e., 10% and 27%, respectively). CoolSavers and RebateSavers also s overachieved relative to their targets (i.e., 144% and 104% respectively).

On the commercial and industrial side, the two small programs, RCx and New Construction missed their targets by a wide margin (10% and 8 % respectively), while the larger Custom and Standard BizSavers programs were near goal (95% and 111% respectively).

Table 3 shows the PSC approved targets, *ex ante* gross, *ex post* gross and *ex post* net demand reductions for PY2013. This table suggests a total demand reduction realization rate of over 100 percent, again primarily because of the high spillover and market effects for the LightSavers program. Table 3 also shows the 2013 achieved demand (kW) reductions relative to 2013 targets.

Table 3: Ameren Missouri Demand Reductions in PY2013, kW

Program	PSC Approved Target	Gross Saving Ex Ante	Gross Savings Ex Post	Net Peak	% of Target Achieved
ApplianceSavers	1,636	1,800	1,336	992	61%
CoolSavers	12,361	9,826	14,502	13,833	112%
CommunitySavers	774	728	505	484	63%
ConstructionSavers	82	73	83	23	28%
LightSavers	3,647	7,909	17,111	21,028	577%
PerformanceSavers	352	35	22	20	6%
RebateSavers	1,273	2,026	779	723	57%
BizSavers Custom	13,022	10,302	10,254	9,480	73%
BizSavers Standard	4,540	3,265	4,292	4,089	90%
BizSavers New Construction	797	0	46	43	5%
BizSavers Retro-commissioning	531	70	73	48	9%
Total	39,015	36,034	49,003	50,763	130%

(Sources: 2013 Program Evaluation Reports from ADM and Cadmus, Ameren Missouri Tariff Filings)

In terms of reaching demand-reduction goals, the larger programs performed better than the smaller programs. LightSavers and CoolSavers surpassed their targeted demand reductions (577% and 112%, respectively). BizSavers, which achieved 91 percent of its energy-savings targets, achieved only 72 percent of its demand-reduction target.

In spite of the under-performance of the smaller programs, the portfolio as a total still achieved 130 percent of its targeted demand reductions largely due to the evaluated demand reductions attributed to LightSavers and CoolSavers.

Although MEEIA only requires electric programs, there was one program in the residential portfolio, "PerformanceSavers" that also tracked and reported natural gas savings. In the March 12, 2014 EM&V meetings, Ameren Missouri indicated that they unilaterally included gas in this program in an effort to include a particular gas utility in some of Ameren Missouri's DSM activities. Although gas is not part of MEEIA, Missouri indicated that adding gas was good for the program and helped make it cost-effective.

Free ridership, spillover, and market effects percentage rates calculated for each programs are shown in Table 4.[7] These factors are used to calculate net-to-gross ratio (NTG), which is, in turn, used to calculate net savings from estimated gross savings.

[7] Note that estimates for market effects and non-participant spillover for BizSavers were not reported in the final EM&V Report.

Table 4: Estimated Free Ridership, Spillover Market Effect Rates and NTG for Each Program

Program	Estimated Free Ridership Rates	Estimated Spillover Rates	Estimated Non-participant Spillover	Estimated Market Effects	NTG Ratio
ApplianceSavers	38.6%	0.3%	12.6%	0.0%	74.2%
CoolSavers	20[8].2%	1.4%	19.2%	0.0%	95.4%
CommunitySavers	4.2%	0.0%	0%	0.0%	95.8%
ConstructionSavers	72.1%	0.4%	0.0%	0.0%	28.3%
LightSavers	24%	25.3%	0.9%	18.4%	125%
PerformanceSavers	16.5%	5.1%	1.7%	0.0%	90.3%
RebateSavers	11.0[9]%	7.0%	1.7%	0.0%	92.7%
BizSavers Custom	93.0%	N/A	N/A	N/A	93.0%
BizSavers Standard	95.0%	N/A	N/A	N/A	95.0%
BizSavers New Construction	94.0%	N/A	N/A	N/A	94.0%
BizSavers RCx	67.0%	N/A	N/A	N/A	67.0%

(Source: Evaluation reports submitted by Cadmus and ADM, February 2014)

In general, free ridership rates for these programs were fairly high. For example, ConstructionSavers had an estimated free ridership rate of 72 percent because participating builders were already building houses that meet program standards. LightSavers also had a high free ridership rate of 24 percent.

Program Level Findings

The following section summarizes the overall program performance by program.

ApplianceSavers

The ApplianceSavers program offers Ameren Missouri's residential customers a $50 incentive and free pickup service for recycling an operable refrigerator and stand-alone freezer. In 2013, the program began including room air conditioner and dehumidifier pickups. The room air conditioners and dehumidifiers made up a very small portion of the program savings. Table 5 summarizes the ApplianceSavers PY2013 results.

[8] Note that the free ridership rate for the CoolSavers program was not reported in the report, but rather had to be derived subtracting the total derived by subtracting 1 – NTG+ME+SO. The weighted free ridership number should have been provided in the final EM&V Report.

[9] Note that the overall free ridership rate for the RebateSavers program was not reported in the EM&V report, but rather had to be derived by subtracting 1 – NTG+ME+SO. The weighted free ridership number should have been provided in the final EM&V Report.

Table 5: Summary of ApplianceSavers Impact Findings

	Energy (kWh)	Demand (kW)
Target	11,739,510	1,636
Ex Ante Gross	9,899,827	1,800
Ex Post Gross	6,963,479	1,336
Ex Post Net	5,170,000	992

(Sources: Ameren Missouri Tariffs and ApplianceSavers 2013)

This program is not meeting its target savings goals. ApplianceSavers program realized 83.9% of its *ex ante* savings, based on actual PY2013 participation. However, the program achieved only 44% (5,170 MWh) of its proposed savings target from Ameren Missouri's tariff (11,739.5 MWh).

The program has a low gross realization rate (70%) and a high rate of free ridership (38.6%), indicating that Ameren Missouri is calculating more savings than is actually occurring, and are also estimating that the program has a greater effect on the market than it actually does.

These discrepancies are due to the erroneous savings values in the TRM. This finding was also apparent in the previous evaluation cycle and suggests that Ameren Missouri did not update these values accordingly. Rather, the savings values were based on PY 2010 models wherein the sample sizes were much smaller than those considered in the 2013 evaluation. However, the evaluators realized these savings values were flawed and therefore developed a more accurate model using a larger and more robust data set to analyze savings from a Michigan metering study and the application of Uniform Measures Project (UMP) protocol.

CoolSavers

CoolSavers offers Ameren Missouri customers living in single-family homes, condominiums, or townhomes incentives for installing high-efficiency central air conditioners (CAC) or heat pumps (HP) through a participating program contractor. The program also offers incentives for HVAC tune-ups, variable-speed fan motors and programmable thermostats. The CoolSavers PY2013 impact results are summarized in Table 6.

Table 6: Summary of CoolSavers Impact Findings

	Energy (kWh)	Demand (kW)
Target	17,218,114	12,361
Ex Ante Gross	27,876,000	9,826
Ex Post Gross	25,098,000	14,502
Ex Post Net	23,941,000	13,833

(Sources: Ameren Missouri Tariffs and CommunitySaver 2013)

The program exceeded its goals. The CoolSavers program had gross savings realization rate of 90 percent. However, two measures' realization rates were below 50 percent: (1) HVAC systems receiving condenser cleaning or evaporator cleaning, and (2) programmable thermostats. However, HVAC systems receiving refrigerant charge adjustment and ground-source heat pumps had realizations rates well over 100% (CoolSavers 2013, p. 2).

The evaluators determined an overall weighted NTG of 95.4 percent based on four findings:

- Free ridership for new HVAC installations, estimated as 23 percent, was determined by analyzing responses from participant and contractors surveys;
- Participant spillover (other non-HVAC actions undertaken by CoolSavers participants) was at 1.4 percent; and,
- Non-participant spillover generated by Ameren Missouri and ICF's substantial investment in CoolSavers-specific marketing (approximately $825,000) was 22.4 percent.
- Free ridership was similar to or lower than other HVAC programs, but changes could reduce it further (CoolSavers 2013, p. 3).

But the program evaluation identified serious concerns with the quality of the data collected. More than 30 percent of the tune-up data were incorrect and adequate data were not collected to allow for independent calculation of unit efficiencies using a "compressor mapping" methodology.

The fact that the program exceeded its goals was due to the extremely high realization rates for AC tune-ups with refrigerant charge adjustment (realization over 350%) and for the application of ground sources heat pumps, which had a realization rate of over 180 percent.

The evaluator reported a high level of free ridership (approximately 23%) but also a high level of spillover (20.6%) CoolSavers 2013, p. 3. These two values offset each other resulting in a high NTG ratio of more than 98 percent. However, these findings remain questionable given that this high spillover rate is attributed to non-participants.

CommunitySavers

Through CommunitySavers, Ameren Missouri delivers cost-effective, energy-efficiency services to low-income multifamily properties that have three or more dwelling units. The program impacts are summarized in Table 7.

Table 7: Summary of CommunitySavers Impact Findings

	Energy (kWh)	Demand (kW)
Target	5,797,743	774
Ex Ante Gross	7,472,000	728
Ex Post Gross	6,149,000	505
Ex Post Net	5,890,000	484

(Sources: Ameren Missouri Tariffs and CommunitySavers 2013)

Given the target population of low-income properties, it is not surprising that the free ridership was low at 4.2 percent, which is consistent for low-income programs.

This program slightly exceeded both energy and demand targets. *Ex post* savings values for several measures including 13W CFL, refrigerators, programmable thermostats, and advanced power strips were lower than the *ex ante* values estimated using the Ameren Missouri TRM.

Cooling measures showed a much higher savings rate than the TRM or *ex ante* values. Therefore, the TRM values should be carefully reviewed and updated.

In addition, this program had an overall NTG of 95.8 percent resulting in a program net savings of 5,890 MWh per year, which is consistent with low-income programs (CommunitySavers 2013, p. 3).

ConstructionSavers

Ameren Missouri added the ConstructionSavers program to its residential Act On Energy® portfolio in PY2013. The program promotes energy-efficient new home construction. Targeting builders, the program offers a package of training, technical assistance, marketing assistance, and incentives for constructing ENERGY STAR® homes.

ConstructionSavers achieved a small percent (10%) of its energy (kWh) target, but almost 100 percent of its demand (kW) target (see Table 8).

Table 8: Summary of ConstructionSavers Impact Findings

	Energy (kWh)	Demand (kW)
Target	678,990	82
Ex Ante Gross	435,000	73
Ex Post Gross	238,005	83
Ex Post Net	67,350	23

(Sources: Ameren Missouri Tariffs and ConstructionSavers evaluation report)

However, the discrepancies in the high reported kW *ex ante* and *ex post* gross savings estimates suggest that there are errors in the savings values and the TRM values should be updated accordingly.

In addition, the program had a low realization rate of 54.7 percent of its energy savings target, which was significantly below program goals. The major factors for this low realization rate were due to overestimation of *ex ante* values in the TRM, further indicating errors that should be corrected in the next TRM update (ConstructionSavers 2012, p. 1).

Unfortunately, program also had a high free ridership rate of 72.1 percent because nearly all the participating builders were already constructing to the standards imposed by the program (ConstructionSavers 2013, p. 2).

Overall, these findings suggest the ConstructionSavers program is currently not on target to meet its goals. Specific recommendations for ways to improve this program are provided in Section 2.

LightSavers

The LightSavers program offers standard and specialty CFLs and various models of LEDs through upstream and coupon channels. The program also distributes CFLs through Social marketing Distribution (SMD). LightSavers is the largest program in the Missouri portfolio. Table 9 summarizes the key LightSavers impact findings.

Table 9: Summary of LightSavers Impact Findings

	Energy (kWh)	Demand (kW)
Target	121,257,847	3,647
Ex Ante Gross	198,735,000	7,909
Ex Post Gross	227,132,000	17,111
Ex Post Net	279,127,000	21, 028

(Sources: Ameren Missouri Tariffs and LightSavers 2013)

The program realized 125 percent of its *ex ante* savings, based on actual PY2013 participation (LightSavers 2013, p.4). The evaluators determined an overall weighted NTG of 125 percent based on the following data:

- Free ridership (24%), the percentage of products that would have been purchased without the retailer discounts or coupons.
- Non-Participant Lighting Spillover or "like" Spillover (28%), the additional non-discounted light bulbs purchased as a result of the program.
- Non-Participant Non-lighting Spillover or "unlike spillover" (1%), the non-lighting energy efficiency actions induced by the program.
- Market Effects (20%), structural market or behavior changes caused by program activity that result in additional purchases of non-discounted bulbs (LightSavers 2013, p.4).

However, as noted in the Executive Summary and explained more fully in Section 4, the EM&V Auditor identified significant concerns regarding the validity of these estimates based on the large potential error bands of these estimates. Note that the 125 percent NTG ratio only applies to the Upstream/markdown/coupon portion of Lightsavers. The social media portion assumed a NTG ratio of one. Therefore, the overall blended realization rate for the program was calculated to be approximately 123 percent, although Cadmus reports the blended NTG to be 119 percent. (Lightsavers 2013 Evaluation 2013, Table 29, pg. 60).

PerformanceSavers

Ameren Missouri added the PerformanceSavers pilot program to the residential Act On Energy® portfolio in PY2013. This program is designed to encourage residents of single-family homes to reduce energy consumption by making improvements to: weatherization, lighting, HVAC, and water heating appliances fueled by natural gas. The program provides some energy-efficient measures at no cost to participants and offers rebates for other measures (air sealing, ceiling insulation, and energy-efficient windows). Table 10 summarizes these findings.

Table 10: Summary of PerformanceSavers Impact Findings

	Energy (kWh)	Demand (kW)
Target	1,070,199	352
Ex Ante Gross	428,000	35
Ex Post Gross	316,000	22
Ex Post Net	285,000	20

(Sources: Ameren Missouri Tariffs and PerformanceSavers 2013)

The program achieved 27 percent of its total program savings goal for PY2013. Despite this underperformance in energy savings, the program surpassed its annual audit recruitment goal for PY2013 by 22 percent. The measures with the highest levels of free ridership were for CFLs (35%), high-efficiency faucet aerators (18%), and water heater pipe wrap (21%). While two measures, insulation (2.3%) and windows (0%), had low free ridership rates. Overall, the free ridership rate for PerformanceSavers was 16.5 percent (PerformanceSavers 2013, pp. 2-3).

Unlike all other programs in the portfolio, PerformanceSavers also tracked and reported natural gas savings. In the March 12, 2014 EM&V meetings, Ameren Missouri indicated that they unilaterally included gas in this program in an effort to encourage gas utility participation. Although gas is not part of MIEEA, Ameren Missouri indicated that adding gas was good for the program and helped make it cost effective.

RebateSavers

The RebateSavers program advertises at point of purchase in retail stores, commonly with many LightSavers retailers. The program offers upstream discounts for advanced power strips sold through the Missouri online store. Also offered are free home energy kits for customers with electric water heaters. Direct installed energy kits are available for multifamily customers with electric water heaters. Table 11 provides a summary of key impact findings across the program.

Table 11: Summary of RebateSavers Impact Findings

	Energy (kWh)	Demand (kW)
Target	7,513,000	1,273
Ex Ante Gross	21,473,000	2,026
Ex Post Gross	8,409,000	779
Ex Post Net	7,794,732	723

(Sources: Ameren Missouri Tariffs and RebateSavers 2012)

The program realized 40 percent of its *ex ante* net savings based on actual participation. However due to higher participation than expected, the program achieved 104 percent of its proposed energy savings target identified in the Missouri tariff.

The high *ex ante* gross savings overstates the actual savings found by the evaluators due to the significant differences in assumed savings values in the TRM. These differences were also caused by significant

variances between the *ex ante* and *ex post* values and the extremely low realization rates for programmable thermostats (RebateSavers 2013, p. 2).

The net savings values for the RebateSavers program experienced an overall savings-weighted NTG of 92.7 percent **(**RebateSavers 2013, p. 3).

Room air conditioners and programmable thermostats experienced low per-unit realization rates and high free ridership rates Further, other metrics support the possibility of market saturation for these measures in Ameren Missouri's territory, including a Home Inventory Study conducted for the LightSavers program which found that 66 percent of customers already had a programmable thermostat, and the ENERGY STAR website which indicates that nationwide ENERGY STAR room air conditioners have a 35 percent saturation rate (RebateSavers 2013, p. 5).

BizSavers

The BizSavers program is a large umbrella program comprised primarily of a standard incentive program and a custom program. The Retro-Commissioning (RCx) and new construction programs are new pilot programs and are very small in comparison to the standard and custom offerings. Table 12 summarizes the PY2013 results for BizSavers program overall, while Tables 13-16 summarize the individual results for each BizSavers' program.

Table 12: Summary of BizSavers Overall Impact Findings

Custom Program	Energy (kWh)	Demand, kW
Target	75,122,212	18,890
Ex Ante Gross	75,813,044	13,636
Ex Post Gross	73,055, 198	14, 664
Ex Post Net	68,202,820	13,659

(Sources: Ameren Missouri Tariffs and BizSavers 2013 Evaluation)

ADM performed detailed calculations using proven techniques including industry accepted engineering calculations, computer simulations and valid sampling techniques. (BizSavers 2013, pp.1-2). New construction and retro-commissioning program evaluation involved analysis of a census of the projects.

The evaluator did not present the data broken out by technology or measure type, and such information would have been useful and interesting so that measures could be categorized into high, medium and low impact on the portfolio performance.

The evaluators suggested that Ameren Missouri should take credit or penalty for interactive effects when a retrofit affects the energy use of other energy using systems (BizSavers 2013, p. 1-8). In addition to the interactive effects effect on electrical energy use and demand across, interactive effects can also affect natural gas use. Ameren Missouri should consider energy and demand savings and interactive effects across fuel types in the future (see Table 13).

Table 13: Summary of BizSavers Custom Track Impact Findings

Custom Program	Energy (kWh)	Demand, kW
Target	48,682,732	13,022
Ex Ante Gross	51,535,015	10,302
Ex Post Gross	47,420,812	10,254
Ex Post Net	43,875,548	9,480

(Sources: Ameren Missouri Tariffs and BizSavers 2013 Evaluation)

There were a total of 620 projects comprising 21 percent of the total custom savings. The custom track realization rate was high at 92 percent.

Table 14 shows the impact evaluation findings for the Standard Track program. In PY2013, there were 817 standard track projects completed, making this the second largest offering in the C&I sector. It also accounted for 35 percent of the energy savings. Similar to the custom track, the realization rate for the standard track was found 105 percent and the net to gross ratio was 95 percent.

Table 14: Summary of BizSavers Standard Track Impact Findings

Standard Program	Energy (kWh)	Demand, kW
Target	21,573,968	4,540
Ex Ante Gross	23,793,935	3,264.74
Ex Post Gross	25,081,134	4,291.96
Ex Post Net	23,899,394	4,088.70

(Sources: Ameren Missouri Tariffs and BizSavers 2013 Evaluation)

Although this was the smallest C&I program, the evaluator found that the New Construction program had a high realization rates 129 percent. There were only two new construction projects, and the evaluator considered a census of these projects. The findings from the New Construction program are summarized in Table 15.

Table 15: Summary of BizSavers New Construction Program Impact Findings

New Construction	Energy (kWh)	Demand, kW
Target	2,513,756	797
Ex Ante Gross	168,063	--
Ex Post Gross	217,614	45.97
Ex Post Net	204,121	43.12

(Sources: Ameren Missouri Tariffs and BizSavers 2013 Evaluation

Similar to the New Construction Program, the results for the Retro-Commissioning was small, comprising only 0.32 percent of the C&I savings. There was only one Retro-Commissioning project, and the evaluator found both a high realization rate of 106 percent and a NTG ratio of 67 percent. Table 16 summarizes the impact findings for this program.

Table 16: Summary of BizSavers RCx Program Impact Findings

RCx Program	Energy (kWh)	Demand, kW
Target	2,351,756	531
Ex Ante Gross	316,031	70
Ex Post Gross	335,638	72.58
Ex Post Net	223,759	48.39

(Sources: Ameren Missouri Tariffs and BizSavers 2013 Evaluation)

Findings from the TRM Review

The impact evaluations indicated a number of serious concerns regarding the validity of the current TRM savings estimates for the following:

- ApplianceSavers (p. 2)
- CommunitySavers (pp. 2, 47-51, 65)
- ConstructionSavers (pp. 29-30)
- LightSavers (pp. 6, 46)
- PerformanceSavers (pp. 30, 34-35)
- RebateSavers (pp. 1, 40-50, 56)
- BizSavers (pp. 1-3, 1-4, 7-1,

These errors, some of which have been identified in previous evaluations, led to a significant overestimate of program savings and therefore should be adjusted as specified in the evaluation reports.

Findings from the Data Tracking Review

The evaluators reviewed the current program tracking databases. Although not explicitly stated, it appears there are no problems with database tracking for PerformanceSavers. Data tracking is also not an issue for ApplianceSavers (ApplianceSavers 2013, p. 13).

But several evaluations identified difficulties with the current program data collection and reporting activities. For example, the new reporting requirements were both time consuming and costly for the

CommunitySavers program. The program requires a multitude of reports from different parties over different periods and requires not only completed installations but also explanations of deviations **(**CommunitySavers 2013, p. 4).

In general, the requirements of the CoolSavers tune- up program are sufficient but the data reported by contractors should be improved. Specifically, the Cadmus team identified data quality issues with 30 percent of the reported tune−up measurements, which significantly reduced the sample size of EER measurements available to our team for estimating savings (CoolSavers 2013 p. 6).

Furthermore, the contractors did not report reliable SEER estimates for early replacement systems (CoolSavers 2013, pp. 5, 18).

Data Tracking for the Demand Elasticity Model: Missing data presented serious challenges in gathering the correct inputs for the demand elasticity model developed by Cadmus. This model relies on the relationship between the changing prices of light bulbs and the associated sales changes. The first round of price changes did not occur until July, and accumulating a meaningful number of sales transactions to reflect the impact of the price change required several weeks.

Some retailers lagged in sales reporting. Several were still missing data as far back as June, when data were being analyzed in November (LightSavers 2013, pp. 25-26).

These data gathering problems were complicated by the fact that the Salesforce data tracking system, from EFI, only worked well for high-level data tracking. It did not contain all the variables needed for the program-level evaluation, which required significant data coordination and data merging efforts (LightSavers 2013, p. 5, 27).

Specifically, the Salesforce tracking database did not provide the level of detail required for the program evaluation, such as retail bulb prices by date or activities. Rather, these activities were tracked separately. Another key variable, bulb wattage, had to be provided separately by APT (LightSavers 2013, p. 5, 27).

Therefore, the data were not easily merged and the evaluation team had difficulties in matching the bulb prices to the aggregated retailer sales data[10] (LightSavers 2013, pp. 25).

Database Issues with BizSavers: The review of the BizSavers program database revealed three common structural and data-entry problems that can complicate, limit, and even introduce error into those analyses:

1. The database may not associate building-specific data to project records in cases where a building is part of a multi-building site or campus;
2. The database may have inconsistently recorded information, which may make the same company or site appear as separate ones; and
3. The database may have relied on an insufficient variety of building end-use codes, resulting in a large percentage of records coded as "other" building type. The database also includes a field that contains historical energy consumption data that does not appear to be accurate for an undetermined percentage of projects (BizSavers 2013, p. 5-32).

[10] The lack of comprehensive data further calls in question the validity of the inputs used in the demand elasticity model, as it appears this information may have been incomplete.

Other challenges with the current database tracking tool include the fact that it is not compatible with Macintosh computers, so the program implementer does not have access to the tracking tool.

It is also more difficult to track budget performance because program budgets are now mixed across the individual incentive programs. This makes it difficult to determine if the program is within budget (BizSavers 2013, p. 5-23).

Another challenge was there may be multiple projects associated with a single site, and multiple sites may be associated with a single company, which makes it difficult to accurately track program applications. (BizSavers 2013, p. 5-32).

The evaluation also uncovered numerous errors regarding inconsistently recorded information for a given company or site, or data were entered in various formats (BizSavers 2013, p. 5-32).

In addition, an engineering error made in a customer's application was not detected by the program implementer, which overstated savings. The evaluator later revised these estimates, which that led to a substantially lower (nearly 75%) estimate of the project's estimated savings (BizSavers 2013, pp. 5-22).

The database also revealed that 20 percent of the records were coded with "Other" for the building's end use. This category may encompass a wide range of disparate end uses, thereby making end-use analyses of one-fifth of the projects meaningless (BizSavers 2013, pp. 5-34-5-35).

As part of the program evaluation, the evaluators calculated project savings as a percentage of each respective site's annual consumption as recorded in the database. The savings percentage figure was unusually or even impossibly high in many cases (BizSavers 2013, pp. 5-35).

1.2 Summary of Key Impact Evaluation Recommendations

The evaluators provided the following recommendations on ways to improve the impact evaluations in the future. These recommendations have been organized by topic and program.

Recommendations to Improve NTG Estimates

ApplianceSavers: The evaluators recommended monitoring free ridership rates throughout program implementation period (ApplianceSavers 2013, PPT, March 12, 2014).

CoolSavers: The evaluators recommended reducing free ridership rates by performing more targeted marketing, specifically focusing in on high electric heat users or those with high summer kilowatt-hour load profiles (CoolSavers 2013, PPT, March 12, 2014).

LightSavers: The program staff should continue to work with retailers to vary prices and promotions and also obtain the sales data early in the program years as a way to generate earlier estimates of NTG data (LightSavers 2013, p. 7).

Recommended Changes to the TRM

The evaluators identified a significant number of issues with the current TRM, these issues are both implied by the wide variation and low realization rates seen in the program, and are also explicitly identified, in many cases, in the reports.

In addition to evaluating and reporting the program impacts, the evaluators found and reported several

important issues that should be addressed. These findings and the recommended solutions are as follows.

- Update TRM values: The EM&V Auditor Team has not reviewed the TRM in detail, but the evaluators report numerous cases where the TRM provides erroneous values. This contributed to the gap between the *ex ante* and *ex post* values (i.e., low realization rates).
- Collect more complete data: For example, the CoolSavers program database reportedly had errors in 30 percent of its tune-up records.

Recommended Updates to Data Tracking

The evaluators also provided several worthwhile recommendations on ways to correct the database deficiencies uncovered in the program evaluations. These recommendations, although directed at specific programs, may be beneficial for Missouri to consider as it constructs its new data warehouse.

BizSavers: The evaluators recommended a number of strategies to reduce data tracking errors including:

- Introduce a building-specific identifier that would be related to the parent site field in a many-to-one relationship would not necessarily prevent situations like the above, but it may encourage the entry of building-specific data associated with each project, making such situations less likely.
- The problem of inconsistent addresses can be addressed through structural database changes or by adopting data entry conventions, and additional data fields (BizSavers p. 5-32-5-35).

CoolSavers: Require contractors to report whether the tuned-up system was covered under an existing maintenance agreement for every system serviced to enable analysis of the differences between these types of participants with improved confidence.

In addition, ICF should work with the Cadmus team to develop standard protocols for approving and reporting EER values used to estimate savings (CoolSavers 2013, p. 8).

CommunitySavers: Honeywell should implement Cadmus' PY12 recommendation to upgrade its data entry systems from the Nextel phone application to a more universal and manageable technology (CommunitySavers 2013, p. 6).

LightSavers. The evaluators provided several suggestions on ways that APT should streamline and combine their current reporting into one overall online tracking system. Combining these reports into a single system would reduce evaluation costs (due to time spent cleaning data, merging multiple files, and completing quality control efforts that ensure accurate matching). It is most critical that APT:

- Incorporate price data by date into the markdown report available on Salesforce.
- Develop a system so that each product has a consistent SKU number in Salesforce (especially when APT and retailers update Memoranda of Understanding or the manufacturer changes reported sales.)
- Maintain the promotions and product placement tracking on Salesforce (LightSavers 2013, p. 7).

Section 2: Summary of Key Findings and Recommendations from the Process Evaluations

Overview of Process Evaluation

The types of process evaluation activities conducted across the Ameren Missouri energy efficiency program portfolio and the key findings are summarized here.

2.1 Summary of Process Evaluation Findings

The most effective way to document and measure the outcomes and effects of Ameren Missouri's Energy Efficiency Program Portfolio is to conduct both a process and impact evaluation. The primary objective of a process evaluation is to "help program designers and managers structure their programs to achieve cost-effective savings while maintaining high levels of customer satisfaction."[11]

A process evaluation gathers information from a variety of sources, including program staff, market actors, trade allies, program participants, and non-participants. To increase the validity of the findings, it is necessary to gather data from multiple sources and then "triangulate" the data or compare it across multiple groups. This methodology increases the overall validity of the findings.

This section summarizes the key findings from the process evaluations of Ameren Missouri's energy efficiency program portfolio targeting both residential and business customers. It is based on a thorough review of each EM&V report prepared for each program. Note, the residential program evaluations were reported in individual reports for each program while the business program evaluations were summarized in one report. References to each report are provided throughout to aid the reader.

Customer Satisfaction

Overall, customer satisfaction is high across all of Ameren Missouri's programs. Satisfaction ratings were highest for the ApplianceSavers Program (100%) (p. 19) and LightSavers participants (90%) rated themselves as *very* satisfied (p.35). In addition, Most tune-up participants described themselves as *very satisfied* with the program overall (88%), while most remaining participants (11%) were *somewhat satisfied* (CoolSavers 2013, p. 24).

Satisfaction rates were also solid for the remaining Ameren Missouri programs—even those with low implementation rates. For example, the survey respondents reported high rates of customer satisfaction (52%) with the audit process, (PerformanceSavers 2013, p. 5) the auditors and with the overall program (PerformanceSavers 2013, p. 5).

Similarly, program participants were also highly satisfied with all aspects of the RebateSavers program with 96 percent of mail-in rebate participants were either *very satisfied* or *somewhat satisfied* with the rebate amount and 99 percent were either *very satisfied* or *somewhat satisfied* with the products they had purchased (RebateSavers 2013, pp. 5, 33). However, the showerheads and faucet aerators received the lowest satisfaction ratings and subsequently low installation rates (RebateSavers 2013, p. 36).

[11] http://www.calmac.org/events/EvaluatorsProtocols_Final_AdoptedviaRuling_06-19-2006.pdf.

CoolSavers also reported a high satisfaction rate among customers regarding all program aspects, including the contractors. Nearly all participants (97%) who installed new HVAC systems described themselves as *very satisfied* with the contractor performing the installation. In addition, 93 percent of the participants who had their HVAC system tuned-up described themselves as *very satisfied* with the contractor performing the installation (CoolSavers 2013, p. 24).

The BizSavers Program also received high satisfaction marks between both program participants for all program facets (BizSavers 2013, p.1-7). Furthermore, the participants in these programs expressed satisfaction with the range of program-qualified equipment and the quality both of the equipment they installed and of the installation (BizSavers 2013, p. 5-52).

Trade Ally Satisfaction

The trade allies also expressed satisfaction with all program elements, including the training events and program guidelines. However, the non-lighting trade allies were less satisfied with both the clarity of the information and coverage of relevant topics than lighting-only trade allies (BizSavers 2013, p. 5-44).

The CommunitySavers Program received high satisfaction ratings among both residents and property managers **(**CommunitySavers 2013, pp. 5, 27).

Satisfaction levels varied slightly among the program partners who participated in the LightSavers Program—ranging from *very satisfied* among the corporate representatives of chain stores to *somewhat satisfied* to *very satisfied* among local store managers (LightSavers 2013, p.36).

According to stakeholders, trade ally satisfaction remains an ongoing concern for the CoolSavers program. The contractors continue to express concerns about the program's tune-up reporting requirements, specifically the requirement to write down and report diagnostic test measurements (CoolSavers 2013, p. 18).

Despite these issues, the new program design resulted in attracting three times the number of contractor participants as the previous program. CoolSavers' design also has reduced some contractor concerns about data reporting and measure eligibility. Participation has increased compared to previous program years; CoolSavers incented more tune-ups in eight months than occurred throughout the entire CheckMe! Program (CoolSavers 2013, p. 18).

Communications

The level of communications was satisfactory for the majority of stakeholders and partners working with Ameren Missouri. This was especially true for those "high touch" programs that required a high degree of interaction between Ameren Missouri staff and program implementers such as the ApplianceSavers Program (p. 19), the CommunitySavers Program (p. 21) and the LightSavers Program (p. 4).

As a way to meet the demands of these programs, Ameren Missouri staff would often schedule weekly meetings with program implementers to ensure that all project activities stayed on track (LightSavers 2013, p. 24; ConstructionSavers, p. 21).

There was also frequent and timely communication between program implementers and Ameren Missouri staff for the business programs, with the program implementers reporting they had very open

communication lines" with Ameren Missouri program managers (BizSavers 2013, pp. 5-10; ConstructionSavers, p. 21).

While participants rated their satisfaction with staff communication high, the program implementer for the PerformanceSavers program indicated there was too much communication regarding confirmation of appointments (PerformanceSavers 2013, p. 19).

The BizSavers evaluation also identified one communication-related challenge: the program implementers were not initially aware that Ameren Missouri needed to review not only content changes to the trade ally section of the website, but formatting changes as well. While this issue has been worked out to the utility's satisfaction, the implementation contractor staff member indicated the turnaround time needed was longer than ideal (BizSavers 2013, p. 5-8).

Awareness

"ActOnEnergy" is the corporate brand for Ameren Missouri's efficiency programs in Missouri and Illinois. Ameren Missouri developed sub-brands for the overarching ActOnEnergy brand employing a "savers" theme, with the "BizSavers" program name for businesses. Consequently, the program website uses both brand names (ActOnEnergy and BizSavers) for its business energy efficiency programs (BizSavers 2013, p. 5-10).

Overall awareness of Ameren Missouri's programs remains low among residential customers (CommunitySavers 2013, p. 24; LightSavers 2013, p. 30. It is even low among customers in "high touch" programs such as PerformanceSavers with less than half (44%) being aware of the ActOnEnergy Brand and the program name (PerformanceSavers 2013, p. 19.)

Very few participating property managers are aware of opportunities to install common area measures through the Business Energy Efficiency Program **(**CommunitySavers 2013, p. 6).

In addition, the RebateSavers evaluation found that customer awareness does not always lead to program participation. While in-store marketing generates customer awareness about the Ameren Missouri rebate program, but does not necessarily influence customers to purchase energy-efficient options. Rather, the majority of purchasers had already decided on the brand and model they were planning to buy before going to the store, which implies that customers are making their decisions based on other information sources. In addition, a significant portion of those applying for the online rebate found out about the rebates through Ameren Missouri's website, indicating that online marketing reaches a different niche of customers (RebateSavers 2013, p. 6).

The BizSavers program is marketed through multiple channels and the implementer reports active outreach to end-use customers and trade allies. However, many trade allies who do not participate in the trade ally network are unaware of its existence (BizSavers 2013, p. 1-8).

Moreover, there is low participation among trade allies in Ameren Missouri's local co-op marketing program for its CoolSavers program (CoolSavers 2013, p. 8).

Sources of Awareness

The leading source of information for program awareness was bill inserts (38%) and the word-of-mouth (27%) for most residential customers (Appliance Savers2013, p. 20).

In contrast, business customers were most likely to learn about the program through non-utility sources, mainly vendors and contractors (BizSavers 2013, pp. 5-3, 5-36, 5-59).

Effectiveness of Marketing Materials

The BizSavers evaluation included a discussion of the effectiveness of both the marketing activities as well as the specific materials developed for trade ally outreach (BizSavers 2013, p. 5-13-5-14). Of note, by the end of PY2013, the program implementation staff had effectively re-enrolled 180 trade allies back into the program (BizSavers 2013, p. 5-17).

The Cadmus team reviewed all of the residential marketing materials and felt they were both compelling and effective. The materials, including the mailers and brochures, had a consistent look and feel, included a direct call-to-action, and closely followed the ActOnEnergy brand guidelines. The self-mailer brochure includes the Missouri and program logos as well as appropriate and relatable imagery (e.g., a family and home). The piece contains several calls-to-action: encouraging a telephone call, e-mail, or return of the reply card. (ApplianceSavers 2013 p. 23; CoolSavers 2013, p. 21; PerformanceSavers 2013, pp. 17-18).

The LightSavers materials were also well-designed, according to the evaluators, and the educational materials such as the *"How to Choose a CFL"* guide and the beam sign—is visually appealing and creates a connection between the consumer and products being promoted. The images of CFL bulbs also helped educate customers about options, increasing customer knowledge and awareness of the variety of bulbs offered and enabling them to make informed purchasing decisions (LightSavers 2013, p. 28).

In-store promotion and training were essential elements for the LightSavers Program and the implementer held 222 promotional events throughout the program year. The implementer also worked with retailers to gain premium product placement such as end caps for visibility[12] (LightSavers 2013, pp. 6, 29).

Both the CoolSavers and ApplianceSavers programs benefited from internal corporate marketing activities during the summer of 2013. The corporate marketing team promoted the CoolSavers program (in addition to the ApplianceSavers program) through its Act On Energy marketing and media. The campaign included: radio spots, digital billboards, out-of-home billboards, transit windscreens, animated and static banner advertisements, social media, direct mailers, gas toppers, and e-mail marketing. Through the Act On Energy campaign, customer engagement was enhanced through the addition of the energy-efficiency look-up.

Based on the campaign recap, the CoolSavers program realized an uptick in applications during the early part of the campaign, experienced increased inbound call volumes, and found that 70 percent of installs occurred in the high- propensity ZIP codes targeted by direct mail. Also, the number of visitors to the CoolSavers website increased nearly fourfold over the previous time frame (i.e., 29% of this increase was tied to paid web banners). Overall, Ameren stakeholders considered the summer campaign a success and felt it contributed to increased program participation during the summer months for both programs (ApplianceSavers 2013, pp. 23-24; CoolSavers 2013, p. 21)

[12] This increased visibility added to the sales lift achieved through price discounts based on the demand elasticity modeling discussed in the impact section of this report. (LightSavers 2013, pp. 1-3).

But, the evaluators did indicate that some of these messages may lead to customer confusion that could weaken the prompt for action. (PerformanceSavers 2013, pp. 16-17; ApplianceSavers Impact 2013, p. 6).

Reasons for Participation

The financial incentive was a stronger influence in PY2013 than in PY2012, when only 31% cited the incentive as the main reason for choosing the program. This is likely due to the greater incentive offered ($50 versus $35) (ApplianceSavers 2013, p. 20).

Similarly, the major reasons for customer participation in the RebateSavers program was driven by a need to replace replacing broken or aging equipment, specifically water heaters, improve comfort for room air conditioners, and save money on energy costs had the largest influence on purchases of heat pump water heaters and programmable thermostats (RebateSavers 2013, p. 6).

In contrast, most BizSavers program participants (approximately two-thirds) reported that equipment vendors, rather than trade allies or program staff, were the biggest factors in influencing their decision to participate in the program (BizSavers 2013, p. 5-62).

Program Delivery/Implementation

The process evaluation reports provided explanations of the program participant process and focused on the key aspects of program implementation for each program. The most successful programs, in terms of program delivery, were PerformanceSavers and LightSavers while ApplianceSavers, CommunitySavers and ConstructionSavers, reported difficulties with program implementation or delays in program launch.

Successes in Program Operations

Efficient Program Processes: Although it is not currently meeting its savings goal, PerformanceSavers exceeded its audit goal for PY2013 by targeting customers with older vintage homes in need of energy upgrades.

Both Ameren Missouri and the implementer were pleased with the response rate to the mailer and Ameren Missouri noted that Honeywell was able to make up for the late launch of the program by distributing a full year of expected mailers in just five months (PerformanceSavers 2013, p. 16.).

The CoolSavers evaluation also indicated that the program implementer and staff are working well together and have established productive relationships with distributors and contractors. Distributors have provided access to their facilities and, with help from their territory managers, have trained local contractors. Distributors also are providing AHRI certificate information, which makes the rebate application process easier for contractors (CoolSavers 2013, p. 20).

In addition, the evaluation indicated that the CoolSavers program is meeting the needs of contractors for training and rebate processing, as ICF staff members have been sufficiently available (CoolSavers 2013, p. 20).

The BizSavers Program uses Energy Savings Project tracker (ESP) to track project flow and the volume of process-oriented emails. A key feature is the use of milestones to track project status cuts down on the need to manage large numbers of project-related emails. The program implementer reported that the ESP tool helps them improve the elapsed time between the application, the offer and project completion, and ultimately will enable them to increase throughput to handle more project volume. It also allows them to

flag projects with unusual savings, such as retro-commissioning projects with more than 15 percent savings (BizSavers 2013, pp. 5-20).

The LightSavers process evaluation also indicated that the implementer (APT) was thorough, efficient, and successful in both recruiting and training participating retailers. In anticipation of increased volume, APT increased its staff from five to nine in PY24. An APT representative visited stores frequently, focusing on high volume stores, for its promotional events. The implementer also performed quality assurance checks through its field representative visits to participating stores and a staff ride-along (LightSavers 2013, pp. 24, 27).

The new online rebate submission tool was also a success for the RebateSavers program offering a streamlined process for customers (RebateSavers 2013, p. 7).

The BizSavers process evaluation also indicated that the program was operating successfully. It has a proactive approach to reviewing applications to minimize free-ridership and ensure that all installed measures are cost-effective through an in-house cost-benefit review (BizSavers 2013, pp. 5-19-5-20).

Appropriate Measure Mix: The process evaluations also assessed the receptivity and comprehensiveness of the various energy efficiency measures offered by each program. Overall, the findings indicated that the measure mix was well-received by program participants.

Of note, the CommunitySavers program is meeting a severe customer need by offering air conditioner/heat pump tune-ups and refrigerant charging for both tenants and property managers which has led to substantial increased energy savings. The level of disrepair and neglect of central air systems at some participating buildings generated significant savings when these units were tuned and charged. These electric savings also translate into dollars saved for low-income households and increased longevity of equipment for low-income properties **(**CommunitySavers 2013, p. 5).

This program is also credited with successfully introducing new high efficient technologies to low-income households, such as CFLs and advanced power strips **(**CommunitySavers, 2013, p. 5).

Through LightSavers, Ameren Missouri has expanded the variety of discounted products in PY2013 through a much broader distribution channel including do-it-yourself stores, mass merchandisers, discount stores, and grocery stores, and the online store run by EFI (LightSavers 2013, p. 8).

Challenges with Program Delivery

Delays in Project Implementation: The process evaluations revealed that several programs met with severe delays to program launch, which contributed to their shortfall in meeting the PY2013 goals. Of note, the CommunitySavers Program failed to meet its goal due to the delay in the launch of its "neighborhood sweep" component in PY2013. However, this delay may have been driven by stakeholder concerns rather than issues caused with program implementation **(**CommunitySavers, 2013, p. 5).

For the ApplianceSavers program, there was a delay in offering pick-up services through retailers which would allow participants to: (1) enroll in the program when purchasing a new appliance at select participating retailers, and (2) schedule a single appointment to have their new unit dropped off and their existing unit picked up for recycling. These delays affected the overall ability to meet anticipated goals, as Ameren Missouri was not able to identify additional retailers to provide the needed volume to meet program goals (ApplianceSavers 2013, p. 18).

Even though LightSavers Program did exceed its annual savings goal, this program also experienced slight delays in program launch that may have affected sales of specialty bulbs. But the overall impact of these delays appears minimal (LightSavers 2013, pp. 26-27).

RebateSavers also reported a delay in mailing the home energy kits (RebateSavers 2013, p. 22).

The CoolSavers program also faced several setbacks including colder than anticipated weather, and delays in program launch—both of which negatively affected program savings. Specifically, it took longer than expected to become operational due to both the difficulties of designating a project manager, aggressive goals for PY2013 and concerns from contractors about new program requirements (CoolSavers 2013, p. 18).

Lack of Interest in the Measures: Both the participants in the PerformanceSavers Program and the builders in the ConstructionSavers Program reported low levels of interest in these program measures, which affected measure installation rates and their associated savings dramatically (ConstructionSavers 2013, p. 21). For PerformanceSavers, the program did not have any major uptake in measures in PY2013. For example, the adoption rates were low for recommended windows (6.0%), air sealing (0.5%), and ceiling insulation (4.6%) (PerformanceSavers 2013, p. 4) The evaluation indicated that the auditors were successful at communicating information about energy-efficiency opportunities and implementing direct-install measures.

RebateSavers also had lower than expected participation due to lower demand for room air conditioners and electric hot water heaters, late home energy kit mailings, and fewer measure offerings (RebateSavers 2013, p. 22).

In addition, the installation rates for the CFLs were only 33 percent, which is significantly lower than the installation rates for other direct-mail kit programs (ranging from 69 to 96 percent). This is likely due to the fact there are 13 bulbs in the kit, as research suggests that CFL installation rates decrease with additional bulbs (RebateSavers 2013, p. 6).

Furthermore, LightSavers primary focus on the high-volume retailers meant that some low volume retailers were not able to take full advantage of the product placement assistance offered by APT. (LightSavers 2013, p. 27).

Similarly, ConstructionSavers experienced low rates of participation and interest from builders during PY2013. Initially, builders dropped out due to the new ENERGY STAR® v3.0 thermal enclosure inspection checklist requirement. In summer of 2013, the program adopted a course correction plan that replaced this program requirement with the ENERGY STAR® v.2.0 thermal bypass inspection checklist. Despite the course correction plan, the program was still unable to attract a sufficient number of builders to meet the expected participation and savings goals for the program's first year (ConstructionSavers 2013, p. 3, 20).

Application Process: Both the CommunitySavers and the BizSavers programs reported difficulty in getting applications completed in a timely manner. For CommunitySavers, it proved difficult for property managers to provide the required refrigerator information for the units in their buildings. This required follow-up visits by the implementation contractor, Honeywell, to gather the missing data and complete the applications **(**CommunitySavers 2013, pp. 6, 21).

Sixty percent of the CoolSavers contractors interviewed (n=18), reported that they would prefer to reduce the amount of paperwork, but none offered suggestions for how to do this (CoolSavers 2013, p. 17).

Application processing was also a challenge in the BizSavers Program. The participants reported the indicated the instructions were unclear and one-quarter of custom participants had to resubmit their application or provide additional supporting documentation. (BizSavers 2013, p. 5-20-5-22).

It was also difficult for the program participants to determine if the project will qualify for an incentive, because the application does not provide the information to easily determine custom program requirements (BizSavers 2013, pp. 5-20-5-22).

In addition, the program implementer had to remind trade allies to use the newest version of the application from the website rather than just reusing an older version (BizSavers 2013, pp. 5-20-5-21).

The program application was also a major reason for customers dropping out of the program (i.e., near participants) due to the delays in application processing, the difficulty of preparing the required calculations, or equipment incompatibility (BizSavers 2013, p. 5-77). Two near-participants said that delays in the processing of program paperwork affected their ability to move forward with their projects. One near-participant reported that preparing the required calculations also was a barrier to project completion (BizSavers 2013, p. 5-77).

Confusion about Program Offerings: ApplianceSavers, in particular, struggled to generate the expected level of participation, ultimately reaching less than two-thirds of its PY2013 goal of 11,000 total units. Among the factors contributing to this lower participation rate was the program name change that led to customer confusion as well as the shortened delivery time (ApplianceSavers 2013, p. 4).

This was also an issue for the RebateSavers regarding the advanced power strips. These measures had a relatively low installation rate of 48 percent and the program participants were confused as to how to operate them correctly (RebateSavers 2013, pp. 7-8).

The participating contractors in the CoolSavers Program also reported that the increased marketing activity in the summer of 2013 led to both contractor and customer confusion. One contractor was prepared for “the flood of calls” they received from customers asking for an Ameren tune-up since the occurred before the contractor was fully engaged in the program and the contractor was unsure about how to address customer question (CoolSavers 2013, p. 22).

Role of Trade Allies

The BizSavers, ConstructionSavers, and CoolSavers programs rely heavily on trade allies to deliver these programs. Therefore, the process evaluations also investigated the effectiveness of trade allies in these specific programs.

Based on the feedback from the contractors, most are satisfied with the program requirements and incentives offered for tune-ups. However, ICF structured the tune-up incentive such that any HVAC system can receive a tune- up. This means some systems receive an incentive for a service that is unnecessary and generates no savings. But this program feature is apparently necessary to encourage trade ally participation (CoolSavers 2013, p. 7).

The BizSavers program implementer focused on enrolling 200 trade allies into the program's BizSavers Trade Ally Network (TAN) by year-end. Overall, the process evaluations indicated that the trade allies play a significant role in marketing the program and energy efficiency to potential customers (2013 BizSavers Program Evaluation, pp. 5-28-5-29).

Overall, the program implementation staff creates a trade-ally friendly environment in which the program provides them with clear, up-to-date information and they are comfortable asking questions and providing feedback about the program in a timely manner (2013 BizSavers Program Evaluation, pp. 5-15-16).

However, most of the focus for trade allies outreach and training is on the largest providers. The process evaluation revealed that the internal staff resources are not sufficient to do on-site orientation trainings with all registered trade allies; so they conduct them with the largest firms and with those that are new to the program, especially those in a position to promote newly incented measures, including data center IT incentives (BizSavers 2013, p. 5-14).

This approach appeared to be successful as the largest trade allies are responsible for delivering the majority of the BizSavers projects (BizSavers 2013, p. 5-16).

Program Bridging or Cross-Participation

Ameren Missouri is trying to encourage cross-program participation, and did some cross promotion with the RebateSavers and the LightSavers program offerings. This approach, defined as bridging, is an approach to lower the overall customer acquisition cost while also offering program participants opportunities to achieve deeper energy savings.

Ameren Missouri also identified additional opportunities for implementers to collaborate in cross-promotions. For example, Ameren Missouri suggested that APT place in-store educational materials for the p program (implemented by Appliance Recycling Centers of America, Inc.). Specifically, the APT staff provided both ApplianceSavers point-of- purchase advertising and some basic training to retailer staff about the benefits of the recycling program for the retailer's customers (Appliance Savers 2013, p. 18; LightSavers 2013, p. 30).

Ameren Missouri identified and coordinated cross-promotional opportunities between the programs in its portfolio. The CoolSavers implementer works collaboratively with implementers of Ameren Missouri's RebateSavers and ApplianceSavers programs to target customers. For example, a direct-mail letter sent to CoolSavers participants referenced the rebates and appliance recycling programs (CoolSavers 2013, p. 22).

The program implementer for the ApplianceSavers Program was able to successfully leverage program's marketing budget to continue its existing marketing efforts and develop complementary marketing tactics (ApplianceSavers 2013, p. 23).

Despite these efforts, however, 92 percent of survey respondents in ApplianceSavers have not participated in any other Ameren Missouri energy-efficiency programs (Appliance Savers 2013, p. 5). In addition, PerformanceSavers participants were not aware that the program offered rebates for major measures (PerformanceSavers, 2013, pp. 18-19).

Barriers to Program Participation

Community Savers, ConstructionSavers, PerformanceSavers and the BizSavers program evaluations identified several barriers to program participation. The major barriers were the high cost associated with installing measures and the participants are not convinced of the need for efficiency upgrades, (PerformanceSavers), concerns about the future and viability of the program (CommunitySavers), and difficulties in identifying the appropriate customer targets (BizSavers).

High Upfront Costs: The upfront cost to customers was the main deterrent to installing major measures, according to the program implementer, as it was mentioned by 41 percent of program participants while 25 percent said the upgrade was not necessary for their home, despite the energy and cost savings summary provided in their audit report (PerformanceSavers 2013, pp. 4, 20).

Unconvinced of Program Benefits: A quarter of program participants (25%) did not feel that the energy efficiency upgrades recommended by the program auditors were necessary (PerformanceSavers 2013, p. 20).

The ConstructionSavers program faces a similar barrier in that the Missouri homebuilders lack awareness of and knowledge about building high-efficiency homes, and they may not fully understand the benefits from participating in the program (ConstructionSavers 2013, p. 4).

Uncertainty About the Program Viability: As the low-income multifamily market reaches its saturation point, program managers planned to meet goals with the addition of income-qualifying single-family residential properties in PY2013. But due to the confusion regarding the program requirements, these opportunities never materialized **(**CommunitySavers 2013, p. 5).

Difficulty Identifying Eligible or Qualified Customers: The RebateSavers evaluation foreshadowed a problem that may affect future program participation—the number of eligible electric hot water heating customers may be smaller in future program years (RebateSavers 2013, p. 7).

The BizSavers evaluation found that it was difficult for the program implementers to develop a list of qualified leads to approach for program participation (BizSavers 2013, p. 5-12).

The program evaluation also identified similar challenges for program implementers to identify smaller electric usage customers, as they are difficult to reach via mass media advertising and are not the focus of the key account managers (BizSavers 2013, pp. 5-12-5-13).

Reluctance to Share Sensitive Information: The BizSavers program evaluation also identified a problem common to many large C&I programs in that larger industrial customers are resistant to sharing their processes with outsiders, thereby limiting the ability of program staff and trade allies to identify savings opportunities (BizSavers 2013, pp. 5-12-5-13).

Areas for Program Improvement

The evaluators identified several areas for program improvement in the following topic areas: ways to enhance current program delivery and outreach as well as suggestions to improve the overall measure mix. These suggestions are summarized next.

Changes in Program Marketing and Outreach Materials: The implementers made several program changes as a way to improve these programs' appeal to customers by revising the various creative materials.

For PerformanceSavers, the implementer changed the self-mailer format to a letter, as letters were shown to generate better response rates. The implementer also revised its messaging to address customer issues identified in the surveys. The implementer added language explicitly stating that program addresses gas and electric customers, added banner advertising to Ameren Missouri home page rotation and moved the PerformanceSavers link "above the fold" (PerformanceSavers 2013, pp. 17-18).

Some coupon store managers in lower performing areas requested better marketing assistance to help them take advantage of the program (LightSavers 2013, p. 37).

Changes in Measure Mix: Given the challenges in encouraging customer follow-through, the program implementer took additional efforts to increase measure uptake by reminding program contractors to educate their customers about the Ameren Missouri rebate and the federal tax credits. Contractors were encouraged to provide installation coupons that the auditors could distribute directly to customers. (PerformanceSavers 2013, p. 14).

In addition, the current installation standards may further limit the market potential for CoolSavers. Contractors reported it is cost-effective for customers to install a heat pump with a gas backup furnace. The current heat pump measure precludes heat pumps with gas backup heat from receiving program incentives. This is limiting program participation and savings. Heat pumps with gas backup heat might have higher electric savings potential than a central AC replace on failure measure because contractors might recommend the installation of a federal minimum efficiency heat pump with a gas backup furnace (CoolSavers 2013, p. 7).

More Proactive Outreach to Non-Participants: Twenty-percent of the non-participant customers contacted by Honeywell indicated they were interested in receiving an audit but had not followed up to schedule one. Ameren Missouri believes that Honeywell should be more proactive with follow-up customer calls. While Honeywell acknowledged the potential benefit to these follow-up customer calls, it indicated that the current program budget would not support this effort (PerformanceSavers 2013, pp. 17-18).

2.2 Summary of Process Evaluation Recommendations

The process evaluations identified more than 70 recommendations on ways in which Ameren Missouri's energy efficiency program portfolio could improve. These recommendations ranged from marketing opportunities to better methods for data-tracking, and are organized in this report by topic as a way to summarize the cross-cutting themes. Details for each specific recommendation are provided in each of the referenced evaluation reports; moreover, the EM&V Auditor has prepared a table of Summary Recommendations in an MS Excel Spreadsheet to facilitate tracking and follow-up in future program evaluations.

Enhance Marketing and Outreach Activities

The evaluators provided 21 recommendations on ways in which the individual program's marketing and

outreach activities could be improved or enhanced. The EM&V Auditor added two additional recommendations as well, which are organized by topic area.

Most recommendations focused on ways in which the programs could increase overall participation by developing more aggressive marketing tactics to reach both current program participants and non-participants. These suggestions included promoting cross-program participation by offering additional incentives for participating in other programs (such as PerformanceSavers) that will leverage the participant's recent and positive experience with ApplianceSavers and increase the likelihood they would take additional energy efficiency actions (ApplianceSavers 2013, p. 6).

Another set of recommendations focused on ways to improve the overall creative design of the marketing materials, for example by making the materials more engaging by incorporating successful marketing approaches from similar campaigns at other utility programs (Appliance Savers2013, p. 7).

The evaluator emphasized that these marketing materials should feature both the energy and non-energy benefits of installing measures, specifically the anticipated cost savings, which may improve the overall participation rates for programs such as ConstructionSavers, PerformanceSavers and ApplianceSavers (ConstructionSavers 2013, p. 4; PerformanceSavers 2013, p. 4; ApplianceSavers PY2013 Evaluation Results PPT).

Furthermore, the EM&V Auditor and the evaluators determined that a marketing pull strategy targeting mortgage lenders rather than just relying on builders would increase participation rates. Other trade allies that should be targeted as well, including HERS raters, realtors, and Home Builder Associations (ConstructionSavers 2013, p. 4).

Develop Better Target Marketing Materials

Based on the findings that 11 percent of current bulb purchasers are non-residential customers, the EM&V Auditor recommended developing specific materials to reach business customers. Generally, these customers have higher hours of use compared to residential customers, and thus may offer greater savings opportunities for the program (LightSavers 2013, p. 95).

The evaluators also suggested that the Ameren Missouri staff and the program implementer work together to develop a systematic approach to reach small and mid-sized businesses. The materials targeting these groups should promote savings opportunities available from non-lighting measures as well as from lighting measures (BizSavers, p. 1-7.)

In addition, the marketing efforts should target high electric usage customers via focused bill stuffers or other materials to specifically reduce program free ridership (CoolSavers 2013, p. 8).

Develop Community Outreach Activities

The evaluators provided suggestions on ways to better leverage customer channels by partnering with local community organizations or participating in neighborhood promotional activities, local fairs, and home shows (PerformanceSavers 2013, p. 5).

For example, the evaluators recommended that the CommunitySavers program implementer continue to provide clarity regarding the perceived obstacles presented by property managers of low-income properties and the launch of a neighborhood sweeps component **(**CommunitySavers 2013, p. 6).

Develop More Integrated Marketing Approaches

In addition, the evaluators recommended that Ameren Missouri and the implementers develop a more comprehensive strategy for program outreach to both buildings contractors as well as homeowners. These suggestions included developing a formal co-op marketing package, or toolkit, for participating contractors, and developing additional messages using testimonials, case studies, and online marketing tactics as a way to better engage homeowners. (CoolSavers 2013, p. 8; PerformanceSavers 2013, p.5; RebateSavers 2013, pp. 6- 7).

Enhance Trade Ally Marketing Activities

The evaluators also offered recommendations on ways to improve materials for participating trade allies, including providing training on calculating program incentive amounts, incorporating case studies, and providing informational updates on recent advances in technology and recent program changes (BizSavers 2013, p. 5-38).

The residential programs should also target current non-participating trade allies, such as builders who do not currently construct new homes or commercial buildings to high energy efficiency building standards (ConstructionSavers 2013, p. 5).

Review and Revise Current Measure Mix

A number of process evaluation recommendations focused on ways in which Ameren Missouri's programs could be improved through changes in the mix and types of measures offered. A few recommendations focused on continuing to provide a diverse range of measures, especially a diverse range of light bulb types, offered through both contractors and via retailers as well (CommunitySavers Year 2013, p. 5; LightSavers 2013, pp. 6- 7).

In addition, the evaluators recommended expanding the measure mix to include the following products, if they were cost-effective:

- Insulation measures, especially attic insulation in multifamily buildings with electric heating and cooling;
- Air sealing measures, such as caulking or window repairs; and
- Upgrades of Packaged Terminal Air Conditioner (PTAC) heating and cooling units and installation of ductless heat pumps in smaller efficiency style apartments with baseboard heating and room air conditioners (CommunitySavers 2013, p. 21).

Other recommendations include:

- Determining whether it is feasible to expand hot water measures to customers with electric water heaters and to apply the savings from new windows to customers who heat their homes with natural gas. (PerformanceSavers Impact and Process Evaluation: Program Year 2013, p.6);
- Amending the measure requirements to allow heat pumps with gas backup heat with an appropriate incentive offering. (CoolSavers 2013, p. 7)
- Diversifying the type and wattage level of bulbs included in the home energy kit to provide participants with more options, possibly including LEDs (RebateSavers 2013, p.8).

Review and Revise Current Measure Options

The evaluators also recommended revising the current measure mix to determine if some measures are still cost-effective, as well as identify other ways to more cost-effectively distribute kit measures to program participants. These recommendations included exploring the following:

- Determine if room air conditioners and programmable thermostats will still meet cost-effectiveness requirements (RebateSavers 2013, p. 7);
- Change the kit's measure mix to only one aerator and one showerhead per household, and provide a follow-up mechanism so that participants can request additional devices if they are satisfied with the ones they received. Ameren Missouri could structure this as a "limited time offer" so that participants have 30 days to request another device upon receiving the kit (RebateSavers 2013, p. 7);
- Consider shifting the target segment for programmable thermostats from single-family to multifamily properties and use a direct-install strategy to reduce the occurrence of replacing existing programmable thermostats (RebateSavers Year 2013, p. 5).

Improve Application Processing

Six recommendations focused on ways in which the program implementers and staff could enhance the program application process. These recommendations were especially relevant given the challenges identified in the BizSavers program (i.e., the amount of effort or time required from the business-owner to participate).

Because most of the program feedback from trade allies centered on requests to simplify and clarify the application process (BizSavers 2013, p. 1-9), the evaluators recommended throughout the report ways in which Ameren Missouri and the program implementer should work together to formalize trade ally training materials that include instructions on how to correctly complete the program application. This recommendation also extended to reaching out to current non-member trade allies as way to minimize errors in applications, especially the custom program component (BizSavers 2013, p. 7-4).

Similarly, the evaluators also recommended proactive training and mentoring to contractors participating in CoolSavers who provided incomplete or erroneous data (CoolSavers 2013, p. 7).

Revise Program Eligibility Requirements

As a way to also minimize program barriers, the evaluators recommended simplifying the reporting requirements intended for property managers in CommunitySavers as a way to streamline program applications and enhance data tracking (CommunitySavers 2013, p. 6).

The evaluators also suggested that the program rules and requirements for the retro-commissioning program may hinder participation in the market and therefore should be revised (BizSavers 2013, p. 1-6).

The evaluators also recommended revising current program requirements for PerformanceSavers. The evaluators suggested expanding the measure mix to customers with electric water heaters to include water conservation measures, which will lead to greater overall savings impacts (PerformanceSavers 2013, p. 5.)

Improve Program Delivery

Several recommendations identified ways that the program implementers could either encourage program participation by providing additional information regarding the benefits of making these measure installations.

For LightSavers, the evaluators suggested encouraging customers to replace incandescent bulbs immediately with CFLs or LEDs through a call to action in marketing materials to replace incandescent bulbs without waiting for them to burn out (2013, p. 6; RebateSavers 2013, p.6).

Providing clear information with pictures and simple instructions may also improve installation rates of the free home energy savings kits (RebateSavers 2013, p. 9).

Other recommended changes included raising the incentives or offering financing to help customers afford the more expensive energy efficiency measures (PerformanceSavers 2013, pp. 4-5) or revise the current incentive structure for CoolSavers to encourage contractors to target units with lower operating efficiencies (CoolSavers 2013, p. 8)

Given the challenges facing ConstructionSavers, the evaluators recommended conducting a program design that may allow greater builder flexibility and perhaps lead to revisions in current program incentives (ConstructionSavers 2013, p. 4).

Promote Program Cross-Participation

To better address the issues associated with participant bridging, the evaluators recommended that Missouri provide incentives or provide additional energy efficiency measures to participants who recommend Ameren Missouri programs to a friend (ApplianceSavers 2013, p. 4).

In addition, Ameren Missouri should have ARCA provide energy-efficiency kits at the time they pick up an appliance (ApplianceSavers 2013, p. 5).

Conduct Program Follow-Up Consistently

The evaluations also identified several ways in which these programs are not effectively following up with customers, and suggested the following strategies to improve and enhance program operations:

- The program should revisit pre-PY2013 participants and perform tune-ups and refrigerant charges if applicable and as necessary **(**CommunitySavers 2013, p. 5).
- The auditors should provide the program implementer with detailed records for each recommendation so they can conduct follow-up calls to participants and generate soft leads for program contractors. (PerformanceSavers 2013, p. 4).

Continue to Reduce Leakage

The evaluators also provided one recommendation as a way to manage the leakage rates for LightSavers by continuing the use the same mix of urban and rural stores (LightSavers 2013, p. 6).

Section 3: Review of Cost-Effectiveness

As part of the review process, the EM&V Auditor Team reviewed the ex post savings values from the program evaluations that were used in the cost-effectiveness tests. The EM&V Auditor Team conducted a series of spot checks across all the various measures and programs. Additionally, the EM&V Auditor Team confirmed that the appropriate cost-effectiveness input values from the Ameren Missouri TRM were used in the calculations (i.e., expected usable life (EUL), incremental cost, etc.).[13]

The evaluators also analyzed the cost-effectiveness of each program according to the industry-standard cost-effectiveness tests. As part of that analysis, the evaluators estimated the average cost of energy saved per program and the net lifetime benefits of each program.

However, in our review of this analysis, the EM&V Auditor Team notes that the evaluation reports do not provide the level of detail sufficient for a comprehensive review of the inputs and outputs for the cost-effectiveness results. For example, the PY2013 evaluation reports do not include details on the background formulas and assumptions used to derive these conclusions, therefore it is impossible independently determine if these estimates are accurate.

As part of this review, the EM&V Auditor Team has summarized the key findings from the cost-effectiveness tests in the following tables.

As Table 17 and Figure 5 show, The LightSavers program had the lowest cost of conserved energy at $0.004 per kWh, followed by 0.01 per kWh for the Custom and Standard programs. Construction Savers is noticeably higher than the other programs at $0.437 per kWh.

[13] Ameren Missouri, Appendix A – Technical Resource Manual (2012).

Table 17: Cost of Conserved Energy ($/kWh)

Program	Cost of Conserved Energy ($/kWh)
ApplianceSavers	$0.020
CoolSavers	$0.016
CommunitySavers	$0.052
ConstructionSavers	$0.437
LightSavers	$0.004
PerformanceSavers	$0.124
RebateSavers	$0.019
Custom	$0.01
Standard	$0.01
New Construction	$0.11
RetroCommissioning	$0.14

(Sources: 2014 Evaluation Reports from Cadmus & ADM)

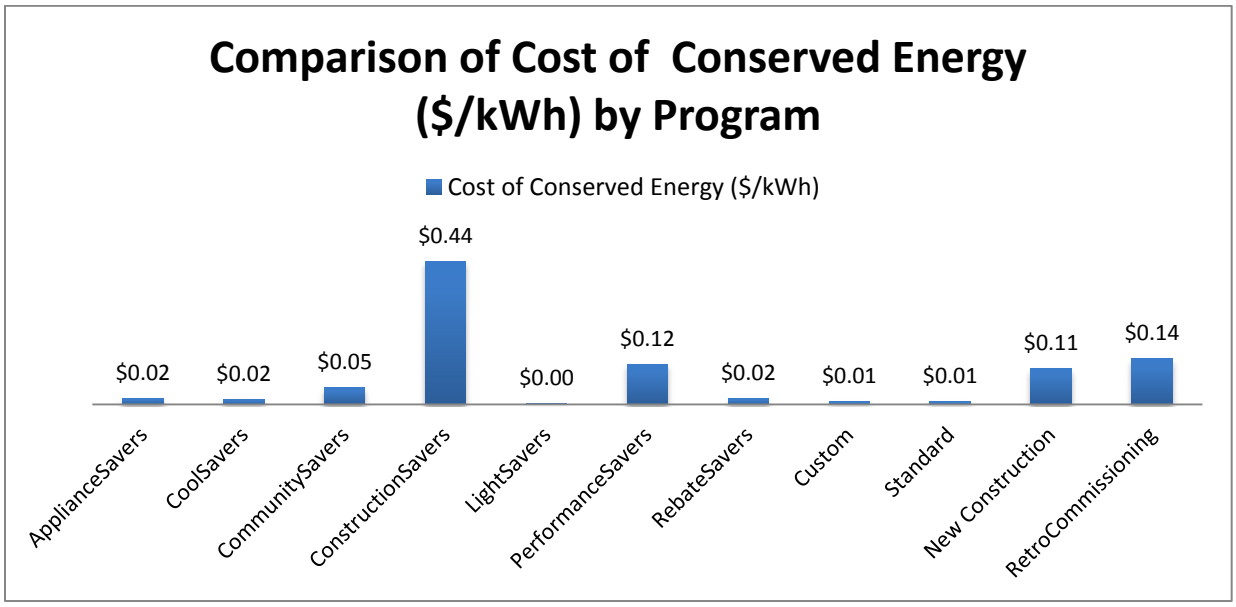


Figure 5: Cost of Conserved Energy ($/kWh)

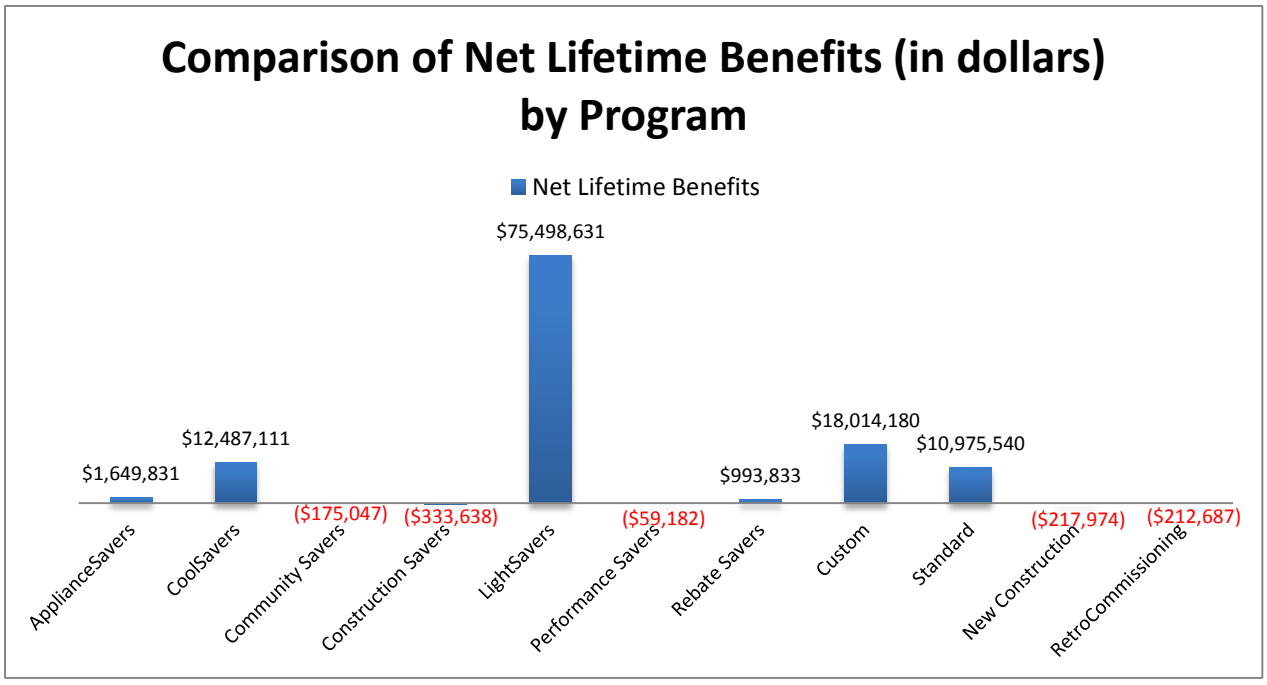
Table 18 and Figure 6 summarize the total net lifetime benefits from these programs. The LightSavers program net lifetime benefits were calculated at $74 million compared to BizSavers at $26 million. Both the Community Savers[14] program and the Construction Savers program are not cost-effective over the life of the program.

[14] Since Community Savers is low-income qualified program, it does not have to be cost effective.

Table 18: Net Lifetime Benefits (in dollars) per Program

Program	Net Lifetime Benefits
ApplianceSavers	$1,649,831
CoolSavers	$12,487,111
Community Savers	($175,047)
Construction Savers	($333,638)
LightSavers	$75,498,631
Performance Savers	($59,182)
Rebate Savers	$993,833
Custom	$18,014,180
Standard	$10,975,540
New Construction	($217,974)
RetroCommissioning	($212,687)

(Sources: 2014 Evaluation Reports from Cadmus & ADM)

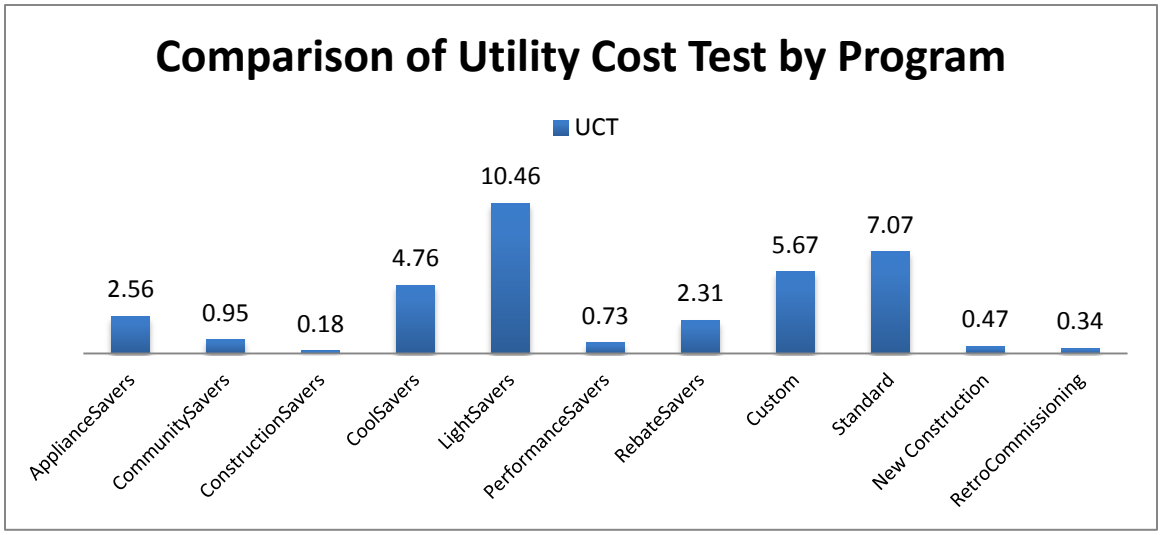


(Sources: 2014 Evaluation Reports from Cadmus & ADM)

Figure 6: Net Lifetime Benefits (in dollars) per Program

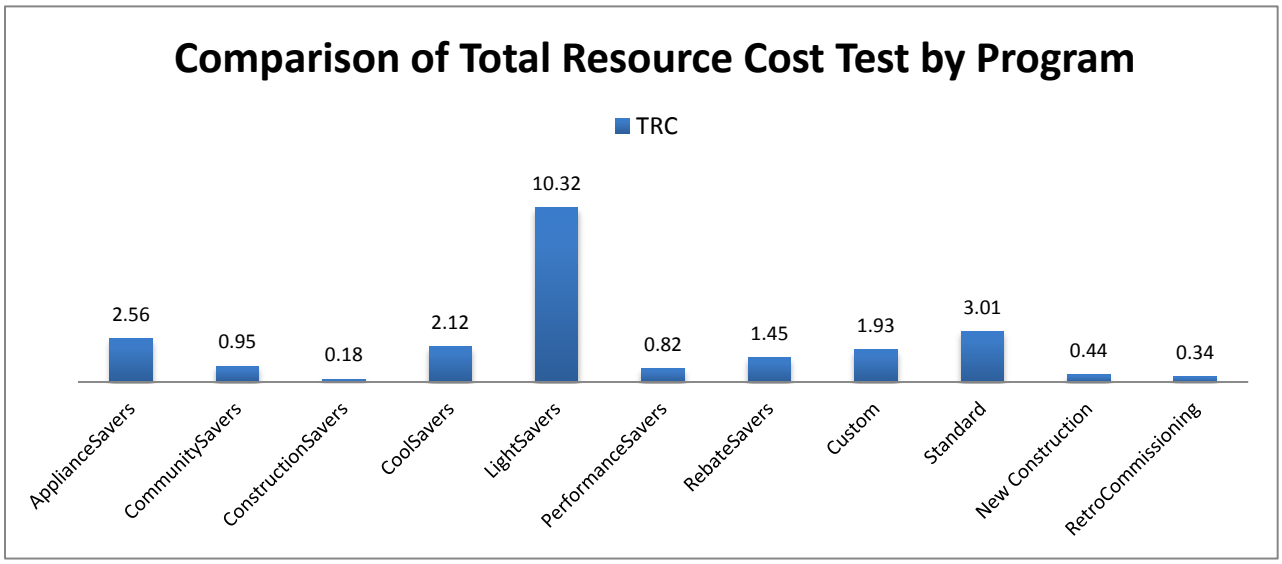
The next set of figures summarize the cost-benefit analysis from the five standard economic tests, starting with the Utility Cost Test (UCT) in Figure 7 and concluding with the results from the Societal Cost Test for the residential programs in Figure 11.

The results from the UCT and the Total Resource Cost (TRC) are similar in that LightSavers is the most cost-effective program while ConstructionSavers, PerformanceSavers, Commercial New Construction and RetroCommissioning are not cost-effective.



(Sources: 2014 Evaluation Reports from Cadmus & ADM)

Figure 7: Comparison of Utility Cost Test by Program



(Sources: 2014 Evaluation Reports from Cadmus & ADM)

Figure 8: Comparison of Total Resource Cost Test by Program

As Figure 9 shows, none of the programs are cost-effective using the Ratepayer Impact (RIM) test.

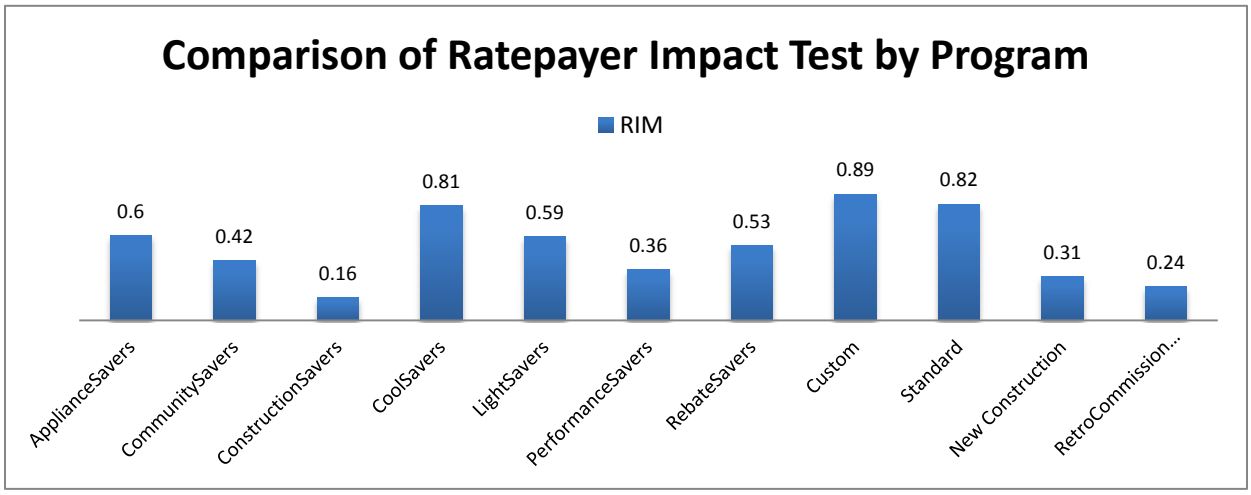
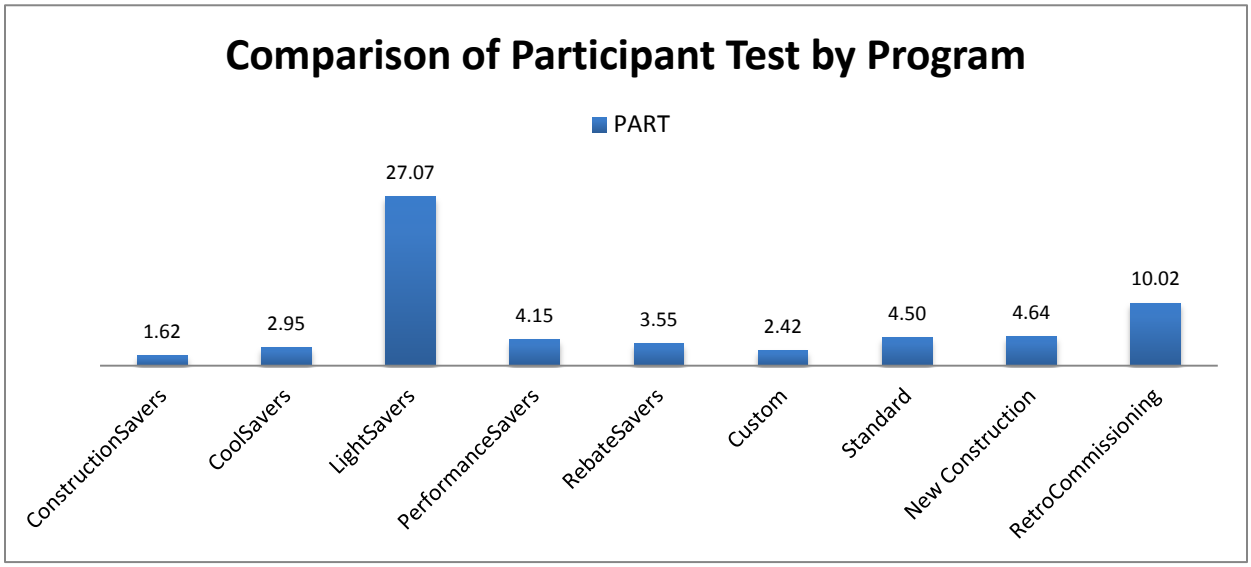


Figure 9: Comparison of Ratepayer Impact Test by Program

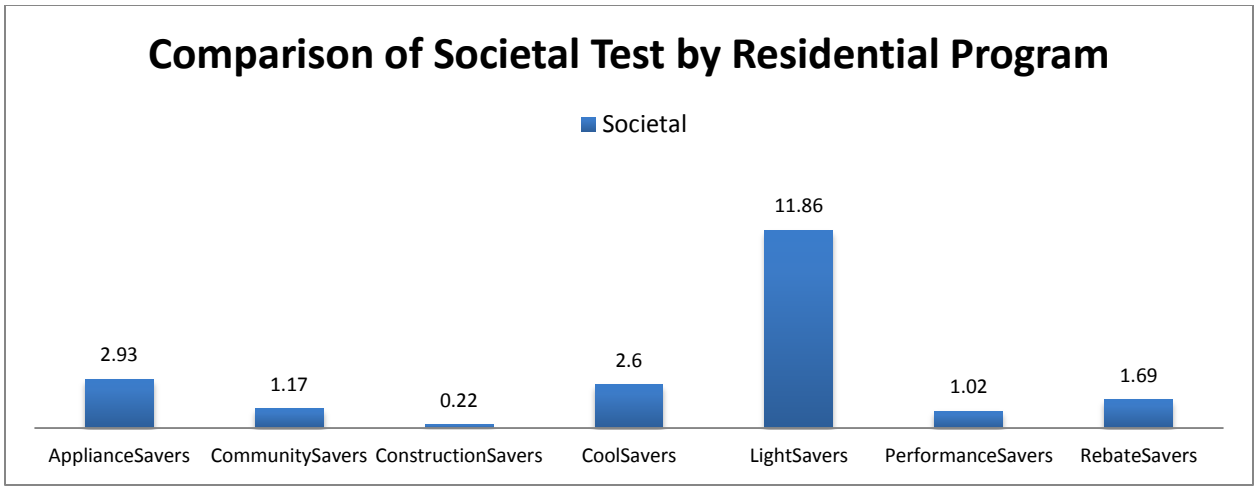
The Participant Cost Test (Figure 10) shows the LightSavers program as an outlier in comparison to the other programs. Note that the findings for the ApplianceSavers and CommunitySavers were not reported. However, all programs are cost-effective.



(Sources: 2014 Evaluation Reports from Cadmus & ADM)

Figure 10: Comparison of Participant Cost Test by Program

Only Ameren's residential program portfolio included the results from the Societal Test, as shown in Figure 11. Consistent with the previous results, LightSavers continues to have the highest cost-benefit result while ConstructionSavers is not cost-effective.



(Sources: 2014 Evaluation Reports from Cadmus & ADM)

Figure 11: Comparison of Societal Cost Test by Residential Program

Section 4: EM&V Auditor Findings and Recommendations

The EM&V Auditor Team summarized program evaluation methodologies used in Section 3.1 followed by a summary of the ways in which these program evaluations met the specific 4 CSR 240-22.070(8)Requirements in Section 3.2.

4.1 Evaluation Methodologies

Table 19 summarizes the overall evaluation methodologies used in the program evaluations while Table 20 provides a summary of residential process evaluations. Table 21 summarizes the evaluation methodologies used in the commercial evaluations. Overall, the evaluations conformed to industry best practices and provided a comprehensive review of all aspects of the program, with the exception of the use of market effects and the application of the non-participant spillover results.

Table 19: Summary of Program Evaluation Activities

Evaluation Activity	Process	Impact	Rationale
Review the Technical Resource Manual		✓	Review TRM values and assumptions and then conduct an engineering analysis to provide updated information for future program years
Review the Data Tracking	✓	✓	Provide ongoing support to ensure all necessary program data are tracked accurately; identify gaps for evaluation, measurement, and verification (EM&V) purposes
Interview Stakeholders	✓		Obtain information and insights into program design and delivery
Review Marketing Materials	✓		Identify gaps and opportunities in marketing and outreach strategies and activities
Survey Participants	✓	✓	Verify measure installation; collect data to inform net-to-gross ratio; collect process-related data
Survey Non-participants	✓	✓	Obtain an in-depth understanding of the program and identify successes and challenges
Analyze Gross and Net Impacts		✓	Develop per-unit gross savings from the impact analysis, using appliance characteristics data from the program database and *in situ* metering data from existing industry/evaluation databases
Analyze Cost-Effectiveness		✓	Measure the cost-effectiveness of the program through five standard perspectives: Total resource cost, utility cost, societal cost test,

(Sources: Cadmus Residential Evaluation Reports, 2014)

Table 20: Summary of Residential Program Evaluation Methodologies

Activity	Appliance Savers	Cool Savers	Community Savers	Construction Savers	Light Savers	Performance Savers	Rebate Savers
Review the Technical Resource Manual	✓	✓	✓	✓	✓	✓	✓
Review the Data Tracking	✓	✓	✓	✓	✓	✓	✓
Interview Stakeholders	✓	✓	✓	✓	✓	✓	✓
Review Marketing Materials	✓	✓	✓	✓	✓	✓	✓
Survey Participants	✓	✓	✓	✓	✓	✓	✓
Survey Non-participants	✓	✓	✓	✓	✓	✓	✓
Analyze Gross and Net Impacts	✓	✓	✓	✓	✓	✓	✓
Analyze Cost-Effectiveness	✓	✓	✓	✓	✓	✓	✓
Conduct a Metering Study			✓		✓		✓
Conduct Site Visits				✓		✓	
Conduct Program Home REM/Rate Reviews and On-Site Spot Checks				✓			
Site Visits and Metering		✓					
Conduct an Engineering Analysis		✓			✓		
Conduct Store Intercepts					✓		
Conduct SMD Surveys					✓		
Interview Retailers					✓		✓

(Sources: Cadmus Residential Evaluation Reports, 2014)

Table 21: Summary of Data Collection Activities for the BizSavers Program Evaluation

Data Source	Method	Dates	Key Research Topics	Analytic Techniques
Program staff (15) Ameren Missouri (5) Lockheed Martin (10)	In-depth interview	January to July 2013	Program function; communication; tracking and reporting; quality control	Qualitative, thematic analysis
Program documentation	Document review	January to December 2013	Program function; tracking and reporting; quality control	Qualitative, thematic analysis
Database analysis (587)	Database review	December 2013	Number of projects; project type and details; data quality	Quantitative, univariate and bivariate frequencies
Trade allies and other program partners (75)	Telephone semi-structured interviews	November to December 2013	Trade ally network; program awareness; program marketing; program processes; promotion of energy efficiency; satisfaction	Quantitative, univariate and bivariate frequencies and qualitative, thematic analysis
Event attendees (18)	Paper survey	December 2013	Event satisfaction; experience with training; Intention to work with BizSavers; firmographics	Qualitative, thematic analysis
Participants, Standard and Custom programs (229)	Online survey	January 2014	Program experiences; installed equipment; satisfaction with program	Quantitative, univariate and bivariate frequencies
Participants, New Construction and Retro-commissioning programs (2)	In-depth Interview	December 2013	Program experiences; installed equipment; satisfaction with program	Qualitative, thematic analysis
Near-participants, Standard and Custom programs (5)	In-depth Interview	December 2013 to January 2014	Program awareness; reason for program withdrawal; other energy efficiency activities; satisfaction with program	Qualitative, thematic analysis

(Source: BizSavers 2013, p. 5-2)

4.2 Summary of 4 CSR 240-22.070(8) Requirements

As part of the 4 CSR 240-22.070(8) requirements, the program evaluations were required to meet specific requirements specified in 4 CSR 240-22.070(8). Overall, these program evaluations conformed to the 4 CSR 240-22.070(8) standards as much as practicable.

Process Evaluation Findings

Primary market imperfection remains lack of awareness for most programs, coupled with lack of financial capital for programs, which require a substantial investment such as CoolSavers, and the BizSavers programs, as the following table illustrates.

Table 22: Summary of Findings for 4 CSR 240-22.070(8) Issue #1

4 CSR 240-22.070(8) Issue #1: What are the primary market imperfections common to the target market segment?	
Appliance Savers	Inadequate understanding of the operating costs of old or secondary refrigerators, and, in many cases, the inability to physically discard the appliance without assistance.
CoolSavers	In adequate information and/or knowledge regarding the energy saving benefits of proper HVAC maintenance and high efficiency HVAC systems for cooling and electric heating. Additionally, the investment/cost of installing a new HVAC unit deters customers from ultimately making the decision to purchase until absolutely necessary.
Community Savers	Split incentives between property managers and tenants; and the work required by the property manager/maintenance staff to facilitate installations.
Construction Savers	Inadequate information and/or knowledge regarding the benefits of high efficient new construction homes. Additionally, there is lack of marketing infrastructure to expose the target market segment to these benefits.
LightSavers	Customers lack information about energy efficient lighting options (difference in hours of use, energy use, lighting quality, etc.) and the prices for some energy efficient bulbs remain much higher than the incandescent baseline.
Performance Savers	Inadequate information and/or knowledge regarding the benefits of increasing energy efficiency within existing homes.
Rebate Savers	Lack of energy efficiency awareness and the higher upfront cost of energy efficient products.
BizSavers	Lack of up-front capital. This disproportionately affects small businesses, which also appear to be less aware of BizSavers incentives, on average, than larger businesses.

(Sources: Appliance Savers2013 p. 26; CoolSavers 2013, p. 29; CommunitySavers 2013, pp. 43-44; ConstructionSavers 2013, p. 28; LightSavers 2013, p. 38; 2013, p. 22; RebateSavers 2013, p. 39; 2013 BizSavers 2013, pp. 7-3-7-4.)

Most programs are currently targeting the appropriate markets; however, additional stratification and outreach may be needed for the ConstructionSavers, PerformanceSavers, and BizSavers programs as summarized in Table 23.

Table 23: Summary of Findings for 4 CSR 240-22.070(8) Issue #2

4 CSR 240-22.070(8) Issue #2: Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?	
Appliance Savers	Yes, the target market segment is appropriately defined as it serves all single-family residential customers regardless of the appliance's usage type (primary or secondary).
CoolSavers	Yes, the target market segment is appropriately defined and comprehensively serves for the single-family residential market. Specifically, the CoolSavers program is designed to help customers maintain the efficiency of operable systems (through tune-ups), and offers tiered incentives for customers replacing a failed and functional system (early retirement).
Community Savers	The low-income multifamily market could be merged with a low-income single-family market if concerns about serving non-low-income households can be resolved.
Construction Savers	The current target segment market would benefit from additional stratification. However, it may be difficult to successfully define and segment additional strata to builder types such as high efficient/green builders.
LightSavers	The LightSavers market is broadly defined, though the program is moving in the direction of targeting bulbs to new audiences, such as discount-retail shoppers. New market research shows that younger customers could be a more interested audience.
Performance Savers	Yes, the current market segment is appropriately designed. The program may realize higher audit rates through segmentation and targeted marketing of the current target market.
Rebate Savers	The target market of all residential customers is appropriate for the mail-in rebate programs and it is subdivided for the Efficiency Kits to just those with electric water heating.
BizSavers	Projects were distributed across a range of business types in rough proportion to the distribution of business types in the general population. Projects were disproportionately concentrated in large buildings. Projects also were concentrated in St. Louis and its suburbs, suggesting a possible need to work toward increasing marketing and outreach in other parts of the state.
BizSavers	Projects were distributed across a range of business types in rough proportion to the distribution of business types in the general population. Projects were disproportionately concentrated in large buildings. Projects also were concentrated in St. Louis and its suburbs, suggesting a possible need to work toward increasing marketing and outreach in other parts of the state.

(Sources: Appliance Savers2013 p. 26; CoolSavers 2013, p. 29; CommunitySavers 2013, pp. 43-44; ConstructionSavers 2013, p. 28; LightSavers 2013, p. 38; 2013, p. 22; RebateSavers 2013, p. 39; 2013 BizSavers 2013, pp. 7-3-7-4.)

Overall, the program measure mix meets current needs, except for the ConstructionSavers program. In addition, the evaluators identified additional measures that should be offered in the all the programs with the exception of LightSavers and BizSavers (see Table 24).

Table 24: Summary of Findings for 4 CSR 240-22.070(8) Issue #3:

4 CSR 240-22.070(8) 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?	
Appliance Savers	Yes, the current mix of end-use measures included in the program is appropriate. In PY2013 the program began collecting room air conditioners and dehumidifiers with eligible refrigerators and freezers, providing additional benefits for customers and savings for Ameren Missouri. However, providing energy-efficiency kits (including CFLs and other easy-to-install measures) could further improve customers' awareness and participation in other programs.
CoolSavers	The program targets the primary end-use technologies within the targeted market segment. However, the program precludes incentives for installation of heat pump HVAC systems, which could decrease participation and limit energy savings potential.
Community Savers	The mix of measures provides cost-effective electric savings in multifamily buildings housing low-income residents. Current measures address lighting, water heating, appliances, electronics, heating, and cooling. Additional measures could be supplied for households with natural gas heating or water heating if natural gas utilities co-sponsored the program. Program stakeholders have also suggested including air sealing measures.
Construction Savers	No. The program should include additional end-use technologies including appliances.
LightSavers	Yes. The program offers a diversity of products that represent the majority of common consumer lighting needs, including a range of wattages, specialty bulbs such as dimmables, globes, and reflectors, and LED bulbs. This year occupancy sensors were added as well.
Performance Savers	Yes, the mix of end-use measures offered through the program is appropriate. However, the program sets specific restrictions (e.g., electric water heater customers not eligible for hot water measures) that should be reviewed for appropriateness.
Rebate Savers	Between the mail-in rebates and free kit measures, the program rebates or provides at no-cost a total of nine energy-efficient home technologies. This is highly diverse program. Depending on the potential for energy savings, the program may be expanded to cover air filters, water coolers, and pool pumps.
BizSavers	The range of equipment meets the needs of respondents. Equipment generally is delivered with little delay, and participants are largely satisfied with the range of program-qualified equipment and the quality both of the equipment they installed and of the installation. Standard program component participants that opt not to pursue the custom program component option do so primarily because the standard program component option covers their equipment needs.

(Sources: Appliance Savers2013 p. 26; CoolSavers 2013, p. 29; CommunitySavers 2013, pp. 43-44; ConstructionSavers 2013, p. 28; LightSavers 2013, p. 38; 2013, p. 22; RebateSavers 2013, p. 39; 2013 BizSavers 2013, pp. 7-3-7-4.)

Overall, the process evaluations found that the communication channels were clear and quite diverse. However, as indicated previously, the evaluators did make recommendations to improve communication and program delivery in the RebateSavers and BizSavers program offerings, as highlighted in Table 25.

Table 25: Summary of Findings for 4 CSR 240-22.070(8) Issue #4:

4 CSR 240-22.070(8) Issue #4: Are the communication channels and delivery mechanisms appropriate for the target market segment?	
Appliance Savers	The implementer ARCA handles the scheduling and pickup for appliances recycled through the program. Participants expressed very high satisfaction with the program, suggesting that the communication channels and delivery mechanisms are appropriate.
CoolSavers	Yes, current communication channels are appropriate as the program uses both mass media marketing to generate demand and interest in the program, as well as targeted marketing through trained local HVAC contractors
Community Savers	The communication channels for the target market include direct contact with property managers by Honeywell staff. Communication with tenants is handled by: property managers, through workshops with Honeywell staff and directly with installation contractors in apartments. The delivery mechanism is direct installation performed by program subcontractors. The communication and delivery mechanism are necessarily direct and hands-on as both the tenant and property managers are considered a hard to reach population and have split incentives.
Construction Savers	Yes, current communication channels are appropriate.
LightSavers	Retailers report that the Ameren Missouri signage is effective. New market research indicates greater online activity could be effective at targeting younger customers.
Performance Savers	Yes, current communication and delivery channels are appropriate.
Rebate Savers	The delivery channels are appropriate but can be improved to overcome market barriers. For example survey results show that many customers already know the type of product they want to purchase before entering the retail store. The online survey showed that listing rebates on the website allowed the program to reach more customers than otherwise would have occurred through only store advertising.
BizSavers	The program is marketed through multiple channels and the implementer reports active outreach to end-use customers and trade allies. Trade allies are critical to program communication and delivery. However, many trade allies who are not members of the trade ally network are not aware of its existence. Lack of clarity in application instructions may be a barrier to effective program delivery, creating delays in and possibly abandonment of project implementation.
	Program rules and requirements may be too stringent for the retro-commissioning market, as program rules sometimes prevent participation, keep customers from capitalizing on incentives, and do not allow them to capture custom program component project opportunities.

(Sources: Appliance Savers2013 p. 26; CoolSavers 2013, p. 29; CommunitySavers 2013, pp. 43-44; ConstructionSavers 2013, p. 28; LightSavers 2013, p. 38; 2013, p. 22; RebateSavers 2013, p. 39; 2013 BizSavers 2013, pp. 7-3-7-4.)

The evaluators identified numerous ways in which the Ameren Missouri and implementation staff could work together to overcome the current market imperfections and program barriers. Many of these strategies were described more fully in the process evaluations but overall they recommend developing a stronger degree of coordination regarding all the various marketing and outreach strategies currently used to promote these programs, as Table 26 shows.

Table 26: Summary of Findings for 4 CSR 240-22.070(8) Issue #5:

4 CSR 240-22.070(8) #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?	
Appliance Savers	Customer acceptance and awareness of appliance operating costs can be increased through additional online advertising (such as Google AdWords or Pandora targeted ads) and earned media (through partnerships with local non-profit organizations).
CoolSavers	The current marketing materials allocate a significant proportion of resources specific to the targeted market. However, the most common suggestion for improvement from program participants surveyed was the need to increase program awareness and benefits, which indicate these efforts should continue.
Community Savers	The CommunitySavers design and implementation has had great success for several years, with high levels of participation and tenant acceptance of new measures like CFLs and advanced power strips. While many of the federally-subsidized properties have been treated, there are still LIHTC properties that can be served through the program. The program can help these property managers understand their eligibility for the program.
Construction Savers	Additional networking with the target market segment to spread program awareness is needed.
LightSavers	Ameren Missouri continues to reach out to more retailers and more audiences, and expand the list eligible measures, but awareness of the program is low. Ameren Missouri has commissioned market research to identify market segments and should use this information to experiment with new messaging and market channels.
Performance Savers	Additional customer education and awareness is needed regarding the benefits, both financial and non-financial, of increasing the efficiency of their homes.
Rebate Savers	Provide more marketing to alert customers about available rebates before they get to the store, provide more education on certain measures such as smart strips/
BizSavers	Lockheed Martin should continue working to expand the trade ally network and educate non-member trade allies about program offerings and application processes; Lockheed Martin should continue to work to clarify application instructions. Lockheed Martin should solicit feedback from customers and trade allies on sources of confusion or difficulty.
	Ameren Missouri and Lockheed Martin staff should work together to formalize orientation materials for new trade allies, possibly including a brief online orientation video. Such materials should stress that learning how to fill out the application correctly up front will save them time in the end.

(Sources: Appliance Savers2013 p. 26; CoolSavers 2013, p. 29; CommunitySavers 2013, pp. 43-44; ConstructionSavers 2013, p. 28; LightSavers 2013, p. 38; 2013, p. 22; RebateSavers 2013, p. 39; 2013 BizSavers 2013, pp. 7-3-7-4.)

Impact Evaluation Findings

Table 27 summarizes the scope of program activities completed for the impact evaluations. Overall, as this table shows, the evaluations met all these requirements to the extent it was appropriate for this evaluation.

Table 27: Impact Evaluation Requirements

4 CSR 240-22.070(8)Impact Evaluation Requirements	Appliance Savers	Cool Savers	Community Savers	Light Savers	Performance Savers	Rebate Savers	Biz Savers
Comparisons of pre-adoption and post-adoption participant rates	✓	✓	✓	✓	✓	N/A	✓
Comparison between participants and control groups over time	✓	✓	NA	✓	✓	✓	
Monthly billing data, hourly data, load research data, end use load metered data, simulations and survey responses		✓	✓			✓	
Audit and survey data on appliance and equipment type, size and efficiency levels, household or business characteristics or energy-related building characteristics	✓	✓	✓	✓	✓	✓	✓
Develop data collection protocols, participation rates, utility costs, participant costs, and total costs	✓	✓	✓	✓	✓	✓	✓

4.3 EM&V Auditor's Assessment of Impact Evaluations

Overall, these evaluations conformed to industry best practices and provided a comprehensive review of all aspects of the program. However, the EM&V Auditor identified significant concerns regarding the use of market effects in the LightSavers program evaluation and the application non-participant spillover results across the entire program portfolio.

The EM&V Auditor noted that the critical information regarding Ameren Missouri's program progress towards reaching its filed savings targets were not presented in a transparent manner during the draft report review. In response the residential sector evaluator developed a residential summary report (Residential Portfolio Evaluation Summary PY 2013, pg. 4) which addressed this issue. The progress towards goals is now included in the evaluation.

As a way to improve future reports and ensure conformity with industry practices, the EM&V Auditor also provides additional long-term recommendations that should be addressed in future EM&V reports. These recommendations are provided in Section 3.

Recommendations to Improve the Current Impact Evaluation Reports

However, the EM&V Auditor Team identified a number of areas that require additional clarification from the evaluators regarding the impact evaluation findings. The evaluators should make the following modifications in the PY2013 EM&V Reports for Ameren Missouri's energy efficiency program portfolio to ensure that these reports comply with accepted industry practices and provide results in a clear and transparent manner.

ApplianceSavers: There was insufficient discussion explaining the reasons for program changes and therefore the analysis would benefit from an initial discussion summarizing the outcome of program analysis and the basis for making program design changes (ApplianceSavers 2013, p. 6).

There should also be better clarification in the report that the program can be cost-effective without requiring the RIM test. (ApplianceSavers 2013, p. 54).

There is also a reference error on page 29.

CommunitySavers: There were some missing data in the tables, which created difficulty in understanding the findings. Specifically, Table 1 does not show the *ex ante* values and the NTG equations are incomplete (CommunitySavers 2013, p. 4). In addition, there should be a clearer discussion as to why the nonparticipant spillover and market effects have no value in this calculation.

In addition, the NTG equation should be standardized for all reports rather than the variations shown in the individual reports (CommunitySavers 2013, p. 62).

Figure 32 is missing data on page 64 (CommunitySavers 2013).

RebateSavers: Based on the feedback from the EM&V Auditor, the report now clearly summarizes the key impact findings and energy savings achieved (RebateSavers 2013, pp. 1-2).

The free ridership levels varied significantly based on whether the surveys were completed online or via telephone, therefore the sample size for these surveys should be reexamined and probably increased going forward (RebateSavers 2013, pp. 63-64).

BizSavers: The evaluator (ADM) did a good job in their evaluation of the programs. The findings and recommendations were sound. The project-by-project write-ups in the evaluation report are well done, and the engineering work appears to be sound.

However, the evaluator should have reported savings and number of projects by end use type, for example chillers, HVAC, lighting, compressed air, etc. to allow for assessment of which types of retrofits have the highest impact on program savings.

In addition, we do not agree with their recommendation regarding using their *ex post* savings values for refrigerator door savings. While they were correct in discounting this retrofit significantly, there remains a lack of technical depth of understanding that should be explored further before accepting deemed values for use in deeming savings.

The evaluator used a number of different terms to label various savings values, and this needs to be corrected in both the current program evaluation drafts as well as in future program evaluations so that the PSC and other interested parties can better understand the findings.

LightSavers: In general, the LightSavers evaluation followed "best practices" evaluation techniques for an upstream lighting program, including following many of the recommendations of the Uniform Methods Project Residential Lighting Protocol. In particular, the evaluation conducted a statistical sample of intercept surveys – which are extremely difficult to get approval from participating retailers – to estimate both leakage and cross-sector sales. The estimate of cross-sector sales is one of the key parameter estimates leading to substantially higher gross savings estimates from the TRM, and the level of rigor in estimating this parameter appears adequate.

The EM&V Auditor Team also commend Cadmus for acknowledging that the spillover and market effects are likely non-zero, and for integrating various data collection activities into a more holistic analytical approach. The report concluded that the program has achieved substantial market effects, pushing the program to a NTG of approximately 1.25. The EM&V Auditor Team, however, has a number of concerns regarding the assumptions used in the analysis, including:

- **The program targets stores with the highest free ridership estimates and the least likely to demonstrate market effects**.[15] For example, 94.1% of sales came from large do-it-yourself, mass merchandise, club, or other "big box" stores (Table 42). So it would be surprising to see such high market effects coming from distribution channels that already sell the bulk of efficient lighting (i.e., stores with high free ridership are presumably the least likely to have market effects).
- **The program spends very little for marketing and outreach activities that would lead to market effects.** The program appears to largely be a markdown and in-store education program, spending only $33,146 on marketing, or 2.1 percent of the entire marketing budget (Table 36). This made it the program with the smallest marketing budget in the entire portfolio. While in-store displays and promotions can lead to increased program bulb sales (as demonstrated by the elasticity model), increased marketing and outreach would be expected to drive market effects, yet the marketing and outreach effort for LightSavers appeared to be quite limited.
- **The report does not conform to the industry standard of preponderance of evidence approach.** The report provides limited additional evidence of qualitative or quantitative indicators of market effects. For example, the logic model would be expected to include several key performance indicators that could be providing corroborating evidence of market transformation. This preponderance of evidence approach would help greatly in terms of either confirming or refuting the longitudinal saturation analysis.[16]

[15] KEMA, Inc., The Cadmus Group Inc., Itron, Inc., PA Consulting Group, and Jai J. Mitchell Analytics. *Draft Evaluation Report: Upstream Lighting Program.* Prepared for the California Public Utilities Commission, Energy Division. December 10, 2009.

[16] See the "California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements or Evaluation Professionals," for a discussion of the Preponderance of Evidence approach.

- **There error bands in the model parameters are likely severely understated**. The report uses a bootstrapping approach to estimate the confidence interval for the elasticity model, but does not provide a confidence interval around the spillover and market effects.[17] Given the number of parameters that feed into the spillover and market effects – including the average number of sockets per home, CFL saturation over two time periods, stocking practices, and the results of the elasticity model – the propagation of error likely leads to a wider "error band" (i.e., exceeding 10% precision at 90% confidence) around the spillover and market effects estimates.[18]
- T**he analysis assumes that naturally occurring adoption from CFLs purchased outside the program is equal to the free-ridership estimated from the price-elasticity model is likely not true**. Those purchasing CFLs outside the program, however, would presumably be less price-sensitive, possibly purchasing CFLs at full cost in no need of a utility discount. This would imply that the naturally occurring adoption among non-program CFLs purchasers would be higher than the free-ridership estimated among program purchasers. Even by using the upper end of the free ridership error band (31%), the naturally occurring adoption could still be much higher.
- **The allocation of market effects between the years investigated should account for the timing of the non-program sales, not just the program sales.** There is strong evidence, presented in detail in Appendix A that sales of CFLs and LEDs were extremely high in 2012, despite the lack of program activity. This is likely due to a "momentum effect" of prior program activity. Reallocating the percentage to match the non-program sales effectively drops the percentage of spillover and market effects that is attributable to the 2013 program from 26.3 percent to 18.8 percent.

Given these issues, the market effects estimate needs to be revised downward, given the number of issues regarding the approach used in the model and the uncertainty surrounding key model inputs**.** While the EM&V Auditor agrees with the evaluator that the market effects are likely non-zero, the EM&V Auditor does not agree that the effects are as large as reported in the evaluation.

Instead, the EM&V Auditor recommends that, based on the additional sales data analysis presented in Appendix A, that timing of the claimed savings be adjusted accordingly. This adjustment accounts for the significant number of non-program bulbs sold prior to 2013, particularly in 2012. Making this adjustment, the proportion of spillover and market effects attributable to the 2013 program drops to 18.8 percent, a downward revision from the 26.3 percent as presented in the LightSavers report. This then drops the NTG with spillover to 87 percent, and with spillover and market effects to 94 percent.

- **The non-participant spillover calculations for the residential programs should be revised to be allocated evenly among programs.** Cadmus used a general population survey (GPS) to identify customers that reportedly installed energy efficient measures, credited the Ameren MO

[17] Bootstrapping is the practice of resampling from the data to estimate the probability distribution of the population (and thus the error bounds of the sample).

[18] Note that the bootstrapping approach for estimating free ridership from the elasticity model is also likely understating the error bounds for a few reasons due to out of sample extrapolation. In other words, the error only captures the fit of the data used for the model; the actual bulb prices are substantially higher (30%-50%) and there are no sales data at those price points.

programs for driving this measure installation, yet did not apply for a program rebate. Cadmus uses an allocation method based on a combination of program marketing spending and energy savings. This leads to exceptionally high non-participant spillover for some programs (e.g., over 20% for CoolSavers). The non-participant spillover measures, however, do not match these same allocations (e.g., the qualifying CoolSavers measures such as CAC and CAC tune-up represent only about 20% of the NPSO, yet 62% of the NPSO is assigned to CoolSavers). A more appropriate approach would have been to apply the 3 percent non-participant spillover across all programs; in this way one program is not being given preference over another in terms of the final savings calculations and cost-effectiveness analysis.

The EM&V Auditor also recommends applying the reported three percent non-participant spillover value to each program, as opposed to the original methodology of allocating the non-participant spillover based on program spending as a proportion of total portfolio costs (marketing, incentives, etc.). The rational for this change stems from the fact that the current program percentages used to allocate the non-participant spillover do not align with the portfolio level savings percentages associated with each program.

Based on the EM&V Auditor's analysis, Table 28 summarizes our revised recommended net-to-gross values for each program after incorporating the three percent non-participant spillover value.

Table 28: EM&V Auditor's Recommended Non-Participant Spillover and NTG for Each Program

	Non-Participant Spillover		Net-to-Gross	
Program	**Original NPSO**	**Recommended NPSO**	**Original NTG**	**Recommended NTG**
ApplianceSavers	12.6%	3.0%	74.2%	64.8%
CoolSavers	19.2%	3.0%	95.4%	79.2%
CommunitySavers	0%	3.0%	95.8%	98.8%
ConstructionSavers	0.0%	3.0%	28.3%	31.3%
LightSavers	0.9%	3.0%	125.0%	94.0%
PerformanceSavers	1.7%	3.0%	90.3%	91.6%
RebateSavers*	1.7%	3.0%	92.7%	94.0%
BizSavers Custom**	N/A	N/A	93.0%	93.0%
BizSavers Standard**	N/A	N/A	95.0%	95.0%
BizSavers New Construction**	N/A	N/A	94.0%	94.0%
BizSavers RCx**	N/A	N/A	67.0%	67.0%

(Source: Evaluation reports submitted by Cadmus and ADM, February 2014)

* For RebateSavers, free ridership and non-participant spillover were estimated using a weighted average of program sub-components.

** BizSavers did not compute non-participant spillover

Table 29 reports the EM&V Auditor's recommended net savings *ex post* and the percent of target achieved for the portfolio energy savings in PY2013 using only the revised net-to-gross values.

Table 29: EM&V Auditor's Recommended Ameren Missouri Portfolio Energy Savings in PY2013, MWh

	Net Savings Ex Post: 2013		% of Target Achieved	
Program	**Original Net Savings Ex Post: 2013**	**Recommended Net Savings Ex Post: 2013**	**Original % of Target Achieved**	**Recommended % of Target Achieved**
ApplianceSavers	5,170	4,512	44%	38%
CoolSavers	23, 941	19878	139%	115%
CommunitySavers	5,890	6075	102%	105%
ConstructionSavers	67	74	9.9%	11%
LightSavers	279,127	227,132	230%	188%
PerformanceSavers	285	289	27%	27%
RebateSavers	7,793	7,905	104%	105%
BizSavers Custom	43,875	43,876	90%	90%
BizSavers Standard	23,899	23,899	111%	111%
BizSavers New Construction	204	204	8%	8%
BizSavers RCx	224	224	10%	10%
Total	390,475	335,431	162%	140%

(Source: 2013 Program Evaluation Reports from ADM and Cadmus)

Table 30 shows the same updates for demand reductions in PY2013.

Table 30: EM&V Auditor's Recommended Ameren Missouri Portfolio Energy Savings in PY2013, kW

Program	Net Peak Savings Ex Post 2013		Revised Net Peak	
	Original kW Ex Post	Recommended kW Ex Post	Original % of Target Achieved	Recommended % of Target Achieved
ApplianceSavers	992	866	61%	53%
CoolSavers	13,833	11486	112%	93%
CommunitySavers	484	499	63%	64%
ConstructionSavers	23	26	28%	32%
LightSavers	21,057	16,106	577%	542%
PerformanceSavers	20	20	6%	6%
RebateSavers	723	732	57%	58%
BizSavers Custom	9,479	9,487	73%	73%
BizSavers Standard	4,088	4,090	90%	90%
BizSavers New Construction	43	43	5%	5%
BizSavers RCx	48.39	49	9%	9%
Total	50,763	44,511	130%	114%

(Sources: 2013 Program Evaluation Reports from ADM and Cadmus, Ameren Missouri Tariff Filings)

4.4 Recommendations to Improve Future Impact Evaluations

The EM&V Auditor also developed several recommendations that should be incorporated into all future EM&V reports prepared for Ameren Missouri. These recommendations are intended to ensure that the presentation of the impact evaluation findings will conform to industry standards and best practices.

Provide additional technical information in the report. When showing confidence and precision values, the evaluators should explain in greater detail how it was calculated and how the information was used. These findings can either be part of a technical appendix or included in footnotes for specific program findings. But in any case, these findings need to be clearly provided in future reports.

In addition, the evaluators need to provide clearer explanations regarding the methodologies use to arrive at their findings and recommendations. It is also critically important that the evaluators provide the technical inputs and assumptions used to calculate the results for the cost-effectiveness analysis as well as the impact evaluation findings.

Provide guidance regarding TRM updates and priorities. The evaluators should provide additional guidance regarding the effects of the erroneous TRM values on realization rates. In addition, it is not sufficient to recommend changes to the TRM, but rather it is more useful to prepare a prioritized list so Ameren Missouri can allocate resources accordingly, and hopefully support the development of a Statewide TRM.

Because of the significant number issues and resulting savings estimates, Ameren Missouri should complete a third -party review of the TRM and then update it in advance of the next planning cycle.

Calculate and present impacts by measure type. The evaluators should calculate and present impacts by measure type. For example, a table showing total impact for lighting, AC replacement, motor saving, envelope measures, etc. should be developed.

4.5 EM&V Auditor's Assessment of Process Evaluations

The process evaluations for the Residential Program Portfolio, for the most part, met industry standards. In a few cases, they exceeded industry standards by providing meaningful findings in clear and understandable ways.

The BizSavers process evaluation (BizSavers 2013, pp.5-1-5-78) was robust, comprehensive, and addressed all key issues and exceeded industry standards. The reporting was detailed yet understandable and provided a comprehensive summary of all key findings. The process evaluation also featured a thorough discussion of all the key survey findings. Overall, this process evaluation, which also included a detailed discussion of both the findings of the document review, program database, and free ridership analysis, provided a high level of rigor and insight.

The ApplianceSavers process evaluation provided an excellent discussion of the specific challenges that delayed program start-up. The range of activities completed in this evaluation is consistent with industry best practices; however, the non-participant survey findings only focused on appliance recycling and therefore missed the opportunity to compare satisfaction levels with Ameren Missouri among participants and non-participants. (ApplianceSavers 2013, pp. 18-25).

In particular, the CommunitySavers process evaluation (CommunitySavers 2013, pp. 17-46) was thorough, comprehensive, and provided meaningful feedback from all of the process evaluation activities that were completed. Similarly, the ConstructionSavers process evaluation (ConstructionSavers 2013, pp. 18-27) also provides a comprehensive examination of all aspects of program operations by including findings from program implementers and builders that identified reasons for low participation.

The LightSavers process evaluation was exceptionally well done, providing a detailed look and critical information regarding all aspects of program design and implementation. It also provided excellent background on changes in program design, as well as a candid summary of the challenges this program faced. The level of specificity regarding promotional activities was important information conveyed in a meaningful way (LightSavers 2013, pp. 21-37).

The PerformanceSavers process evaluation (PerformanceSavers 2013, pp. 14-21) did address the major issues that the program faced regarding challenges to implementation. However, the discussion of the revised marketing and creative materials should have included examples of these new materials. Nearly all of the other process evaluations provided examples of the marketing materials, which is especially helpful in understanding the analysis.

The RebateSavers process evaluation was also well done (RebateSavers 2013, pp.17-38). The process evaluation activities were both comprehensive and informative, and the deployment of the participant surveys and process flow diagram are all excellent examples of industry best practices. The findings were

well-organized by key topics and the inclusion of both examples of marketing materials as well as in-store photographs were especially helpful.

Based on the feedback provided in the EM&V Auditor draft report, the process evaluation in the final CoolSavers program evaluation report now includes the findings and recommendations from the contractor interviews and a more thorough discussion of program challenges (CoolSavers 2013, pp. 16-19).

Based on the feedback from the EM&V Auditor, the evaluator did provide examples of the marketing materials to provide additional information regarding the effects of changes in program operations (PerformanceSavers 2013, pp. 14-21).

The BizSavers program evaluations now include a program flow diagram to identify potential bottlenecks in the application process, which also aided to the overall understanding of the key findings as requested by the EM&V Auditor (2013, p. 5-21).

Recommendations to Improve the Current Process Evaluation Reports

The findings from the non-participant surveys should be provided as a standalone appendix in the final report. Given the importance associated with the findings for spillover, these findings should be provided in an appendix to facilitate understanding and conform to industry best practices for both process and impact evaluations.

There were also some lost opportunities in the deployment of the non-participant surveys. Although this was a critical element in the program evaluation, the non-participant survey focused primarily on ways to estimate non-participant spillover and did not gather critical data regarding overall satisfaction with Ameren Missouri. Although the non-participant results were "sprinkled" throughout the various program evaluations, a standalone summary report in an Appendix would be a preferred method of conveying these results. However, the PowerPoint Presentation provided by Cadmus and the frequency counts (via data request) did provide additional background and context; these should have been provided in a standalone report.

Recommendations to Improve Future Process Evaluations

ConstructionSavers: The evaluator should conduct the participant survey with home buyers in 2014, as described in the process evaluation report (ConstructionSavers 2013, p 25), as this will provide additional insight regarding barriers to program participation.

Non-participant Surveys: Future surveys should include critical process evaluation issues including customer satisfaction questions as a way to compare differences participants and non-participants.

4.6 Overall Conclusion from the EM&V Auditor Team

Overall, these evaluations conformed to industry best practices and provided a comprehensive review of all aspects of the program. However, the EM&V Auditor notes that the critical information regarding Ameren Missouri's program progress towards reaching its filed savings targets were not presented in a transparent manner, consistent with EM&V best practices.

The EM&V Auditor also appreciates the evaluators' efforts to address and correct many issues identified in our initial review of the draft EM&V Reports.

However, the EM&V Auditor identified significant concerns regarding the use of market effects in the LightSavers program evaluation and the application non-participant spillover results across the entire program portfolio.

Specifically, the market effects estimate needs to be revised downward, given the number of issues regarding the approach used in the model and the uncertainty surrounding key model inputs. While the EM&V Auditor agrees with the evaluator that the market effects are likely non-zero, the EM&V Auditor does not agree that the PY2013 effects are as large as reported in the evaluation.

As discussed in detail in Appendix A, the EM&V Auditor performed an independent analysis of the annual allocation of the spillover and market effects. The EM&V Auditor believes any impacts due to potential spillover and market effects needs to incorporate the sales pattern of non-program bulbs, not just program bulbs. Making this adjustment, the proportion of spillover and market effects attributable to the 2013 program drops to 18.8 percent, a downward revision from the 26.3 percent as presented in the LightSavers report. Incorporating this change – along with an adjustment to the non-participant spillover – then drops the NTG with spillover to 87 percent, and with spillover and market effects to 94 percent.

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Definition of Key Acronyms

As a first step to detailing the evaluation methodologies, the evaluators provided a glossary of terms:

- ACCA- --- the program implementer for Ameren Missouri's ApplianceSavers program
- APT: Applied Proactive Technologies- the program implementer for Ameren Missouri's LightSavers program
- ASHP – Air-source heat pump
- C&I – Commercial and Industrial
- CAC – Central air conditioner
- CFL – Compact fluorescent lamp
- CDD – Cooling degree days
- Deemed Savings – A savings estimate for homogenous measures, in which an assumed average savings across a large number of rebated units is applied
- DLC – Residential direct load control
- ECM – Energy conservation measure
- EFLH – Equivalent full load hour
- EISA – Energy Independence and Security Act of 2007
- EM&V – Evaluation, measurement and verification
- *Ex Ante* – A program parameter or value used by implementers/sponsoring utilities in estimating savings before implementation
- Expected Savings - The saving calculated by the implementation contractor, These numbers are developed prior to the evaluator's analysis.
- *Ex Ante* Net Savings = *Ex Ante* Gross Savings x *Ex Ante* Free-Ridership Rate
- *Ex Post* – A program parameter or value as verified by the Evaluators following completion of the evaluation effort
- Ex Post Net Savings = Ex Post Gross Savings x Ex Post Free-Ridership Rate
- FAQ – Frequently asked questions
- Free Ridership – Percentage of participants who would have implemented the same energy efficiency measures in a similar timeframe absent the program.
- Gross Savings – Energy savings as determined through engineering analysis, statistical analysis, and/or onsite verification
- Gross Realization Rate = Ratio of *Ex Post* Gross Savings / *Ex Ante* Gross Savings
- HDD – Heating degree days
- HP – Heat pump
- HVAC – Heating, ventilation, and air conditioning
- ICF – ICF International
- ISR – In–service rate
- kW – Kilowatt
- kWh – Kilowatt-hour
- M&V – Measurement and verification
- MW – Megawatt
- MWh – Megawatt hour
- Net Realization Rate = Ratio of *Ex Post* Net Savings / *Ex Ante* Net Savings
- Net Savings –Gross savings factoring off free-ridership and adding in spillover.
- NTG – Net-to-gross
- NTGR – Net-to-gross-ratio = (1 – Free Ridership % + Spillover %), also defined as Net Savings / Gross Savings
- POP – Point-of-purchase

- QA – Quality assurance
- QC – Quality control
- ROI – Return on investment
- RR – Realization rate
- Realized Savings or Achieved Savings- The savings that have been verified by the EM&V contractor. This includes adjustments for equipment that may not have been installed, calculation errors, and differences in assumptions.
- Spillover – Savings generated by a program that are not incentivized.
- T&D – Transmission and distribution
- TRM – Technical Reference Manual
- VFD – Variable Frequency Drive

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