BizSavers Program Evaluation Report

PY2018 Long-Lead Projects

Volume I of II

March 2020 - February 2021

Prepared For:

Ameren Missouri

Prepared by:

ADM Associates, Inc.

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1. Executive Summary

This report presents the energy and demand savings for the second year of the PY2018 long-lead project period evaluated for the Ameren Missouri Standard Program, Custom Program, and New Construction Program. Projects with long-lead times that were approved during the PY2018 program year, but not completed within the program year, were eligible for continuation under the MEEIA Cycle 2 to Cycle 3 Transition Plan for a period of two additional years. This report is for the second year of the two-year period for completion of the PY2018 long-lead projects. These projects were completed from March 2020 through February 2021. This report does not include the energy and demand savings from the base PY2018 period of projects completed from March 2018 through February 2019 but does supplement the project evaluation sampling and participant survey sampling from this base period for application to the long-lead project population. The additional long-lead project population is a relatively small proportion of the base PY2018 population, accounting for approximately 2.8% of the PY2018 population expected energy savings.

The impact evaluation, measurement, and verification (EM&V) for the second year of the two-year plan is completed by ADM Associates, Inc. The demand-side management (DSM) programs are implemented by TRC Energy Services (formerly Lockheed Martin Energy Solutions). The electric distribution and transmission utility is Ameren Missouri. The primary evaluation activities are listed in the following paragraphs.

The evaluation team collected data for the evaluation through review of program materials, project level engineering desk reviews, on-site data collection and monitoring, and a survey of program participants.

The sample design for the PY2018 projects, inclusive of long-lead projects, facilitates program-level estimation of first year program savings with +/-10% statistical error at a 90% level of confidence. The supplemental long-lead project sample increased the number of PY2018 sampled projects for the three programs with projects completed in the second year of the long-lead period, as summarized in the following table.

Table 1-1 PY2018 Sample and Long-Lead Year 2 Supplement Sample

Program	*Base PY2018*		*Long-Lead Year 2*	
	Projects Complete	*EM&V Sampled Projects*	*Projects Complete*	*EM&V Sampled Projects*
Custom	1,456	88	5	1
Standard	5,276	205	2	1
New Construction	88	17	10	1
Total	**6,820**	**310**	**17**	**3**

To develop the long-lead sampling plan, the evaluation team reviewed the sampling and results for the three BizSavers Programs for which additional long-lead projects were

completed. Based on that review, the evaluation team concluded that adding three additional projects to the PY2018 base sample would facilitate maintenance of the statistical precision levels.

The achieved statistical precision of energy savings estimates is ±7.3% for the Custom Program, ±5.6% for the Standard Program, and ±9.9% for New Construction.

Table 1-2 Sample Statistical Precision by Program

Program	*Statistical Precision*
Custom	7.3%
Standard	5.6%
New Construction	9.9%

Ex post gross kWh energy savings analysis was performed for each sampled project. The evaluation team applied the gross energy realization rates by program and sampling strata associated with the base PY2018 sample to estimate the energy savings associated with non-sampled measures.

ADM completed a net program impact analysis to determine what portion of gross energy savings and demand reductions achieved by program participants are attributable to the effects of the program. Net savings are equal to gross savings, minus free ridership, plus spillover.

Net Savings = Gross Savings – Free-ridership + SO

The evaluation team surveyed decision maker contacts for the long-lead projects for use in estimating net program savings to supplement the base PY2018 survey results.

Table 1-3 provides a summary of the EM&V data collection efforts. The table lists data sources used for the evaluation, the data collection method, the dates during which data collection and/or analysis was performed, the research objectives, and the type of analysis performed (qualitative vs. quantitative).

Table 1-3 Summary of BizSavers Long-Lead EM&V Data Collection Efforts

Data Source	*Method*	*Dates*	*Key Research Topics*	*Analysis Type*
Post install sample (3 projects)	Engineering Desk Review & Site Visit Monitoring	January 2020 to May 2021	Verify measure installation and collect end use metering data	Quantitative and Qualitative
Participant Census Survey (2 responses)	Online survey	February 2021 to May 2021	Decision making	Quantitative and Qualitative

Table 1-4 provides a summary of the long-lead projects' evaluated energy savings for the second long-lead year. The table presents the ex ante and ex post gross energy, and ex post net energy savings along with the net-to-gross ratio.

Table 1-4 Summary of Energy Savings for Long-Lead Projects Year 2

Program Component	*Gross Energy Savings (kWh)*			*Net Energy Savings (kWh)*	
	Ex Ante Gross	*Ex Post Gross*	*Gross RR*	*Ex Post Net*	*Estimated NTG Ratio*
Custom	1,116,733	1,128,279	101%	1,054,315	93%
Standard	1,710,188	1,608,642	94%	1,569,041	98%
New Construction	6,833,289	6,913,617	101%	6,551,216	95%
Total	**9,660,210**	**9,650,538**	**100%**	**9,174,572**	**95%**

Table 1-5 summarizes the long-lead projects' peak demand savings for the second long-lead year. The table presents the ex ante and ex post gross peak demand, and ex post net peak demand savings.

Table 1-5 Summary of Demand Savings for Long-Lead Projects Year 2

Program Component	*Peak Demand Savings (kW)*			*Net Demand Savings (kW)*
	Ex Ante Gross	*Ex Post Gross*	*Gross RR*	*Ex Post*
Custom	619.37	624.11	100.8%	604.27
Standard	324.87	305.58	94.1%	298.06
New Construction	2,504.33	2,534.91	101.2%	2,400.32
Total	**3,448.67**	**3,464.60**	**100.5%**	**3,302.65**

Table 1-6 lists the incentives paid for projects completed during long-lead year two of $952,609, which compares with $1,148,191 in incentives during long-lead year one. There are no remaining open projects, with no remaining committed incentives.

Table 1-6 Long-Lead Projects Year 2 Incentives

Period	*Incentives*
Completed March 2020-Feb 2021	$952,609
Committed Long-Lead Projects not completed	$0

2. Introduction

This report presents the results of the impact evaluation of long-lead projects completed through the BizSavers Custom, Standard, and New Construction Programs in the second year of the long-lead project completion period. The long-lead projects were initiated during the PY2018 program year and completed during the period of March 2020 through February 2021 and are summarized in the following table.

Table 2-1 Summary of Long-Lead Project Activity Year 2

Program Component	*Number of Projects*	*Energy Savings (kWh)*	*Peak Demand Savings (kW)*
		Ex Ante	*Ex Ante*
Custom	5	1,116,733	619.37
Standard	2	1,710,188	324.87
New Construction	10	6,833,289	2,504.33
Total	**17**	**9,660,210**	**3,448.67**

2.1 Long-Lead Project Trends

The following figures summarize the completion month of the long-lead projects installed in the second year of the long-lead project completion period.

Figure 2-1 plots the Custom Program ex ante energy savings by project completion month and cumulative energy savings through the second year of the long-lead project completion period. These projects were completed in the building types of government, faith-based, industrial, and office buildings.

Figure 2-1 Custom Program Ex Ante Energy Savings by Project Completion Month

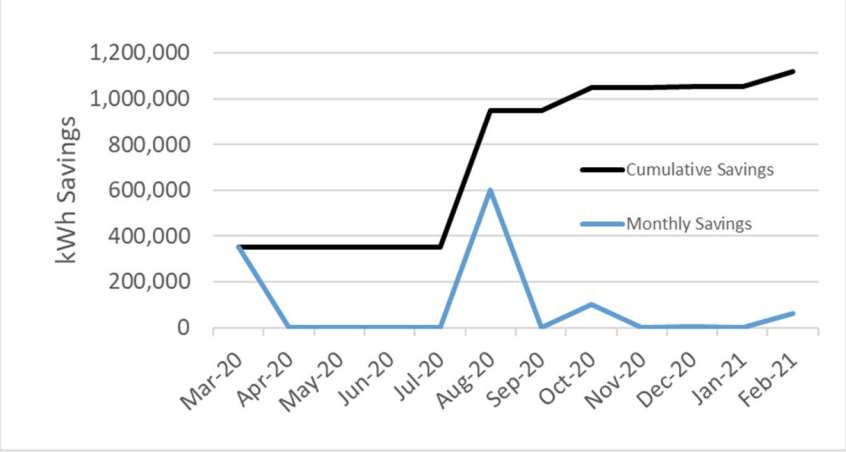


Figure 2-2 plots the Standard Program ex ante energy savings by project completion month and cumulative ex ante energy savings through the second year of the long-lead project completion period. These two projects were installed in a government building and an education building.

Figure 2-2 Standard Program Ex Ante Energy Savings by Project Completion Month

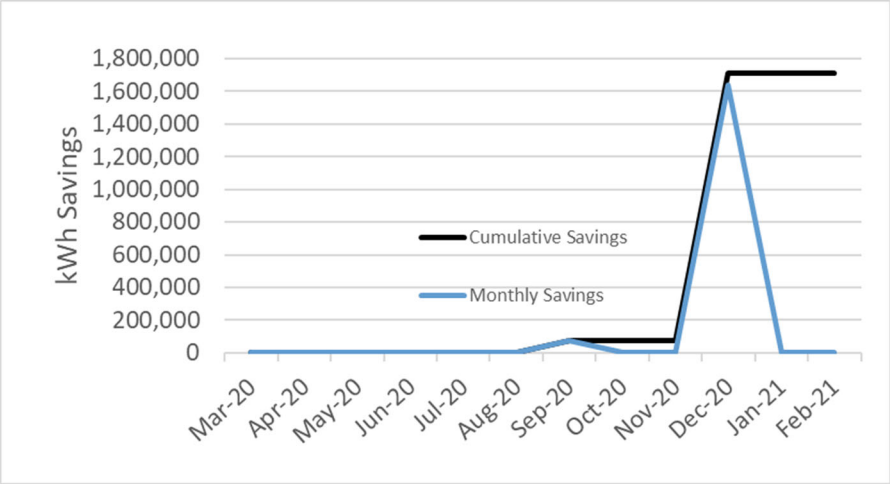
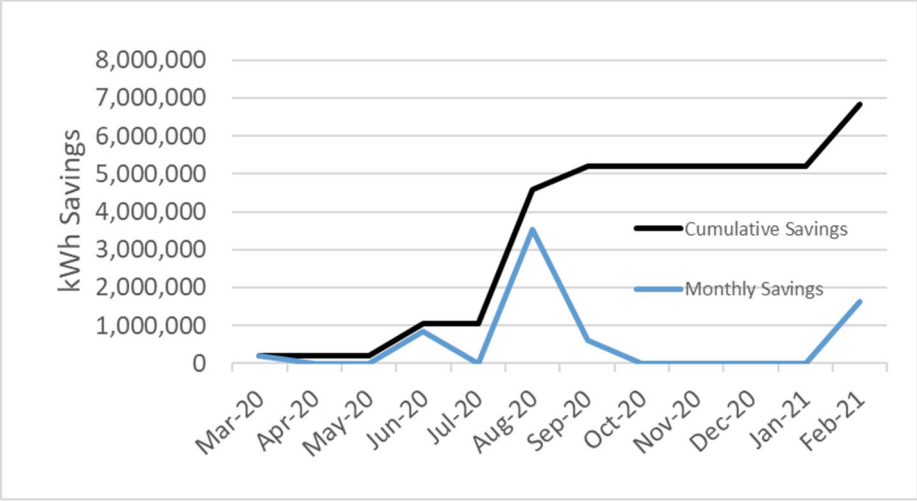


Figure 2-3 displays the ex ante program energy savings by month as well as cumulatively for the New Construction Program. These ten projects for new construction were in parking garages, recreation, education, warehouse, and office buildings.

Figure 2-3 New Construction Ex Ante Energy Savings by Project Completion Month



3. Estimation of Ex Post Gross Savings

This chapter addresses the estimation of ex post gross energy savings and ex post gross peak demand savings associated with the second year of the long-lead project completion period. The long-lead projects were initiated during base PY2018 program year and completed during the period of March 2020 through February 2021.

ADM performed impact analyses in accordance with evaluation requirement in Missouri 4 CSR 240-20.093 Demand-Side Programs Investment Mechanism and 4 CSR 240-20.094 Demand-Side Program and following the evaluation tasks in the Stipulation and Agreement Regarding Cycle 2 Transition Plan, filed as EO-2015-0055.

Section 3.1 describes the methodology used for estimating ex post gross energy and demand impacts. Section 3.2 presents the results of the effort to estimate savings for the long-lead projects.

3.1 Methodology for Estimating Gross Savings

The program gross energy and demand savings were determined by evaluating a sample of individually completed projects receiving incentives that is statistically significant. The evaluation team reviewed the population of PY2018 and PY2018 long-lead projects to develop an additional sample of long-lead projects to estimate first year program savings with +/-10% statistical error at a 90% level of confidence.

3.1.1 Sampling Plan

The sample design for long-lead projects was developed to estimate first year program savings with +/-10% statistical error at a 90% level of confidence. Table 3-1 summarizes the population and sampling for the base PY2018 program year, with the additional samples from the first year of the long-lead project period, and the supplemented samples for the second year of the long-lead period. Three additional samples were supplemented to the pre-existing sample of PY2018 projects. No additional Retro-Commissioning Program projects were completed during the second year of the long-lead period and so the sample for that program was not needed.

Table 3-1 PY2018 and Long-Lead Project Population with Sample Size

Program	*PY2018 March 2018 to Feb 2019*		*Long-Lead Year 1 March 2019 to Feb 2020*		*Long-Lead Year 2 March 2020 to Feb 2021*	
	Projects Complete	*EM&V Sampled Projects*	*Projects Complete*	*EM&V Sampled Projects*	*Projects Complete*	*EM&V Sampled Projects*
Custom	1,456	88	29	0	5	1
Standard	5,276	205	30	0	2	1
New Construction	88	17	10	2	10	1
RCx	15	9	2	1	0	0
Total	**6,835**	**319**	**71**	**3**	**17**	**3**

Note: Some projects receive incentives through multiple programs leading to the sum of program-projects exceeding the total number of projects.

The basis for the estimation of savings for the programs is a ratio estimation procedure that allows the measured and verified (M&V) sample to, with a specific statistical precision, explain the annual ex post gross savings for all completed projects. The sampling statistical precision for each program is shown in Table 3-2. The Custom Program sample achieved an estimation of energy savings with statistical precision of 7.3%, while the precision of the Standard Program sample is 5.6% and sampling precision of the New Construction Program sample at 9.9%.

Table 3-2 Sample Statistical Precision by Program

Program	*Statistical Precision*
Custom	7.3%
Standard	5.6%
New Construction	9.9%

3.1.2 Review of Documentation

After the sample selection, ADM obtained project documentation from the tracking database maintained by Ameren Missouri's program implementation contractor. ADM analysts then reviewed this documentation and other program materials that were relevant to the evaluation effort.

The available documentation (e.g., audit reports, savings calculation work papers, invoices, etc.) for each incentivized measure was reviewed, with attention given to the calculation procedures and documentation for ex ante energy saving estimates. The reviewed documentation for all selected projects included program forms, databases,

invoices, product spec sheets, reports, billing system data, weather data, and any other potentially useful data. Examination of each application to determine whether the following type of information is included:

- Documentation for the equipment changed, including (1) descriptions, (2) schematics, (3) performance data, and (4) other supporting information;
- Documentation for the new equipment installed, including (1) descriptions, (2) schematics, (3) performance data, and (4) other supporting information; and
- Information about the savings calculation methodology, including (1) what methodology was used, (2) specifications of assumptions and sources for these specifications, and (3) correctness of calculations.

If there was uncertainty regarding a project or incomplete project documentation, then ADM staff contacted the implementation contractor to seek further information to ensure the development of an appropriate project-specific M&V plan.

3.1.3 Verification Procedures

ADM completed desk reviews when BMS trend data or billing data was available to support savings estimation, and otherwise performed on-site light logger monitoring. Desk reviews were completed, which included review of all project documentation, comparison to previous projects implemented at the same site, and collection of utility billing data. These projects were supplemented to the base PY2018 evaluation sample, which were all verified by on-site visits.

3.1.4 Procedures for Estimating kWh Savings from Measures Installed through the Program

Table 3-3 presents a high-level description of the savings analysis methods applied to sampled measures. Estimates of program-level gross savings were developed by applying a ratio estimation procedure in which achieved savings levels estimated for the sample units are statistically extrapolated to the program-level ex ante savings.

Table 3-3 Typical Methods to Determine Savings for Custom Measures

Type of Measure	*Method to Determine Savings*
Lighting	Reference to data on wattages of newly-installed measures, metered hours-of-use data, obtained project documents and published operating hours, with baseline data informed by applicable standards or pre-existing equipment characteristics.
HVAC (including packaged units, chillers, cooling towers, controls/EMS)	Whole Building Analysis with weather data and utility billing data

Volume II of this report presents information on the results of analysis at the site-level, and the program level analysis results are presented in section 3.2 of this document.

3.1.5 Procedures for Estimating Peak kW Savings from Measures Installed through the Program

The system peak net demand (kW) savings for PY2018 long-lead project measures are determined by factoring the first year annual energy savings by the end use-specific energy-to-demand ratios. Table 3-4 shows the applicable business energy to peak demand factors, which are sourced from Appendix E to the *Non-Unanimous Stipulation and Agreement* in File No. EO-2015-0055[1]. The *Non-Unanimous Stipulation and Agreement* in File No. EO-2015-0055 states: “Only measures that are expected to deliver energy savings in 2023 and beyond are counted towards the demand goal in the EO included in Appendix A.” ADM referenced the Ameren Missouri TRM for secondary data on measure EUL to assess whether measures are sufficiently long-lived to apply the stipulated energy-to-demand ratio to determine 2023-persistent kW savings.

[1] https://www.efis.psc.mo.gov/mpsc/commoncomponents/viewdocument.asp?DocId=935982981

Table 3-4 End-Use Category Energy to Peak Demand Factors

End Use	*Factor*
Air Comp	0.0001379439
Building Shell	0.0004439830
Cooking	0.0001998949
Cooling	0.0009106840
Exterior Lighting	0.0000056160
Heating	0.0000000000
HVAC	0.0004439830
Lighting	0.0001899635
Miscellaneous	0.0001379439
Motors	0.0001379439
Process	0.0001379439
Refrigeration	0.0001357383
Water Heating	0.0001811545

3.2 Results of Ex Post Gross Savings Estimation

To estimate ex post gross energy savings and ex post gross peak demand reductions for the BizSavers programs, data was collected and analyzed for the samples identified in Table 3-1. ADM analyzed the project and measure data using the methods described in section 3.1 to estimate measure energy savings, peak demand reductions, and determine gross realization rates. This section presents the results of that analysis. Note that detailed, site-level analysis methods and results are presented in Volume II of this report.

3.2.1 Ex Post Gross Energy Savings

Table 3-5 summarizes ex post gross energy savings of projects completed during the second year of PY2018 long-lead project completion period.

Table 3-5 Summary of Ex Post Gross Energy Savings

Program	*Energy Savings (kWh)*		
	Ex Ante Gross	*Ex Post Gross*	*Gross RR*
Custom	1,116,733	1,128,278.9	101%
Standard	1,710,188	1,608,642.4	94%
New Construction	6,833,289	6,913,617.4	101%
Total	**9,660,210**	**9,650,538.7**	**100%**

3.2.2 Ex Post Gross Peak Demand Savings

Table 3-6 contains the ex post gross energy savings of the second year of PY2018 long-lead project period.

Table 3-6 Ex Ante and Ex Post Gross Peak Demand Savings

Program	*Peak Demand Savings (kW)*		
	Ex Ante Gross	*Ex Post Gross*	*Gross RR*
Custom	619.37	624.11	100.8%
Standard	324.87	305.58	94.1%
New Construction	2,504.43	2,534.91	101.1%
Total	**3,448.67**	**3,464.60**	**100.5%**

4. Estimation of Ex Post Net Savings

This chapter reports the results from estimating the net impacts of the program during the second year of the long-lead project completion period, where ex post net savings represent the portion of ex post gross savings that can be directly attributed to the effects of the program. Net savings estimated in this report equal gross savings, *minus* free ridership, *plus* participant spillovers.

The results of the analyses are based on the combined samples of survey responses collected as part of the PY2018 BizSavers evaluation and those collected from participants that completed PY2018 long-lead projects. The survey responses from both periods were combined because the long-lead projects were initiated in PY2018 and were completed under the PY2018 program guidelines. Thus, the long-lead projects can be considered a part of the population of PY2018 projects.

4.1 Procedures Used to Estimate Net Savings

The evaluation team administered an online survey to decision-maker contacts who completed long-lead projects during the March 2020 – February 2021 period. The results of the analysis of these survey responses were integrated with the net-savings results for the PY2018 projects completed during the March 2018 – February 2019 period.

The same procedures were used to estimate net savings for all the BizSavers programs. The following sub-sections describe the methodology used to estimate free ridership, and participant spillover.

4.1.1 Procedures Used to Estimate Free Ridership

Free riders are those program participants that would have installed the same energy efficiency measures without the program incentives. Net savings may be less than gross savings because of free ridership impacts, which arise to the extent that participants in a program would have adopted energy efficiency measures and achieved the observed energy changes even in the absence of the program. Conversely, net savings may be greater than gross savings due to energy savings spillovers or market transformation impacts attributable to the program. Participants or non-participants may implement energy efficiency measures due to the influence of the program, without receiving program incentives for implemented measures.

Survey response data collected from a sample of program participants was used to support the net-to-gross analysis. A copy of the survey instrument is presented in Volume II of this report. Based on review of this information, the preponderance of evidence regarding free ridership inclinations was used to attribute a customer's savings to free ridership.

Several criteria determine which portion of a participant's savings should be attributed to free ridership. The first criterion comes from the response to the following two questions:

- "Would you have been financially able to install the equipment or measures without the financial incentive from the BizSavers Program?"
- "To confirm, your organization would NOT have allocated the funds to complete a similar energy saving project if the program incentive was not available. Is that correct?"

Respondents answering "No" to the first question and "Yes" to the second question were considered to require program financial assistance to undertake the project and were not deemed to be free riders.

For decision makers who did not indicate a lack of financial ability to undertake energy efficiency projects without financial assistance from the program, three additional factors determined what percentage of savings is attributable to free ridership. The three factors were:

- Plans and intentions of the firm to install a measure even without support from the program.
- Influence that the program had on the decision to install a measure; and
- A firm's previous experience with a measure installed under the program.

For each of these factors, rules were applied to decision-maker survey responses to develop binary variables indicating whether a participant showed free ridership behavior.

The first step was to determine if a participant stated that his or her intention was to install an energy efficiency measure without the help of the program incentive. Two binary variables were constructed to account for customer plans and intentions: one, based on a more restrictive set of criteria that describe a high likelihood of free ridership, and a second, based on a less restrictive set of criteria that describe a relatively lower likelihood of free ridership.

The first, more restrictive criteria (Definition 1) indicating customer plans and intentions that likely signify free ridership were as follows:

- The respondent answered "yes" to the following two questions: "Did you have plans to install the measure before participating in the program?" and "Would you have completed the [Equipment/Measure] project even if you had not participated in the BizSavers Program?"
- The respondent answered, "definitely would have installed" to the following question: "If the financial incentive from the BizSavers Program had not been available, how likely is it that you would have installed [Equipment/Measure] anyway?"

- The respondent answered, “did not affect timing of purchase and installation” to the following question: “How did the availability of information and financial incentives through the BizSavers Program affect the timing of your purchase and installation of [Equipment/Measure]?”
- The respondent answered “no, the program did not affect level of efficiency that we chose for equipment” in response to the following question: “How did the availability of information and financial incentives through the BizSavers Program affect the level of energy efficiency you chose for [Equipment/Measure]?

The second, less restrictive criteria (Definition 2) indicating customer plans and intentions that likely signify free ridership were as follows:

- The respondent answered “yes” to the following two questions: “Did you have plans to install the measure before participating in the program?” and ““Would you have completed the [Equipment/Measure] project even if you had not participated in the BizSavers Program?”
- Either the respondent answered, “definitely would have installed” or “probably would have installed” to the following question: “If the financial incentive from the BizSavers Program had not been available, how likely is it that you would have installed [Equipment/Measure] anyway?”
- Either the respondent answered “did not affect timing of purchase and installation” to the following question: “How did the availability of information and financial incentives through the BizSavers Program affect the timing of your purchase and installation of [Equipment/Measure]?” or the respondent indicated that while program information and financial incentives did affect the timing of equipment purchase and installation, in the absence of the program they would have purchased and installed the equipment within the next two years.
- The respondent answered “no, the program did not affect level of efficiency that we chose for equipment” in response to the following question: “How did the availability of information and financial incentives through the BizSavers Program affect the level of energy efficiency you chose for [Equipment/Measure]?

To summarize, the two definitions of plans differ in how restrictive the criteria are and how much free ridership is assigned based on the responses.

To meet the most restrictive definition (Definition 1), the respondent needed to state that they definitely would have implemented the measure in the absence of the program and that the program had no impact on timing. If these criteria are met, an initial assignment of full free ridership is made.

The second definition is less restrictive. To meet this definition, the respondent needed to state that the program definitely or probably would have implemented the measure

without the program. Additionally, they could have stated that either the program had no impact on timing or that the measure would have been implemented in the next two years. If these criteria are met, an initial assignment of 33% free ridership is made.

The second factor indicated if a customer reported that a recommendation from a program representative or past experience with the program was influential in the decision to install a particular piece of equipment or measure.

This criterion indicated that the program's influence lowers the likelihood of free ridership when either of the following conditions are true:

- The respondent answered, "very important" to the following question: "How important was previous experience with the BizSavers Program in making your decision to install [Equipment/Measure]?"
- The respondent answered "yes" to the following question: "Did a representative of the BizSavers Program recommend that you install [Equipment/Measure]?"

The third factor was based on whether a participant in the program indicated that he or she had previously installed an energy efficiency measure similar to one that they installed under the program without an energy efficiency program incentive during the last three years. A participant indicating that he or she had installed a similar measure is considered to have a higher likelihood of free ridership because respondents who report installing similar equipment without incentives may demonstrate a willingness to implement efficiency measures without program support.

The criteria indicating that previous experience may signify a higher likelihood of free ridership are as follows:

- The respondent answered "yes" to the following question: "Before participating in the BizSavers Program, had you installed any equipment or measure similar to [Incentivized Equipment/Measure] at your facility?"
- The respondent answered "yes, purchased energy efficient equipment but did not apply for financial incentive." to the following question: "Has your organization purchased any energy efficient equipment in the last three years for which you did not apply for a financial incentive through the BizSavers Program?"

The four sets of rules just described were used to construct four different indicator variables that address free ridership behavior. For each customer, a free ridership value was assigned based on the combination of variables. With the four indicator variables, there were 12 applicable combinations for assigning free ridership scores for each respondent, depending on the combination of answers to the questions creating the indicator variables. Table 4-1 shows these values. A free ridership score of 100% indicates total free ridership, and a free ridership score of 0% indicates no free ridership.

The free ridership scoring of the four response variables for participants that were financially able to install the project without the incentives are summarized in the following table. Decision maker responses and project documentation were reviewed to assess the reasonableness of free ridership estimates developed using the methodology described above, and to ensure that reported free ridership estimates account for available data regarding the decision-making process.

Table 4-1 Free Ridership Scores for Combinations of Indicator Variable Responses

Indicator Variables				*Free Ridership Score*
Had Plans and Intentions to Install Measure without BizSavers Program? (Definition 1)	*Had Plans and Intentions to Install Measure without BizSavers Program? (Definition 2)*	*BizSavers Program had influence on Decision to Install Measure?*	*Had Previous Experience with Measure?*	
Y	N/A	Y	Y	100%
Y	N/A	N	N	100%
Y	N/A	N	Y	100%
Y	N/A	Y	N	67%
N	Y	N	Y	67%
N	Y	Y	Y	33%
N	N	N	Y	33%
N	Y	N	N	33%
N	Y	Y	N	0%
N	N	N	N	0%
N	N	Y	N	0%
N	N	Y	Y	0%

4.1.2 Procedures Used to Estimate Participant Spillover

ADM estimated participant spillover associated with additional measures installed without incentives by referencing information reported by decision makers who completed the online participant survey. Survey respondents provided information on the installation of additional equipment implemented without a program incentive, including information on the program's influence on the decision to install the additional equipment, and information on the measure specifications used to estimate the energy saving impacts of the equipment.

Specifically, respondents were asked:

- Since participating in the BizSavers Program has your organization installed any ADDITIONAL energy efficiency measures at this facility or at your other facilities within Ameren Missouri's service territory that did NOT receive incentives through Ameren Missouri's BizSavers Program?

Customers who indicated “yes” were identified as potential spillover candidates. Potential spillover candidates were also asked to identify the type of additional equipment installed and provide information about the equipment for use in estimating energy savings. For each type of equipment that respondents reported installing, respondents were asked the following two questions to assess if any savings resulting from the additional equipment installed were attributable to the program:

- [SP1] How important was your experience with the BizSavers Program in your decision to install this [EQUIPMENT TYPE], using a scale of 0 to 10, where 0 is not at all important and 10 is extremely important?”
- [SP2] If you had not participated in the BizSavers Program, how likely is it that your organization would still have installed this [EQUIPMENT TYPE], using a 0 to 10 scale, where 0 means you definitely WOULD NOT have installed this equipment and 10 means you definitely WOULD have installed this equipment?

A spillover score was developed based on these responses as follows:

Spillover Score = Average(SP1, 10-SP2)

The energy savings of equipment installations associated with a spillover score of greater than five were attributed to the program.

Survey respondent net savings were adjusted based on the reported spillover savings. All cases of spillover identified, were from the survey of participants who completed projects during the March 2018 – February 2019 period. That is, the evaluation team found no additional cases of spillover identified by decision makers who completed the survey and also implemented long-lead projects during the March 2020 – February 2021 period. To extrapolate spillover savings to non-survey respondents, a spillover ratio was calculated as follows:

Spillover Ratio = Sum of Sample Reported Spillover/ Sum of Sample Ex Post Gross Savings

4.2 Results of Net Savings Estimation

The procedures described in the preceding section were used to estimate net-to-gross ratios for the PY2018 BizSavers Program long-lead projects. The following subsections detail the results of the free ridership and spillover analyses.

4.2.1 Results of Estimation of Free Ridership

Two participants from the long-lead year two program completed surveys providing data to supplement the PY2018 free ridership scoring by program. The data used to assign free ridership scores were collected through a customer survey of decision makers for projects completed during PY2018, responses from another eight customers that completed long-lead projects in the first year of the long-lead project completion period,

and two customers that completed long-lead projects in the second year of the long-lead project completion period. The responses were qualified for validity based on affirmative answers to the survey, resulting in a total of 506 responses to determine the free ridership scoring. The results of the separate net savings studies were combined because the long-lead projects were initiated during PY2018 and were completed under those same guidelines.

For purposes of adjusting gross savings to account for free ridership, the gross savings of projects associated with decision makers that were surveyed by ADM were adjusted by that decision makers specific free-ridership *score (Gross Savings * (1 – Free Ridership Score))*. Gross savings of projects associated with decision makers that were *not* surveyed by ADM were adjusted by the program-level free ridership score using data collected during PY2018 and during the long-lead project evaluation period. For the programs for which free ridership research was conducted, Table 4-3 below provides a summary of the program-level free ridership.

Table 4-2 Percent of Ex Post Gross Energy Savings Associated with Free-Ridership

Program Component	*Percent of kWh Savings Associated with Free Ridership*
Custom	7.5%
Standard	4.5%
New Construction	5.6%
Total	**5.6%**

As a sensitivity analysis, ADM compared the above free ridership results to the results had analysis been limited to long-lead projects. For each program, the free ridership results would have been lower if the analysis had been limited to the long-lead projects only, based on the two responses.

Table 4-3 Free Ridership Sensitivity Analysis

Program Component	*Percent of kWh Savings Associated with Free Ridership (PY2018 and Year 2 Long-Lead Samples)*	*Percent of kWh Savings Associated with Free Ridership (Year 2 Long-Lead Samples Only)*
Custom	7.5%	0.0%
Standard	4.5%	0.0%
New Construction	5.6%	0.0%
Total	**5.6%**	**0.0%**

Table 4-4 summarizes the number of responses for each of the free ridership categories developed from the four indicator variables, along with the two financial ability

questions. The contribution to the free ridership score from the responses in the long-lead year two project survey are indicated in the last column of the table.

Table 4-4 Count of Survey Responses by Free Ridership Score

Indicator Variables				Financial Ability	Free Ridership Score	Count of All Responses (PY2018, Long Lead Year 1 & Year 2 Samples)	Count of Year 2 Responses (Year 2 Long-Lead Samples Only)
Had Plans and Intentions to Install Measure without BizSavers Program? (Definition 1)	Had Plans and Intentions to Install Measure without BizSavers Program? (Definition 2)	BizSavers Program had influence on Decision to Install Measure?	Had Previous Experience with Measure?				
Y	N/A	Y	Y	Y	100%	1	0
Y	N/A	N	N	Y	100%	15	0
Y	N/A	N	Y	Y	100%	1	0
Y	N/A	Y	N	Y	67%	1	0
N	Y	N	Y	Y	67%	8	0
N	Y	Y	Y	Y	33%	1	0
N	N	N	Y	Y	33%	5	0
N	Y	N	N	Y	33%	35	0
N	Y	Y	N	Y or N	0%	14	0
N	N	N	N	Y or N	0%	282	0
N	N	Y	N	Y or N	0%	115	2
N	N	Y	Y	Y or N	0%	17	0
N	N	N	Y	N	33%	11	0
Total						**506**	**2**

4.2.2 Results of Estimation of Spillover Energy Savings

Long-lead project participant spillover energy impacts were assessed. Table 4-5 summarizes the result. The results presented were developed from analysis and data collected for the evaluation of the March 2018 – February 2019 period and aggregated to the long-lead program activity, inclusive of the long-lead projects.

Table 4-5 Summary of Spillover Energy Savings

Program Component	Spillover Total (kWh)	Participant Spillover-Tracked	Participant Spillover-Survey
Custom	4,620	0	4,620
Standard	30,315	0	30,315
New Construction	2,513	0	2,513
Total	**37,449**	**0**	**37,449**

4.3 Ex Post Net kWh Savings

Table 4-6 summarizes the program level ex post net energy savings along with associated net-to-gross ratios.

Table 4-6 Summary of Free Ridership, Spillover, and Net Energy Savings by Program

Program	*Energy Savings (kWh)*		*Energy Savings (kWh)*		*Net-to-Gross Ratio*
	Estimated Free Ridership	*Spillover*	*Ex Post Gross*	*Ex Post Net*	
Custom	78,585	4,620	1,128,279	1,054,315	93%
Standard	69,916	30,315	1,608,642	1,569,041	98%
New Construction	364,914	2,513	6,913,617	6,551,216	95%
Total	**513,415**	**37,449**	**9,650,539**	**9,174,572**	**95%**

Table 4-7 presents the free-ridership and spillover values as a percent of ex post net energy savings. Across the three programs for which projects were completed during the second year of the long-lead project completion period, energy savings associated with free ridership represents 5.6% of total ex post gross energy savings and spillover energy savings represents 1.5% of the total ex post gross energy savings.

Table 4-7 Summary of Free Ridership and Spillover as Percent of Ex Post Gross Energy Savings

Program Component	*Energy Savings (kWh)*				
	Ex Post Net	*Estimated Free Ridership*	*FR as a % of Ex Post Gross kWh*	*Spillovers*	*SO as a % of Ex Post Gross*
Custom	1,054,315	78,585	7.5%	4,620	0.4%
Standard	1,569,041	69,916	4.5%	30,315	1.9%
New Construction	6,551,216	364,914	5.6%	2,513	0.0%
Total	**9,174,572**	**513,415**	**5.6%**	**37,449**	**0.4%**