Ameren Missouri Program Year 2020 Annual EM&V Report

Volume 3: Business Portfolio Report

June 10, 2021

Table of Contents

Table of Tables

Table of Figures

1.   Executive Summary

This volume presents the evaluation results of the Ameren Missouri PY2020 portfolio of business energy efficiency programs as described in Ameren Missouri's 2019–21 Missouri Energy Efficiency Investment Act (MEEIA) Energy Efficiency Plan. Results for the Residential Portfolio and the Demand Response Portfolio are provided in separate volumes.

The following programs comprise the Business Portfolio:

- Standard Incentive Program
- Custom Incentive Program
- Small Business Direct Install (SBDI) Program
- New Construction (NC) Program
- Retro-Commissioning (RCx) Program

In addition to these five programs, this volume also includes the Business Social Services (BSS) Program.[1] Collectively, the six programs are referred to as the "business programs" or the "BizSavers programs."

The following sections present overarching key evaluation findings for the business programs. The remainder of this volume is organized as follows:

- Chapter 2 presents the general evaluation approach for the business programs, including overarching evaluation objectives and an overview of the PY2020 evaluation activities and methodologies.
- Chapters 3–7 present evaluation results for the six BizSavers programs.

In addition, the Appendix to Volume 3 contains additional detail on the methodology used to estimate free ridership (FR) as well as project-level summaries of our desk reviews and onsite visits, by program.

1.1   Portfolio Impact Results

The PY2020 Business Portfolio achieved 119,805 MWh of first year net energy savings and 35.18 MW of first year net demand savings, achieving 79% and 89%, respectively, of its goals, as outlined in Ameren Missouri's 2019–21 MEEIA Energy Efficiency Plan. The portfolio exceeded its target for last year demand savings in the 15+ Year effective useful life (EUL) category (113% of target) but fell short of target in the 10–14 Year EUL category (36% of target) and the <10 Year EUL category (4% of target).[2]

Savings-weighted portfolio-level gross realization rates (RR) ranged from 98% for energy savings to 109% for last year demand savings in the 10–14 Year EUL category, while savings-weighted net-to-gross ratios (NTGR) ranged from 83% to 86%.

---

[1] While considered part of Ameren Missouri's low-income portfolio, the BSS Program is included in this volume because of implementation and evaluation similarities with the other business programs: (1) it is implemented by the same implementation contractor using similar program processes, and (2) it was evaluated using similar evaluation methods. As such, much of the overarching content in this volume is applicable to the BSS Program.

[2] Throughout this volume, we refer to "goals" and "targets." Ameren Missouri's 2019–21 MEEIA Energy Efficiency Plan sets annual first year energy and demand savings **goals**. In addition, Ameren Missouri developed impact **targets** that are used to determine Earnings Opportunities.

Table 1 summarizes first year and last year annual gross and net savings for the Business Portfolio in PY2020.

Table 1. PY2020 Business Portfolio Savings Summary

	Ex Ante Gross	Gross RR	Ex Post Gross	NTGR	Ex Post Net	Goal/Target Net	% of Goal/Target
First Year Savings							
Energy Savings (MWh)	146,947	97.9%	143,852	83.3%	119,805	152,347	79%
Demand Savings (MW)	41.67	101.5%	42.27	83.2%	35.18	39.49	89%
Last Year Demand Savings							
<10 EUL *(MW)*	0.05	105.1%	0.05	85.4%	0.04	1.10	4%
10–14 EUL (MW)	4.14	109.2%	4.53	86.4%	3.91	10.72	36%
15+ EUL (MW)	37.48	100.6%	37.70	82.9%	31.23	27.68	113%

The Standard Program was the largest program in Ameren Missouri's Business Portfolio in PY2020, contributing 59% of first year ex post net energy savings and 47% of first year ex post net demand savings. The Standard Program and the New Construction Program both exceeded their first year net impact energy and demand savings goals. All other programs fell short of first year net impact energy and demand goals.

Portfolio-wide, the primary driver of low program-specific performance relative to net savings goals was lack of participation. For all programs other than Standard and New Construction, even gross ex ante savings are below net goals (in some cases significantly), indicating that the shortfall was not primarily a result of low RRs or NTGRs.

Table 2 summarizes first year annual gross and net savings for all programs in the PY2020 Business Portfolio.

Table 2. PY2020 Business Portfolio First Year Savings Summary by Program

Program	Ex Ante Gross	Gross RR	Ex Post Gross	NTGR	Ex Post Net	Goal Net	% of Goal
First Year Energy Savings (MWh)							
Standard	85,129	97.3%	82,832	85.0%	70,390	56,470	125%
Custom	35,049	97.0%	34,010	82.4%	28,031	69,882	40%
SBDI	5,565	97.8%	5,442	87.8%	4,778	10,118	47%
New Construction	15,106	97.0%	14,655	70.0%	10,258	8,660	118%
Retro-Commissioning	6,099	113.4%	6,913	91.8%	6,346	7,217	88%
Total Business	**146,947**	**97.9%**	**143,852**	**83.3%**	**119,805**	**152,347**	**79%**
First Year Demand Savings (MW)							
Standard	18.50	105.5%	19.51	85.0%	16.58	11.40	145%
Custom	15.47	98.1%	15.18	82.4%	12.51	21.39	58%
SBDI	1.06	102.5%	1.09	87.8%	0.96	1.75	55%
New Construction	4.36	86.6%	3.78	70.0%	2.64	2.30	115%
Retro-Commissioning	2.27	119.3%	2.71	91.8%	2.49	2.65	94%
Total Business	**41.67**	**101.5%**	**42.27**	**83.2%**	**35.18**	**39.49**	**89%**

Program performance relative to target net demand savings by EUL category varied widely, but overall, the Business Portfolio achieved 4% of target last year net demand savings in the <10 Year EUL category, 36% of target last year net demand savings in the 10–14 Year EUL category, and 113% of target last year net demand

savings in the 15+ Year EUL category. All programs had their strongest performance relative to targets in the 15+ Year EUL category, but only the Standard Program, New Construction Program, and RCx Program surpassed their targets (achieving 277%, 127%, and 133% of target last year demand savings, respectively).

While the Custom Program accounted for only 23% of the Business Portfolio's ex post net energy savings it significantly contributed to the portfolio's ex post last year demand savings, particularly in the 15+ Year EUL category (18.38 MW or 39% of the total Business Portfolio).

Table 3 summarizes last year annual gross and net savings for all programs in the PY2020 Business Portfolio.

Table 3. PY2020 Business Portfolio Last Year Demand Savings Summary by Program

Program	Ex Ante Gross	Gross RR	Ex Post Gross	NTGR	Ex Post Net	Target Net	% of Target
< 10 Year EUL (MW)							
Standard	0.04	105.4%	0.04	85.0%	0.03	1.08	3%
Custom	-	n/a	-	n/a	-	-	n/a
SBDI	0.01	103.3%	0.01	87.8%	0.01	0.01	48%
New Construction	-	n/a	-	n/a	-	-	n/a
Retro-Commissioning	-	n/a	-	n/a	-	-	n/a
Total Business	**0.05**	**105.1%**	**0.05**	**85.4%**	**0.04**	**1.10**	**4%**
10–14 Year EUL (MW)							
Standard	2.82	109.2%	3.08	85.0%	2.62	5.28	50%
Custom	0.39	88.4%	0.34	82.4%	0.28	3.01	9%
SBDI	0.06	101.8%	0.07	87.8%	0.06	0.72	8%
New Construction	-	n/a	-	n/a	-	0.21	0%
Retro-Commissioning	0.87	119.3%	1.04	91.8%	0.95	1.49	64%
Total Business	**4.14**	**109.2%**	**4.53**	**86.4%**	**3.91**	**10.72**	**36%**
15+ Year EUL (MW)							
Standard	15.64	104.8%	16.39	85.0%	13.93	5.04	277%
Custom	15.08	98.4%	14.84	82.4%	12.23	18.38	67%
SBDI	0.99	102.5%	1.02	87.8%	0.89	1.02	88%
New Construction	4.36	86.6%	3.78	70.0%	2.64	2.09	127%
Retro-Commissioning	1.40	119.3%	1.68	91.8%	1.54	1.16	133%
Total Business	**37.48**	**100.6%**	**37.70**	**82.9%**	**31.23**	**27.68**	**113%**

As noted above, this volume also includes the results of the BSS Program evaluation. The BSS Program underperformed in PY2020, achieving 32% of its first year net energy savings goals and 33% of its first year net demand savings goals. Table 4 summarizes first year and last year annual gross and net savings for the BSS Program in PY2020.

Table 4. PY2020 BSS Program Savings Summary

	Ex Ante Gross	Gross RR	Ex Post Gross	NTGR	Ex Post Net	Goal/Target Net	% of Goal/Target
First Year Savings							
Energy Savings (MWh)	585	97.3%	569	100.0%	569	1,793	32%
Demand Savings (MW)	0.11	102.7%	0.11	100.0%	0.11	0.34	33%
Last Year Demand Savings							
<10 EUL (MW)	0.01	102.7%	0.01	100.0%	0.01	0.04	24%
10–14 EUL (MW)	0.02	104.1%	0.02	100.0%	0.02	0.19	10%
15+ EUL *(MW)*	0.08	102.3%	0.09	100.0%	0.09	0.11	79%

1.2   CSR Process Evaluation Requirements

The PY2020 evaluation did not include an assessment of BizSavers Program processes. However, findings from the following research activities and data sources can help inform the process evaluation requirements for Ameren Missouri's BizSavers Program:[3]

- PY2020 evaluation activities, including a survey with Standard and Custom Program participants, interviews with RCx and NC Program participants, and an interview with BizSavers Program staff;

- The PY2020 program-tracking database;

- Market research—conducted by Opinion Dynamics in the summer of 2020—on potential impacts of the COVID-19 pandemic on the BizSavers Program. Results of this research are provided along with other materials supporting this evaluation.

Table 5 summarizes responses to the five CSR process evaluation questions.

Table 5. PY2020 CSR Process Questions

CSR Required Process Evaluations Questions	Findings
What are the primary market imperfections that are common to the target market segment?	▪ Based on PY2019 research, the primary market barriers to adoption of energy-efficient equipment in the business sector are lack of awareness of energy saving opportunities and programs, the high cost of energy efficiency equipment, access to financing or capital, and uncertainty about expected bill savings. ▪ In PY2020, business customers experienced additional barriers as a result of the COVID-19 pandemic, including competing priorities for available capital and uncertainty about the future. Based on our research, these barriers trumped the more traditional cost-related barriers in PY2020 and resulted in delays or cancellations of investment projects.
Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?	▪ Ameren Missouri's BizSavers portfolio serves businesses of varying sizes and sectors. The SBDI Program recognizes the unique challenges of small businesses though small businesses can still participate in the Standard or Custom programs if the offerings are a better match to customer needs. The current target audience for the SBDI Program is commercial electric customers that are classified as Small General Service Rate 2(M). This covers a wide range of market segments. The SBDI

---

[3] The Missouri Code of State Regulations (20 CSR 4240.22(8), formerly 4 CSR 240-22.070(8)) requires that demand-side programs, operating as part of a utility's preferred resource plan, are subject to ongoing process and impact evaluations that meet certain criteria, including the process evaluation questions presented in this section.

CSR Required Process Evaluations Questions	Findings
	Program is generally serving the majority of the market segments existing in the General Service Rate 2(M), although participation has been concentrated in a few segments (50% of PY2020 projects were completed in the office and retail segments). ▪ The new BSS Program serves nonprofit organizations that provide services to the low-income public. The PY2019 program was small in scope, with 31 projects completed by 14 organizations that offer a mix of family, social, and healthcare services; the PY2020 program was even smaller, with only 12 projects completed by eight organizations. Given the extremely small participation and targeted outreach strategy to-date, insights into the reach of the program and appropriateness of market segmentation are still limited. ▪ The SBDI program appears to have been successful in serving renters, a frequently underserved market segment by business portfolios. According to program tracking data renters accounted for 54% of PY2020 SBDI Program participants, which tracks extremely well with Ameren Missouri's business customers overall (36% are renters) according to market research in support of Ameren Missouri's 2019 potential study.
Does the mix of enduse measures included in the program appropriately reflect the diversity of enduse energy service needs and existing enduse technologies within the target market segment?	▪ PY2019 evaluation research found that participants were relatively dissatisfied with the breadth of measure offerings. In some cases, participants and market partners were dissatisfied with the list of eligible measures; in other cases, they indicated low incentives rendered an officially eligible measure effectively ineligible. The most common suggestion was to add outdoor lighting to the list of available measures, which the program did for the Standard and SBDI programs during PY2020. ▪ In PY2019, the SBDI Program only provided incentives for lighting measures. For PY2020, the program added HVAC measures, increased incentive caps, and developed a simplified, stand-alone HVAC application form. Despite these changes, uptake of non-lighting measures in PY2020 was limited to 15 smart thermostats, accounting for 0.2% of program savings. ▪ While the BSS Program offers a range of measures across different technologies, the program was almost exclusively focused on lighting measures in both PY2019 and PY2020. The PY2019 evaluation found that incentive levels for non-lighting equipment were insufficient to induce adoption in this market segment. While the program added a few new measures to the program in PY2020—including occupancy sensors, VFDs, and kitchen ventilation controls—incentive levels remained largely unchanged. The cost of delivering the program remains a concern to implementation staff and appears to affect the number and types of projects pursued.
Are the communication channels and delivery mechanisms appropriate for the target market segment?	▪ According to market research in support of Ameren Missouri's 2019 potential study, awareness of Ameren Missouri BizSavers Programs is relatively low among the target market. Just over one-third of customers (36%) are aware of the programs offered. Medium and large businesses are much more likely to be aware of Ameren Missouri BizSavers Programs than small businesses (60% compared to 33%). These results suggest that additional communication or delivery of messages through alternative channels is needed for small businesses. ▪ Trade allies remain a key communication channel for the BizSavers Program and much of the program's outreach efforts are focused on them. However, the program is expanding its direct customer outreach through social media, search engine marketing, segment-specific collateral, email blasts, and other efforts. While trade allies/contractors are still the primary source of information for program participants (reported by 62% of Standard and 69% of Custom survey

CSR Required Process Evaluations Questions	Findings
	respondents), these numbers are slightly lower than those reported by PY2019 participants (77% Standard and 83% Custom), with other information channels (including BizSavers representatives, Ameren Missouri's website, and e-mail blasts) becoming more important. Notably, more than one-third (38%) of Standard/Custom participants prefer e-mail outreach or electronic newsletters as an information channel for energy efficiency opportunities, which aligns well with recent program outreach efforts.

What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation for select enduses/measure groups included in the Program?	The PY2020 evaluation did not include process research designed to answer this question. The PY2019 evaluation provided the following recommendations, some of which were adapted in PY2020:
	▪ Continue to expand the slate of program-eligible measures. Outdoor lighting is the only one that arose as a specific recommendation, but others likely offer potential.
	  ▪ The program added exterior lighting (offered in combination with interior lighting projects) in the summer of 2020.
	  ▪ Other new measures include occupancy sensors, VFDs for certain applications, kitchen ventilation controls, compressed air measures, and high-volume low-speed fans.
	▪ Revisit incentive levels to improve the uptake of non-lighting measures.
	  ▪ In response to COVID-19 impacts, the program offered a 15% bonus incentive for HVAC measures (compared to 10% for lighting measures). In addition, it increased incentive levels for central air conditioning equipment and heat pumps.
	  ▪ Notably, the Standard Program saw a substantial increase in HVAC projects and savings during PY2020.
	▪ Continue to expand the network of trade allies and Service Providers, focusing on increasing the diversity of services offered and market segments targeted.
	  ▪ In light of the COVID-19 pandemic, the program undertook considerable effort re-engaging and supporting its trade ally network. However, any expansion of the network in PY2020 was limited.
	▪ Increase customer-focused, strategic, targeted marketing to customers.
	  ▪ As noted above, the program has been expanding its direct customer outreach through social media, search engine marketing, segment-specific collateral, email blasts, and other efforts.

1.3   Cost-Effectiveness Results

Cost-effectiveness analysis compares the benefits of an energy efficiency or demand response program with the cost of delivering it, expressed as the ratio of the net present value (NPV) of lifetime benefits to the costs. A cost-effectiveness ratio of greater than 1.0 means that the benefits generated by the program exceeded its costs. Cost-effectiveness can be assessed from several different "perspectives," using different tests, with each test including a slightly different set of benefits and costs.

The evaluation team assessed the cost-effectiveness of each of the six BizSavers programs, using five costs-effectiveness tests recommended by the California Standard Practice Manual[4] and used in prior evaluations:

■ **Total Resource Cost (TRC) Test:** Perspective of all utility customers (participants and nonparticipants) in the utility service territory;

---

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

- **Utility Cost Test (UCT):** Perspective of utility, government agency, or third-party program implementer;
- **Ratepayer Impact Measure (RIM) Test:** Impact of efficiency measure on nonparticipating ratepayers overall;
- **Participant Cost Test (PCT):** Perspective of the customers installing the measures; and
- **Societal Cost Test (SCT):** Perspective of all utility customers (participants and nonparticipants) in the utility service territory.[5]

Table 6 summarizes the cost-effectiveness results for the six BizSavers programs. All six programs were cost-effective in PY2020 based on the TRC test and the PCT. Only the UCT for the BSS Program and the RIM test for the Standard, SBDI, New Construction, and BSS programs resulted in cost-effectiveness ratios of less than 1.0.

Table 6. Summary of BizSavers Cost-Effectiveness Results

Program	TRC	UCT	RIM	PCT
Standard	2.20	4.01	0.71	3.79
Custom	2.10	4.16	1.09	2.28
SBDI	3.02	2.44	0.60	7.07
New Construction	1.33	3.46	0.77	1.87
Retro-Commissioning	4.94	5.19	1.08	6.03
Business Social Services	2.12	0.82	0.40	6.60

Cost-effectiveness results for the overall Business Portfolio—including the Business Demand Response Program but excluding the BSS Program—are presented in Volume 1.

---

[5] Although we developed SCT results as a part of our evaluation, this section does not show the results because they are equivalent to TRC results due to two factors: (1) Ameren Missouri does not include non-energy impacts in cost-effectiveness testing, and (2) Ameren Missouri uses the same planning assumptions for both tests, including the discount rate.

2. Evaluation Approach

While the evaluation team conducted separate evaluations of each of the six BizSavers programs, many research objectives and evaluation activities were common across all the programs. To reduce repetition, this chapter discusses overarching research objectives and presents an overview of the evaluation approach and activities conducted to address the research objectives. Additional, program-specific detail, where needed, is presented in the individual program chapters.

2.1 Research Objectives

The business portfolio evaluation was designed to address numerous gross impact, net impact, and cost-effectiveness objectives. A fourth category of objectives is focused on responding to the five key research questions stipulated in 20 CSR 4240-22.070.[6] The research objectives addressed by the PY2020 business portfolio evaluations include:

Gross Impact Objectives

- Verify program tracking data;
- Verify measure installation (not applicable to all programs);
- Review and update, as appropriate, expected useful life (EUL) assumptions for lighting measures;[7] and
- Estimate the first year and last year[8] ex post gross energy (kWh) and demand (kW) savings.

Attribution/Net Impact Objectives

- Determine net-to-gross ratios (NTGR), including an assessment of free ridership and participant spillover (not applicable to all programs);
- Estimate the first year ex post net energy (kWh) and demand (kW) savings; and
- Estimate the last year ex post net demand (kW) savings, by EUL category.

Cost-Effectiveness

- Assess the cost-effectiveness of each business program, and the business portfolio as a whole, using industry-standard cost-effectiveness tests;
- Ensure alignment of cost-effectiveness testing assumptions and parameters with the PY2020 business evaluation results, Ameren Missouri's TRM,[9] and industry best practices; and
- Provide total program benefits, costs, net benefits, and cost-effectiveness testing results.

---

[6] Please note prior to September 2019, these research questions were found in 4 CSR 240-22.070(8). As of September 2019, they have been moved to 20 CSR 4240-22.070(8) (https://www.sos.mo.gov/CMSImages/AdRules/csr/current/20csr/20c4240-22.pdf).

[7] This objective was defined during stakeholder discussions following submission of the PY2019 Annual Evaluation Report.

[8] Last year savings represent the energy or demand savings expected to occur in the final year of a measure's expected useful life.

[9] Our ex post evaluation relied on most recent TRM version available. Ameren Missouri revised the approved 2019–2021 MEEIA Cycle Appendix F (Deemed Savings Table) and Appendix H and I (TRM Volumes 2 and 3) in October 2020 (referred to as "Ameren Missouri TRM" or "TRM Revision 4.0").

CSR Mandated Research Objectives (20 CSR 4240-22.070(A))

- What are the primary market imperfections that are common to the target market segment?
- Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?
- Does the mix of enduse measures included in the program appropriately reflect the diversity of enduse energy service needs and existing enduse technologies within the target market segment?
- Are the communication channels and delivery mechanisms appropriate for the target market segment?
- What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation for select enduses/measure groups included in the Program?

2.2   Evaluation Activities and Methodologies

This section provides an overview of the evaluation activities undertaken as part of the PY2020 evaluation, including a high-level description of common methodologies. The combination of evaluation activities for each program was based on factors such as levels of program participation, the type and size of energy efficiency projects, and the number and type of market partners relevant to the program.[10]

Table 7 summarizes the evaluation activities, by program.

Table 7. PY2020 Evaluation Activities by Program

Evaluation Activity	Standard	Custom	SBDI	NC	RCx	BSS
Program Manager and Implementer Interviews	✓	✓	✓	✓	✓	✓
Program Material Review	✓	✓	✓	✓	✓	✓
Participant and Market Actor Research						
Participant Survey	✓	✓	-	-	-	-
Participant In-Depth Interviews	-	-	-	✓	✓	-
Gross Impact Analysis						
Database Review	✓	✓	✓	✓	✓	✓
Lighting Measure EUL Review and Analysis	✓	-	✓	-	-	✓
Engineering Analysis	✓	-	✓	-	-	✓
Desk Reviews	-	✓	-	✓	✓	-
Onsite Verification	-	✓	-	-	✓	-
Attribution/Net Impact Analysis						
Free Ridership	✓	✓	-	✓	✓	-
Participant Spillover	✓	✓	-	✓	✓	-

The following subsections provide a general description of each evaluation activity. Program-specific details are included in each program chapter, where relevant.

---

[10] The program implementer refers to participating contractors as "market partners." Registered market partners are referred to as "trade allies."

Program Manager and Implementer Interviews

We conducted two interviews with program and implementation staff to support the PY2020 evaluation of the BizSavers Program:

- The first interview was conducted in January 2020 as part of the PY2019 year-end interview. During this interview, we explored any planned changes to program design and implementation in PY2020 that might affect our evaluation approaches or priorities.
- The second interview was conducted towards the end of the program year, on December 2, 2020. The objectives of this second interview were to understand the program team's perspective on program performance during PY2020, to assess program accomplishments and challenges, to clarify any outstanding questions about program design and implementation, and to gain an understanding of planned changes for PY2021.

Program Material Review

We reviewed available program materials, including program guidelines, marketing plans and activity summaries, application forms, and incentive brochures. This review served to familiarize the evaluation team with details of program design and implementation and changes made relative to the PY2019 programs.

Participant Research

The participant research consisted of quantitative online surveys for the Standard and Custom programs and qualitative telephone interviews for the New Construction and RCx programs. These data collection efforts focused on questions to determine free ridership (FR) and participant spillover (PSO). Details of the individual data collection activities—including population sizes, sampling approaches, and response rates—are presented in the individual program chapters. Final data collection instruments are provided under separate cover.

Gross Impact Analysis

The gross impact analysis developed first and last year ex post gross energy and demand savings and gross energy and demand realization rates. The methods varied by program and included onsite visits (Custom and RCx), desk reviews (Custom, RCx, and New Construction), and lighting measure engineering analysis (Standard, SBDI, and BSS). Per the evaluation plan, we applied the PY2019 gross realization rates for Standard non-lighting measures (which accounted for 6% of PY2020 Standard Incentive Program savings). To optimize evaluation budgets, we also applied PY2019 gross realization rates for Custom lighting and compressed air measures[11] as well as a deemed 100% realization rate for SBDI non-lighting measures.[12]

Table 8 summarizes the PY2020 gross impact approaches used for the various BizSavers programs and enduse categories.

---

[11] Both enduse categories account for a relatively small share of PY2020 Custom Program ex ante gross energy savings (11% and 9%, respectively), and the PY2019 evaluation results showed good precision for both categories.
[12] The PY2019 evaluation did not develop a realization rate for SBDI non-lighting since all incented program measures were lighting. The PY2020 SBDI non-lighting measures accounted for 0.2% of SBDI savings.

Table 8. PY2020 Gross Impact Approaches by Program

Gross Impact Approach	Program / Enduse
Desk Review & Onsite Visit	▪ Custom (HVAC, Motors, Other)* ▪ RCx
Desk Review	▪ New Construction
Engineering Analysis	▪ Standard (Lighting) ▪ SBDI (Lighting) ▪ BSS (Lighting)
PY2019 Realization Rate	▪ Standard Non-Lighting ▪ Custom (Lighting, Compressed Air)*
100% Deemed Realization Rate	▪ SBDI (HVAC)

* For the Custom Program, the enduse category is based on the enduse assigned in the tracking data and the measure description. The Custom "Other" enduse includes the following enduse categories: Building Shell, Process, Refrigeration, and Water Heating.

The following should be noted:

■ For lighting measures, ex post energy savings reflect a heating penalty for applicable lighting measures that were installed in electrically heated spaces.

■ We applied deemed enduse-specific coincidence factors (CF) from Ameren Missouri's TRM Revision 4.0 to ex post energy savings to calculate ex post demand savings. For lighting measures, CFs are applied to ex post gross savings net of any heating penalty. As such, program-level ex post demand savings may not equal the product of ex post gross savings and the CF.

Database Review

We reviewed the program-tracking database to check that project data was recorded fully and correctly, and that the database contained all needed deemed measure information to (1) verify estimation of ex ante savings and (2) inform savings inputs for the ex post analysis. We also used the program-tracking database to develop desk review and onsite samples for the Custom, RCx, and New Construction programs.

Lighting EUL Analysis

To address stakeholder comments on business lighting EUL values used in the PY2019 evaluation (which were based on a memorandum prepared by the program implementer[13]), we conducted two research activities during PY2020:

■ Calculation of EULs based on rated equipment lifetime and estimated annual HOU for installed lighting products in the program-tracking data; and

■ Review of technical reference manuals (TRMs), to provide additional context by comparing the TRC memo EUL values with EUL values used in other jurisdictions for similar lighting measures.

Based on these research activities, we developed EUL recommendations by lighting category for the PY2020 program evaluation and future TRM updates. Table 9 summarizes the EULs used in the PY2020 evaluation alongside the PY2019 EULs from the TRC memo.

---

[13] Lockheed Martin, Memo: "Ameren Missouri MEEIA 2019-21 Energy, PCDR, and EUL Methodology," January 30, 2019. At the time of the memo, the program implementation team was part of Lockheed Martin; the implementation team now works under the name TRC.

Table 9. Recommended EUL Values by Lighting Type

Lighting Type		% kWh	PY2019 EULs (TRC Memo)		Used in PY2020	
			EUL	EUL Bin	EUL	EUL Bin
Type B		35%	15	15+	15	15+
Fixture		21%	15	15+	15	15+
HID Replacement		16%	**11**	**10-14**	**15**	**15+**
Retrofit Kit		13%	15	15+	15	15+
Type A & Hybrid		8%	10	10-14	10	10-14
Type C		3%	**15**	**15+**	**11**	**10-14**
Lamp Replacement	Standard	2%	**17**	**15+**	**10**	**10-14**
	Reflector	2%	11	10-14	10	10-14
Exit Signs		<1%	**16**	**15+**	**7**	**<10**

A memorandum describing the detailed methodology and findings from this research is included in Appendix A of this Volume.

It should be noted that due to the timing of this research (in the fall/winter of 2020) these EUL updates were not reflected in the PY2020 program-tracking data received from the implementer. Based on discussions with Ameren Missouri and the implementer, we incorporated these changes into the ex ante values presented in this report. Doing so allows for a cleaner comparison of ex ante and ex post results, which would otherwise be obfuscated by changes in EUL bins. Table 10 compares the EUL bin categorization of last year demand savings between the original program-tracking data and the ex ante values shown in this report.

Table 10. Recommended EUL Values by Lighting Type

Measure Category	Last Year Demand Savings (kW)					
	Program-Tracked EUL			Ex Ante EUL		
	< 10 Year EUL	10–14 Year EUL	15+ Year EUL	< 10 Year EUL	10–14 Year EUL	15+ Year EUL
Standard Program						
Other Linear LED	-	818.2	7,330.0	-	1,272.3	6,875.9
LED Replacing T12	-	61.2	3,199.0	-	76.9	3,183.4
Other Non-Linear LED	-	2,490.2	61.7	38.2	212.5	2,301.3
Lighting Redesign	-	-	995.7	-	-	995.7
LED Replacing Incandescent A-Lamp	-	-	249.9	-	249.9	-
Lighting Controls	-	55.8	-	-	55.8	-
LED Exit Sign	-	-	0.7	0.7	-	-
Exterior Lighting	-	0.2	<0.1	-	0.2	<0.1
Total	-	3,425.5	11,837.0	38.9	1,867.4	13,356.3
SBDI Program						
LED Replacing T12	-	2.2	770.6	-	2.2	770.6
Other Non-Linear LED	-	140.2	7.5	7.5	26.2	114.0
Other Linear LED	-	1.9	108.2	-	1.9	108.2

Measure Category	Last Year Demand Savings (kW)					
	Program-Tracked EUL			Ex Ante EUL		
	< 10 Year EUL	10–14 Year EUL	15+ Year EUL	< 10 Year EUL	10–14 Year EUL	15+ Year EUL
LED Replacing Incandescent A-Lamp	-	-	19.9	-	19.9	-
Lighting Controls	-	4.6	-	-	4.6	-
LED Exit Sign	-	-	0.1	0.1	-	-
Total	-	148.9	906.3	7.6	54.7	992.8
BSS Program						
Other Linear LED	-	-	59.9	-	-	59.9
LED Replacing T12	-	-	23.8	-	-	23.8
Other Non-Linear LED	-	7.0	9.1	9.1	6.7	0.3
LED Replacing Incandescent A-Lamp	-	-	11.3	-	11.3	-
Total	-	7.0	104.1	9.1	18.0	84.0

Engineering Analysis

We conducted an engineering analysis to estimate PY2020 ex post gross savings for lighting measures in the Standard, SBDI, and BSS programs. We leveraged project-specific information reported in the program-tracking database in conjunction with Ameren Missouri TRM algorithms and assumptions to estimate ex post gross savings.

As part of this analysis, we investigated whether to apply either in-service rates (ISRs) or hours of use (HOU) adjustments in the ex post analysis, based on results from the PY2019 desk reviews and/or onsite visits. In particular, we investigated whether ISRs and HOU adjustments in the PY2019 evaluation resulted in realization rates statistically different from 1.0, by program. This analysis showed that PY2019 ISRs were not statistically different from 1.0 and ex post HOU were not statistically different from ex ante HOU, at 90% confidence. As such, the PY2020 ex post analysis for Standard, SBDI, and BSS lighting measures used an ISR of 1.0 and an HOU adjustment factor of 1.0.

Engineering Desk Reviews

We conducted engineering desk reviews for a sample of projects from the Custom, RCx, and New Construction programs to verify information in the program-tracking database, including baseline and installed equipment types, efficiencies, quantities, hours of operation, and other information needed to validate the ex ante savings estimates and determine ex post gross savings. For the sampled projects, we reviewed all available project documentation, including project application materials, project planning documentation (e.g., project narratives, electrical and mechanical drawings, and equipment schedules), invoices, and equipment specification sheets. Where relevant, we collected and analyzed pre- and post-installation billing data, either to confirm and calibrate ex ante savings and/or to support development of ex post gross savings (per IPMVP Option C). In some cases, we contacted project representatives to collect or clarify additional information, such as ex ante calculation workbooks, building simulation model files and assumptions, current occupancy or operating schedules, and baseline assumptions.

We determined the optimal sampling approach for each program based on the number, type, and size of projects completed in PY2020, targeting 10% relative precision at 90% confidence (90/10), where possible. We stratified random sampling approach, stratifying by enduse and project size.[14]

Onsite Verification

Onsite verification involved in-person visits to the site of measure installation, conducted for a subset of the Custom and RCx projects that received an engineering desk review. Onsite visits provided additional rigor to the verification process through visual inspections of the installed equipment and operating characteristics, collection of trend and other performance data, and deeper engagement with project or facility personnel to confirm that baseline conditions, equipment characteristics, and building characteristics are consistent with project documents and program implementer's assumptions.

We tailored the scope of each onsite visit to the specific project and the measure(s) installed at the site, based on the in-depth engineering desk review of the site's project files. At a minimum, the engineer performed the following actions during the onsite visits:

- Verified that the incented measures are installed and functioning, and that the quantity and equipment specifications (e.g., model number, capacity, and efficiency) is consistent with the information in the project application form, the program-tracking database, and the basis for ex ante savings.
- Collected additional physical data to further analyze and determine the energy savings resulting from the incented measure(s).
  - For lighting measures, we verified the lighting control methods by area, operating hours, and characteristics of the building's HVAC equipment.
  - For non-lighting measures, we obtained historical operational data from site monitoring systems, including information on operating equipment and inputs to savings workbooks and modeling files such as control settings, HVAC and/or refrigeration load data, temperature setpoints and levels, equipment power, and other process production metrics.
- Conducted interviews with facility staff to verify current and typical equipment operating schedules and other baseline building and equipment conditions. We also discussed any current and sustained impacts from COVID-19 that may influence the energy efficiency measure or project performance.

Program-Level Gross Impacts

For each BizSavers program, we developed enduse and/or program-level realization rates for first year energy and demand savings. For programs with sample-based gross impact approaches, we developed these by aggregating the project-level results from the desk reviews and/or onsite visits, applying weights that reflect (1) the relative size of each project within the sample and (2) the probability of each project to be sampled. The enduse and/or program-level realization rates were then used to adjust the ex ante savings for the population of program projects.

---

[14] The enduse classification used for the evaluation's gross impact analysis differs slightly from that in the program tracking database: For evaluation purposes, all VFD and motors measures are classified as "Motors;" "Cooling" measures (other than VFDs and motors) are classified as "HVAC;" "Miscellaneous" measure that are lighting are classified as "Lighting;" and Building Shell, Process, Refrigeration, and Water Heating are grouped into the "Other" enduse category.

Attribution/Net Impact Analysis

Our NTG analysis included consideration of FR, PSO, and market partner spillover (MPSO); it did not include consideration of NPSO. The NTGR was calculated as follows:

NTGR = 1 – FR + PSO + MPSO

It should be noted that MPSO is only included for the Standard and Custom programs and is based on PY2019 evaluation results. Estimates of FR and PSO are based on participant surveys and interviews. For the Standard, Custom, NC, and RCx programs, we conducted primary research with program participants as part of the PY2020 evaluations and developed new estimates of FR and PSO; the SBDI evaluation did not include new participant primary research and leveraged FR and PSO estimates from PY2019. For the BSS Program, since it falls under the umbrella of low-income programs, we applied a default NTGR of 1.0, assuming that both FR and SO are zero.

Table 11 summarizes, by program, which components are included in the NTGR and the program year in which they were evaluated. The subsections following the table provide more detail on the estimation of FR, and PSO.[15]

Table 11. Components of NTGR by Program

NTGR Component	Standard	Custom	SBDI	NC	RCx	BSS
Free Ridership	PY2020	PY2020	PY2019	PY2020	PY2020	n/a
Participant Spillover	PY2020	PY2020	PY2019	PY2020	PY2020	n/a
Market Partner Spillover	PY2019	PY2019	-	-	-	n/a

Free Ridership

Free riders are program participants who would have completed the same energy efficiency upgrade without the program. FR scores represent the percentage of savings that would have been achieved in the absence of the program. FR scores can range from 0% (not a free rider; the participant would not have completed the project without the program) to 100% (a full free rider; the participant would have completed the project without the program). FR scores between 0% and 100% represent partial free riders, i.e., participants who were to some degree influenced by the program to complete the energy efficiency upgrade.

FR survey questions focused on the program's influence on the level of efficiency, the quantity of installed measures, and the timing of the installations.[16] For each respondent, FR is calculated as follows:

FR = Efficiency FR Score * Quantity & Timing Adjustment

The Efficiency FR Score consists of two measurements: The first is based on the importance of various program factors on the respondent's decision to install energy-efficient equipment; the second is based on two measurements of what the respondent would have done in the absence of the program (i.e., the counterfactual). The survey embedded consistency checks in case inconsistent responses were given and provided the respondent with an opportunity to revise their initial responses and/or provide additional context.

---

[15] The PY2019 Annual Evaluation Report contains a detailed discussion of the methodology and results of the MPSO analysis.

[16] Given the nature of NC and RCx projects, the FR algorithm for these programs differs slightly from the other BizSavers programs: The algorithm for the NC Program did not include program influence on quantity and timing, while the algorithm for the RCx Program assessed program influence on timing but not on quantity.

We used responses about the program's influence on measure quantity and project timing to adjust the Efficiency FR Score, allowing the program to receive credit in cases where the program influenced project size and timing rather than, or in addition to, the level of efficiency of the installed equipment.

To increase the confidence in the FR scores of sampled projects, we conducted an additional review of survey responses for two types of projects:[17] (1) sampled projects with inconsistent efficiency responses that account for 1% or more of sampled savings (separately estimated for Standard and Custom projects); and (2) sampled projects that account for 5% or more of sampled savings (also separately estimated for Standard and Custom projects). Based on this review, we made further adjustments to the Efficiency FR Score or the Quantity & Timing Adjustment or both.

Figure 1 presents a diagram of the respondent-level FR algorithm used for this evaluation.

Figure 1. Overview of Respondent-Level Free Ridership Algorithm
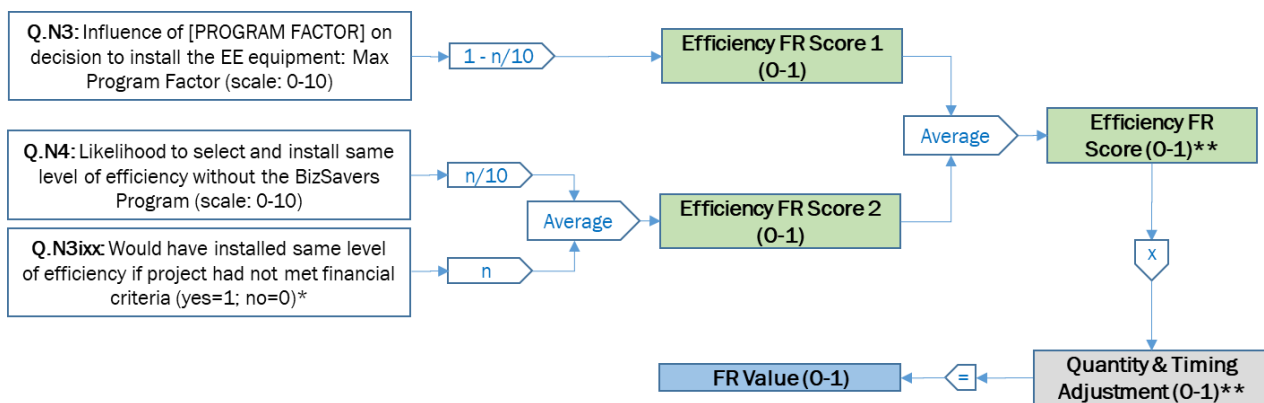
*Asked only of those who rated importance of financial criteria >7 and indicated that the incentive caused the project to meet their financial criteria.
** We conducted an additional review of open-ended and other closed-ended responses for (1) projects with inconsistent responses to efficiency and/or quantity & timing questions, respectively, that account for at least 1% of sampled program savings; and (2) projects accounting for at least 5% of sampled program savings.

We developed FR estimates, by program, as follows:

- We first developed a FR estimate for each survey respondent, using the algorithm depicted above.
- We then aggregated respondent-level FR estimates to the stratum level, weighting the sampled projects within each stratum by their ex post gross savings. In cases of low numbers of responses within an analysis group, we combined two or more of the size strata.
- For each program, we developed a FR value by applying ex post savings weights to reflect the relative contribution of each stratum to the program's overall savings.

As a final step in the FR analysis, we applied a program-level "COVID Adjustment" to the FR values for the Standard, Custom, and RCx programs. This value was applied because we observed unexpected levels of FR for these programs, which appeared inconsistent with the economic conditions created by the COVID-19 pandemic and results from Opinion Dynamics' COVID-related market research (conducted in the summer of 2020). As noted above, interviewed BizSavers trade allies and PY2019 program participants reported negative impacts of the pandemic on customer capital investments, specifically delays in project starts and completions

---

[17] This review was limited to the Standard and Custom programs since FR inputs were collected via an online survey. For the NC and RCx programs, we conducted in-depth interviews, which facilitated resolution of inconsistent responses during the interview.

and project cancellations. Trade allies further reported that these negative impacts were smaller for BizSavers projects compared to similar non-BizSavers projects. While our FR algorithm captures program influence on the initial timing of projects (in addition to efficiency and quantity), it does not address program influence on preventing project delays and cancellations well. As such, we believe that an adjustment to correct for this un-measured program influence is warranted.

The COVID Adjustment factor applied for the Standard, Custom, and RCx programs is 0.8, or a 20% reduction in FR. While this value is not based on a strictly quantitative method, its magnitude is supported by the following findings from the 2020 COVID research:

- Almost one-third of PY2019 BizSavers participants (31%) have postponed a planned investment project, with many (18%) expecting delays of six months or more.

- Approximately one of three interviewed Trade Allies indicated fewer cancellations among BizSavers projects compared to other similar projects, and one of four indicated additional financial support from Ameren Missouri would have a great deal of an impact on mitigating project cancellations.

- Approximately one of four interviewed Trade Allies indicated experiencing fewer project delays among BizSavers projects, and one of six indicated additional financial support from Ameren Missouri would have a great deal of an impact on mitigating project delays.

In addition to these research findings, a 20% COVID adjustment brings PY2020 FR levels for these programs into the range of PY2019 FR values, which is more plausible than the unadjusted values given the consistency with PY2019 in program design/implementation and evaluation methods and the additional strain on customer finances during the COVID-19 pandemic.

It should be noted that this COVID Adjustment is not applied to the FR value developed for the NC Program. The FR algorithm for that program does not include a Quantity & Timing Adjustment, based on the assumption (which our interviews verified) that the timing of NC projects is not impacted by the program. As such, we would not expect that the program would have an impact on preventing project delays or cancellations either. It should also be noted that this is a one-time, pandemic-driven adjustment that we do not expect to apply in future evaluations (unless COVID-19 conditions persist during PY2021).

Additional detail on the respondent-level FR methodology used in this evaluation is presented in Appendix A.

Participant Spillover

PSO refers to additional energy efficiency upgrades participants made at the time of or after their participation in the BizSavers program that were influenced by the program but for which they did not receive a program incentive. We developed separate PSO estimate for the Standard, Custom, RCx, and NC programs. PSO is expressed as a percentage of program savings.

To determine if a survey respondent is eligible for PSO savings, we asked a series of questions about additional energy efficiency installations that they made without receiving an incentive and the degree to which the program influenced their decision to install the efficient equipment. The survey included two program influence questions:

Q1. How much did your experience with the BizSavers Program or interactions with Ameren Missouri staff influence your decision to make these additional efficiency improvements without an incentive?

This question was asked on a scale of 0 to 10, where 0 means "No Influence" and 10 means "Greatly Influenced."

Q2. If you had NOT participated in the BizSavers Program, how likely is it that <COMPANY> would still have made the additional energy efficient improvements?

This question was asked on a scale of 0 to 10, where 0 means "Definitely would not have made improvements" and 10 means "Definitely would have made improvements."

To supplement these numeric responses, we asked open-ended questions about how the program influenced the decision to make the energy efficiency installations and why the participant made the installations without a program incentive. A respondent's additional energy efficiency installations were deemed eligible for PSO if two conditions were met: (1) the Program Influence Factor (see below) was greater than 5.0, and (2) the open-ended responses did not contradict that the installations were eligible for PSO.

The Program Influence Factor was calculated as follows:

Program Influence Factor = (Q1 Response + (10 – Q2 Response)) ÷ 2

In addition, we applied a third PSO eligibility condition: that the participant did not work with a participating market partner. This condition was necessary because this evaluation also includes MPSO. When estimating spillover (SO) from multiple sources, it is important to avoid double-counting. In the case of this evaluation, double-counting could occur if participants and market partners report SO from the same projects. We avoided such double-counting by determining if the participant's SO project was completed by a market partner who completed at least one project through the program during PY2020. If so, the SO reported by the participant was excluded from the PSO estimate as it was captured in our MPSO estimate.

Figure 2 presents a diagram of the PSO eligibility determination methodology used for this evaluation.

Figure 2. Participant Eligibility for Spillover - Methodology
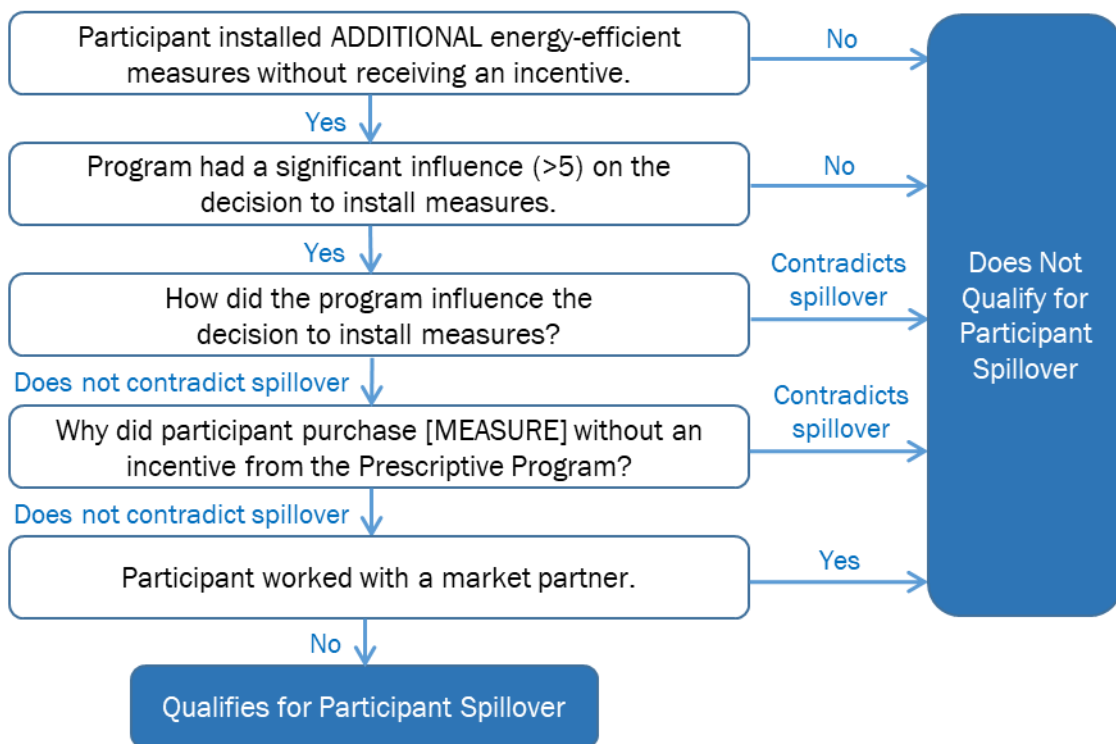
The survey also included a few follow-up questions about SO-eligible measures, including the type of equipment and, for lighting measures only, information on the quantity of measures installed, whether they were installed in a conditioned space, and the type of lighting they replaced.

For participants with qualifying installations, we conducted follow-up interviews to collect more-detailed information for each additional measure, such as baseline and efficient wattages or the age of the equipment. We used TRM engineering algorithms to develop SO savings for each measure and developed a "PSO Rate," by program, which is calculated using the following formula:

$$PSO\ Rate = \frac{SO\ in\ Sample}{Ex\ Post\ Gross\ Impacts\ in\ Sample}$$

Net Impacts

The final step in the net impact analysis was application, by program, of the NTGRs to ex post gross savings using the following formula:

*Ex post net savings = Ex post gross savings * NTGR*

3.   Standard and Custom Incentive Programs

This chapter summarizes the PY2020 evaluation methodology and results for the Standard and Custom Incentive Programs. While the Standard and Custom programs are two distinct programs within the BizSavers portfolio, we combine discussion of evaluation methodologies and results in one chapter due to considerable overlap in program design and implementation, customer and market partner participation, and evaluation activities. Where relevant and possible, we provide separate results for the two programs.

The PY2020 evaluation of the Standard Incentive Program included an engineering analysis of lighting measures and application of the PY2019 gross realization rates for non-lighting measures.[18] The evaluation of the Custom Program included application of PY2019 gross realization rates for Custom Lighting and Custom Compressed Air measures, and desk reviews and onsite visits for a sample of measures within the HVAC, Motors, and "Other" enduse categories.[19] Both evaluations included an assessment of program attribution but did not assess program processes. Additional details on the evaluation methodology are presented in Chapter 2, and Appendix A. Appendix B includes detailed desk review and onsite visit findings for the Custom Program.

3.1   Evaluation Summary

The Standard Incentive Program and the Custom Incentive Program are the two largest programs in Ameren Missouri's PY2020 business portfolio. Within the BizSavers portfolio, the Standard Incentive Program accounts for 59% and 47% of first year ex post net energy and demand savings, respectively; while the Custom Incentive Program accounts for 23% and 36% of first year ex post net energy and demand savings, respectively.

The Standard and Custom programs are designed to promote energy awareness and installation of energy-efficient technologies or services by providing incentives to offset the higher cost associated with completing these projects. The Standard Incentive Program encourages customer participation through simple and streamlined program processes and focuses on technologies that include lighting, motors, controls, HVAC, and refrigeration. The Custom Incentive Program applies to processes, technologies, and energy efficiency measures that do not fall within the other pre-defined programs. These projects are sometimes complex and always unique, requiring customer-specific incentive applications and calculations of estimated energy savings.

Whereas measures offered through the Standard Program are mostly prescriptive and receive set incentive amounts per unit; incentive levels for the Custom Program are calculated based on energy savings estimates for each proposed measure. Onsite visits are required for projects with incentives exceeding $15,000 to verify baseline data, energy savings estimates, and post-installation measuring capabilities.

In PY2020, the only participation channel was application-based and supported by a network of registered trade allies and other, non-registered market partners (including contractors, distributors, wholesale retailers, and, where applicable, local economic development and professional associations).

The target market for the Standard and Custom programs includes commercial, industrial, and institutional customers and excludes multifamily and low-income customers, who are served by the residential programs.

---

[18] Non-lighting measures in the Standard Program account for 6% of overall ex ante energy savings.
[19] The "Other" enduse includes building shell, process, refrigeration, and water heating.

The PY2020 Standard and Custom programs are both ongoing programs from the previous MEEIA cycle, and their implementation has remained largely unchanged from previous years. Notable changes compared to PY2019 include:

- Increased incentive levels

- Incentives for additional Standard measures

- A trade ally / market partner incentive for completing large projects (i.e., projects with greater than or equal to 200,000 kWh of savings) for part of the year

- Bonus incentives for some lighting and HVAC measures

- New incentives for exterior lighting measures when they are implemented in conjunction with interior lighting measures

- A simplified project pre-approval process for Standard and Custom Incentive Programs

- A higher threshold for Standard projects that require pre-approval

3.1.1   Participation Summary

Table 12 presents PY2020 participation in the Standard and Custom programs, including the number of projects and ex ante gross savings. Overall, Ameren Missouri business customers implemented 2,008 projects through the Standard Program and 344 through the Custom Program in PY2020, resulting in 85,129 and 35,049 MWh, respectively, of ex ante gross energy savings. For both programs, this level of participation and savings represents an increase from PY2019, which saw a total of 1,699 projects through the Standard program and 197 projects through the Custom program, resulting in 76,553 MWh and 16,807 MWh in ex ante gross savings, respectively.

Similar to PY2019, the PY2020 Standard Program was heavily focused on lighting (94% of ex ante gross energy savings). However, the program did see a substantial increase in HVAC savings—a priority enduse for the implementation team in PY2020. While the majority of Custom projects also included lighting (60%), the Custom Program derived the majority of its savings from HVAC measures (59%).

Table 12. PY2020 Standard and Custom Program Participation Summary

Enduse	Projects		Ex Ante Gross Savings	
	Number [a]	%	MWh	%
Standard Program				
Lighting	1,832	91%	80,384	94%
HVAC	172	9%	4,425	5%
Motors	2	<1%	143	<1%
Water Heating	3	<1%	63	<1%
Refrigeration	2	<1%	41	<1%
Cooking	2	<1%	9	<1%
Miscellaneous	1	<1%	63	<1%
Total Standard	**2,008**	**100%**	**85,129**	**100%**
Custom Program				
HVAC	96	28%	20,756	59%
Motors	22	6%	4,016	11%

Enduse	Projects		Ex Ante Gross Savings	
	Number [a]	%	MWh	%
Lighting	206	60%	3,779	11%
Compressed Air	8	2%	3,020	9%
Process	4	1%	2,228	6%
Refrigeration	17	5%	887	3%
Water Heating	1	<1%	264	1%
Building Shell	5	1%	98	<1%
Total Custom	344	100%	35,049	100%

[a] *The number of projects by lighting type and by enduse sum to more than the totals shown due to projects containing more than one enduse and/or lighting type.*

3.1.2 Key Impact Results

Standard Program

The Standard Program was the largest program in Ameren Missouri's Business Portfolio in PY2020, contributing 59% of first year ex post net energy savings and 47% of first year ex post net demand savings. Table 13 summarizes first year and last year annual gross and net savings for the Standard Program in PY2020 as well as the evaluated gross realization rates. As shown, the program achieved 125% and 145%, respectively, of Ameren Missouri's first year net energy and demand savings goals, and 3%, 50% and 277%, respectively, of Ameren Missouri's last year net demand savings targets in the <10 Year EUL, 10–14 Year EUL, and 15+ Year EUL categories.

Table 13. PY2020 Standard Savings Summary

	Ex Ante Gross	Gross RR	Ex Post Gross	NTGR	Ex Post Net	Goal/Target Net	% of Goal/Target
First Year Savings							
Energy Savings (MWh)	85,129	97.3%	82,832	85.0%	70,390	56,470	125%
Demand Savings (MW)	18.50	105.5%	19.51	85.0%	16.58	11.40	145%
Last Year Demand Savings							
< 10 EUL (MW)	0.04	105.4%	0.04	85.0%	0.03	1.08	3%
10–14 EUL (MW)	2.82	109.1%	3.08	85.0%	2.62	5.28	50%
15+ EUL (MW)	15.64	104.8%	16.39	85.0%	13.93	5.04	277%

The PY2020 Standard Program achieved gross realization rates of 97.3% and 105.5% for first year energy and demand savings, respectively. Realization rates for last year demand savings ranged between 104.8% in the 15+ Year EUL category to 109.1% in the 10–14 Year EUL category. The PY2020 gross impact analysis included an engineering analysis for lighting measures but applied PY2019 realization rates for non-lighting measures. Energy RRs are driven by the ex post application of building type-specific energy waste heat factors (WHFs) and electric heating penalties, where applicable, versus the application of a modeled Heating and Cooling Interaction Factor (HCIF) of 1.07 in the ex ante analysis. Demand RRs are driven solely by the ex post application of demand WHFs while the ex ante analysis applies the HCIF of 1.07.

The NTGR for the Standard Program was 85.0%, including consideration of FR (16.2%), PSO (0.27%), and MPSO (0.91%). Free ridership and participant spillover were estimated based on surveys conducted with PY2020 participants; the MPSO rate is based on the PY2019 evaluation.

Custom Program

The Custom Program was the second largest program in Ameren Missouri's Business Portfolio in PY2020, contributing 23% of first year ex post net energy savings and 36% of first year ex post net demand savings. Table 14 summarizes first year and last year annual gross and net savings for the Custom Program in PY2020. As shown, the program achieved 40% and 58%, respectively, of Ameren Missouri's first year net energy and demand savings goals, and 9% and 67%, respectively, of Ameren Missouri's last year net demand savings targets in the 10–14 Year EUL and 15+ Year EUL categories.

Table 14. PY2020 Custom Savings Summary

	Ex Ante Gross	Gross RR	Ex Post Gross	NTGR	Ex Post Net	Goal/Target Net	% of Target
First Year Savings							
Energy Savings (MWh)	35,049	97.0%	34,010	82.4%	28,031	69,882	40%
Demand Savings (MW)	15.47	98.1%	15.18	82.4%	12.51	21.39	58%
Last Year Demand Savings							
< 10 EUL (MW)	-	n/a	-	n/a	-	-	n/a
10–14 EUL (MW)	0.39	88.4%	0.34	82.4%	0.28	3.01	9%
15+ Year EUL (MW)	15.08	98.4%	14.84	82.4%	12.23	18.38	67%

The PY2020 Custom Program achieved high gross realization rates for both first and last year energy and demand savings, at 97% and 98%, respectively. The small reduction in the realization rates is mainly driven by lighting and "other" Custom measures, which have energy realization rates of 93.4% and 82.6%, respectively.[20] However, due to their small contribution to overall savings and a strong realization rate of 99.6% for HVAC projects, which account for 59% of program savings, the overall impact on realization rates is small.

The NTGR for the Custom Program was 82.4%, including consideration of FR (18.6%), PSO (0.11%), and MPSO (0.91%). FR and PSO were estimated based on surveys conducted with PY2020 participants; the MPSO rate is based on the PY2019 evaluation.

3.1.3   Key Process Findings

The PY2020 evaluation did not include an assessment of program processes for the Standard and Custom programs. We provide a few observations, however, based on program-tracking data and limited process data from the PY2020 participant survey:

- ■ **Program Participation:** In PY2020, Ameren Missouri business customers completed 2,008 projects through the Standard Program and 344 projects through the Custom Program. The number of Standard and Custom projects increased substantially toward the end of the program year, reflecting that participants may have wanted to complete the projects during PY2020 to take advantage of the BizSavers' incentives, and likely the effect of the trade ally incentive and exterior lighting incentive, which took effect in September 2020.

- ■ **Sources of Program Information:** BizSavers trade allies and market partners continue to be essential sources of program information for both Standard and Custom participants, with 62% of Standard participants and 69% of Custom participants reporting that they had heard about the program through a contractor, vendor, or energy consultant in 2020. Similar to PY2019 results, more than one-third

---

[20] Note that the lighting RR is based on PY2019 evaluation results.

(38%) of all respondents indicated that Ameren Missouri should send an email blast or electronic newsletter to inform their companies of energy saving opportunities.

■ **Participant Satisfaction:** Overall, BizSavers participants report high levels of satisfaction with the program, with 89% of both Standard and Custom participants being "Very Satisfied" with the program overall.

3.1.4   Conclusions and Recommendations

Based on the results of this evaluation, the evaluation team offers the following conclusions and recommendations for the Standard and Custom programs:

■ **Conclusion #1:** The Standard and Custom programs both performed strongly during PY2020, especially considering the challenging circumstances due to the COVID-19 pandemic. Similar to PY2019, the Standard Program carried the BizSavers portfolio and significantly exceeded its savings targets. The Custom Program, while still short of targets, more than doubled its savings relative to PY2019.

■ **Conclusion #2:** Similar to PY2019, the PY2020 Standard Program was dominated by lighting measures. While these offer a cost-effective way of achieving savings targets, changing market conditions will necessitate a shift of program activity towards other enduses, if program savings are to be sustained over the longer term. The Standard Program did, however, see a substantial increase in HVAC savings, facilitated by implementation team efforts to promote this technology (including a 15% bonus incentive, higher than the 10% bonus offered for lighting projects).

   ■ **Recommendation:** Continue to harvest lighting savings, while available, but begin increased promotion of other enduses among trade allies and customers to facilitate the transition away from lighting as the LED market matures.

■ **Conclusion #3:** The program implementer uses an average HCIF of 1.07 to estimate ex ante energy and demand savings for interior lighting measures, regardless of building type or HVAC system type. In contrast, the evaluation team applied building and HVAC type-specific WHFs and Heating Penalty Interactive Factors (IFs) based on the tracked building and system types for each project and specifications in the Ameren Missouri TRM Appendix H. Across all projects, the average combined ex post energy savings adjustment (WHF plus IF) was 1.04, and the average ex post demand savings adjustment (WHF only) was 1.09.

   ■ **Recommendation:** To improve the accuracy of ex ante savings, we recommend that the implementer either (1) apply building type-specific WHF and IF values (as stipulated in the TRM and done in the ex post analysis); or (2) develop and apply separate HCIFs that account for both cooling and heating interaction for annual energy savings and that account for the cooling interaction only for demand savings. Based on the engineering analysis across prescriptive lighting measures in the Standard, SBDI, and BSS programs, we recommend an energy factor of 1.04 and a demand factor of 1.09.

■ **Conclusion #4:** The building types used in the implementer's database do not align with the Ameren Missouri TRM building type list. Building types are used in various TRM engineering algorithms, including those for interior lighting measures.

   ■ **Recommendation:** To improve consistency with the Ameren Missouri TRM, we recommend that the implementer update the "Building Type" field in the program-tracking database to match the building types used in the Ameren Missouri TRM Appendix H.

- **Conclusion #5:** For Custom projects, key project documentation and analysis files were missing from the set of project documents available in the program-tracking database. The evaluation team was able to obtain many of the required files and additional information from the implementation contractor on request, but this extra step added cost to the evaluation and additional burden on trade allies and customers.

  - **Recommendation:** Develop and follow guidelines for the minimum level of required documentation to be stored and accessible to program staff and evaluation contractors for each project. The minimum required documentation may vary by project size and should include project narrative describing the baseline equipment/operation and the high-efficiency equipment/operation; analysis files that clearly show the methods, assumptions, and basis for ex ante savings; invoices and equipment submittals for all purchased equipment; and any documentation from post-installation commissioning or post-installation inspection activities.

- **Conclusion #6:** Through Custom Program desk reviews of the ex ante savings estimation methods, the evaluation team found multiple scenarios where the baseline and installed case scenarios were modeled for different production outputs. Unless the energy efficiency measure was designed to reduce the load or production level (e.g., a building shell measure), the energy savings should be modeled to demonstrate baseline and proposed equipment performing at the same production level (e.g., cooling load, heating load, refrigeration load, or process production level).

  - **Recommendation:** When developing savings for equipment upgrades in manufacturing processes, normalize the baseline and efficient case scenarios to the same production output (in the same way an HVAC project would normalize baseline and efficient system energy performance to the same heating and cooling load).

- **Conclusion #7:** Several Custom projects modeled the baseline scenario using existing equipment, even when that equipment was very old (e.g., operating well past its effective useful life). This is a common assumption, especially when the existing equipment is still operational, but may not be the appropriate baseline in cases where the customer planned to or would likely be required to replace the equipment within the measure life of the new equipment. It is not uncommon for building managers to continue maintenance until equipment failure rather than replacing equipment at some specified interval, but there is still risk to using existing conditions as the baseline.

  - **Recommendation:** In cases where the existing equipment is at or near the end of its effective useful life (as determined by measure type in the Ameren Missouri TRM), the program implementer or trade ally should be required to provide justification for using that equipment as the baseline for the ex ante savings estimation.

- **Conclusion #8:** The current stipulated method for estimating peak savings—as the product of the custom-calculated annual energy savings and the coincidence factor prescribed for each enduse—risks a misalignment of estimated and actual peak demand savings for some Custom projects.

  - **Recommendation:** To avoid reporting potentially unrealistic demand savings, Ameren Missouri should consider allowing exceptions to the current approach of estimating peak demand savings for Custom projects—if possible under current Stipulation rules. This could include setting a cap on the peak demand savings (e.g., based on the maximum or full load equipment capacity) or allowing the program teams to develop custom estimates of peak demand savings.

3.2   Standard and Custom Evaluation Methodology

Table 15 provides an overview of the PY2020 evaluation activities for the Standard and Custom programs. Most of these activities are similar across the various business programs and were described in Chapter 2. The sections following the table highlight program-specific aspects of key evaluation activities.

Table 15. PY2019 Evaluation Activities for the Standard and Custom Incentive Programs

Evaluation Activity	Description
Program Manager and Implementer Interviews	▪ Conducted interviews in January 2020 to inform evaluation planning and in December 2020 to understand program staff's perspective on program performance.
Program Material Review	▪ Reviewed program materials to understand program changes relative to PY2019.
Participant Survey	▪ Conducted two waves of survey with program participants to collect data to inform NTG (FR and PSO).
EUL Review and Analysis (Standard Lighting Measures)	▪ Leveraged rated lighting equipment lifetime and annual HOU from the program tracking database to calculate EULs. ▪ Reviewed multiple TRMs to compare EULs used in other jurisdictions with those used in the PY2019 evaluation. ▪ Developed EUL recommendations to apply in PY2020 and future evaluations.
Engineering Analysis (Standard Lighting Measures)	▪ Verified that ex ante savings use correct TRM values and algorithms and reviewed custom calculations where appropriate. ▪ Developed HOU and ISR adjustment factors, based on results of the PY2019 evaluation. ▪ Developed ex post savings using TRM algorithms, deemed savings assumptions, and site-specific parameters.
Engineering Desk Reviews & Onsite Verification (Select Custom Enduses)	▪ Reviewed supporting project documentation for a sample of projects to ensure that original data was correctly entered from invoices and other documentation. ▪ Performed onsite verification visits for a sample of projects to confirm quantity and continued operation of incented measures, collected additional data to develop energy savings, and verified other parameters through staff interviews. ▪ Collected pre/post facility consumption data when possible to validate the overall savings impact. ▪ Developed ex post savings for the sample and the population.
NTG/Net Impact Analysis	▪ Developed estimates of free ridership and participant spillover. ▪ Estimated PY2020 net impacts.

3.2.1   Participant Survey

We conducted a quantitative online survey with Ameren Missouri business customers who participated in the Standard and Custom programs during PY2020. A combined survey was fielded in two waves: in August 2020 and in January 2021. The survey focused mainly on FR and PSO, but covered a few process-related topics, including sources of program information and participant satisfaction.

The survey sample was designed to allow for the development of separate FR estimates for the Standard and Custom programs. For both programs, we stratified the sample by energy savings. While the sampling unit for this survey was the unique customer contact, the FR questions asked about a specific project completed by that customer. Because many customers had completed more than one project during PY2020, sometimes

across more than one BizSavers program, our sampling approach prioritized projects in programs and strata with fewer available sample points, i.e., Custom projects and projects with larger savings.[21]

Across the two waves, the sample frame included 1,398 unique participants. We invited all 1,398 program participants to participate in the survey via e-mail (i.e., we attempted a census of participants), sending an initial invitation and two reminders. The initial invitation resulted in 73 bounced e-mails and 9 ineligible respondents, giving us a total of 1,316 valid sample points. Overall, 250 participants completed the survey (205 Standard Program participants and 45 Custom Program participants), resulting in a response rate of 19%.

3.2.2   EUL Review and Analysis

The PY2020 evaluation included a review and update of EULs for prescriptive lighting measures used in the PY2019 evaluation. We developed PY2020 EUL recommendations based on lighting equipment lifetime and HOU for lighting measures in the program-tracking database while also leveraging TRMs of other jurisdictions to compare EULs. In this report, we applied the PY2020 EUL recommendations when summarizing both ex ante and ex post last year demand savings by EUL category.

3.2.3   Engineering Analysis

We conducted an engineering analysis of all Standard Program lighting measures to estimate ex post gross program savings. We first reviewed program-tracking data to verify correct TRM algorithms and savings assumptions were used to calculate ex ante savings. We then calculated ex post savings using Ameren Missouri TRM algorithms, deemed savings assumptions, and site-specific parameters from the program-tracking database.

For all non-lighting measures incented through the program, accounting for 6% of the program's ex ante gross savings, we applied the PY2019 Standard non-lighting gross realization rates of 91.6% and 121.4% for MW and MWh, respectively.

Hours of Use Adjustment

As part of the engineering analysis for lighting projects, we explored whether to apply an HOU adjustment, based on results from the PY2019 desk review/onsite sample of Standard Program lighting projects. This analysis found that while measure-level and project-level evaluated HOU often vary from program-tracked HOU, there was no statistically significant difference (at 90% confidence) between the estimates at the program level. As such, we applied an HOU adjustment factor of 1.0 as part of the PY2020 engineering analysis.

In-Service Rate

Similar to the HOU adjustment, we explored whether to apply ISRs in the ex post analysis, based on results from the PY2019 desk reviews and onsite visits. Specifically, we investigated whether the program-level ISR in PY2019 was statistically different from 1.0. This analysis showed that the PY2019 lighting ISR was not statistically different from 1.0, at 90% confidence. As such, the PY2020 ex post analysis for Standard lighting measures used an ISR of 1.0.

---

[21] Projects with energy savings of more than 650,000 kWh were considered large projects for purposes of sampling.

3.2.4   Engineering Desk Reviews and Onsite Visits

We conducted engineering desk reviews for a sample of 29 Custom projects—focused on the HVAC, Motors, and "Other" enduses—to review and verify project documentation and savings assumptions.[22] The main purpose of the desk reviews was to verify that the program-tracking database correctly reflected the installed measure(s), including equipment types, efficiencies, quantities, hours of operation, and other information needed to verify the project installation and estimate gross energy and savings. In most cases, the evaluation team verified or updated the ex ante savings estimates based on project documentation or other post-installation information. For some projects, the evaluation team developed project-specific calculations or analyzed pre- and post-installation billing data as a more accurate method of quantifying ex post energy savings.

We also conducted onsite visits for a subset of 21 of the 29 Custom projects. Onsite visits provided additional rigor to the verification process by confirming through visual inspection that the incented measures were still installed and operational, and that the baseline conditions, equipment characteristics, and building characteristics were consistent with project documents and program implementer's assumptions. Through onsite visits, the evaluation team also collected additional information about current facility operations, including whether the facility changed operations due to COVID-19 and whether those COVID-19 related changes were temporary or permanent.

Table 16 summarizes the final sample for the desk reviews and onsite visits for the PY2020 Custom Program.

Table 16. Custom Program Gross Impact Sampling Summary

Enduse	Number of Projects [A]		
	Population	Desk Reviews	Onsite Visits
HVAC	**96**	**15**	**11**
Census	1	1	0
Stratum 3	10	4	4
Stratum 2	19	5	4
Stratum 1	66	5	3
Motors	**22**	**7**	**6**
Census	1	1	1
Stratum 1	21	6	5
Other	**27**	**7**	**4**
Stratum 2	4	3	1
Stratum 1	23	4	3
Total	**145**	**29**	**21**

[A] For sampling purposes, projects are defined by project numeral and enduse.

---

[22] Our original sample included 15 HVAC projects, 8 Motors projects, and 7 Other projects (total of 30 Custom projects). During the evaluation activities we dropped one Motors project from the sample due to limited information on the project documentation and inability to connect with the project contact to provide additional project information.

3.2.5 NTG Analysis

The NTG analysis for the Standard and Custom programs included consideration of FR, PSO, and MPSO. FR and PSO are based on the PY2020 participant survey, while MPSO is based on PY2019 evaluation results. The NTGR was calculated as follows:

$$NTGR = 1 - FR + PSO + MPSO$$

- **Free riders** are program participants who would have purchased the same measure(s) at the same time without any program influence. The participant survey collected information about the program's influence on (1) the efficiency of the installed equipment, (2) the quantity of installed equipment (where applicable), and (3) the timing of the installation. FR was estimated separately for the Standard Program and the Custom Program. For both programs, we applied a COVID adjustment factor that reduced FR by 20%.

- **PSO** refers to additional energy efficiency upgrades participants made concurrent with or following their BizSavers program participation that were influenced by the program but for which they did not receive a program incentive. We developed separate PSO estimates for the Standard and Custom programs. PSO is expressed as a percentage of program savings.

- **MPSO** refers to non-incented energy efficiency upgrades made by customers who were influenced by a participating market partner who was in turn influenced by their participation in the BizSavers Program. The PY2019 evaluation developed a combined MPSO estimate for the Standard and Custom programs. MPSO is expressed as a percentage of program savings.

Additional detail on NTG methodologies is provided in Chapter 2 as well as Appendix A.

3.3 Evaluation Results

3.3.1 Process Results

The PY2020 evaluation did not include an assessment of Standard and Custom program processes. We provide a few observations, however, based on program tracking data and limited process data from the PY2020 participant survey.

Program Participation

During PY2020, Ameren Missouri business customers implemented 2,008 projects through the Standard Program and 344 projects through the Custom Program. Half (50%) of interviewed participants indicated being a repeat participant, i.e., their company had received incentives from Ameren Missouri's BizSavers Program in prior program years. There is no significant difference in previous participation between Standard Program participants (49%) and Custom Program participants (58%).

Project starts for Standard and Custom projects were relatively steady over the program year (see Figure 3 and Figure 4), averaging 149 and 21 projects started per month, respectively. Eleven percent of Standard projects and 26% of Custom projects that were completed in 2020, started in 2019. Custom projects generally take longer to complete, so there are more Custom projects that started in 2019. Interestingly, there was a jump in the number of both Standard and Custom projects started in October 2020. This increase may have been influenced by the payments that the BizSavers program offered to trade allies and contractors for large projects starting after mid-September.

Project completions for both programs also remained steady over the first three-quarters of the program year, but they increased significantly over the last quarter. The steady completion of projects even in the early months is not surprising, given that the implementation team was able to carry over a pipeline of projects from PY2019. Concurrent with the number of projects, both programs also achieved a significant share of their ex ante savings during the final quarter of the program year (47% Standard; 63% Custom). This large uptick in project completions suggests that participants may have wanted to complete the projects during PY2020 to take advantage of the BizSavers' incentives, while trade allies and contractors may have wanted to take advantage of the large project trade ally incentive.

Figure 3. PY2020 Standard Program Monthly Project Starts and Completions
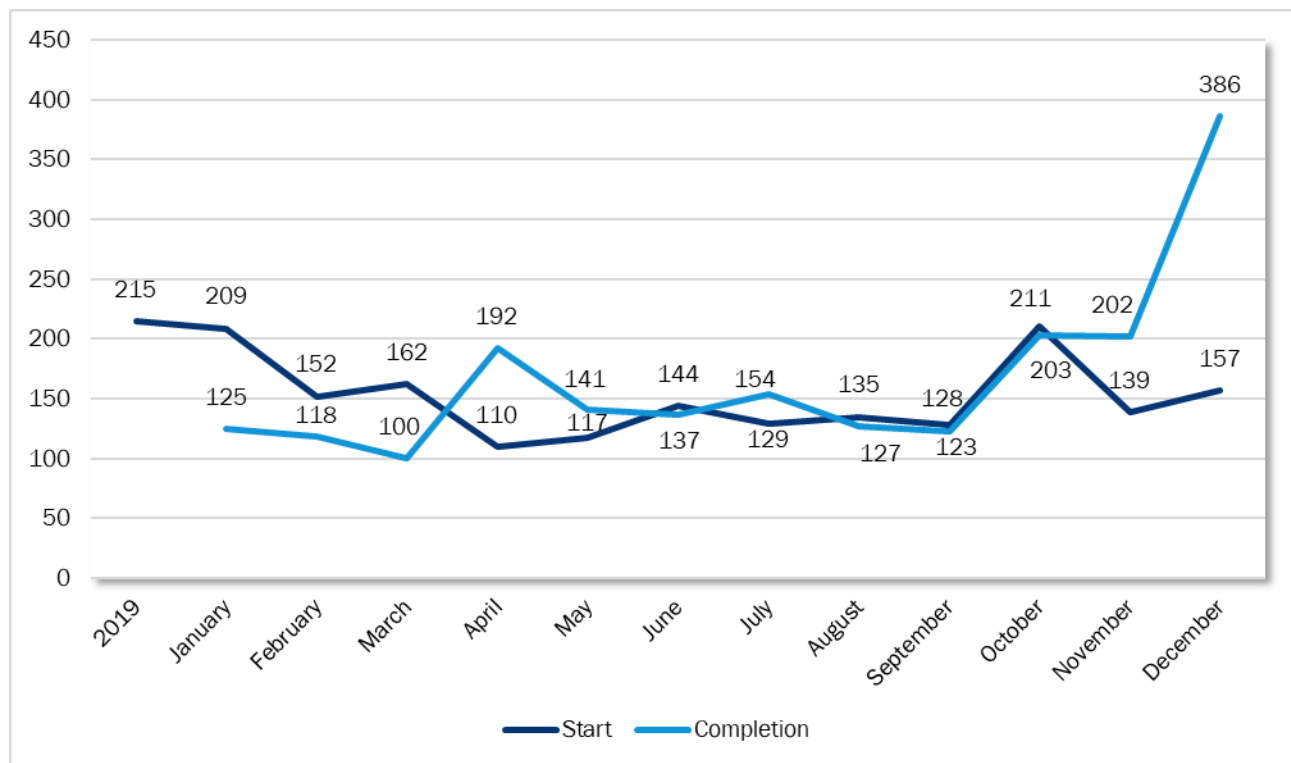
Figure 4. PY2020 Custom Program Monthly Project Starts and Completions
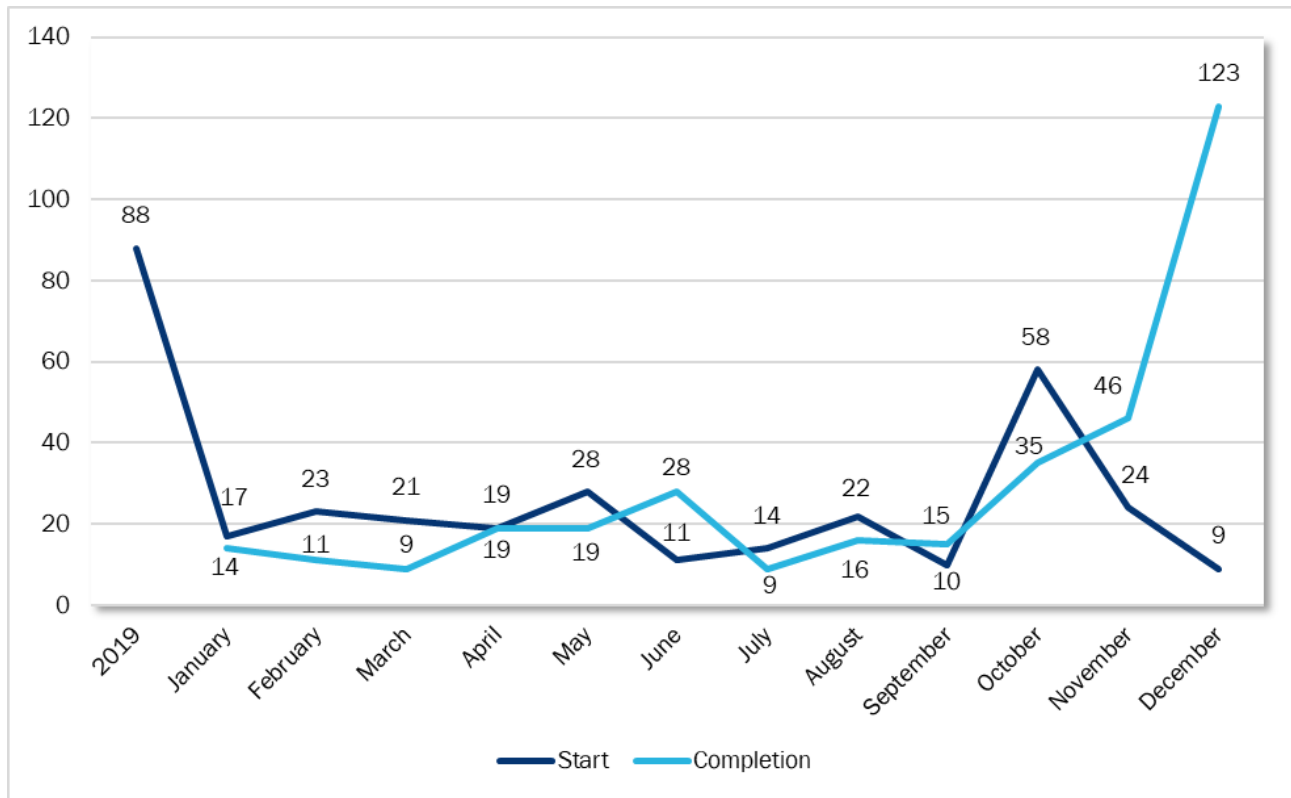
Sources of Program Information

In 2020, the large majority of respondents (62% Standard; 69% Custom) heard about the BizSavers Program through their contractor, equipment vendor, or energy consultant, underscoring the importance of the BizSavers network of market partners in promoting the program (see Figure 5). For Custom Program participants, BizSavers representatives were another key sources of information about the BizSavers Program. Other sources of program information important to both programs include informal communication from friends and colleagues and the Ameren Missouri website.

Figure 5. How Participants Heard About Ameren Missouri's BizSavers Program in 2020
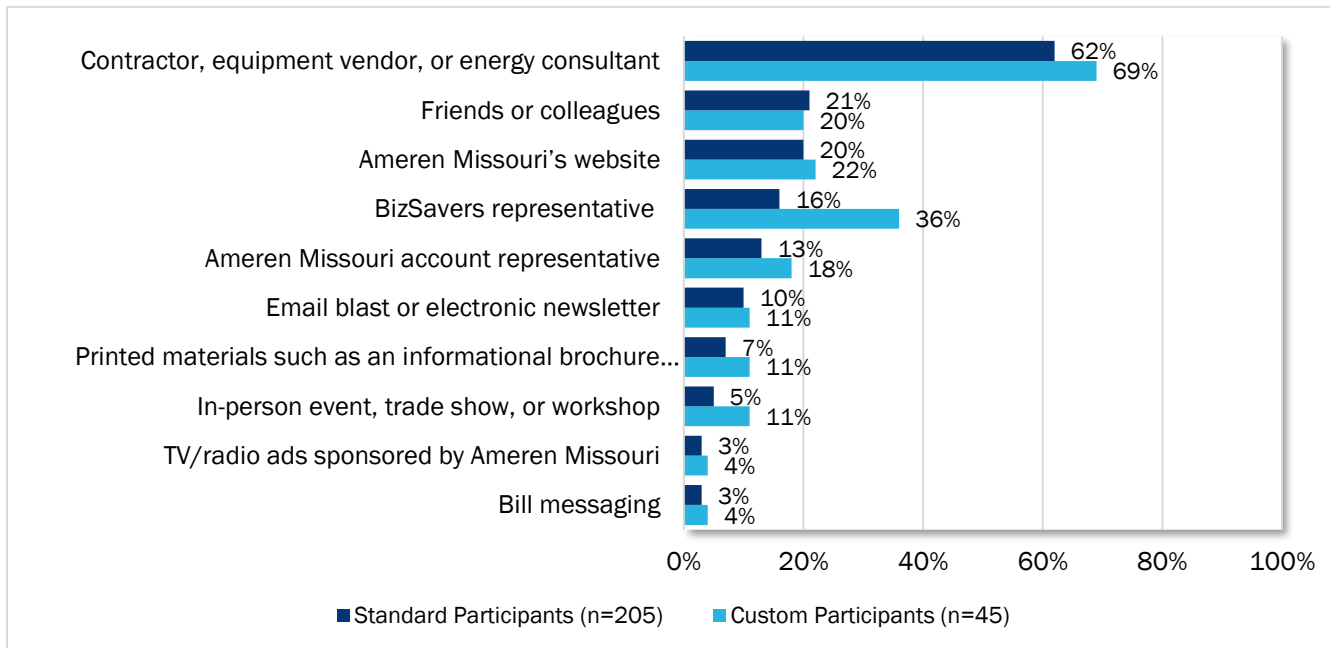
Although few participants heard about the BizSavers Program through an e-mail blast or electronic newsletter, more than one-third (38%) of all respondents indicated that this was the best way to inform their company of energy efficiency opportunities. Other preferred means of outreach commonly cited by participants include their contractor (16%), their Ameren Missouri account representative (10%), or a BizSavers representative (10%).

Participant Satisfaction

Participant satisfaction with Ameren Missouri's BizSavers Program overall is generally high. Almost nine of ten Custom respondents (89%) and Standard respondents (89%) reported being very satisfied with the program overall. Only a couple of respondents reported being dissatisfied with the program (see Figure 6).

Figure 6. Participant Satisfaction with the BizSavers Program Overall
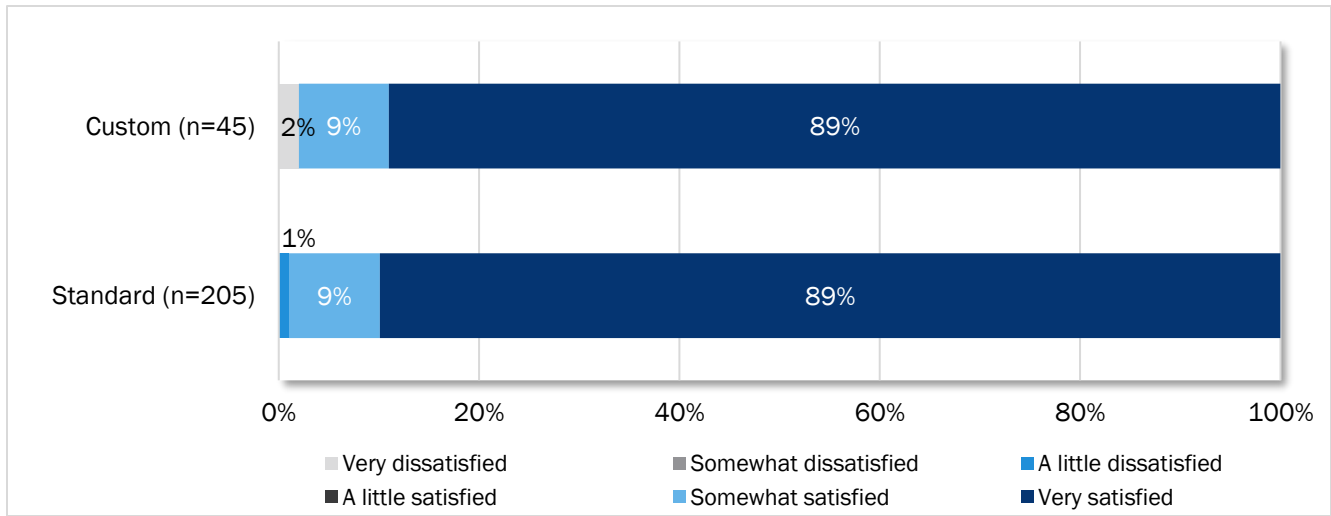
3.3.2   Impacts of COVID-19

We also asked participants about the impact that COVID-19 and any associated containment measures may have had on their business operations. More than half of respondents (60%) reported a lot to a great deal of impact on their operations. Respondents in both waves of the survey reported a similar level of impact, meaning that impacts did not change significantly between August 2020 and January 2021. Respondents commonly reported experiencing decreased revenue or profits (55%) and temporarily closed businesses (54%) due to COVID-19 (see Figure 7). Few participants (5%) experienced no impacts on their operations due to COVID-19.

Figure 7. Impacts of COVID-19
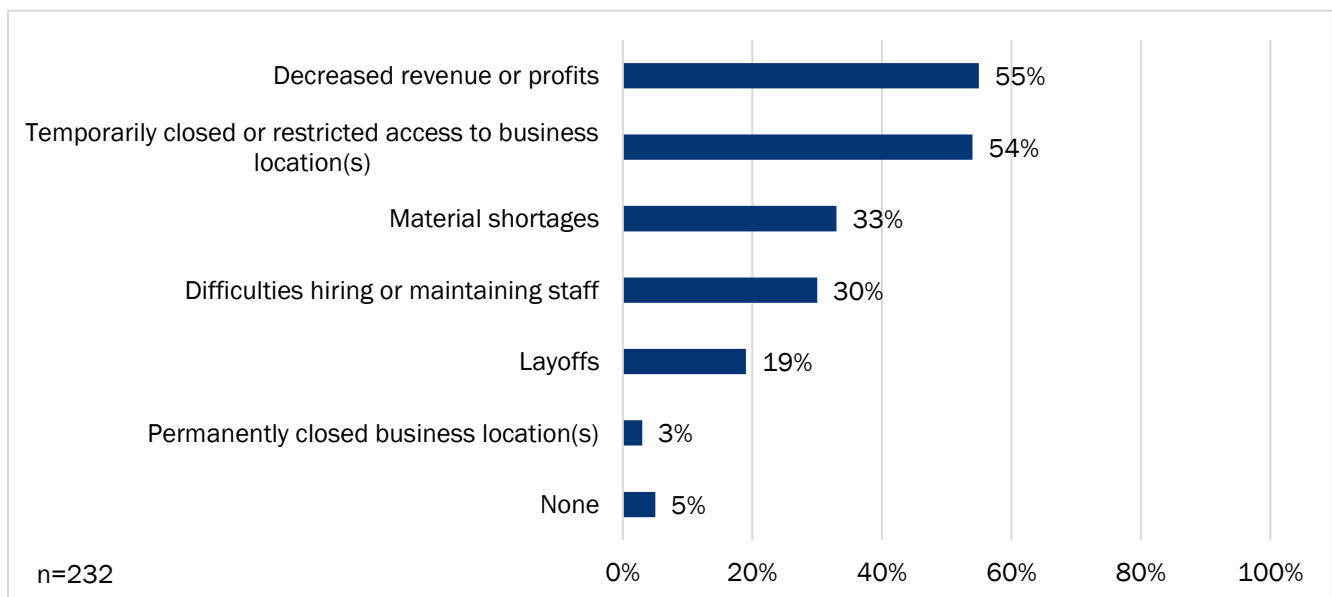
3.3.3   Gross Impact Results: Standard Program

This section summarizes gross impact results for the PY2020 Standard Incentive Program. Ex post gross savings are based on an engineering analysis of lighting measures and PY2019 evaluation results for non-lighting measures.

Table 17 compares ex ante and ex post first year and last year gross savings, at the program level. As shown, the program achieved first year ex post gross energy savings and demand savings of 82,832 MWh and 19.51 MW, respectively, as well as last year ex post demand savings of 0.04 MW in the <10 Year EUL category, 3.08 MW in the 10–14 Year EUL category, and 16.39 MW in the 15+ Year EUL category.

Table 17. PY2020 Standard Program Gross Impacts

	Ex Ante Gross	Gross RR	Ex Post Gross
First Year Savings			
Energy Savings (MWh)	85,129	97.3%	82,832
Demand Savings (MW)	18.50	105.5%	19.51
Last Year Demand Savings			
< 10 EUL (MW)	0.04	105.4%	0.04
10–14 EUL (MW)	2.82	109.1%	3.08
15+ EUL (MW)	15.64	104.8%	16.39

Most of the PY2020 savings for the Standard Program came from LED lighting, including LED linear tube retrofits, LED fixture retrofits, and LED lighting redesign. Five percent of the program ex post energy savings are from non-lighting measures, mostly from HVAC projects but also including motors, water heating, refrigeration, and cooking equipment.

Table 18 summarizes first year gross savings and realization rates by enduse.

Table 18. PY2020 Standard Program First Year Gross Savings by Enduse

Enduse	Energy Savings (MWh)			Demand Savings (MW)		
	Ex Ante	Gross RR	Ex Post	Ex Ante	Gross RR	Ex Post
Lighting	80,384	97.64%	78,486	15.26	102.11%	15.58
Other Linear LED	42,893	97.9%	42,000	8.15	101.8%	8.29
LED Replacing T12	17,162	95.6%	16,406	3.26	102.5%	3.34
Other Non-Linear LED	13,434	97.2%	13,064	2.55	102.0%	2.60
Lighting Redesign	5,242	101.9%	5,344	1.00	102.6%	1.02
LED Replacing Incandescent A-Lamp	1,315	101.2%	1,331	0.25	106.3%	0.27
Lighting Controls	294	101.3%	297	0.06	101.4%	0.06
Ext Lighting	39	100.0%	39	0.00	100.0%	0.00
LED Exit Sign	5	103.4%	5	0.00	142.3%	0.00
Non-Lighting	4,745	91.6%	4,346	3.24	121.4%	3.93
Total	85,129	97.3%	82,832	18.50	105.5%	19.51

Below, we provide additional detail on these results, organized by enduse.

Lighting Impacts

Based on the engineering analysis for lighting projects, we made the following adjustments to ex ante savings:

- **Waste Heat Factor (WHF) and Heating Penalty Interactive Factor (IF).** To capture the heating and cooling interactive impacts when calculating ex ante savings for interior lighting measures, the program implementer applies an HCIF of 1.07, encompassing both waste heat factors and heating penalties (referred to as WHF and IF, respectively, in the Ameren Missouri TRM). Notably, the HCIF is applied to both energy and demand savings, even though heating penalties are not relevant for demand savings. In contrast, the evaluation team used building type-specific assumptions, based on information reported in the program-tracking database and in accordance with the Ameren Missouri TRM:

  - For energy savings, the evaluation team applied building type-specific WHFs and IFs based on the Ameren Missouri TRM tables, resulting in lower ex post energy savings compared to ex ante.

  - For demand savings, the evaluation team applied building type-specific WHFs, resulting in higher ex post demand savings compared to ex ante.

  Based on our analysis, ex post WHFs ranged from 1.00 to 1.21 with an average value of 1.09 across all 6,988 records in the ex post analysis. In addition, 2,040 (21%) of the 6,988 records in the analysis were associated with sites identified as having electric heating based on building heat fuel source reported in the tracking database. Interactive electric heating factors (IFs) for the 6,988 records in the analysis range from 0 to -0.34, resulting in an average of -0.05. These average ex post WHF and IF values produce an average combined energy savings adjustment factor of 1.04, slightly lower than the ex ante HCIF of 1.07.

Table 19 presents lighting measure last year demand impacts by measure type and EUL category. As shown, the majority (88%) of last year demand savings comes from the 15+ Year EUL category, with linear LEDs (other than T12 replacements) accounting for the largest share.

Table 19. PY2020 Standard Program Annual Ex Post Energy and Demand Impacts for Lighting Measures

Measure Category	Last Year Ex Post Demand Savings (MW)			
	<10	10–14	15+	Total
Other Linear LED	-	1.30	6.99	8.29
LED Replacing T12	-	0.08	3.26	3.34
Other Non-Linear LED	0.04	0.22	2.34	2.60
Lighting Redesign	-	-	1.02	1.02
LED Replacing Incandescent A-Lamp	-	0.27	-	0.27
Lighting Controls	-	0.06	-	0.06
Ext Lighting	-	0.00	0.00	0.00
LED Exit Sign	0.00	-	-	0.00
Total	0.04	1.92	13.62	15.58

Non-Lighting Impacts

The non-lighting realization rates of 91.6% for energy savings and 121.4% for demand savings are based on the PY2019 gross impact analysis, which included desk reviews and/or onsite visits for a sample of 10 non-lighting projects. In PY2020, non-lighting measures represented 6% of Standard program ex ante energy savings.

3.3.4   Gross Impact Results: Custom Program

This section summarizes gross impact results for the PY2020 Custom Incentive Program. Ex post gross savings are estimated by enduse, relying on a combination of calculated and deemed realization rates. For lighting and compressed air measures we apply the PY2019 realization rates (which had strong relative precision values). We conducted desk reviews and onsite visits for a sample of PY2020 projects to develop enduse-specific realization rates for the HVAC, Motors, and "Other" measures (where "Other" consists of Building Shell, Process, Refrigeration, and Water Heating measures). Calculated realization rates are based on a desk review and onsite sample of 29 projects, consisting of 15 HVAC projects, 7 motor projects, and 7 Other projects, extrapolated to the population within an enduse.

Table 20 compares ex ante and ex post first year and last year gross savings, at the program level. As shown, the program achieved first year ex post gross energy savings and demand savings of 34,010 MWh and 15.18 MW, respectively, as well as last year ex post demand savings of 0.34 MW in the 10–14 Year EUL category and 14.84 MW in the 15+ Year EUL category.

Table 20. PY2020 Custom Program Gross Impacts

	Ex Ante Gross	Gross RR	Ex Post Gross
First Year Savings			
Energy Savings (MWh)	35,049	97.0%	34,010
Demand Savings (MW)	15.47	98.1%	15.18
Last Year Demand Savings			
< 10 EUL (MW)	-	n/a	-
10–14 EUL (MW)	0.39	88.4%	0.34
15+ EUL (MW)	15.08	98.4%	14.84

Most of the PY2020 savings for the Custom Program come from HVAC projects, with motors and lighting projects accounting for the next largest shares of savings. Table 21 summarizes first year gross savings and realization rates by enduse.

Table 21. PY2020 Custom Program First Year Gross Savings by Enduse

Measure Category	Energy Savings (MWh)			Demand Savings (MW)		
	Ex Ante	Gross RR	Ex Post	Ex Ante	Gross RR	Ex Post
HVAC	20,756	99.6%	20,665	12.92	98.4%	12.72
Motors	4,016	97.6%	3,921	1.08	98.6%	1.06
Lighting	3,779	93.4%	3,530	0.53	99.5%	0.53
Compressed Air	3,020	100.1%	3,023	0.42	100.1%	0.42
All Other [a]	3,478	82.6%	2,871	0.52	87.2%	0.45
Total	35,049	97.0%	34,010	15.47	98.1%	15.18

[a] The "Other" enduse includes building shell, process, refrigeration, and water heating.

- **HVAC:** HVAC is the largest enduse within the Custom Program, and—due to their cooling season operation—provides a significant amount of peak demand savings. The gross energy and demand realizations rates for Custom HVAC measures are 99.6% and 98.4%, respectively. The energy and demand realization rates for sampled Custom HVAC projects ranged from 64% to 133%, indicating a wide variety of evaluation results at the project level.

■ For most projects, the measure was installed and is operating as expected. The evaluation, however, found some discrepancies between the equipment parameters used in the ex ante savings analysis and the equipment information observed through project documents (e.g., invoices) and through onsite visual inspections.

■ **Motors:** The gross energy and demand realizations rate for Custom Motors measures are 97.6% and 98.6%, respectively. The energy and demand realization rates for sampled Custom motors projects ranged from 75% to 133%.

   ■ The largest discrepancy was due to a difference in the equipment specifications used between the ex ante and ex post analysis. The ex ante analysis used a general efficiency value; and the ex post analysis used equipment-specific efficiency values based on equipment model information.

■ **Other (Building Shell, Process, Refrigeration, Water Heating):** The gross energy and demand realizations rate for custom building shell, process, refrigeration, and water heating measures are 82.6% and 87.2%, respectively. The energy and demand realization rates for sampled Custom Other projects ranged from 5% to 109%.

   ■ The 5% realization rate is due to a project that claimed savings for the removal of refrigeration equipment without replacement. The equipment removal was due to a business strategic change to no longer offer products that required low-temperature refrigeration.

   ■ Another project had a low realization rate due to inconsistencies between the equipment specifications used in the ex ante savings analysis and the as-built equipment specifications.

   ■ Savings were also reduced for a project upgrading the injection molding machines (IMMs) at a manufacturing facility. The ex ante analysis compared energy consumption levels for baseline and proposed equipment but had not normalized those energy consumption estimates for the same level of production. The ex post analysis made this adjustment to model baseline and as-built performance for the same production or output level.

For Custom Lighting and Compressed Air measures, the realization rates are based on the PY2019 evaluation.

Additional details on the onsite findings, ex post analysis methods, and reasons for discrepancies are available in the individual site reports in Appendix B.

3.3.5 Net Impact Results

Net-to-Gross Results

The evaluation team conducted research with 205 Standard Program participants and 45 Custom Program participants to develop NTGRs for PY2020. We estimate the program-level NTGR to be 85.0% for the Standard Program and 82.4% for the Custom Program. Table 22 presents the individual NTG components (i.e., FR, PSO, and MPSO) and the resulting NTGRs for both programs. The NTGR is calculated as 1 – FR + PSO + MPSO.

Table 22. Summary of Standard and Custom NTG Results

Program [a]	Free Ridership	Participant SO	Market Partner SO	NTGR [a]
Standard	16.2%	0.27%	0.91%	85.0%
Custom	18.6%	0.11%		82.4%

[a] NTGR = 1 – FR + PSO + MPSO

Free Ridership

A total of 196 Standard Program participants and 43 Custom Program participants provided valid responses to the FR questions in the participant survey and were included in the FR analysis.[23] Using the algorithm summarized in Chapter 2 we estimate program-level FR to be 16.2% for the Standard Program and 18.6% for the Custom Program.

We attempted a census of unique project contacts for both the programs. As such, the concept of sampling precision does not apply. Table 23 summarizes the FR estimates for the Standard and Custom programs.

Table 23. Summary of Standard and Custom FR Estimates

Program	n	Free Ridership
Standard	196	16.2%
Custom	43	18.6%

Participants' FR related survey responses show the following:

- **Efficiency:** Surveyed participants generally reported a high degree of program influence on the efficiency level of their projects, resulting in savings-weighted Efficiency FR Scores of 0.29 for the Standard Program and 0.30 for the Custom Program.

- **Quantity:** The program had a significant influence on the scope of many incented projects. Respondents reported that 55% of the Standard incented measures and 34% of the Custom incented measures would not have been installed at the same time without the program.

- **Timing:** Similar to the program's influence on quantity, participants reported that the program was responsible for accelerating their projects. The resulting timing adjustment factors, applied to the quantity that participants would not have installed at the same time without the program, were 0.50 for the Standard Program and 0.67 for the Custom Program.[24]

- **Quantity and Timing Adjustment:** Combining the responses to the quantity and timing questions resulted in overall Quantity and Timing Adjustments of 0.69 for the Standard Program and 0.78 for the Custom Program, meaning that the programs can claim credit for 31% (1 − 0.69 = 0.31) of Standard savings and 22% (1 − 0.78 = 0.22) of Custom savings that would be considered free rider savings based on efficiency alone.

Figure 8 summarizes FR results for the Standard and Custom programs. The figure reflects the final COVID Adjustment of 0.80 that was applied to the FR values estimated based on the survey responses. As described in Chapter 2, this adjustment reflects the un-measured program influence on preventing project delays and cancellations during the COVID-19 pandemic. This value was applied because we observed unexpected levels of FR for these programs, which appeared inconsistent with the economic conditions created by the COVID-19 pandemic and results from Opinion Dynamics' COVID-related market research (conducted in the summer of 2020).

---

[23] Nine Standard Program participants and two Custom Program participants were excluded from the FR analysis due to incomplete responses.
[24] A higher factor means a lower adjustment, i.e., less program influence on the timing of the project.

Figure 8. Free Ridership Results – Standard and Custom
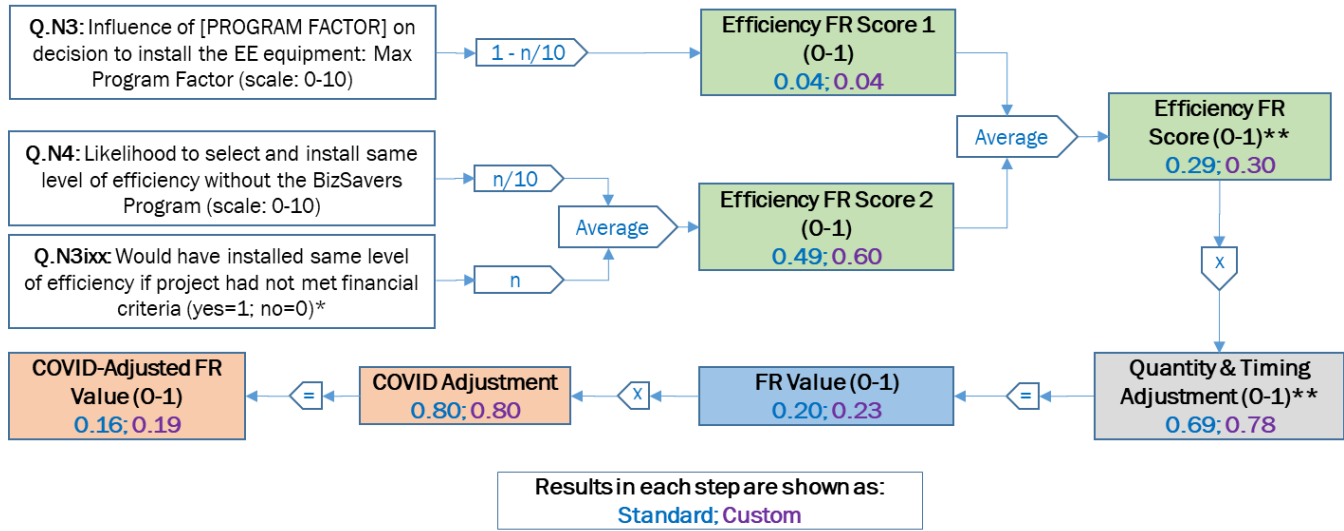
Participant Spillover

A total of 250 Standard and Custom participants completed the spillover questions in the participant survey and were included in the PSO analysis. Most of these participants (80%) did not install any additional energy efficiency measures without receiving an incentive or did install additional measures but were not significantly influenced by the program (15%). Ten respondents (4%) qualified for PSO; eight were PY2020 participants in the Standard Program only, one was a participant in the Custom Program only, and one participated in both programs.

Figure 9 summarizes the analysis of PSO eligibility.

Figure 9. Participant Eligibility for Spillover - Results
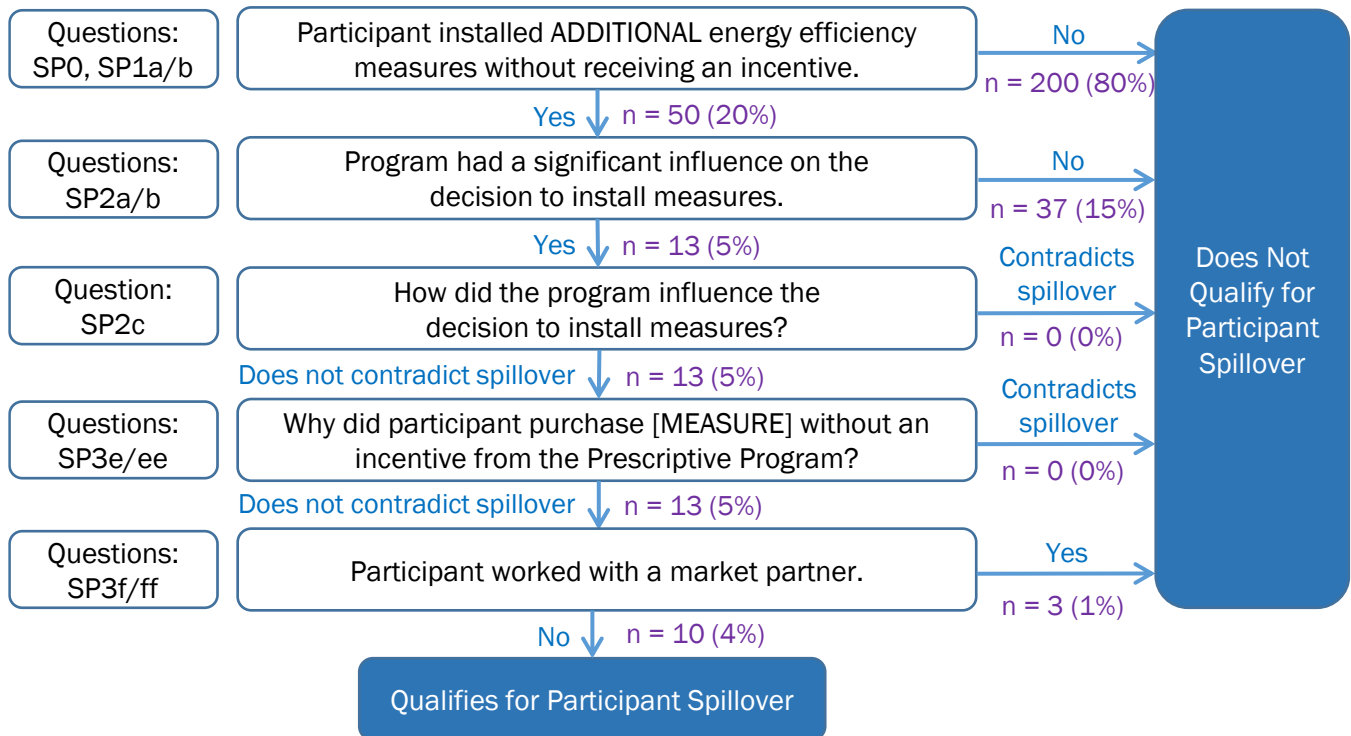
We estimated spillover savings for the ten respondents with PSO, using TRM algorithms and a combination of survey responses and deemed savings assumptions. In addition, we also conducted follow-up calls with respondents who agreed to being contacted, which allowed us to collect additional information on the completed installations. In a few cases, we were not able to reach respondents and did not have sufficient information to estimate spillover savings for their reported spillover measures. For these respondents, we applied the average savings of the projects for which we could estimate savings.

Table 24 summarizes the PSO measures, our analysis approach, and the resulting savings for the Standard and Custom programs.

Table 24. Summary of Standard and Custom Measure-Level Participant Spillover

Respondent	Measure	Quantity	Analysis Summary	kWh per Unit	Total kWh	
					Standard	Custom
#1	Exterior LEDs	8	Engineering analysis*	1,004	8,031	--
	Exterior LEDs	12	Engineering analysis*	257	3,085	
#2	Linear LEDs	12	Engineering analysis*	153	1,832	
#3	LED Lamps	12	Engineering analysis*	88	1,055	
#4	Nonlinear LEDs	4	Engineering analysis*	133	531	
#5	Linear LEDs	2	Engineering analysis*	140	280	
#6a	Wall Insulation	1	Engineering analysis* Savings algorithms from the Pennsylvania TRM.[b]	322	161	161
#7	Skylight	20	Engineering analysis*	336		6,721

Respondent	Measure	Quantity	Analysis Summary	kWh per Unit	Total kWh	
					Standard	Custom
	Compressor Waste Heat	1	Respondent indicated gas heat; no eligible spillover savings	0		0
#8	AC Unit	DK	Average PSO value (unable to reach participant)		2,428	
#9	Motor Controllers	DK	Average PSO value (unable to reach participant)		2,428	
#10	New Appliances	DK	Average PSO value (unable to reach participant)		2,428	
				Total	22,260	6,882

* Analysis based on survey responses and Ameren Missouri deemed savings assumptions.

a Respondent participated in both the Standard and Custom programs; spillover savings are divided between both programs.

b Pennsylvania PUC. Technical Reference Manual Volume 3: Commercial and Industrial Measures. February 2021. http://www.puc.pa.gov/filing_resources/issues_laws_regulations/act_129_information/technical_reference_manual.aspx

To determine the PSO Rate for each program, we divided PSO savings for that program by the total ex post gross savings of the sampled projects completed by the survey respondents for that program. This calculation yielded a PSO rate of 0.27% for the Standard Program and 0.11% for the Custom Program.

$$\text{Standard PSO Rate} = \frac{\text{Standard PSO}}{\text{Standard Ex Post Gross Impacts}} = \frac{22{,}260 \text{ kWh}}{8{,}280{,}146 \text{ kWh}} = 0.27\%$$

$$\text{Custom PSO Rate} = \frac{\text{Custom PSO}}{\text{Custom Ex Post Gross Impacts}} = \frac{6{,}882 \text{ kWh}}{6{,}207{,}854 \text{ kWh}} = 0.11\%$$

Market Partner Spillover

The PY2020 evaluation did not include development of a new market partner spillover estimate. Instead, we applied the MPSO rate of 0.91% from the PY2019 evaluation.

Net Impacts

The evaluation team applied the PY2020 NTGRs to ex post gross savings to determine net impacts for the PY2020 Standard and Custom programs. Table 25 presents PY2020 first year ex post net impacts for the two programs, by enduse. The Standard Program generated 70,390 MWh of net energy savings and 16.58 MW of net demand savings, while the Custom Program generated 28,031 MWh of net energy savings and 12.51 MW of net demand savings.

Table 25. PY2020 Standard and Custom Program Annual First Year Net Impacts

Enduse	Energy Savings			Demand Savings		
	Ex Post Gross (MWh)	NTGR	Ex Post Net (MWh)	Ex Post Gross (MW)	NTGR	Ex Post Net (MW)
Standard Incentive Program						
Lighting	78,486	85.0%	66,697	15.58	85.0%	13.24
Non-Lighting	4,346		3,693	3.93		3.34
Total Standard	**82,832**	**85.0%**	**70,390**	**19.51**	**85.0%**	**16.58**
Custom Incentive Program						
HVAC	20,665		17,032	12.72		10.48
Motors	3,921		3,231	1.06		0.87
Lighting	3,530	82.4%	2,909	0.53	82.4%	0.44
Compressed Air	3,023		2,492	0.42		0.34
Other	2,871		2,366	0.45		0.37
Total Custom	**34,010**	**82.4%**	**28,031**	**15.18**	**82.4%**	**12.51**

Table 26 presents PY2020 last year ex post net demand impacts, by enduse and EUL category. The Standard Program accounted for 0.03 MW in the <10 Year EUL category, 2.62 MW in the 10–14 year EUL category, and 13.93 MW in the 15+ Year EUL category, while the Custom Program accounted for 0.28 MW in the 10–14 year EUL category and 12.23 MW in the 15+ Year EUL category. For both programs, the majority of ex post net savings are associated with the 15+ year EUL category.

Table 26. PY2020 Standard and Custom Program Annual Last Year Net Demand Impacts

Enduse	Ex Post Gross (MW)			NTGR	Ex Post Net (MW)		
	<10	10–14	15+		<10	10–14	15+
Standard Incentive Program							
Lighting	0.04	1.92	13.62	85.0%	0.03	1.63	11.58
Non-Lighting	-	1.16	2.77		-	0.99	2.35
Total Standard	**0.04**	**3.08**	**16.39**	**85.0%**	**0.03**	**2.62**	**13.93**
Custom Incentive Program							
HVAC	-	0.03	12.68		-	0.03	10.45
Motors	-	-	1.06		-	-	0.87
Lighting	-	0.01	0.52	82.4%	-	0.01	0.43
Compressed Air	-	0.00	0.41		-	0.00	0.34
Other	-	0.30	0.15		-	0.25	0.13
Total Custom	**-**	**0.34**	**14.84**	**82.4%**	**-**	**0.28**	**12.23**

4. Small Business Direct Install Program

This chapter summarizes the PY2020 evaluation methodology and results for the SBDI Program. The PY2020 evaluation of the SBDI Program included an engineering analysis of lighting measures. It did not include an assessment of program attribution or program processes. Additional details on the evaluation methodology are presented in Chapter 2.

4.1 Evaluation Summary

The SBDI Program is designed to promote the installation of energy-efficient technologies in small businesses by removing barriers such as high upfront cost, lack of knowledge, and lack of time and resources to investigate energy efficiency opportunities. The target market includes small non-residential customers with a Small General Service Rate 2(M), including commercial and institutional customers but excluding multifamily customers.

The SBDI Program encourages small business customer participation through a simple, immediate, and streamlined program process. A group of SBDI Program Service Providers delivers the energy-efficient measures at low-cost to small business customers. These Service Providers supply, install, and finalize paperwork for eligible participants, and are tasked with identifying additional energy efficiency opportunities not covered under the SBDI Program.

The SBDI Program is an ongoing program from MEEIA Cycle II. In PY2019, program-eligible measures were limited to LED lighting and smart thermostats. In PY2020, the program introduced the following changes:

- Added new measures:
    - HVAC measures (air-cooled chillers, advanced roof top unit controls, and demand controlled ventilation) at the start of PY2020
    - Occupancy sensors in mid-2020
    - Exterior lighting (in combination with interior lighting projects) in the fall of 2020;
- Increased the incentive cap from $3,500 to $5,000 (per Ameren Missouri customer per cycle);
- Developed a simplified, stand-alone HVAC application form; and
- Extended the application due date from 30 to 90 days of the invoice date.

4.1.1 Participation Summary

During PY2020, the SBDI Program provided incentives to 323 unique small businesses for a total of 381 projects,[25] resulting in 5,565 MWh of ex ante gross energy savings. This level of participation and savings represents a decrease from PY2019, which saw a total of 452 projects and 6,385 MWh in ex ante gross savings.

In PY2019, all incentives provided through the SBDI Program were for lighting measures. PY2020 program activity was still dominated by lighting (accounting for 99.8% of ex ante gross savings) but also included four projects with HVAC measures (smart thermostats). Notably, 54% of SBDI projects were implemented at tenant-

---

[25] Unique businesses are defined at the company level, rather than the location level (i.e., a company that participated at more than one location is only counted once).

occupied buildings, a traditionally hard-to-reach population. Overall, 23 Service Providers completed SBDI projects in PY2020, with the most active three providers accounting for 63% of all projects.

Table 27 summarizes PY2020 SBDI Program participation by end use, including the number of projects and ex ante gross energy savings.

Table 27. PY2020 SBDI Program Participation Summary

Enduse	Projects		Ex Ante MWh	
	Number	**%**	**Number**	**%**
Lighting	377	99.0%	5,555	99.8%
HVAC	4	1.0%	10	0.2%
Total	**381**	**100%**	**5,565**	**100%**

Project starts and completions for the SBDI Program were very volatile over the program year (see Figure 10), averaging approximately 30 projects per month. After a strong performance in February and particularly March of 2020, program activity plummeted in April, May, and June, likely due to the impacts of COVID-19. Program activity recovered slightly over the summer and finished the year strong with the highest number of project completions (84) in December.

Figure 10. PY2020 SBDI Program Monthly Project Starts and Completions
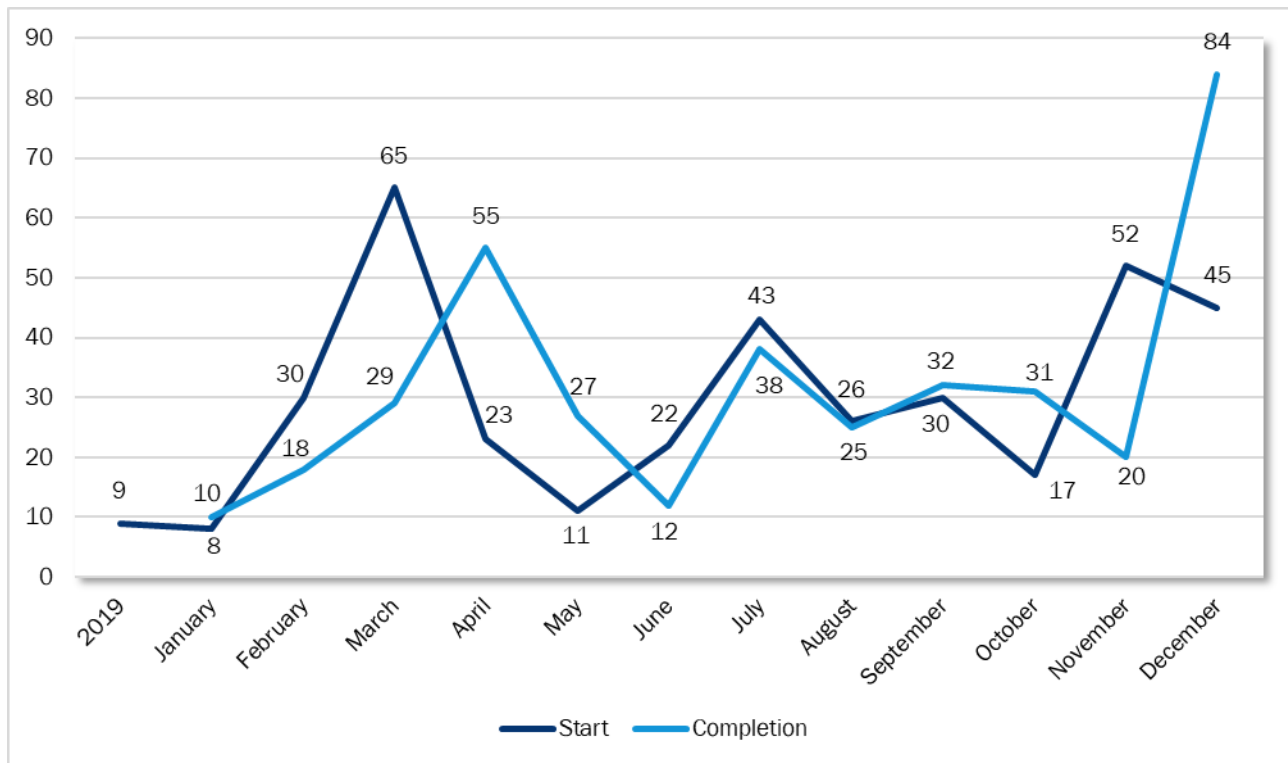
4.1.2   Key Impact Results

The SBDI Program was the smallest of the non-income qualified programs in Ameren Missouri's Business Portfolio in PY2020, contributing 4% of first year ex post net energy savings and 3% of first year ex post net demand savings.

Table 28 summarizes first year and last year annual gross and net savings for the SBDI Program in PY2020. As shown, the program achieved 47% and 55%, respectively, of Ameren Missouri's first year net energy and demand savings goals, and 48%, 8%, and 88%, respectively, of Ameren Missouri's last year net demand savings targets in the <10 Year EUL, 10–14 Year EUL and 15+ Year EUL categories.

Table 28. PY2020 SBDI Savings Summary

	Ex Ante Gross	Gross RR	Ex Post Gross	NTGR	Ex Post Net	Goal/Target Net	% of Goal/Target
First Year Savings							
Energy Savings (MWh)	5,565	97.8%	5,442	87.8%	4,778	10,118	47%
Demand Savings (MW)	1.06	102.5%	1.09	87.8%	0.96	1.75	55%
Last Year Savings							
< 10 EUL (MW)	0.01	103.3%	0.01	87.8%	0.01	0.01	48%
10–14 EUL (MW)	0.06	101.8%	0.07	87.8%	0.06	0.72	8%
15+ EUL (MW)	0.99	102.5%	1.02	87.8%	0.89	1.02	88%

The PY2020 SBDI Program achieved gross realization rates of 97.8% and 102.7% for first year energy and demand savings, respectively. Realization rates for last year demand savings ranged between 101.8% in the 10–14 Year EUL category to 103.3% in the <10 Year EUL category. The PY2020 gross impact analysis included an engineering analysis for lighting measures but applied default realization rates of 100% for non-lighting measure energy and demand savings.

Energy RRs are driven by the ex post application of building-type-specific energy WHFs and electric heating penalties, where applicable, versus the application of a modeled HCIF of 1.07 in the ex ante analysis. Demand RRs are driven solely by the ex post application of building type-specific WHFs where the ex ante analysis applies a HCIF of 1.07.

The PY2020 evaluation did not include development of a new NTGR for the SBDI Program. Instead, we applied the NTGR of 87.8% from the PY2019 evaluation.

4.1.3   Key Process Findings

The PY2020 evaluation did not include an assessment of program processes for the SBDI Program.

4.1.4   Conclusions and Recommendations

Based on the results of this evaluation, the evaluation team offers the following conclusions and recommendations for the SBDI Program:

- **Conclusion #1:** PY2020 saw a downturn in program participation and savings relative to PY2019, likely a result of the COVID-19 pandemic. As a result, the program fell well short of its savings goals, with 47% of first year net energy savings and 55% of first year net demand savings achieved. The program

continued to be successful in encouraging participation by renters, a traditionally hard-to-reach population, with 54% of PY2020 SBDI projects implemented in tenant-occupied buildings.

■ **Conclusion #2:** The program implementer uses an average HCIF of 1.07 to estimate ex ante energy and demand savings for interior lighting measures, regardless of building type or HVAC system type. In contrast, the evaluation team applied building- and HVAC-type-specific WHFs and Heating Penalty Interactive Factors (IFs) based on the tracked building and system types for each project and specifications in the Ameren Missouri TRM Appendix H. Across all projects, the average combined ex post energy savings adjustment (WHF plus IF) was 1.04, and the average ex post demand savings adjustment (WHF only) was 1.09.

   ■ **Recommendation:** To improve the accuracy of ex ante savings, we recommend that the implementer either (1) apply building-type-specific WHF and IF values (as stipulated in the TRM and done in the ex post analysis); or (2) develop and apply separate HCIFs that account for both cooling and heating interaction for annual energy savings and that account for the cooling interaction only for demand savings. Based on the engineering analysis across prescriptive lighting measures in the Standard, SBDI, and BSS programs, we recommend an energy factor of 1.04 and a demand factor of 1.09.

■ **Conclusion #3:** The building types used in the implementer's database do not align with the Ameren Missouri TRM building type list. Building types are used in various TRM engineering algorithms, including those for interior lighting measures.

   ■ **Recommendation:** To improve consistency with the Ameren Missouri TRM, we recommend that the implementer update the "Building Type" field in the program-tracking database to match the building types used in the Ameren Missouri TRM Appendix H.

4.2   SBDI Evaluation Methodology

Table 29 provides an overview of the PY2020 evaluation activities for the SBDI Program. Most of these activities are similar across the various business programs and were described in Chapter 2. The sections following the table highlight program-specific aspects of key evaluation activities.

Table 29. PY2019 Evaluation Activities for the SBDI Program

Evaluation Activity	Description
Program Manager and Implementer Interviews	▪ Conducted interviews in January 2020 to inform evaluation planning and in December 2020 to understand program staff's perspective on program performance.
Program Material Review	▪ Reviewed program materials to understand program changes relative to PY2019.
EUL Review and Analysis (Lighting Measures)	▪ Leveraged rated lighting equipment lifetime and annual HOU from the program tracking database to calculate EULs. ▪ Reviewed multiple TRMs to compare EULs used in other jurisdictions with those used in the PY2019 evaluation. ▪ Developed EUL recommendations to apply in PY2020 and future evaluations.
Engineering Analysis (Lighting Measures)	▪ Verified that ex ante savings use correct TRM values and algorithms and reviewed custom calculations where appropriate. ▪ Developed HOU and ISR adjustment factors, based on results of the PY2019 evaluation. ▪ Developed ex post savings using TRM algorithms, deemed savings assumptions, and site-specific parameters.
Net Impact Analysis	▪ Estimated PY2020 net impacts, using the PY2019 NTGR.

4.2.1 EUL Review and Analysis

The PY2020 evaluation included a review and update of EULs for prescriptive lighting measures used in the PY2019 evaluation. We developed PY2020 EUL recommendations based on lighting equipment lifetime and HOU for lighting measures in the program-tracking database while also leveraging TRMs of other jurisdictions to compare EULs. In this report, we applied the PY2020 EUL recommendations when summarizing both ex ante and ex post last year demand savings by EUL category.

4.2.2 Engineering Analysis

We conducted an engineering analysis of all SBDI Program lighting measures to estimate ex post gross program savings. We first reviewed program-tracking data to verify correct TRM algorithms and savings assumptions were used to calculate ex ante savings. We then calculated ex post savings using Ameren Missouri TRM algorithms, deemed savings assumptions, and site-specific parameters from the program-tracking database.

For the 15 smart thermostats incented through the program, accounting for 0.2% of the program's ex ante gross savings, we applied a default realization rate of 100% since no evaluated value from PY2019 was available.[26]

Hours of Use Adjustment

As part of the engineering analysis for lighting projects, we explored whether to apply an HOU adjustment, based on results from the PY2019 desk review sample of SBDI Program lighting projects. This analysis found that while measure-level and project-level evaluated HOU sometimes vary from program-tracked HOU, there was no statistically significant difference (at 90% confidence) between the estimates at the program level. As such, we applied an HOU adjustment factor of 1.0 as part of the PY2020 engineering analysis.

In-Service Rate

Similar to the HOU adjustment, we explored whether to apply ISRs in the ex post analysis, based on results from the PY2019 desk reviews. Specifically, we investigated whether the program-level ISR in PY2019 was statistically different from 1.0. This analysis showed that the PY2019 lighting ISR was not statistically different from 1.0, at 90% confidence. As such, the PY2020 ex post analysis for SBDI lighting measures used an ISR of 1.0.

4.3 SBDI Evaluation Results

4.3.1 Process Results

The PY2020 evaluation did not include an assessment of SBDI Program processes.

---

[26] The PY2019 program only incented lighting measures.

4.3.2   Gross Impact Results

This section summarizes gross impact results for the PY2020 SBDI Program. Ex post gross savings are based on an engineering analysis of lighting measures and the application of a default realization rate of 100% for non-lighting measures.

Table 30 compares ex ante and ex post first year and last year gross savings, at the program level. As shown, the program achieved first year ex post gross energy and demand savings of 5,442 MWh and 1.09 MW, respectively, as well as last year ex post demand savings of 0.01 MW in the <10 Year EUL category, 0.07 MW in the 10–14 Year EUL category, and 1.02 MW in the 15+ Year EUL category.

Table 30. PY2020 SBDI Gross Impacts

	Ex Ante Gross	Gross RR	Ex Post Gross
First Year Savings			
Energy Savings (MWh)	5,565	97.8%	5,442
Demand Savings (MW)	1.06	102.5%	1.09
Last Year Savings			
< 10 EUL (MW)	0.01	103.3%	0.01
10–14 EUL (MW)	0.06	101.8%	0.07
15+ EUL (MW)	0.99	102.5%	1.02

Table 31 summarizes first year gross savings and realization rates by enduse. As noted above, almost all (98.8% of ex post energy savings) come from lighting measures.

Table 31. PY2020 SBDI Program First Year Gross Savings by Enduse

Enduse	Energy Savings (MWh)			Demand Savings (MW)		
	Ex Ante	Gross RR	Ex Post	Ex Ante	Gross RR	Ex Post
Lighting	5,555	97.8%	5,432	1.06	102.5%	1.08
Non-Lighting	10	100.0%	10	0.01	100.0%	0.01
Total	5,565	97.8%	5,442	1.06	102.5%	1.09

Below, we provide additional detail on these results.

Lighting Impacts

Most of the PY2020 savings for the SBDI Program came from LED lighting, including LED linear tube retrofits, LED fixture retrofits, and omni-directional A19 LED bulbs. Based on the engineering analysis for lighting measures, we made the following adjustments to ex ante savings assumptions:

- **Waste Heat Factor (WHF) and Heating Penalty Interactive Factor (IF).** To capture the heating and cooling interactive impacts when calculating ex ante savings for interior lighting measures, the program implementer applies an HCIF of 1.07, encompassing both waste heat factors and heating penalties (referred to as WHF and IF, respectively, in the Ameren Missouri TRM). Notably, the HCIF is applied to both energy and demand savings, even though heating penalties are not relevant for demand savings. In contrast, the evaluation team used building-type-specific assumptions, based on information reported in the program-tracking database and in accordance with the Ameren Missouri TRM:

■ For energy savings, the evaluation team applied building-type-specific WHFs and IFs based on the Ameren Missouri TRM tables, resulting in lower ex post energy savings compared to ex ante.

■ For demand savings, the evaluation team applied building-type-specific WHFs, resulting in higher ex post demand savings compared to ex ante.

Based on our analysis, ex post WHFs ranged from 1.00 to 1.11 with an average value of 1.09 across all 1,297 records in the ex post analysis. In addition, 372 of the 1,297 (29%) records in the analysis were associated with sites identified as having electric heating based on the building's heat fuel source reported in the program-tracking database. IFs for the 1,297 records in the analysis range from 0 to -0.34, resulting in an average across all sampled projects of -0.05. These average ex post WHF and IF values produce an average combined energy savings adjustment factor of 1.04, lower than the ex ante HCIF of 1.07.

Table 32 presents first year ex post gross energy and demand savings by lighting measure type. As shown, almost three-quarters of both energy and demand savings come from linear LEDs replacing T12s.

Table 32. PY2020 SBDI Ex Post Gross Savings by Lighting Category

Measure Category	Energy Savings		Demand Savings	
	MWh	%	MWh	%
LED Replacing T12	3,979	73%	0.79	73%
Other Non-Linear LED	771	14%	0.15	14%
Other Linear LED	557	10%	0.11	11%
LED Replacing Incandescent A-Lamp	102	2%	0.02	2%
Lighting Controls	23	<1%	<0.01	<1%
LED Exit Sign	1	<1%	<0.01	<1%
Total	5,432	100%	1.08	100%

Non-Lighting Impacts

We applied a default realization rate of 100% to develop ex post energy and demand savings for SBDI non-lighting measures. In PY2019, all measures incented through the SBDI Program were lighting measures. As a result, the PY2019 evaluation did not develop a realization rate for non-lighting measures. In PY2020, non-lighting measures represented only 0.2% of SBDI program ex ante energy savings.

4.3.3   Net Impact Results

The PY2020 evaluation did not include development of a new NTGR for the SBDI Program. Instead, the PY2020 evaluation leveraged the results of the PY2019 evaluation, which estimated a program-level NTGR of 87.8% (comprised of a FR value of 12.8% and a PSO value of 0.6%).

The evaluation team applied the PY2019 NTGR to PY2020 gross impacts to determine net impacts for the PY2020 SBDI Program. Table 33 presents the first year net energy and demand impacts, showing a total of 4,778 MWh of energy savings and 0.96 MW of demand savings.

Table 33. PY2020 SBDI Annual First Year Net Impacts

Measure Category	Energy Savings			Demand Savings		
	Ex Post Gross (MWh)	NTGR	Ex Post Net (MWh)	Ex Post Gross (MW)	NTGR	Ex Post Net (MW)
LED Replacing T12	3,979		3,494	0.79		0.69
Other Non-Linear LED	771		677	0.15		0.13
Other Linear LED	557		489	0.11		0.10
LED Replacing Incandescent A-Lamp	102	87.8%	89	0.02	87.8%	0.02
Lighting Controls	23		20	<0.01		<0.01
LED Exit Sign	1		<1	<0.01		<0.01
HVAC	10		9	0.01		0.01
Total	5,442	87.8%	4,778	1.09	87.8%	0.96

Table 34 presents the last year ex post gross and ex post net demand impacts by measure type and EUL category. The program attained most of its last year demand savings (0.89 MW, or 77%) in the 15+ Year EUL category.

Table 34. PY2020 SBDI Annual Last Year Net Demand Impacts

Measure Category/Enduse	Ex Post Gross (MW)			NTGR	Ex Post Net (MW)		
	< 10	10–14	15+		< 10	10–14	15+
LED Replacing T12	-	0.00	0.79		-	0.00	0.69
Other Non-Linear LED	0.01	0.03	0.12		0.01	0.02	0.10
Other Linear LED	-	0.00	0.11		-	0.00	0.10
LED Replacing Incandescent A-Lamp	-	0.02	-	87.8%	-	0.02	-
Lighting Controls	-	0.00	-		-	0.00	-
LED Exit Sign	0.00	-	-		0.00	-	-
HVAC	-	0.01	-		-	0.01	-
Total	0.01	0.07	1.02	87.8%	0.01	0.06	0.89

5.   New Construction Program

This section summarizes the PY2020 evaluation methodology and results for the New Construction Program. The PY2020 evaluation of the New Construction Program included in-depth desk reviews for a sample of six New Construction projects. The evaluation included assessment of program attribution but did not assess program processes. Additional details on the evaluation methodology are presented in Chapter 2. Appendix C includes detailed desk review findings.

5.1   Evaluation Summary

The New Construction Program is designed to promote cost-effective, energy-efficient design in nonresidential new construction and major renovation projects in the Ameren Missouri service territory. The program provides a financial incentive for projects to incorporate measures and design elements that reduce the projected annual energy use of the new building compared to a project-specific baseline, usually defined by the minimum requirements of building codes.

In PY2020, participants could choose from three types of energy efficiency incentives: installed interior lighting, custom measures, and whole building performance modeling. The program offers interior lighting incentives to participants who reduce the lighting power density (LPD) of the new building relative to the approved baseline.[27] All other non-lighting energy efficiency measures are eligible for custom incentives. All measures incentivized by the program must demonstrate reliable and cost-effective energy savings potential. Participants who choose to perform a whole building energy simulation of their project can receive the whole building performance incentive.

The PY2020 New Construction Program is an ongoing program from MEEIA Cycle II. Incentive levels for the LPD channel remained consistent with PY2019 while custom incentives are, by design, consistent with those offered in the Custom Incentive Program.

5.1.1   Participation Summary

In PY2020 the New Construction Program served 37 projects covering five enduses. Almost all projects (95%) included lighting, yet this enduse accounts for just 60% of program level ex ante savings. Table 35 presents PY2020 participation and ex ante gross energy savings in the New Construction Program by enduse.

Table 35. PY2020 New Construction Participation Summary

Enduse	Projects [a]		Ex Ante Gross Savings	
	Number	%	MWh	%
Lighting	35	95%	9,008	60%
HVAC	15	41%	4,710	31%
Refrigeration	1	3%	1,344	9%
Compressed Air	1	3%	43	<1%
Total	37	100%	15,106	100%

[a] Sums to more than 100% due to projects containing more than one endues.

---

[27] The LPD baseline may be calculated on a space-by-space basis or using the whole building.

5.1.2   Key Impact Results

In PY2020 the New Construction Program achieved 118% and 115%, respectively, of Ameren Missouri's first year net energy savings and demand savings goals, and less than 1% and 127%, respectively, of Ameren Missouri's last year net demand savings targets in the 10-14 Year EUL and 15+ Year EUL categories. Table 36 presents first year and last year annual savings achieved in PY2020.

Table 36. PY2020 New Construction Savings Summary

	Ex Ante Gross	Gross RR	Ex Post Gross	NTGR	Ex Post Net	Goal/Target Net	% of Goal/Target
First Year Savings							
Energy Savings (MWh)	15,106	97.0%	14,655	70.0%	10,258	8,660	118%
Demand Savings (MW)	4.36	86.6%	3.78	70.0%	2.64	2.30	115%
Last Year Demand Savings							
<10 EUL (MW)	-	n/a	-	n/a	-	-	n/a
10-14 EUL (MW)	-	n/a	-	n/a	-	0.21	<1%
15+ EUL (MW)	4.36	86.6%	3.78	70.0%	2.64	2.09	127%

Based on desk reviews of a sample of six PY2020 New Construction projects, the program achieved realization rates of 97.0% and 86.6%, respectively, of first year gross energy and demand savings. The project-specific realization rates for the six sampled projects ranged from 78% to 110% for energy savings and from 48% to 144% for demand savings. Key drivers of realization rates include adjustments based on equipment specifications and site-specific operating conditions; adjustments to baseline definitions; normalization of production levels; and enduse changes for some measures.

Additional details on the onsite findings, ex post analysis methods, and reasons for discrepancies are available in the individual site reports in Appendix C.

The evaluation team calculated new NTGRs for PY2020 based on in-depth interviews with participating customers. Given the variety of motivating factors that participants supplied during these interviews, the research team asked FR questions separately for lighting and non-lighting measures but developed a single, program-level FR value. Interviews with program participants found no evidence of participant spillover. The savings-weighted program-level NTGR is 70%.

5.1.3   Key Process Findings

The PY2020 New Construction evaluation did not include a formal review of program processes. Based on review of program-tracking data and results from the NTGR-focused interviews with participants, however, the evaluation team made the following observations:

- **Market partners and industry experience are the most cited sources of program information.** When asked how they heard about the New Construction Program, five out of nine interviewed participants mentioned their interactions with a trade ally. Three respondents said their work experience in the industry led them to become aware of the program offerings. Only one respondent mentioned the program website.

- **Participants value communication with program staff, typically through email.** When asked about the best way to inform their organization of future energy efficiency opportunities through Ameren Missouri, most in-depth interview respondents (7 of 9) preferred email communication. Two

respondents encouraged the presence of program staff at conferences and in face-to-face meetings. Regardless of mode, respondents tended to value more frequent and consistent communication with program representatives.

■ **Project schedules are unaffected by program participation.** Eight out of nine in-depth interview respondents said their participation in the program did not affect their project's schedule or timeline. The remaining respondent indicated program participation marginally delayed their project.

5.1.4   Conclusions and Recommendations

Based on the results of this evaluation, the evaluation team offers the following conclusions and recommendations for the New Construction Program:

■ **Conclusion #1:** The program achieved strong realization rates while significantly growing in size compared to PY2019. The energy realization rate of 97% represents a significant increase relative to PY2019, where the program achieved an energy realization rate of 74.6%. Further, the program significantly increased in size, completing 37 projects representing 15,106 MWh in ex ante savings compared to just 12 projects and 2,626 MWh in savings in PY2019.

■ **Conclusion #2:** Key project documentation and analysis files were missing from the set of project documents available in the tracking database. The evaluation team was able to obtain many of the required files and additional information from the implementation contractor on request, but this extra step added cost to the evaluation and additional burden on trade allies and customers.

  ■ **Recommendation:** Develop and follow guidelines for the minimum level of required documentation for each project. The minimum required documentation may vary by project size but should include: a project narrative describing the baseline equipment/operation and the high-efficiency equipment/operation; analysis files that clearly show the methods, assumptions, and basis for ex ante savings; invoices and equipment submittals for all purchased equipment; and any documentation from post-installation commissioning or post-installation inspection activities.

■ **Conclusion #3:** Especially for new construction facilities, ex ante savings estimates often utilize projected occupancy, loading, and/or production levels. For example, the savings for a new construction office building may be based on full occupancy (even though the building will not be fully occupied immediately after the project is completed; an indoor agriculture or other production facility may be modeled based on anticipated full production levels; and an ice arena may estimate loading levels based on information from a similar ice arena. These performance assumptions may have a big impact on savings but may not reflect the actual, as-built facility operation.

  ■ **Recommendation:** For large projects—or for projects for which measure performance is driven by a projected occupancy or production level—that were not operating during post-installation inspections, the program implementer should add a task to the tracking system to true-up the estimated savings based on actual operations or the most up-to-date projections.

■ **Conclusion #4:** Ice rinks and indoor agricultural facilities are two common building types for Ameren Missouri's business energy-efficiency portfolio but there is no code-baseline or documented industry standard practice for either of these operations.

  ■ **Recommendation:** Due to the frequency of these building types in the Custom and New Construction programs, Ameren Missouri and the program implementer should provide guidance for defining new constriction (or normal replacement) baselines for these applications.

■ **Conclusion #5:** The current stipulated method for estimating peak savings—as the product of the custom-calculated annual energy savings and the coincidence factor prescribed for each enduse—risks a misalignment of estimated and actual peak demand savings for some New Construction projects.

   ■ **Recommendation:** To avoid reporting potentially unrealistic demand savings, Ameren Missouri should consider allowing exceptions to the current approach of estimating peak demand savings for Custom projects—if possible under current Stipulation rules. This could include setting a cap on the peak demand savings (e.g., based on the maximum or full load equipment capacity) or allowing the program teams to develop custom estimates of peak demand savings.

5.2   New Construction Evaluation Methodology

As described in Chapter 2, the evaluation team performed gross and net impact evaluation activities to assess the performance of the New Construction Program in PY2020.

Table 37 provides an overview of the New Construction Program evaluation activities. Following the table, we outline program-specific aspects of key evaluation methodologies.

Table 37. PY2020 Evaluation Activities for the New Construction Program

Evaluation Activity	Description
Program Manager and Implementer Interviews	▪ Conducted interviews in January 2020 to inform evaluation planning and in December 2020 to understand program staff's perspective on program performance.
Program Material Review	▪ Reviewed program materials to understand program changes relative to PY2019.
Participant Interviews	▪ Conducted interviews with program participants to collect data to inform NTG (FR and PSO).
Engineering Desk Reviews	▪ Reviewed supporting project documentation for sampled projects to verify the installed equipment and other measures, review the baseline assumptions, and examine ex ante savings methodology. ▪ Collect additional information as needed (e.g., facility occupancy or other operational information; or billing data) to verify or update the estimated savings. ▪ Developed ex post savings for the sample and the population.
NTG/Net Impact Analysis	▪ Developed estimates of FR and PSO. ▪ Estimated PY2020 net impacts.

5.2.1   Participant In-Depth Interview

The evaluation team conducted in-depth interviews with participants in the PY2020 New Construction Program. During each interview the evaluation team asked program participants a series of questions about their decision to include energy-efficient measures in their project and how the New Construction Program may have influenced this decision. Results from the participant interviews are the basis of the NTG analysis for PY2020.

The evaluation team developed a stratified random sample of PY2020 projects based on ex ante energy savings. Using this method, the evaluation team randomly selected 16 projects to be contacted for an interview. The interview period spanned approximately three weeks during the months of January and February 2021. During this period, the evaluation team attempted to contact all 16 participants in the sample via email

and phone. Overall, we completed interviews with eleven participants, although two could not provide sufficient information to calculate FR and PSO.[28]

5.2.2 Engineering Desk Reviews

We conducted engineering desk reviews of a sample of six PY2020 New Construction projects to review and verify savings assumptions. Table 38 describes the New Construction sample selected for the gross impact evaluation.

Table 38. New Construction Gross Impact Sampling Summary

Stratum	Number of Projects			1st Year Ex Ante Savings (MWh)		
	Population	Sample		Population	Sample	% Sampled
Stratum 1	1	1	100%	5,021	5,021	100%
Stratum 2	5	2	40%	5,573	2,501	45%
Stratum 3	31	3	10%	4,511	878	19%
Total	37	6	16%	15,106	8,400	56%

The review of documents focused on the method of estimating savings as well as results and included the following:

- Verification of the project baseline to either local building code or the initial design level, if already started when applying for incentives.

- Comparison of product specifications with building models or engineering equations.

- Review of building energy model inputs or revising the inputs of engineering weather bin calculations based on the installed conditions, where applicable. The models are calibrated to the building's electric billing data or submeter data when available.

- Review of post-inspection site visit materials, where available, including as-installed photographs of model plates and screenshots from the building management system.

- Replication of ex ante calculations to validate the equation result or differences in the base and efficient building model.

5.2.3 NTG Analysis

As discussed in Chapter 2, the NTG analysis for the PY2020 New Construction Program included estimation of FR and PSO. The NTGR calculation uses the following formula:

$$NTGR = 1 - FR + PSO$$

Unlike the Standard and Custom programs, the FR algorithm for the NC Program did not include an explicit factor for program influence on quantity or timing. A quantity adjustment is not needed because the FR algorithm, even without this adjustment, fully captures the influence of the New Construction Program due to the definition of a measure in this program. For example, the "measure" for Installed Interior Lighting projects is "reduced lighting power density" which already embeds the concept of quantity. Similarly, because of the size and scope of new construction and major renovation projects, it is assumed the Ameren Missouri New

---

[28] All participants who did not complete an interview were contacted at least four times before being considered unreachable. The BizSavers team also assisted with outreach to sampled participants at the evaluation team's request.

Construction Program had no impact on the timing of the project. We verified this assumption during our interviews.

The methods used for calculating FR and PSO are summarized in Chapter 2 and are further detailed in Appendix A.

5.3   Evaluation Results

5.3.1   Process Results

As part of the PY2020 participant interviews, the evaluation team asked participants to consider how they learned about the New Construction Program and their preferred channels for future program communications. When asked to discuss the former, participants most often cited their interactions with a contractor or past work experiences. One participant said they consulted the program website (see Figure 11). When asked about the best way to communicate future energy efficiency opportunities to their organization, most participants (7 of 9) preferred email and two preferred face-to-face communication. The evaluation team noted that participants tended to prefer more frequent communications from program staff.

Figure 11. How Participants Heard About the BizSavers New Construction Program in 2020
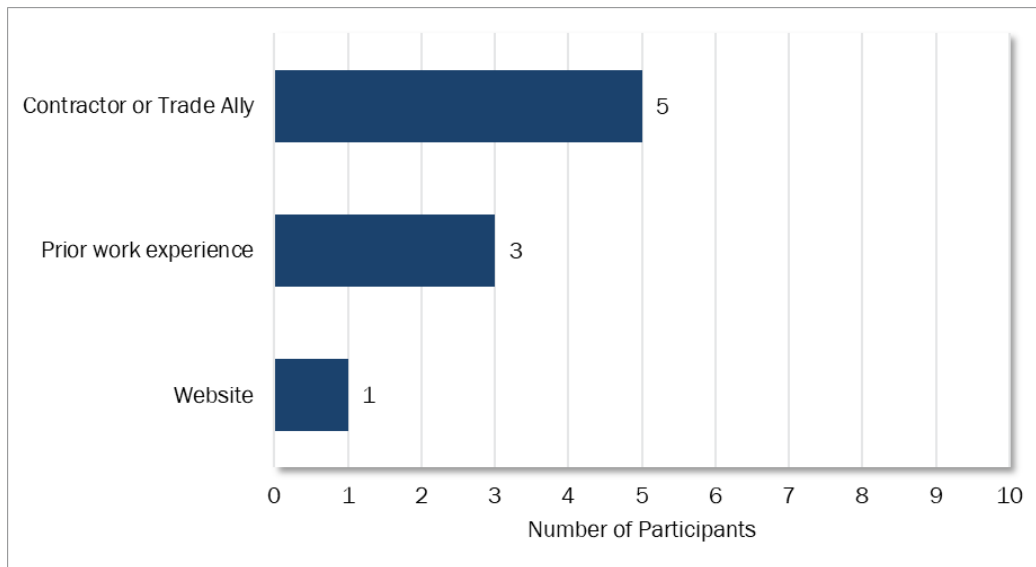
5.3.2   Gross Impact Results

This section summarizes gross impact results for the PY2020 New Construction Program. Ex post gross savings are based on desk reviews for a sample of six PY2020 projects.

The New Construction Program achieved first year ex post gross energy savings of 14,655 MWh and first year ex post gross demand savings of 3.78 MW, with realization rates of 97.0% and 86.6%, respectively (see Table 39). Notably, a single project (the conversion of a warehouse into an indoor agriculture facility) accounted for 34% of ex post energy savings and 38% of ex post peak demand savings.

Table 39. PY2020 New Construction Program Annual Savings

	Ex Ante Gross	Gross RR	Ex Post Gross
First Year Savings			
Energy Savings (MWh)	15,106	97.0%	14,655
Demand Savings (MW)	4.36	86.6%	3.78
Last Year Savings			
< 10 EUL (MW)	-	n/a	-
10-14 EUL (MW)	-	n/a	-
15+ EUL (MW)	4.36	86.6%	3.78

In general, the evaluation team adopted the savings estimation methods developed for the ex ante analysis, making adjustments to the savings calculations based on desk review findings. The gross realization rates and discrepancies between ex ante and ex post energy and demand savings are driven by these ex post adjustments, which include:

- Adjustments to the ex ante savings estimates based on the installed equipment specifications and site-specific operating conditions (e.g., lighting HOU or building operating schedules).

- Adjustments to the baseline definition, especially for indoor agriculture facilities. The ex post analysis developed baseline assumptions based on in-depth reviews of manufacturer specifications for comparable lighting equipment.

- Adjustments to the ex ante analysis to normalize the equipment production levels (e.g., total tons of refrigeration delivered) between the baseline and installed scenarios, to isolate the savings achieved by the increased efficiency of the refrigeration equipment.

- Changes to the selected enduse for some measures. The ex post analysis examined monthly consumption and savings provides to verify the appropriate enduse and estimation of peak demand savings. For example, the overall demand realization rate is driven by a change in the selected enduse (from HVAC to Process) for the cooling equipment at an indoor agriculture facility. The energy savings estimates, developed using a building simulation model, show that the savings are constant throughout the year, rather than peaking during summer or winter months. This savings profile is more consistent with a Process enduse.

Table 40 presents first year ex post gross energy and demand savings by enduse. As shown, 60% of lighting savings come from the lighting enduse. While only 31% of energy savings come from the HVAC enduse, it is the largest enduse for demand savings, representing 56% of ex post demand savings. All demand savings are in the 15+ Year EUL category.

Table 40. PY2020 New Construction Ex Post Gross Savings by Enduse

Enduse	Energy Savings		Demand Savings	
	MWh	%	MWh	%
Lighting	8,740	60%	1.48	39%
HVAC	4,570	31%	2.13	56%
Refrigeration	1,304	9%	0.16	4%
Compressed Air	42	<1%	0.01	<1%
Total	14,655	100%	3.78	100%

Additional details on the desk review findings, ex post analysis methods, and reasons for discrepancies are available in the individual site reports in Appendix C.

5.3.3   Net Impact Results

Net-to-Gross Ratio Results

The evaluation team conducted in-depth interviews with eight participants to develop an NTGR for the New Construction Program. We asked respondents about the lighting and non-lighting portion of their projects separately. We estimate the program-level NTGR to be 70.0%. Table 41 presents the individual NTGR components (i.e., FR and PSO) and the resulting NTGR for the program overall.

Table 41. PY2020 New Construction Program Net-to-Gross Ratio

Enduse	Free Ridership (FR)	Participant Spillover (PSO)	NTGR (1-FR+PSO)
Overall Program	30.0%	0%	70.0%

Free Ridership

We estimate the FR for the PY2020 New Construction Program to be 30.0%, with similar rates observed among lighting and non-lighting projects. Table 42 summarizes the FR estimates for the New Construction program.

Table 42. PY2020 New Construction Program FR Estimate

n	1 - FR	Relative Precision
9	70.0%	6%

The New Construction Program achieved a similar NTGR in PY2020 compared to PY2019. Key findings from the interviews include:

- Consistent with PY2019 results, participants in PY2020 report a high level of awareness about the long-term cost savings associated with energy efficiency measures.

- When asked about their main reason for including energy-efficient measures, most respondents (7 of 9) noted a desire to reduce energy costs. Most respondents (7 of 9) also reported standard practice as being of equal or greater influence than the program incentive, suggesting energy-efficient building designs are becoming increasingly common in the market.

- When asked how the design of their project would have been different absent the program, four of nine respondents said they would have installed standard efficiency measures, another four said they would have installed a subset of the measures as they did through the program, and only one said they would have installed all of the same measures.

- When asked to rate the likelihood of including the same level of energy efficient their project absent the program, two respondents provided a rating of eight or higher on a scale from zero to ten, where zero represents "Not at all Likely" and ten represents "Extremely Likely."

The following figure summarizes the FR results for New Construction participants.

Figure 12. Free Ridership Results – New Construction Program
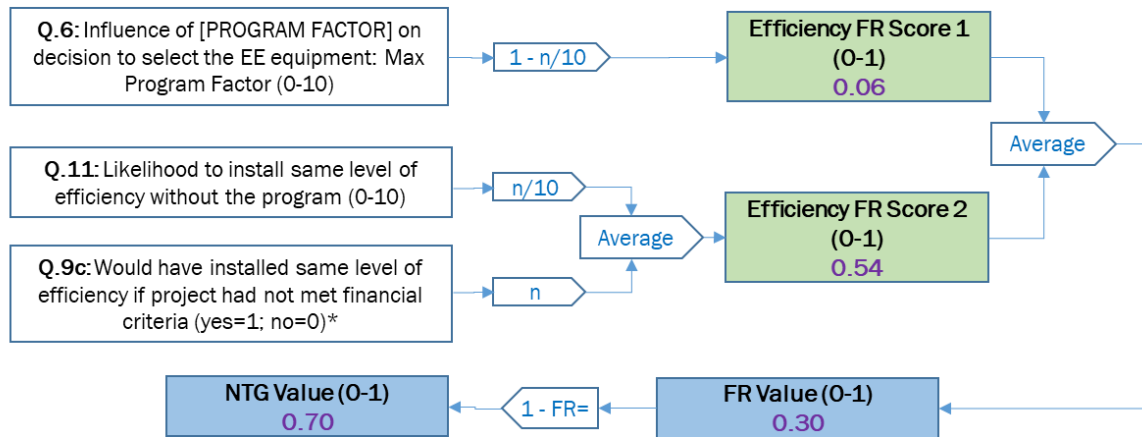
Asked of those who rated importance of financial criteria >7 and indicated that the incentive caused the project to meet their financial criteria

Participant Spillover

The participant in-depth interviews revealed no evidence of PSO during PY2020. During the interviews, the evaluation team asked participants questions about unincentivized energy-efficiency improvements that may have been included in their projects or installed after they participated in the New Construction Program. While three out of nine respondents installed additional energy efficiency measures without receiving an incentive, two indicated they will be applying for an incentive in the future, and the other indicated a level of program influence on this decision that was below the established threshold of PSO. Chapter 2 presents more-detailed information on the screening criteria used in the PSO analysis.

Net Impacts

The evaluation team applied the PY2020 NTGRs to ex post gross savings to determine ex post net impacts for the PY2020 New Construction Program. Table 43 presents these results. All measures have EULs of 15 years or greater.

Table 43. PY2020 New Construction Program First Year Net Impacts

Enduse	Energy Savings			Demand Savings		
	Ex Post Gross (MWh)	NTGR	Ex Post Net (MWh)	Ex Post Gross (MW)	NTGR	Ex Post Net (MW)
Lighting	8,740		6,118	1.48		1.04
HVAC	4,570	70.0%	3,199	2.13	70.0%	1.49
Refrigeration	1,304		913	0.16		0.11
Compressed Air	42		29	0.01		<0.01
Total	14,655	70.0%	10,258	3.78	70.0%	2.64

6. Retro-Commissioning Program

This section summarizes the PY2020 evaluation methodology and results for the RCx Program. The PY2020 evaluation of the RCx Program included desk reviews and onsite visits for a sample of four projects. The evaluation included assessment of program attribution but did not assess program processes. Additional details on the evaluation methodology are presented in Chapter 2. Appendix D includes detailed findings from the onsite visits.

6.1 Evaluation Summary

The RCx Program is designed to help customers retro-commission existing facilities. Program activities include conducting a retro-commissioning study, benchmarking existing building system performance levels, identifying operating system performance optimization improvements, and, where applicable, providing financial incentives to support implementation of program recommendations. The most common optimization measures involve compressed air, refrigeration, and building systems. The program relies on qualified contractors (Retro-Commissioning Service Providers, or RSPs) to deliver measurable energy savings. These RSPs complete a facility energy study on equipment optimization and educate customers about maintaining equipment efficiency.

The PY2020 RCx Program is an ongoing program from MEEIA Cycle II. Incentive levels and program design remained largely consistent with PY2019.

6.1.1 Participation Summary

The PY2020 RCx Program completed 12 projects, accounting for 6,099 MWh of ex ante gross energy savings. The two largest projects account for almost half of the program's energy savings and almost one-third of the program's demand savings. This level of participation and savings represents a substantial increase from PY2019, which saw a total of four projects and 1,086 MWh in ex ante gross energy savings. Table 44 presents PY2020 participation and gross energy savings by enduse.

Table 44. PY20120 RCx Program Participation Summary

Enduse/Channel	Projects		Ex Ante Savings	
	Number	%	Number	%
HVAC	10	83%	4,330	71%
Compressed Air	2	17%	1,769	29%
Total	12	100%	6,099	100%

6.1.2 Key Impact Results

In PY2020 the RCx Program achieved 88% and 94%, respectively, of Ameren Missouri's first year net energy and demand savings goals, and 64% and 133%, respectively, of Ameren Missouri's last year net demand savings targets in the 10-14 Year EUL and 15+ Year EUL categories.

Table 45 presents first year and last year savings achieved in PY2020.

Table 45. PY2020 RCx Program Impact Summary

	Ex Ante Gross	Gross RR	Ex Post Gross	NTGR	Ex Post Net	Goal/Target Net	% of Goal/Target
First Year Savings							
Energy Savings (MWh)	6,099	113.4%	6,913	91.8%	6,346	7,217	88%
Demand Savings (MW)	2.27	119.3%	2.71	91.8%	2.49	2.65	94%
Last Year Demand Savings							
< 10 EUL (MW)	-	n/a	-	n/a	-	-	n/a
10–14 EUL (MW)	0.87	119.3%	1.04	91.8%	0.95	1.49	64%
15+ EUL (MW)	1.40	119.3%	1.68	91.8%	1.54	1.16	133%

Based on desk reviews and onsite visits of a sample of PY2020 RCx projects, the program achieved 6,913 MWh and 2.71 MW in ex post gross savings. Although the PY2020 program fell short of its savings goals, the program's ex post savings exceeded the ex ante savings for both energy and demand, earning gross realization rates of 113% and 119%, respectively.

- Project-level realization rates for the sampled RCx projects ranged from 98% to 148% for both energy and demand savings. For all four sampled projects, the evaluation team found the measures to be implemented and operating as expected. The high PY2020 realization rates were driven by the use of equipment specifications in the estimation of ex post savings, rather than generalized savings assumptions in the estimation of ex ante savings.

Additional details on the onsite findings, ex post analysis methods, and reasons for discrepancies are available in the individual site reports in Appendix D.

The evaluation team calculated new NTGRs for PY2020 based on in-depth interviews with participating customers. Given the variety of motivating factors that participants supplied during these interviews, the research team assessed attribution by enduse before developing a program-level NTGR. Interviews with program participants found no evidence of participant spillover. The savings-weighted program-level NTGR is 92%.

6.1.3 Key Process Findings

The PY2020 evaluation did not include an assessment of program processes for the RCx Program. We provide a few observations, however, based on program-tracking data and limited insights data from the PY2020 participant interviews.

- **Program Participation:** In PY2020, Ameren Missouri business customers completed 12 projects and achieved 6,099 MWh in ex ante gross energy savings through the RCx Program. This represents a significant increase over PY2019, where business customers completed four projects and achieved 1,086 MWh in ex ante savings.

- **Sources of Program Information:** BizSavers trade allies are essential sources of program information for RCx participants; almost all (5 of 6) of interviewed RCx participants reported they had heard about the program through a program Trade Ally in 2020. Yet, most stated their preference would be to receive notification of future energy efficiency opportunities via e-mail and phone, either from a Trade Ally with whom they already had a relationship or a utility representative.

6.1.4   Conclusions and Recommendations

Based on the results of this evaluation, the evaluation team offers the following conclusions and recommendations for the RCx Program:

- **Conclusion #1:** The program achieved strong realization rates while significantly growing in size compared to PY2019. For the second year in a row, the program achieved energy and demand realization rates in excess of 100%, with a PY2020 energy realization rate of 113% and a demand realization rate of 119%. Further, the program significantly increased in size, completing 12 projects representing 6,099 MWh in ex ante savings compared to just four projects and 1,086 MWh in savings in PY2019.

- **Conclusion #2:** Evaluation activities verified that all four sampled RCx projects were implemented and operating as expected based on available project materials. For some of the sampled RCx projects, but not all, the ex ante savings were based on post-implementation trended performance data. Utilizing trend data to verify implementation and savings is a best practice.

  - **Recommendation:** Share best practices among RSPs and encourage them to collect pre- and post-installation trend data and/or to provide a method for the implementer to remotely obtain access to the building management system to collect these trend data. These trended data help the facility personnel verify achieved savings and facilitate evaluation of program savings.

- **Conclusion #3:** Weather bin analysis is a reliable and transparent method for estimating annual energy consumption and savings for weather-dependent HVAC equipment and controls measures. A robust weather bin analysis tool can help develop accurate and consistent ex ante estimates. Evaluated projects used different formats of weather bin analyses.

  - **Recommendation:** Consider developing a standardized weather bin analysis tool that includes both sensible and latent cooling considerations and that uses standardized inputs to support future ex ante analyses.

- **Conclusion #3:** In our desk review/onsite sample of projects, most repaired air leaks were outside the equipment operating envelope and located within peripheral equipment, such as air lines to pneumatic tools or blow off guns, because of safety concerns with opening operating compressor equipment to detect air leaks. Trade allies who normally conduct the leak detection are often limited in their access to primary equipment and thus limited in their ability to identify air leaks. Some facilities overcome this limitation by performing ultrasonic leak detection as a preventative maintenance check.

  - **Recommendation:** Consider developing methods to safely identify air leaks within operating equipment, which consumes more air than other equipment and where larger air leaks potentially exist. Methods may include training programs and equipment for participants to self-perform ultrasonic air leak detection.

6.2   RCx Evaluation Methodology

Table 46 provides an overview of the RCx Program evaluation activities. Following the table, we outline program-specific aspects of evaluation methodologies. Most of these activities are similar across the various business programs and were described in Chapter 2. The sections following the table highlight program-specific aspects of key evaluation activities.

<div align="center">Table 46. PY2020 Evaluation Activities for the RCx Program</div>

Evaluation Activity	Description
Program Manager and Implementer Interviews	▪ Conducted interviews in January 2020 to inform evaluation planning and in December 2020 to understand program staff's perspective on program performance.
Program Material Review	▪ Reviewed program materials to understand program changes relative to PY2019.
Participant Interviews	▪ Conducted interviews with program participants to collect data to inform NTG (FR and PSO).
Engineering Desk Reviews & Onsite Verification	▪ Reviewed supporting project documentation for all projects to ensure that original data was correctly entered from invoices and other documentation. ▪ Verified measure installation, operation, and characteristics. ▪ Developed ex post energy and demand savings based on evaluation activities and findings.
NTG/Net Impact Analysis	▪ Developed estimates of FR and PSO. ▪ Estimated PY2020 net impacts.

6.2.1 Participant In-Depth Interviews

The evaluation team conducted in-depth interviews with program participants in the PY2020 RCx Program. During each interview, the evaluation team asked program participants a series of questions about their decision to conduct a RCx study and project, and how the RCx Program may have influenced this decision. Results from the participant interviews are the basis of the NTG analysis for PY2020.

The interview period spanned approximately five weeks during the months of January and February 2021. During this period, we attempted to contact all 12 participants via email and phone, i.e., a census attempt. Seven (58%) participants completed the interview, five (42%) could not be reached.[29]

6.2.2 Engineering Desk Reviews and Onsite Verification

The evaluation team conducted engineering desk reviews and onsite visits for a sample of four PY2020 completed RCx projects. Onsite visits provided additional rigor to the verification process by confirming that the incented measures were still installed and operational, and that the baseline conditions, equipment characteristics, and building characteristics were consistent with project documents and the program implementer's assumptions.

Table 47 summarizes the sampling strategy for onsite visits for the RCx Program.

<div align="center">Table 47. RCx Gross Impact Sampling Summary</div>

Enduse	Number of Projects			First Year Ex Ante Savings		
	Population	Sample	% Sampled	Population (MWh)	Sample (MWh)	% Sampled
Stratum 1	2	2	100%	2,595	2,595	100%
Stratum 2	10	2	20%	3,504	1,072	31%
Total	12	4	33%	6,099	3,667	60%

---

[29] All participants who did not complete an interview were contacted at least four times before being considered unreachable. The BizSavers team also assisted with outreach to sampled participants at the evaluation team's request.

6.2.3   NTG Analysis

As discussed in Chapter 2, the NTG analysis for the PY2020 RCx Program included estimation of FR and PSO. The NTGR calculation uses the following formula:

$$NTGR = 1 - FR + PSO$$

The FR algorithm for the RCx Program includes an explicit adjustment factor for program influence on timing but, unlike the Standard and Custom programs, it does not include a separate adjustment for program influence on quantity. A quantity adjustment is not needed because the FR algorithm, even without this adjustment, fully captures the influence of the RCx Program. Participants are asked to rate the likelihood their RCx project would have included the same incented RCx measures absent the program, where the "measure" could be optimizing HVAC scheduling, adding pressure and temperature resets, and revising economizer operation. This likelihood-based counterfactual encompasses both efficiency and quantity, while the Standard and Custom Program's FR algorithm phrases the analogous question in terms of efficiency only.

The methods used for calculating FR and PSO are summarized in Chapter 2 and are further detailed in Appendix A.

6.3   Evaluation Results

6.3.1   Process Results

The majority of participants heard about the BizSavers Retro-Commissioning Program in PY2020 through program trade allies (see Figure 13). Yet, most stated their preference would be to receive notification of future energy efficiency opportunities via e-mail and phone. Two of six interviewed participants reported that they would prefer to hear from a Trade Ally with whom they have a pre-existing relationship, while the other participants were indifferent on whether the information came from a Trade Ally or a utility representative.

Figure 13. How Participants Heard About the BizSavers RCx Program in 2020
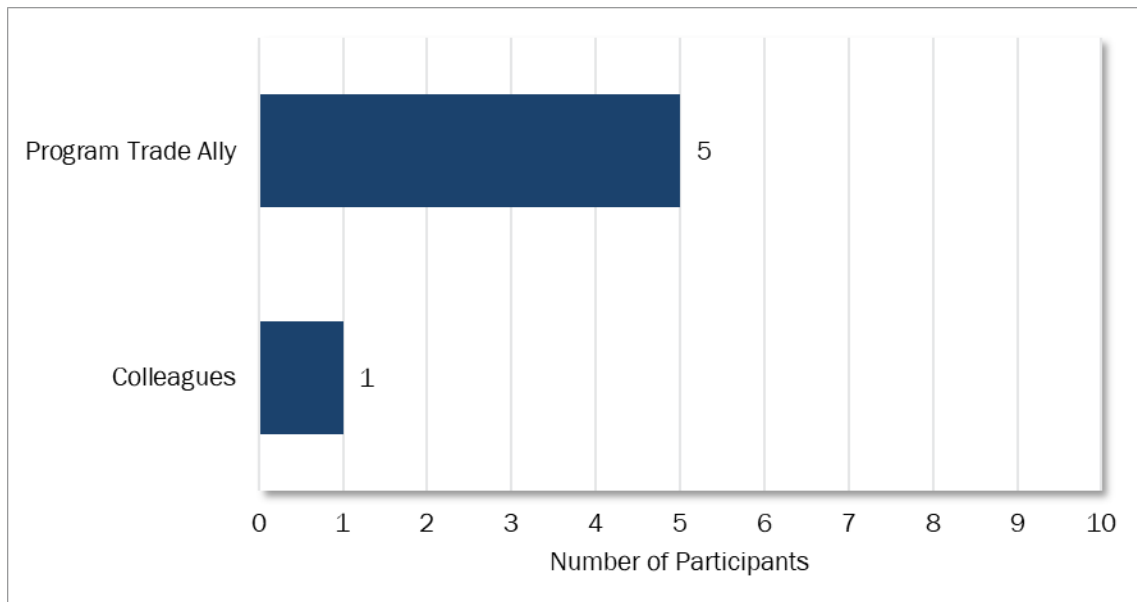
6.3.2   Gross Impact Results

This section summarizes gross impact results for the PY2020 RCx Program. Ex post gross savings are based on desk reviews and onsite verification for a sample of four projects (out of 12 projects completed during PY2020), including the two largest projects that account for almost half of the RCx program energy savings.

Table 48 presents PY2020 RCx Program annual gross savings. As shown, the program achieved first year ex post gross energy and demand savings 6,913 MWh and 0.84 MW, respectively, as well as last year ex post demand savings of 1.04 MW in the 10–14 Year EUL category and 1.68 MW in the 15+ Year EUL category.

Table 48. PY2020 RCx Program Gross Impact Summary

	Ex Ante Gross	Gross RR	Ex Post Gross
First Year Savings			
Energy Savings (MWh)	6,099	113.4%	6,913
Demand Savings (MW)	2.27	119.3%	2.71
Last Year Demand Savings			
< 10 EUL (MW)	-	n/a	-
10–14 EUL (MW)	0.87	119.3%	1.04
15+ EUL (MW)	1.40	119.3%	1.68

Project-level realization rates for the sampled RCx projects ranged from 98% to 148% for both energy and demand savings. For all four sampled projects, the evaluation team found the measures to be implemented and operating as expected, and three of the four sampled projects had gross realization rates close to 100%. The overall high PY2020 realization rates resulted from a single project for which the ex ante analysis used generalized savings assumptions; the ex post analysis verified the installed equipment and updated the annual energy and demand savings calculations using equipment specifications.

Additional details on the sampled projects—including findings, ex post analysis methods, and reasons for discrepancies—are available in the individual site reports in Appendix D.

Table 49 presents first year ex post gross energy and demand savings by enduse. As shown, the majority of ex post gross savings come from the HVAC enduse (71% of energy and 89% of demand).

Table 49. PY2020 RCx Program Ex Post Gross Savings by Enduse

Enduse	Energy Savings		Demand Savings	
	MWh	%	MWh	%
HVAC	4,908	71.0%	2.42	89.3%
Compressed Air	2,005	29.0%	0.29	10.7%
Total	6,913	100%	2.71	100%

Table 50 presents last year ex post gross demand savings by enduse and EUL category. As shown, the majority of last year demand savings comes from HVAC projects in the 15+ Year EUL category.

Table 50. PY2020 RCx Annual Ex Post Demand Savings by EUL Category

Measure Category	Last Year Ex Post Demand Savings (MW)		
	10–14	15+	Total
HVAC	0.75	1.68	2.42
Compressed Air	0.29	-	0.29
Total	1.04	1.68	2.71

6.3.3   Net Impact Results

Net-to-Gross Results

The evaluation team conducted in-depth interviews with seven participants to develop an NTGR for the PY2020 Retro-Commissioning Program. Table 51 presents the individual NTGR components (i.e., FR and PSO) and the resulting NTGR for the program overall.

Table 51. Summary of PY2020 RCx NTG Results

Enduse	Free Ridership (FR)	Participant Spillover (PSO)	NTGR (1-FR+PSO)
Overall Program	8.2%	0.00	91.8%

Free Ridership

We estimate the program-level FR to be 8.2%. Since we attempted a census of all projects, the concept of sampling precision does not apply.

Key findings from the interviews include:

- At the very least, the RCx Program influenced companies to expand the scope of their energy-efficient upgrade efforts. Every participant stated that had the program not existed, they would have implemented only a subset of the measures that they had implemented through the program, whether at the same time or at a later time.

- Interviewed participants consistently rated recommendations from a Trade Ally, incentives offered for both the study and the measures, financial criteria, and the expected energy savings as the most important factors in their decision to participate in the program. Trade allies are clearly a very important aspect of the RCx Program, particularly when combined with the findings that participants most commonly heard about the program in 2020 from a Trade Ally. It also appears that marketing materials are not adequately reaching potential participants: only three out of seven interviewees reported receiving any material at all, and of those that did receive materials, none indicated that they were a particularly important factor in their decision-making.

- Projects involving HVAC improvements were not only the most common type of project completed through the program but also the ones where the program had the largest influence on companies' decision to perform retro-commissioning. Only one out of six respondents who completed an HVAC project claimed that they were likely to have done so without the program.

Figure 14 summarizes FR results for the RCx Program, showing Efficiency FR scores and the Timing Adjustment based on interview responses. The figure reflects the final COVID Adjustment of 0.80 that was applied to the estimated FR value based on the survey responses. As described in Chapter 2, this adjustment reflects the

un-measured program influence on preventing project delays and cancellations during the COVID-19 pandemic. This value was applied to account for the economic conditions created by the COVID pandemic and reflect the results of Opinion Dynamics' COVID-related market research (conducted in the summer of 2020).

Figure 14. Free Ridership Results – Retro-Commissioning
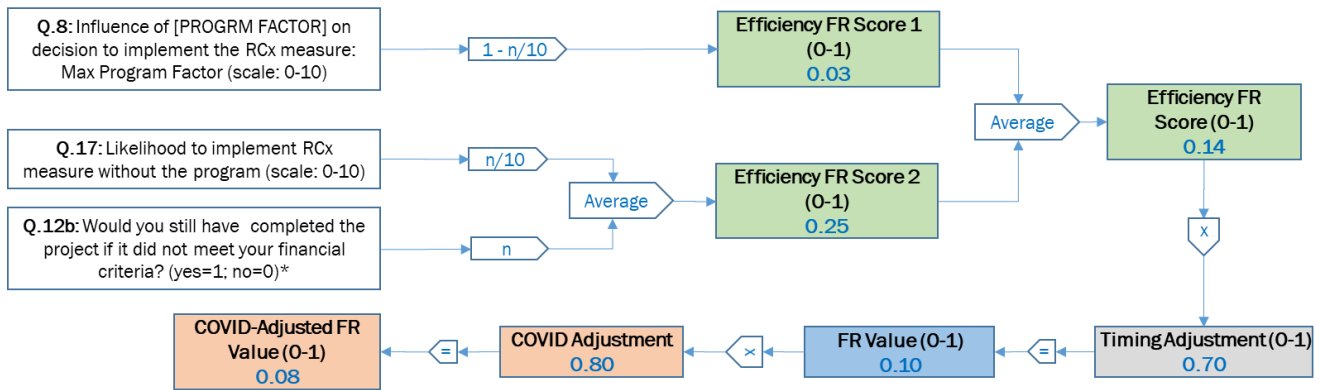
Participant Spillover

The participant in-depth interviews revealed no evidence of PSO during PY2020. During the interviews, we asked participants questions about unincentivized energy efficiency improvements that may have been included in their projects or completed after they participated in the RCx Program. One participant mentioned installing additional unincentivized lighting but claimed that the BizSavers RCx Program had had no effect on their decision to do so. Another participant also indicated that they had not yet applied for an incentive for additional lighting upgrades, but that they planned to do so in the future. All other participants confirmed that they had not made any additional unincentivized energy efficiency upgrades during or after their participation in the RCx Program.

Net Impacts

The evaluation team applied the PY2020 NTGRs to ex post gross savings to determine net impacts for the PY2020 RCx Program. Table 52 and

Table 53 present these results.

Table 52. PY2020 RCx Program Annual First Year Net Impacts

Enduse	Energy Savings			Demand Savings		
	Ex Post Gross (MWh)	NTGR	Ex Post Net (MWh)	Ex Post Gross (MW)	NTGR	Ex Post Net (MW)
HVAC	4,908	91.8%	4,506	2.42	91.8%	2.22
Compressed Air	2,005		1,840	0.29		0.27
Total	**6,913**	**91.8%**	**6,346**	**2.71**	**91.8%**	**2.49**

Table 53. PY2020 RCx Program Annual Last Year Net Demand Impacts

Enduse	Ex Post Gross (MW)		NTGR	Ex Post Net (MW)	
	10-14	15+		10-14	15+
HVAC	0.75	1.68	91.8%	0.68	1.54
Compressed Air	0.29	-		0.27	-
Total	**1.04**	**1.68**	**91.8%**	**0.95**	**1.54**

7. Business Social Services Program

This section summarizes the PY2020 evaluation methodology and results for the BSS Program. While the BSS Program is part of Ameren Missouri's portfolio of low-income programs, the evaluation results are presented in this volume because of implementation and evaluation similarities with the other business programs: (1) it is implemented by the same implementation contractor using similar program processes, and (2) it was evaluated using similar evaluation methods.

The PY2020 evaluation of the BSS Program included an engineering analysis of lighting measures. No non-lighting measures were incented through the program in PY2020. The evaluation did not include an assessment of program attribution or program processes. Additional details on the evaluation methodology are presented in Chapter 2.

7.1 Evaluation Summary

The BSS Program was a new program for Ameren Missouri in PY2019. The program is designed to promote the installation of energy-efficient technologies in social service organizations by removing barriers such as high upfront cost, lack of financing, lack of knowledge, and lack of time and resources to investigate energy efficiency opportunities.

The target market consists of commercial, nonprofit, and tax-exempt business customers that provide social services to the low-income public in federally designated opportunity zones, including family services, healthcare facilities, homeless shelters, employment services, worker training, job banks, and childcare facilities. The BSS Program provides lighting and other measures at low- or no-cost to social services business customers with qualifying facilities. Service Providers supply and install measures, finalize paperwork for eligible participants, and identify additional energy efficiency opportunities not covered under the BSS Program. The BSS Program offers the highest incentive levels for deemed measures among all BizSavers programs, including incentives for select interior lighting measures that cover 100% of eligible costs.

In PY2020, the BSS Program offered a few new measures (including occupancy sensors, VFDs for certain applications, kitchen ventilation controls, and high-volume low-speed fans) but incentive levels remained largely unchanged. In response to COVID-19, the program increased the timeline for application submission from 30 days to 90 days from invoice date.

7.1.1 Participation Summary

In PY2020, the BSS Program served eight unique customers, including four faith-based and four social services organizations. These customers implemented 12 energy efficiency projects accounting for 585 MWh of ex ante gross energy savings, a 45% reduction relative to PY2019 ex ante gross savings (1,072 MWh). According to implementation staff, the reduction in the volume of BSS projects in PY2020 was intentional and designed to control the costs of the program.

While other measures are offered through the program, PY2020 program activity consisted exclusively of LED lighting upgrades.

7.1.2 Key Impact Results

Table 54 presents first year and last year annual savings achieved in PY2020. As shown, the program achieved only 32% and 33%, respectively, of Ameren Missouri's first year net energy and demand savings goals, and

24%, 10%, and 79%, respectively, of Ameren Missouri's last year net demand savings targets in the <10 Year EUL, 10–14 Year EUL and 15+ Year EUL categories.

Table 54. PY2020 BSS Savings Summary

	Ex Ante Gross	Gross RR	Ex Post Gross	NTGR	Ex Post Net	Goal/Target Net	% of Goal/Target
First Year Savings							
Energy Savings (MWh)	585	97.3%	569	100.0%	569	1,793	32%
Demand Savings (MW)	0.11	102.7%	0.11	100.0%	0.11	0.34	33%
Last Year Demand Savings							
< 10 EUL (MW)	0.01	102.7%	0.01	n/a	0.01	0.04	24%
10–14 EUL (MW)	0.02	104.1%	0.02	100.0%	0.02	0.19	10%
15+ EUL (MW)	0.08	102.3%	0.09	100.0%	0.09	0.11	79%

The PY2020 BSS Program achieved gross RRs of 97.3% and 102.7% for first year energy and demand savings, respectively. Realization rates for last year demand savings ranged between 102.3% in the 15+ Year EUL category to 104.1% in the 10–14 Year EUL category. Energy RRs are driven by the ex post application of building type-specific energy WHFs and electric heating penalties, where applicable, versus the application of a modeled HCIF of 1.07 in the ex ante analysis. Demand RRs are driven solely by the ex post application of building type-specific WHFs where the ex ante analysis applies a HCIF of 1.07.

Because the BSS Program is part of the Low-Income Portfolio, the default NTGR for this program is 1.0 and net savings are equal to gross savings.

7.1.3   Conclusions and Recommendations

Based on the results of this evaluation, the evaluation team offers the following conclusions and recommendations for the BSS Program:

- **Conclusion #1:** Program activity in PY2020 was low, with only 12 completed projects (compared to 31 in PY2019) and a 45% decrease in ex ante gross energy savings. As a result of this reduced activity, the program achieved only one-third of its PY2020 first year energy and demand savings targets. All 12 projects included lighting measures only.

- **Conclusion #2:** The program achieved strong first year energy realization rates (97.3%) and first and last year demand realization rates (between 102% and 104%).

- **Conclusion #3:** The program implementer uses an average HCIF of 1.07 to estimate ex ante energy and demand savings for interior lighting measures, regardless of building type or HVAC system type. In contrast, the evaluation team applied building and HVAC type-specific WHFs and Heating Penalty Interactive Factors (IFs) based on the tracked building and system types for each project and specifications in the Ameren Missouri TRM Appendix H. Across all projects, the average combined ex post energy savings adjustment (WHF plus IF) was 1.05, and the average ex post demand savings adjustment (WHF only) was 1.10.

  - **Recommendation:** To improve the accuracy of ex ante savings, we recommend that the implementer either (1) apply building type-specific WHF and IF values (as stipulated in the TRM and done in the ex post analysis); or (2) develop and apply separate HCIFs that account for both cooling and heating interaction for annual energy savings and that account for the cooling interaction only for demand savings. Based on the engineering analysis across prescriptive lighting

measures in the Standard, SBDI, and BSS programs, we recommend an energy factor of 1.04 and a demand factor of 1.09.

- ■ **Conclusion #4:** The building types used in the implementer's database do not align with the Ameren Missouri TRM building type list. Building types are used in various TRM engineering algorithms, including those for interior lighting measures.

  - ■ **Recommendation:** To improve consistency with the Ameren Missouri TRM, we recommend that the implementer update the "Building Type" field in the program-tracking database to match the building types used in the Ameren Missouri TRM Appendix H.

7.2 BSS Evaluation Methodology

Table 55 provides an overview of the PY2020 evaluation activities for the BSS Program. Most of these activities are similar across the various business programs and were described in Chapter 2. The sections following the table highlight program-specific aspects of key evaluation activities.

Table 55. PY2020 Evaluation Activities for the BSS Program

Evaluation Activity	Description
Program Manager and Implementer Interviews	▪ Conducted interviews in January 2020 to inform evaluation planning and in December 2020 to understand program staff's perspective on program performance.
Program Material Review	▪ Reviewed program materials to understand program changes relative to PY2019.
EUL Review and Analysis (Lighting Measures)	▪ Leveraged rated lighting equipment lifetime and annual HOU from the program tracking database to calculate EULs. ▪ Reviewed multiple TRMs to compare EULs used in other jurisdictions with those used in the PY2019 evaluation. ▪ Developed EUL recommendations to apply in PY2020 and future evaluations.
Engineering Analysis (Lighting Measures)	▪ Verified that ex ante savings use correct TRM values and algorithms and reviewed custom calculations where appropriate. ▪ Developed HOU and ISR adjustment factors, based on results of the PY2019 evaluation. ▪ Developed ex post savings using TRM algorithms, deemed savings assumptions, and site-specific parameters.
Net Impact Analysis	▪ Estimated PY2020 net impacts.

7.2.1 EUL Review and Analysis

The PY2020 evaluation included a review and update of EULs for prescriptive lighting measures used in the PY2019 evaluation. We developed PY2020 EUL recommendations based on lighting equipment lifetime and HOU for lighting measures in the program-tracking database while also leveraging TRMs of other jurisdictions to compare EULs. In this report, we applied the PY2020 EUL recommendations when summarizing both ex ante and ex post last year demand savings by EUL category.

7.2.2 Engineering Analysis

We conducted an engineering analysis of all BSS Program lighting measures to estimate ex post gross program savings. We first reviewed program-tracking data to verify correct TRM algorithms and savings assumptions were used to calculate ex ante savings. We then calculated ex post savings using Ameren Missouri TRM algorithms, deemed savings assumptions, and site-specific parameters from the program tracking database.

Hours of Use Adjustment

As part of the engineering analysis for lighting measures, we explored whether to apply an HOU adjustment based on the results of the PY2019 desk reviews of BSS lighting projects. This analysis found no differences between program-tracked and evaluated HOU values. As such, we applied an HOU adjustment factor of 1.0 as part of the PY2020 engineering analysis.

In-Service Rate

Similar to the HOU adjustment, we explored whether to apply ISRs in the ex post analysis, based on results from the PY2019 desk reviews. In specific, we investigated whether the program-level ISR in PY2019 was statistically different from 1.0. This analysis showed that the PY2019 lighting ISR was not statistically different from 1.0, at 90% confidence. As such, the PY2020 ex post analysis for BSS lighting measures used an ISR of 1.0.

7.3   Evaluation Results

7.3.1   Gross Impact Results

This section summarizes gross impact results for the PY2020 BSS Program. Ex post gross savings are based on an engineering analysis for BSS lighting projects. The program provided no incentives for non-lighting measures in PY2020.

Table 56 compares ex ante and ex post first year and last year gross savings, at the program level. As shown, the program achieved first year ex post gross energy and demand savings of 569 MWh and 0.11 MW, respectively. The largest share of last year ex post demand savings was in the 15+ Year EUL category (0.09 MW, or 75%), followed by the 10–14 Year EUL category (0.02, or 16%) and the <10 Year EUL category (0.01, or 8%).

Table 56. PY2020 BSS Annual Savings

	Ex Ante Gross	Gross RR	Ex Post Gross
First Year Savings			
Energy Savings (MWh)	585	97.3%	569
Demand Savings (MW)	0.11	102.7%	0.11
Last Year Demand Savings			
< 10 EUL (MW)	0.01	102.7%	0.01
10–14 EUL (MW)	0.02	104.1%	0.02
15+ EUL (MW)	0.08	102.3%	0.09

As shown in the table above, gross realization rates for the BSS Program ranged from 97.3% to 104.1%. Based on the engineering analysis for lighting measures, we made the following adjustments to ex ante savings assumptions:

- ◼ **Waste Heat Factor (WHF) and Heating Penalty Interactive Factor (IF).** To capture the heating and cooling interactive impacts when calculating ex ante savings for interior lighting measures, the program implementer applies a HCIF of 1.07, encompassing both waste heat factors and heating penalties (referred to as WHF and IF, respectively, in the Ameren Missouri TRM). Notably, the HCIF is applied to both energy and demand savings, even though heating penalties are not relevant for

demand savings. In contrast, the evaluation team used building type-specific assumptions, based on information reported in the program-tracking database and in accordance with the Ameren Missouri TRM:

■ For energy savings, the evaluation team applied building type-specific WHFs and IFs based on the Ameren Missouri TRM tables, resulting in lower ex post energy savings compared to ex ante.

■ For demand savings, the evaluation team applied building type-specific WHFs, resulting in higher ex post demand savings compared to ex ante.

Based on our analysis, ex post WHFs ranged from 1.08 to 1.21 with an average value of 1.10 across all 107 records in the ex post analysis. In addition, 40 of the 107 (37%) records in the analysis were associated with sites identified as having electric heating based on building heat fuel source reported in the tracking database. Interactive electric heating factors (IFs) for all 107 records in the analysis range from 0 to -0.28, resulting in an average across all projects of -0.06. These average ex post WHF and IF values produced an average combined energy savings adjustment factor of 1.05, slightly lower than the ex ante HCIF of 1.07.

Table 57 presents first year ex post gross energy and demand savings by measure type. As shown, approximately three-quarters of both energy and demand savings come from linear LEDs, which have an EUL of 15+ years.

Table 57. PY2020 BSS Ex Post Gross Savings by Lighting Category

Measure Category	Energy Savings		Demand Savings	
	MWh	%	MWh	%
Other Linear LED	302	53%	0.06	54%
LED Replacing T12	125	22%	0.02	22%
Other Non-Linear LED	82	14%	0.02	14%
LED Replacing Incandescent A-Lamp	60	10%	0.01	10%
Total	569	100%	0.11	100%

7.3.2   Net Impact Results

Because the BSS Program falls under the umbrella of low-income programs, we applied a default NTGR of 1.0, assuming that both FR and SO are zero. As such, net impacts for the BSS Program are equal to the gross impacts presented in the section above.

For more information, please contact:

Antje Flanders
Vice President

617-301-4643 tel
617-497-7944 Fax
aflanders@opiniondynamics.com

1000 Winter Street
Waltham, MA 02451