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Ameren Missouri Program Year 2021 Annual EM&V Report

Volume 3: Business Portfolio Report

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1. Executive Summary

This volume presents the evaluation results of the Ameren Missouri PY2021 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 PY2021 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), the methodology used in the Standard gross impact analysis, and project-level summaries of our desk reviews and onsite visits, by program.

1.1 Portfolio Impact Results

The PY2021 Business Portfolio achieved 145,141 MWh of first year net energy savings and 45.55 MW of first year net demand savings, achieving 71% and 87%, 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 (112% of target) but fell short of target in the 10–14 Year EUL category (30% of target) and the <10 Year EUL category (8% of target).[2]

[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.

Savings-weighted portfolio-level gross realization rates (RR) ranged from 97.5% for energy savings to 106.7% for last year demand savings in the 10–14 Year EUL category, while savings-weighted net-to-gross ratios (NTGR) ranged from 82.2% to 87.4%.

Table 1 summarizes first year and last year annual gross and net savings for the Business Portfolio in PY2021.

Table 1. PY2021 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)	179,123	97.5%	174,583	83.1%	145,141	204,544	71%
Demand Savings (MW)	55.72	98.8%	55.07	82.7%	45.55	52.39	87%
Last Year Demand Savings							
<10 EUL (MW)	0.12	104.6%	0.13	87.1%	0.11	1.34	8%
10–14 EUL (MW)	4.51	106.7%	4.81	87.4%	4.20	14.12	30%
15+ EUL (MW)	51.09	98.1%	50.13	82.2%	41.24	36.92	112%

The Standard Program was the largest program in Ameren Missouri's Business Portfolio in PY2021, contributing 49% of first year ex post net energy savings and 40% 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. The New Construction Program was by far the most successful program relative to goal, achieving 307% of its first year net energy savings goal. All other programs fell short of first year net 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 realization rates or NTGRs.

Table 2 summarizes first year annual gross and net savings for all programs in the PY2021 Business Portfolio.

Table 2. PY2021 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	82,335	100.1%	82,396	87.1%	71,730	68,607	105%
Custom	31,884	95.8%	30,532	82.0%	25,026	100,445	25%
SBDI	5,658	98.1%	5,552	87.8%	4,875	11,340	43%
New Construction	52,293	94.0%	49,175	75.4%	37,082	12,076	307%
Retro-Commissioning	6,953	99.6%	6,928	92.8%	6,429	12,076	53%
Total Business	**179,123**	**97.5%**	**174,583**	**83.1%**	**145,141**	**204,544**	**71%**
First Year Demand Savings (MW)							
Standard	19.74	105.0%	20.72	87.1%	18.03	13.59	133%
Custom	14.65	94.2%	13.80	82.0%	11.31	29.20	39%
SBDI	1.07	101.6%	1.09	87.8%	0.96	1.97	49%
New Construction	16.88	95.7%	16.16	75.4%	12.19	3.20	380%

Program	Ex Ante Gross	Gross RR	Ex Post Gross	NTGR	Ex Post Net	Goal Net	% of Goal
Retro-Commissioning	3.37	97.8%	3.30	92.8%	3.06	4.43	69%
Total Business	**55.72**	**98.8%**	**55.07**	**82.7%**	**45.55**	**52.39**	**87%**

Program performance relative to target net demand savings by EUL category varied widely, but overall, the Business Portfolio achieved 8% of target last year net demand savings in the <10 Year EUL category, 30% of target last year net demand savings in the 10–14 Year EUL category, and 112% 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 250%, 417%, and 125% of target last year demand savings, respectively).

Table 3 summarizes last year annual gross and net savings for all programs in the PY2021 Business Portfolio.

Table 3. PY2021 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	0.12	104.0%	0.12	87.1%	0.11	1.33	8%
Custom	-	n/a	-	n/a	-	-	n/a
SBDI	0.00	119.2%	0.01	87.8%	0.00	0.02	31%
New Construction	-	n/a	-	n/a	-	-	n/a
Retro-Commissioning	-	n/a	-	n/a	-	-	n/a
Total Business	**0.12**	**104.6%**	**0.13**	**87.1%**	**0.11**	**1.34**	**8%**
10–14 Year EUL (MW)							
Standard	3.35	109.5%	3.67	87.1%	3.19	6.37	50%
Custom	0.35	97.8%	0.34	82.0%	0.28	4.16	7%
SBDI	0.05	101.7%	0.05	87.8%	0.05	0.81	6%
New Construction	0.04	114.1%	0.05	74.6%	0.04	0.29	12%
Retro-Commissioning	0.71	97.8%	0.69	92.8%	0.64	2.49	26%
Total Business	**4.51**	**106.7%**	**4.81**	**87.4%**	**4.20**	**14.12**	**30%**
15+ Year EUL (MW)							
Standard	16.27	104.0%	16.92	87.1%	14.73	5.89	250%
Custom	14.30	94.1%	13.46	82.0%	11.03	25.04	44%
SBDI	1.02	101.5%	1.03	87.8%	0.91	1.14	79%
New Construction	16.84	95.7%	16.12	75.4%	12.15	2.91	417%
Retro-Commissioning	2.66	97.8%	2.60	92.8%	2.42	1.94	125%
Total Business	**51.09**	**98.1%**	**50.13**	**82.2%**	**41.24**	**36.92**	**112%**

As noted above, this volume also includes the results of the BSS Program evaluation. The BSS Program underperformed in PY2021, achieving 28% of its first year net energy savings goals and 23% 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 PY2021.

Table 4. PY2021 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)	463	101.8%	472	100.0%	472	1,700	28%
Demand Savings (MW)	0.088	102.0%	0.090	100.0%	0.090	0.39	23%
Last Year Demand Savings							
<10 EUL (MW)	0.005	101.1%	0.005	100.0%	0.005	0.04	12%
10–14 EUL (MW)	0.004	101.5%	0.005	100.0%	0.005	0.19	2%
15+ EUL (MW)	0.079	102.1%	0.081	100.0%	0.081	0.11	74%

1.2 CSR Process Evaluation Requirements

The PY2021 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]

- PY2021 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; and
- The PY2021 program-tracking database.

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

Table 5. PY2021 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 PY2021, business customers experienced different barriers as a result of the COVID-19 pandemic, including material shortages and difficulty hiring or maintaining staff, although the impacts of these barriers on planned capital projects appears limited.
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 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 (58% of PY2021 projects were completed in the office and retail segments). Savings realized through this program have decreased over the PY2019-PY2021 program cycle, likely due, in part, to the COVID-19 pandemic.

[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
	▪ The SBDI program appears to have been less successful in serving renters, a frequently underserved market segment by business portfolios, than in prior program years. According to program tracking data renters accounted for 25% of PY2021 SBDI Program participants, compared to 54% of PY2020 SBDI Program participants and 36% of Ameren Missouri's population of business customers (according to market research in support of Ameren Missouri's 2019 potential study). ▪ The new BSS Program serves nonprofit organizations that provide services to the low-income public. The program is small in scope, with 31 projects completed by 14 organizations in PY2019; 12 projects completed by eight organizations in PY2020; and 23 projects completed by 16 organizations in PY2021. 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.
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, but then discontinued again in PY2021. ▪ 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. There was no uptake of non-lighting measures in PY2021. ▪ While the BSS Program offers a range of measures across different technologies, the program was almost exclusively focused on lighting measures in PY2019, PY2020, and PY2021. 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 over the 3-year program cycle. 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 57% of Standard and 53% of Custom PY2021 survey respondents), these numbers have decreased over the 3-year program cycle (62% Standard and 59% Custom in PY2020; 77% Standard and 83% Custom

CSR Required Process Evaluations Questions	Findings
	in PY2019), with other information channels (including BizSavers representatives, Ameren Missouri's website, and e-mail blasts) becoming more important. This trend likely reflects a change in outreach strategy by the implementer due to COVID-19. Notably, almost half (44%) of Standard/Custom participants prefer e-mail outreach or electronic newsletters as an information channel for energy efficiency opportunities.
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 PY2021 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 or PY2021: ▪ 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 but discontinued the measure in PY2021. ▪ Other new measures introduced in PY2020 included 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 the spring of 2021, the program offered a temporary trade ally incentive to increase the uptake of HVAC measures. ▪ While the program offered a 15% bonus incentive for HVAC measures (compared to 10% for lighting measures) in PY2020, the only bonus incentive in PY2021 was for certain Standard lighting measures. ▪ Notably, the Standard Program saw a substantial increase in HVAC projects and savings over the 3-year program cycle. ▪ 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 or PY2021 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. These efforts have been successful as more participants now hear about the program through these channels.

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 all five costs-effectiveness tests recommended by the California Standard Practice Manual and used in prior evaluations:[4]

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

- **Total Resource Cost (TRC) Test:** Perspective of all utility customers (participants and nonparticipants) in the utility service territory
- **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
- **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 PY2021 based on the TRC test and the PCT. Only the UCT test for the BSS Program and the RIM test for all six 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	2.89	3.01	0.61	6.41
Custom	1.47	3.30	0.93	1.73
SBDI	2.71	2.73	0.55	6.68
New Construction	1.32	3.15	0.78	1.89
RCx	2.66	3.04	0.92	3.96
BSS	1.71	0.71	0.35	6.06

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 PY2021 business portfolio evaluations address the following research objectives:

Gross Impact Objectives

- Verify program-tracking data
- Verify measure installation (not applicable to all programs)
- Estimate the first year and last year ex post gross energy (kWh) and demand (kW) savings[7]

Attribution/Net Impact Objectives

- Update FR values (not applicable to all programs)
- Estimate the first year ex post net energy (kWh) and demand (kW) savings
- 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 PY2021 business evaluation results, Ameren Missouri's TRM,[8] and industry best practices
- 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] Last year savings represent the energy or demand savings expected to occur in the final year of a measure's expected useful life.
[8] 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 September 2021 (referred to as "Ameren Missouri TRM"). The referenced TRM versions, updated in September 2021, include Appendix H, Version 3 and Appendix F, Version 5.0.

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 PY2021 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.[9]

Table 7 summarizes the evaluation activities, by program.

Table 7. PY2021 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	-	-	-	✓[A]	✓	-
Gross Impact Analysis						
Database Review	✓	✓	✓	✓	✓	✓
Engineering Analysis	✓	-	✓	-	-	✓
Desk Reviews	✓	✓	-	✓[A]	✓	-
Onsite Verification	✓	✓	-	✓[A]	✓	-
Attribution/Net Impact Analysis						
Free Ridership	✓	✓	-	✓[A]	✓	-

[A] For indoor agriculture New Construction projects only.

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

[9] 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 PY2021 evaluation of the BizSavers Program:

- The first interview was conducted in December 2020 as part of the PY2020 year-end interview. During this interview, we explored any planned changes to program design and implementation in PY2021 that might affect our evaluation approaches or priorities.
- The second interview was conducted towards the end of the program year, on December 20, 2021. The objectives of this second interview were to understand the program team's perspective on program performance during PY2021, 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 PY2022.

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 PY2020 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 FR. 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 in Appendix H.

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 (Standard, Custom, RCx and New Construction), desk reviews (Standard, 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[10] for Standard non-lighting non-HVAC measures (which accounted for less than 1% of PY2021 ex ante gross Standard Incentive Program savings). To optimize evaluation budgets, we also applied PY2020 gross realization rates for Custom motors and other[11] measures.[12] We also applied PY2020 gross realization rates for New Construction projects other than indoor agriculture projects.[13]

[10] In the PY2019 evaluation all non-lighting enduses were sampled and evaluated together. We recalculated a realization rate for non-lighting non-HVAC measures by removing all HVAC projects from the PY2019 sample and results. The recalculated realization rate is 80.8% for energy savings and 129.3% for demand savings.
[11] Custom refrigeration and process measures are grouped together as "other" enduses for evaluation purposes.
[12] Both enduse categories account for a relatively small share (1%) of PY2021 Custom Program ex ante gross energy savings, and the PY2020 evaluation results showed good precision for both categories (achieving 10% relative precision or better at a 90% confidence level).
[13] In the PY2020 evaluation all New Construction Program projects were sampled and evaluated together. We recalculated a realization rate for non-indoor agriculture projects by removing all indoor agriculture projects from the PY2020 sample and results. The recalculated realization rate is 102.8% for energy savings and 114.1% for demand saving.

Table 8 summarizes the PY2021 gross impact approaches used for the various BizSavers programs and enduse categories.

Table 8. PY2021 Gross Impact Approaches by Program

Gross Impact Approach	Program / Enduse
Desk Review & Onsite Visit	▪ Standard (HVAC) ▪ Custom (HVAC, Lighting, Compressed Air) ▪ RCx ▪ New Construction
Engineering Analysis	▪ Standard (Lighting) ▪ SBDI (Lighting) ▪ BSS (Lighting)
PY2019 Realization Rate	▪ Standard Non-Lighting Non-HVAC
PY2020 Realization Rate	▪ Custom (Motors, Other) [A] ▪ New Construction (Non-Indoor Ag)

[A] 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: Process and Refrigeration.

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 3.0 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 Standard, Custom, RCx, and New Construction programs.

Engineering Analysis

We conducted an engineering analysis to estimate PY2021 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 the ex post analysis, we applied in-service rates (ISRs) or hours of use (HOU) adjustments developed in PY2020, based on results from the PY2019 desk reviews and/or onsite visits. Table 9 summarizes the values applied.[14]

[14] Application of these adjustments was agreed upon as part of the response and comment process for the PY2020 Annual Evaluation Report.

Table 9. PY2021 Ex Post HOU Adjustments and ISRs

Program	HOU Adjustment	ISR	Combined
Standard	99.4%	99.6%	99.0%
SBDI	100.7%	99.2%	99.9%
BSS	100.0%	100.1%	100.1%

Engineering Desk Reviews

We conducted engineering desk reviews for a sample of projects from the Standard, 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 PY2021, targeting 10% relative precision at the 90% confidence level (90/10), where possible. We stratified random sampling approach, stratifying by enduse and project size.[15]

Onsite Verification

Onsite verification involved in-person visits to the site of measure installation, conducted for a subset of the Standard, Custom, New Construction, 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. The engineer performed the following actions during the onsite visits:

- Verified that the incented measures were installed and functioning, and that the quantity and equipment specifications (e.g., model number, capacity, and efficiency) was 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). Such onsite data include identification of facility HVAC systems, collection of

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

equipment nameplate information, verification of controls equipment and programming, direct measurement of floor areas, and historical operational data from site monitoring systems.

- 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.

Attribution/Net Impact Analysis

Our net-to-gross (NTG) analysis included consideration of FR, participant spillover (PSO), and market partner spillover (MPSO); it did not include consideration of non-participant spill over (NPSO). The net-to-gross ration (NTGR) was calculated as follows:

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

It should be noted that the PY2021 evaluation only included primary data collection to develop new FR values for the Standard, Custom, NC, and RCx programs. Other inputs into the NTGR for the BizSavers programs are based on the research conducted for prior program years.

Table 10 summarizes, by program, which components are included in the NTGR and the program year in which they were evaluated. The subsection following the table provides more detail on the estimation of FR.[16]

Table 10. Components of NTGR by Program

NTGR Component	Standard	Custom	SBDI	NC	NC-Indoor Ag	RCx	BSS
Free Ridership	PY2021	PY2021	PY2019	PY2020	PY2021	PY2021	n/a
Participant Spillover	PY2020	PY2020	PY2019	PY2020	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.

[16] The PY2019 and PY2020 Annual Evaluation Reports contain a detailed discussion of the methodology and results of the PSO and MPSO analyses.

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.[17] For each respondent, FR is calculated as follows:

*FR = Efficiency FR Score * Min(Quantity & Timing Adjustment, COVID 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.

For each respondent, we developed two adjustment factors that allow the program to receive credit in cases where the program influenced project size and/or timing rather than, or in addition to, the level of efficiency of the installed equipment:

1. The **Quantity & Timing Adjustment** was already used in our PY2019 and PY2020 evaluations and reflects the fact that the available incentives sometimes allow a customer to accelerate all or parts of their projects (compared to when they would have completed them without the program).
2. The **COVID Timing Adjustment** is a new factor designed to capture a potential impact of the program in preventing project cancelations or delays due to COVID-19 and associated containment measures or broader economic impacts.[18]

We multiplied the smaller of the two factors by the Efficiency FR Score to capture this potential program influence on project size and/or timing.

To increase the confidence in the FR scores of sampled projects, we conducted an additional review of survey responses for two types of projects:[19] (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.

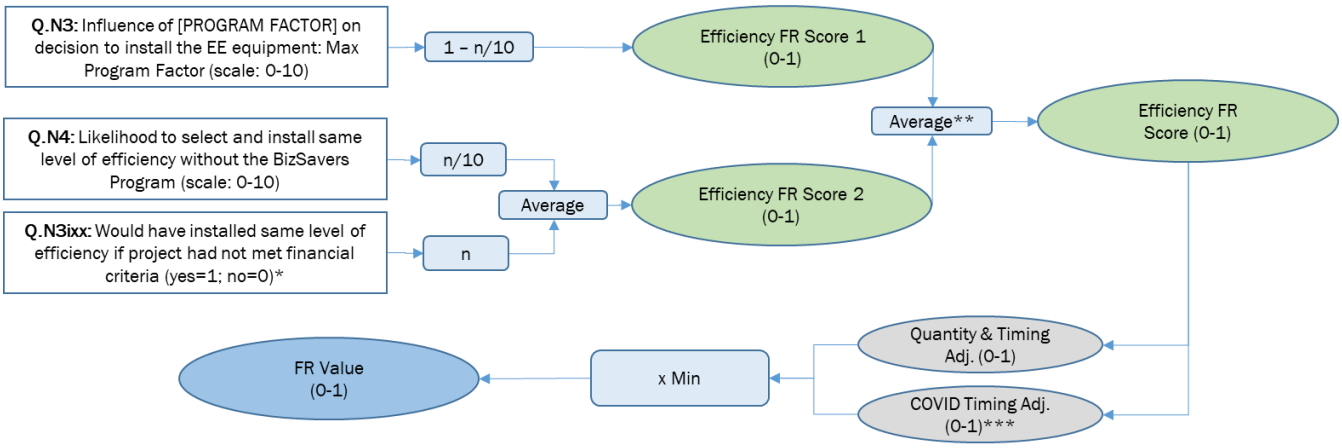
Figure 1 presents a diagram of the respondent-level FR algorithm used for this evaluation.

[17] 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.

[18] The COVID Timing Adjustment is only applied in the Standard and Custom Program evaluations and is excluded from the New Construction and RCx Program algorithms. As discussed in Section 5.2.3, it is unlikely the New Construction Program has a significant impact on project timing in general, which is why a timing adjustment is excluded from the New Construction Program FR algorithm. Therefore, it follows that the program is unlikely to have an impact on preventing COVID-19 related delays specifically. As discussed in Section 6.2.3, while the RCx algorithm does include a Timing Adjustment, this adjustment factor is readily capable of capturing any additional impact on COVID-19 related delays specifically. Therefore, we revised the RCx interview guide questions to capture this impact while maintaining the existing algorithm.

[19] 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.

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.*
*** In cases where the two efficiency scores are inconsistent, the algorithm uses a weighted average, based on the level of program influence reported in other survey responses.*
**** Applied only in Standard and Custom evaluations.*

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.

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

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:

$$\textit{Ex post net savings} = \textit{Ex post gross savings} * \textit{NTGR}$$

3. Standard and Custom Incentive Programs

This chapter summarizes the PY2021 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 PY2021 evaluation of the Standard Incentive Program included an engineering analysis of lighting measures, desk reviews and onsite visits for a sample of Standard HVAC projects, and application of PY2019 gross realization rates for non-HVAC enduses.[20] The evaluation of the Custom Program included desk reviews and onsite visits for a sample of projects within the HVAC, lighting, and compressed air enduse categories, and, to optimize evaluation budgets, application of PY2020 gross realization rates for the motors and "other" enduse categories.[21] Both evaluations included an assessment of program FR but did not assess SO or program processes. Additional details on the evaluation methodology are presented in Chapter 2, Appendix A, and Appendix B. Detailed desk review and onsite visit findings for the sampled Custom lighting, HVAC, and compressed air projects are presented in Appendices C through E.

3.1 Evaluation Summary

The Standard Incentive Program and the Custom Incentive Program are the first and third largest programs in Ameren Missouri's PY2021 business portfolio, respectively, by ex post net savings. Within the BizSavers portfolio, the Standard Incentive Program accounts for 50% and 40% of first year ex post net energy and demand savings, respectively; while the Custom Incentive Program accounts for 17% and 25% 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.

While 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 PY2021, the only participation channel for the Standard and Custom programs 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).

[20] In PY20219 all non-lighting enduses were evaluated together, including both Standard HVAC and other non-lighting enduses. Because Standard HVAC is evaluated separately from other non-lighting enduses in PY2021, we recalculated the PY2019 non-lighting realization rate for application in PY2021 by removing Standard HVAC projects.
[21] The "other" enduse includes building shell, process, refrigeration, and water heating.

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.

The PY2021 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 PY2020 include:

- Temporarily offering an incentive bonus for some Standard Lighting measures
- Temporarily offering a Trade Ally incentive from May through July for some Standard HVAC measures

3.1.1 Participation Summary

Table 11 summarizes PY2021 participation in the Standard and Custom programs, including the number of projects and ex ante gross savings. Overall, Ameren Missouri business customers implemented 2,200 projects through the Standard Program and 279 through the Custom Program in PY2021, resulting in 82,335 and 31,884 MWh, respectively, of ex ante gross energy savings. For the Standard Program, this represents an increase in participation but a decrease in ex ante savings compared to PY2020, which saw a total of 2,008 projects and 85,129 MWh in ex ante gross savings. For the Custom Program, this represents a decrease in both participation and ex ante gross savings compared to PY2020, which saw a total of 344 projects and 35,049 MWh in ex ante gross savings.

Similar to PY2019 and PY2020, the PY2021 Standard Program was heavily focused on lighting (91% of ex ante gross energy savings). However, in the HVAC enduse—a priority enduse for the implementation team in PY2021—the program did continue to increase the number of projects completed (317 in PY2021 compared to 172 in PY2020) and ex post gross savings (6,901 kWh compared to 4,425 kWh). While the majority of Custom projects also included lighting (55%), the Custom Program derived the majority of its savings from HVAC measures (76%).

Table 11. PY2021 Standard and Custom Program Participation Summary

Enduse	Projects		Ex Ante Gross Savings	
	Number [A]	%	MWh	%
Standard Program				
Lighting	1,887	86%	74,767	91%
HVAC	317	14%	6,901	8%
Refrigeration	16	1%	154	<1%
Compressed Air	3	<1%	155	<1%
Motors	1	<1%	140	<1%
Cooking	1	<1%	8	<1%
Miscellaneous	7	<1%	210	<1%
Total Standard	**2,200**	**100%**	**82,335**	**100%**
Custom Program				
HVAC	105	38%	24,257	76%
Lighting	154	55%	4,314	14%
Compressed Air	9	3%	2,590	8%
Motors	7	3%	358	1%
Refrigeration	9	3%	173	1%

Enduse	Projects		Ex Ante Gross Savings	
	Number [A]	%	MWh	%
Process	2	1%	193	1%
Total Custom	**279**	**100%**	**31,884**	**100%**

[A] The number of projects by lighting type and by enduse sum to more than the totals shown due to some 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 PY2021, contributing 50% of first year ex post net energy savings and 40% of first year ex post net demand savings. Table 12 summarizes first year and last year annual gross and net savings for the Standard Program in PY2021 as well as the evaluated gross realization rates. As shown, the program achieved 105% and 133%, respectively, of Ameren Missouri's first year net energy and demand savings goals, and 8%, 50% and 250%, 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 12. PY2021 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)	82,335	100.1%	82,396	87.1%	71,730	68,607	105%
Demand Savings (MW)	19.74	105.0%	20.72	87.1%	18.03	13.59	133%
Last Year Demand Savings							
< 10 EUL (MW)	0.12	104.0%	0.12	87.1%	0.11	1.33	8%
10–14 EUL (MW)	3.35	109.5%	3.67	87.1%	3.19	6.37	50%
15+ EUL (MW)	16.27	104.0%	16.92	87.1%	14.73	5.89	250%

The PY2021 Standard Program achieved gross realization rates of 100.1% and 105.0% for first year energy and demand savings, respectively. Realization rates for last year demand savings were 104.0% in the 15+ Year EUL and <10 Year EUL categories and 109.5% in the 10–14 Year EUL category.

The PY2021 gross impact analysis included an engineering analysis for lighting measures, desk reviews and onsite visits for a sample of HVAC measures, and applied PY2019 realization rates for all other enduse categories. Energy realization rates are driven by the following:

- For Standard lighting measures, the ex post application of building type-specific energy waste heat factors (WHFs) and electric heating penalties from the Ameren Missouri TRM, where applicable, resulted in a reduction in lighting energy savings compared to the application of an average Heating and Cooling Interaction Factor (HCIF) of 1.07 in the ex ante analysis. In addition, the ex post analysis applied an ISR of 99.6% and an HOU adjustment factor of 99.4%. Overall, the energy realization rate for Standard lighting measures was 97.8%.
- For Standard HVAC measures, findings from the desk reviews and onsite visits resulted in an energy realization rate of 126.6%. The increase in savings is driven by the inclusion of electric heating

impacts for ASHP and thermostat measures in electrically-heated buildings. However, this Standard HVAC energy realization rate is only applied to a small portion (8%) of program ex ante gross savings.

- Demand realization rates for lighting measures are driven by differences in energy savings (summarized above), the ex post application of demand WHFs (compared to the ex ante average HCIF value of 1.07), and, to a lesser extent, the correction of the coincidence factor for LED exit signs replacing CFL exit signs. The resulting demand realization rate for lighting measures is 100.7%. The HVAC desk review and onsite visits resulted in a Standard HVAC demand realization rate of 115.8%, driven by ex post adjustments to the cooling equivalent full load hour values based on verified building type and location and adjustments to the cooling savings factor for Demand Control Ventilation.

The NTGR for the Standard Program was 87.1%, including consideration of FR (14.2%), PSO (0.35%), and MPSO (0.91%). Free ridership was estimated based on surveys conducted with PY2021 participants. The PSO rate is calculated as an average of PY2019 and PY2020 evaluation results while the MPSO rate is based on the PY2019 evaluation.

Custom Program

The Custom Program was the third largest program in Ameren Missouri's Business Portfolio in PY2021, contributing 17% of first year ex post net energy savings and 25% of first year ex post net demand savings. Table 13 summarizes first year and last year annual gross and net savings for the Custom Program in PY2021. As shown, the program achieved 25% and 39% of Ameren Missouri's first year net energy and demand savings goals, respectively, and 7% and 44% of Ameren Missouri's last year net demand savings targets in the 10–14 Year EUL and 15+ Year EUL categories, respectively.

Table 13. PY2021 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)	31,884	95.8%	30,532	82.0%	25,026	100,445	25%
Demand Savings (MW)	14.65	94.2%	13.80	82.0%	11.31	29.20	39%
Last Year Demand Savings							
< 10 EUL (MW)	-	n/a	-	n/a	-	-	n/a
10–14 EUL (MW)	0.35	97.8%	0.34	82.0%	0.28	4.16	7%
15+ Year EUL (MW)	14.299	94.1%	13.46	82.0%	11.03	25.04	44%

The PY2021 Custom Program achieved 95.8% and 94.2% gross energy and demand realization rates, respectively. Realization rates for last year demand savings are 107.8% in the 10–14 Year EUL category and 94.1% in the 15+ Year EUL category. The small reduction in the realization rates was mainly driven by HVAC measures, which have realization rates of 93.5% and 93.3% for energy and first year demand, respectively.

The NTGR for the Custom Program was 82.0%, including consideration of FR (19.0%), PSO (0.06%), and MPSO (0.91%). Free ridership was estimated based on surveys conducted with PY2021 participants. The PSO rate is calculated as an average of PY2019 and PY2020 evaluation results while the MPSO rate is based on the PY2019 evaluation.

3.1.3 Key Process Findings

The PY2021 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 PY2021 participant survey:

- **Program Participation**: In PY2021, Ameren Missouri business customers completed 2,200 projects through the Standard Program and 279 projects through the Custom Program. A large percentage of PY2021 projects (24% for Standard and 40% for Custom) closed in December 2021. We also see an increase in Standard Program project starts/completes between May and July, coinciding with the HVAC Trade Ally Incentive.
- **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 57% of Standard participants and 53% of Custom participants reporting they had heard about the program through a contractor, vendor, or energy consultant in 2021. Similar to PY2019 and PY2020 results, over two-fifths (44%) 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 88% of Standard and 93% of Custom participants being "Very Satisfied" with the program overall.
- **COVID-19 Impacts**: Compared to 2020, fewer PY2021 participants reported significant impacts on their operations due to COVID-19. In particular, participants were less likely to experience temporarily closed business locations or decreased revenue due to COVID-19, but were more likely to experience material shortages and difficulties hiring or maintaining staff. Further, more respondents reported experiencing no impacts on their operations due to COVID-19 in 2021 than in 2020 (30%, vs. 5% in 2020).

3.1.4 Conclusions and Recommendations

The Standard program performed strongly during PY2021, especially considering the challenging circumstances due to the ongoing effects of the COVID-19 pandemic. Similar to PY2019 and PY2020, the Standard Program carried the BizSavers portfolio and exceeded its savings targets. The Custom Program fell short of targets, but achieved realization rates between 93% (HVAC) and 107% (Lighting) for the enduses evaluated in PY2021.

Conclusions and Recommendations for the Standard Program

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

- **Conclusion #1:** The Standard Program had another strong year in PY2021, contributing significantly to portfolio savings and exceeding both energy and demand savings goals. The program continued to work on increasing adoption of non-lighting measures and, relative to PY2020, more than doubled its savings from HVAC measures, which accounted for 11% of ex post net savings in PY2021.
- **Conclusion #2:** Despite the increase in savings from HVAC measures, the PY2021 Standard Program continued to be dominated by lighting measures. While these offer a cost-effective way of achieving

savings targets, changing market conditions will necessitate a continuing shift of program activity towards other enduses, if program savings are to be sustained over the longer term.

  - **Recommendation:** Continue to harvest lighting savings, while available, but continue 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 1.05, and the average ex post demand savings adjustment (WHF only) was 1.08.

  - **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 but for the cooling interaction only for demand savings. The PY2021 engineering analysis across prescriptive lighting measures in the Standard, SBDI, and BSS programs found an energy factor of 1.05 and a demand factor of 1.08. The PY2020 evaluation had found an energy factor of 1.04 and a demand factor of 1.09. We recommend leveraging these past evaluation results to develop factors for future ex ante application.

- **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 Standard HVAC measures, the evaluation team observed several areas where the ex ante savings calculation methods were not consistent with the savings methods prescribed in the Ameren Missouri TRM Appendix B. For example, ex ante savings used an average value for Equivalent Full Load Hours (EFLH) rather than the TRM values which are based on Building Type and geographic location. Similarly, ex ante savings used deemed average savings factors (from TRM Appendix F) for demand control ventilation and thermostat measures rather than using Appendix B savings factors based on Building Type and geographic location.

  - **Recommendation**: To improve consistency with the Ameren Missouri TRM, ex ante savings should use EFLH values and savings factors provided in the TRM based on building type and location. For unique building types that do not fit within the existing Building Type categories, use an average value for the geographic location.

- **Conclusion #6**: In multiple instances, ex ante savings calculations did not count heating savings. This included ASHP and thermostat measures installed in electrically-heated buildings. Both of these HVAC measures improve heating season efficiency, and the associated TRM algorithms include prescriptive methods for estimating electric heating savings.

- **Recommendation**: To improve consistency with the Ameren Missouri TRM for estimated energy savings for Standard HVAC measures and to count all energy impacts from HVAC measures, ex ante savings should include heating season impacts for facilities with electric heat.

Conclusions and Recommendations for the Custom Program

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

Overarching

- **Conclusion #1:** Compared to PY2020, the Custom Program was smaller in PY2021, in terms of participation (279 projects in PY2021 vs 344 projects in PY2020) and gross ex ante gross savings (31,884 MWh in PY2021 vs 35,049 MWh in PY2020). Although the Custom Program was the third largest contributor to the PY2021 Business Portfolio in terms of ex post net savings, it achieved the lowest performance relative to goal, only achieving 25% of its first year net energy savings goal.
- **Conclusion #2**: For some Custom projects, key project documentation and savings analysis files were missing from the set of project documents available in the program-tracking database. These include facility energy studies, detailed project summaries, savings calculation and modeling files, and post-installation inspection reports. In some cases, the available documents were outdated, such that the project information did not match the final project or the savings calculation files did not match the final ex ante savings. The evaluation team was able to obtain many of the required files and additional project information from the implementer, upon request, but in some cases, the implementer directed us to the trade ally or customer for additional information, suggesting that key information was not available to support the implementer's review of project applications. Overall, the incomplete and inconsistent documentation (1) calls into question the implementer's process for fully validating claimed savings when reviewing and approving incentive applications; (2) creates confusion about the project scope and increases the chance of errors in the final claimed savings; (3) can create additional burden on trade allies and customers and lead to dissatisfaction; and (4) increases evaluation cost and restricts the evaluation team's ability to fully verify savings, especially given that a large percentage of projects closed in December and information was not available until late January, leaving limited time for multiple rounds of follow-up. The evaluation team made a similar finding in the PY2020 Evaluation Report.
  - **Recommendation**: To improve the completeness and accuracy of project documentation as well as consistency with final savings claims, we recommend the program team develop and follow guidelines for the minimum level of required documentation to be stored and accessible to program staff and evaluation contractors for each Custom 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. The implementer should consider developing and using a checklist to ensure all final documentation are captured as part of the project close-out and before a project is considered "Complete."
- **Conclusion #3:** Although all evaluated projects had reached the project complete stage with a signed project completion form, the evaluation team found several instances where key measures were still being implemented and/or commissioned. For example, for one Custom HVAC project the outside air ductwork and economizer equipment were still being installed when the evaluation team first made

contact with the site in January 2022, more than three months after the project completion form was signed in September 2021. Large HVAC projects with new equipment and controls measures often require post-installation commissioning to achieve the anticipated energy savings.

- **Recommendation**: To ensure the anticipated energy savings are achieved by custom projects, especially large projects with large equipment upgrades and controls measures, the program should complete its post-installation inspection and project close-out processes before considering a project "complete" to ensure that all relevant equipment and controls measures are implemented and operating as intended. This may include completing commissioning phases and collecting data through commissioning. As a general principle, the PY2021 evaluation only awarded savings for measures that were confirmed to be in place and operating as intended, but this approach was hampered by poor project documentation as it was often unclear what the exact system configuration or measure specifications were, for either the baseline or efficient scenarios. In many cases, the onsite verifications were missions to discover and reveal the measure and system operation details instead of true verification. For future program years, projects will strictly be evaluated for savings verifiable at the time of the evaluation, and incomplete projects will have savings based on the currently achieved levels of savings.

Custom HVAC

- **Conclusion #4**: Many of the sampled Custom HVAC projects leverage energy modeling software to estimate annual energy savings, especially for projects with multiple measures impacting HVAC system loads, controls, and operating efficiency. Energy simulation models are a reliable tool for capturing the interactive effects of multiple measures. In most cases, the baseline energy models were comparable to metered baseline consumption. In some cases, it was difficult for the evaluation team to connect the modeling inputs with the baseline and proposed project and measure descriptions.
  - **Recommendation**: The evaluation team encourages the use of energy simulation modeling as tool for estimating savings for large HVAC projects and/or projects with multiple interactive measures. When using energy simulation models, the implementer should ensure that (1) baseline models are calibrated per the most appropriate IPMVP Option or ASHRAE Guideline 14 to match metered baseline consumption data or other baseline trended data (when appropriate) and (2) the project documentation includes a summary of how each model represents the baseline and/or proposed efficient condition and highlights the differences between each model simulation (i.e., specific changes to model parameters between baseline and alternative model runs).
- **Conclusion #5**: The evaluation made several adjustments the baseline assumptions used in the ex ante analysis for HVAC projects, including for projects with multiple, interactive measures and for replace-on-fail projects. For projects with multiple interactive measures (e.g., cooling load reduction and new high-efficiency cooling equipment), energy savings estimates must consider that interaction to avoid overstating savings. Similarly, for replace-on-fail and time-of-sale measures, the baseline should not be the existing conditions. The Ameren Missouri TRM provides clear guidance for ROF and TOS measures ("the baseline equipment is assumed to be a standard-efficiency [equipment] that meets the energy efficiency requirements of local building code."), but the program guidance is less defined for custom projects. Also, the baseline guidance is not clear for jurisdictions that have not adopted an energy code or for local code requirements that lag behind industry standard practice.
  - **Recommendation**: To ensure appropriate and consistent estimation of energy savings, the implementer should develop clear guidance for the development and documentation of baseline equipment and operations, including (1) make clear when local code is a minimum baseline, (2) provide guidance for jurisdictions with no adopted code, and (3) set minimum documentation

requirements for scenarios where an alternative customer-specific baseline is defined. The program should strive for consistency between prescriptive and custom methods and explore measures for which industry standards should supersede minimum code requirements, especially in jurisdictions with no or very outdated code requirements.

- **Conclusion #6**: The evaluation encountered several examples of projects containing both Standard and Custom measures affecting the same piece of equipment. For example, one project provided Standard HVAC incentives for new HVAC equipment and Custom HVAC incentives for controls on the same new equipment. Conversely, another project provided Custom HVAC incentives for new HVAC equipment and Standard HVAC incentives for the controls on that new equipment. In both cases, it is unclear why the Custom track was used for the new HVAC equipment or controls as the measures were available through the Standard Program.
  - **Recommendation**: For energy-efficiency measures that qualify for a Standard incentive, the implementer should use the Standard incentive track, which provides standardized methods for estimating energy and demand savings. Otherwise, for measures that are similar to prescriptive measures, the implementer should clarify in the project documentation why the measure or application was not appropriate for the Standard incentive and savings methods and why a Custom incentive was selected instead.
  - **Recommendation**: When a project includes multiple measures directly impacting the same equipment, the implementer should avoid splitting measures between Standard and Custom program tracks. Keeping connected measures together improves consistency and accuracy in the savings estimation methods (e.g., by ensuring similar baseline assumptions and capturing interactive effects between connected measures).
- **Conclusion #7:** Seven of the fourteen sampled Custom HVAC projects were completed in the last two months of the program year (November and December of 2021), and most of these projects involved cooling equipment and controls. The late-in-the-year project completion timing, combined with the regulatory evaluation deadlines, limits the evaluation team's ability to conduct a rigorous ex post analysis, especially for cooling-related measures because (1) the short post-installation period limits available post-installation data, and (2) there may be no post-installation cooling loads or operation to observe and measure.
  - **Recommendation**: When cooling-related Custom measures are not completed before the cooling season, the program should collect and include with the project documentation (1) pre- and post-installation trend data showing baseline heating and cooling loads and (2) any commissioning or post-installation studies conducted for the project.
- **Conclusion #8:** For several Custom HVAC projects, the evaluation team requested system trend data to demonstrate the operation and performance for key equipment. While some site contacts were able to share trend data, other site contacts had limited BMS access or had not yet set up their BMS to capture trend data. In addition to being a valuable source of data for evaluation, trend reports are valuable for ongoing energy management and to support the persistence of efficient HVAC system operations.
  - **Recommendation**: To support both post-installation verification of energy-efficiency measures and customers' ability to access and monitor system performance, the program should consider including BMS training and setting up basic trend reports for customers who received large and/or complex HVAC system upgrades. This could be part of the post-installation inspection or commissioning processes before a project is marked complete.

Custom Lighting

- **Conclusion #9**: For custom lighting measures, the program implementer typically uses an average Waste Heat Factor (WHF) of 1.07 to estimate HVAC interactive effects when calculating ex ante energy and demand savings for interior lighting measures in conditioned spaces. The implementer uses this "C&I Average" value from a previous TRM version, regardless of building type, HVAC system type, or heating fuel. For electrically heated spaces, the program implementer does not include a heating penalty.
  - **Recommendation**: To improve the accuracy of ex ante savings, we recommend that the implementer estimate the HVAC interactive effects by applying either customized calculations (e.g., based on the site-specific HVAC equipment efficiencies) or the building type-specific WHF and IF values provided in the Ameren Missouri TRM, based on building and HVAC type.
- **Conclusion #10**: A key parameter for estimating savings for lighting projects is the annual hours of use (HOU) for baseline and new lighting systems. For most custom lighting projects, the project documentation did not include information supporting the annual hours of use (HOU) value for the lighting measures.
  - **Recommendation**: To improve the accuracy and transparency of key parameter values like HOU and energy savings calculations, we recommend the implementer develop a standardized approach to estimating and documenting annual lighting system HOU. These details supporting the HOU estimate should include daily lighting schedules for weekdays, weekends, and holidays and any seasonal variation (e.g., for schools) and should be included in the project documentation.
- **Conclusion #11**: Other key parameters for estimating energy savings for lighting projects are the quantity and wattages for baseline and new lighting fixtures or for lighting systems connected to new lighting controls measures. For several custom lighting projects, the project documentation did not include information supporting all these parameters for the lighting measures being analyzed. For two of nine sampled custom lighting projects, the project documentation lacked detail supporting the baseline and high-efficiency parameters and characterizations and contained inconsistencies between project information and the tracked energy savings.
  - **Recommendation**: To improve the accuracy and transparency of key parameter values like connected kW, number of fixtures, and wattages, we recommend the implementer develop a standardized approach to documenting these parameters, including the fixture types, counts, and wattages by building area (e.g., office, bathroom, hallway, etc.)

Custom Compressed Air

- **Conclusion #12**: For all custom compressed air projects, estimated energy savings were based on one to two weeks of baseline system monitoring data to develop annualized equipment load profiles. In all cases, the annual energy savings were calculated assuming the baseline monitoring period represented annual operations. The project documentation provided no justification for the extrapolation of the monitoring period to annual performance and identified potential inconsistencies between the project-reported and customer-reported annual operating hours.
  - **Recommendation**: To improve the accuracy and transparency of annual energy savings estimates, we recommend the implementer collect and document information regarding the extrapolation of monitored data to annual operations. The implementer should document information regarding system operation outside of the monitoring period, such as annual operating hours, holiday impacts, seasonal variation, and whether the monitoring period reasonably represents normal

annual operations. Understanding how production may vary throughout the year is important when extrapolating data from short monitoring periods.

3.2 Evaluation Methodology

Table 14 provides an overview of the PY2021 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 14. PY2021 Evaluation Activities for the Standard and Custom Incentive Programs

Evaluation Activity	Description
Program Manager and Implementer Interviews	▪ Conducted interviews in December 2020 to inform evaluation planning and in December 2021 to understand program staff's perspective on program performance.
Program Material Review	▪ Reviewed program materials to understand program changes relative to PY2020.
Participant Survey	▪ Conducted a survey with program participants to collect data to inform participant FR.
Engineering Analysis (Standard Lighting Measures)	▪ Verified that ex ante savings use correct TRM algorithms and project-specific values or TRM assumptions ▪ Developed ex post savings using TRM algorithms, site-specific parameters, and deemed savings assumptions.
Engineering Desk Reviews & Onsite Verification (Select Standard and 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, collect additional data to develop energy savings, and verify other parameters through staff interviews. ▪ Collected additional data and confirmed key analysis parameters through direct outreach to participants. ▪ Collected pre/post facility consumption data, when possible, to validate the overall savings impact. ▪ Developed ex post savings for the sample and the population. ▪ Developed historical realization rates for non-sampled enduses.
NTG/Net Impact Analysis	▪ Developed estimates of FR. ▪ Estimated PY2021 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 PY2021. A combined survey was fielded in December 2020 and January 2021. The survey focused mainly on FR, but covered a few process-related topics, including sources of program information, participant satisfaction, material shortages, and the impacts of COVID-19.

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 PY2021, 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.[22]

The sample frame included 1,125 unique participants.[23] We invited all 1,125 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 58 bounced e-mails and 9 ineligible respondents, giving us a total of 1,058 valid sample points. Overall, 192 participants completed the survey (162 Standard Program participants and 30 Custom Program participants), resulting in a response rate of 18.2%.

3.2.2 Engineering Analysis

We conducted an engineering analysis of all Standard Incentive 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, site-specific parameters from the program-tracking database, and deemed savings assumptions (including application of HOU and ISR adjustment factors, based on results of the PY2019 evaluation – see Table 9 in Chapter 2).

3.2.3 Engineering Desk Reviews and Onsite Visits

We conducted engineering desk reviews for a sample of 37 Standard and Custom projects to review and verify project documentation and savings assumptions.[24] 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. Where possible, we confirmed or updated key analysis inputs through direct outreach to participants. Wherever needed and possible, we leveraged phone and e-mail communication with site contacts to verify the measure installation and operation, including timing of the installation, and key parameters affecting savings for lighting equipment, e.g., occupancy schedules, system setpoints, hours of use, and operating strategies. To support this desk review data collection, site contacts provided photographs of installed equipment (e.g., equipment nameplates), screenshots from the building automation systems, and trends data showing historical performance.

In most cases, the evaluation team verified or updated the ex ante savings estimates based on project documentation, review of facility consumption data, research of publicly available information (e.g., building size), review of additional project details collected during the evaluation, 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 conducted onsite visits for a subset of 8 of the 37 Standard and Custom projects, where key project details or parameters could not be verified through the desk reviews and customer outreach. 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

[22] Projects with energy savings of more than 650,000 kWh were considered large projects for purposes of sampling.
[23] For the Standard Program, the sample frame was developed in late November 2021 and did not include all final PY2021 participants.
[24] Note that the PY2021 Evaluation Plan included a total of 40 project reviews, including up to 20 with onsite visits. We reduced this number to accommodate desk reviews and onsite visits for a sample of New Construction projects (see Chapter 5), which were not included in the PY2021 plan. In addition, we more heavily leveraged phone and e-mail communication with site contacts to verify measure installation and operation, focusing onsite visits on projects where reliable information could not be gathered remotely.

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 15 summarizes the final sample for the desk reviews and onsite visits for the PY2021 Standard and Custom Programs.

Table 15. Standard and Custom Programs Gross Impact Sampling Summary

Program – Enduse	Number of Projects [A]		
	Population	Desk Reviews	Onsite Visits
Standard – HVAC	**317**	**9**	**3**
Stratum 3	15	2	1
Stratum 2	37	2	0
Stratum 1	265	5	2
Custom – HVAC	**105**	**14**	**4**
Stratum 3	3	2	1
Stratum 2	20	4	2
Stratum 1	82	8	1
Custom – Lighting	**154**	**9**	**1**
Stratum 3	1	1	0
Stratum 2	13	3	1
Stratum 1	140	5	0
Custom – Compressed Air	**9**	**5**	**0**
Stratum 3	1	1	0
Stratum 2	2	2	0
Stratum 1	6	2	0
Total	**588**	**37**	**8**

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

For enduses not covered by the engineering analysis for Standard lighting measures or the desk reviews/onsite visits, we applied gross realization rates based on PY2020 evaluation results.

3.2.4 NTG Analysis

The NTG analysis for the Standard and Custom programs included consideration of FR, PSO, and MPSO. FR is based on the PY2021 participant survey, while PSO and MPSO are based on PY2020 and 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.

- 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. The PY2020 evaluation 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 PY2021 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 PY2021 participant survey.

Program Participation

During PY2021, Ameren Missouri business customers implemented 2,200 projects through the Standard Program and 279 projects through the Custom Program. About three-quarters of the interviewed Custom participants (73%) and over two-fifths of the interviewed Standard participants (44%) indicated being a repeat participant, i.e., their company had received incentives from Ameren Missouri's BizSavers Program in prior program years.

Standard and Custom program project starts for were relatively steady over the program year (see Figure 2 and Figure 3), averaging 174 and 19 projects started per month, respectively. Five percent of Standard projects and 20% of Custom projects that were completed in 2021 started in 2019 or 2020. Since Custom projects generally take longer to complete, there are more Custom projects that started in preceding years. There was a jump in the number of Custom projects started in May 2021, and Standard projects from May to July 2021. For the Standard Program, this increase may have been influenced by the Trade Ally Incentive the BizSavers program offered for Standard HVAC projects in May through July 2021.

Project completions for both programs also remained steady over the first eleven months of the program year before they increased significantly in December. Both programs similarly achieved a significant share of their ex ante savings during the final month of the program year (36% Standard; 39% Custom). This large uptick in project completions suggests participants may have wanted to complete the projects during PY2021 to take advantage of expiring BizSavers' incentives.

Figure 2. PY2021 Standard Program Monthly Project Starts and Completions

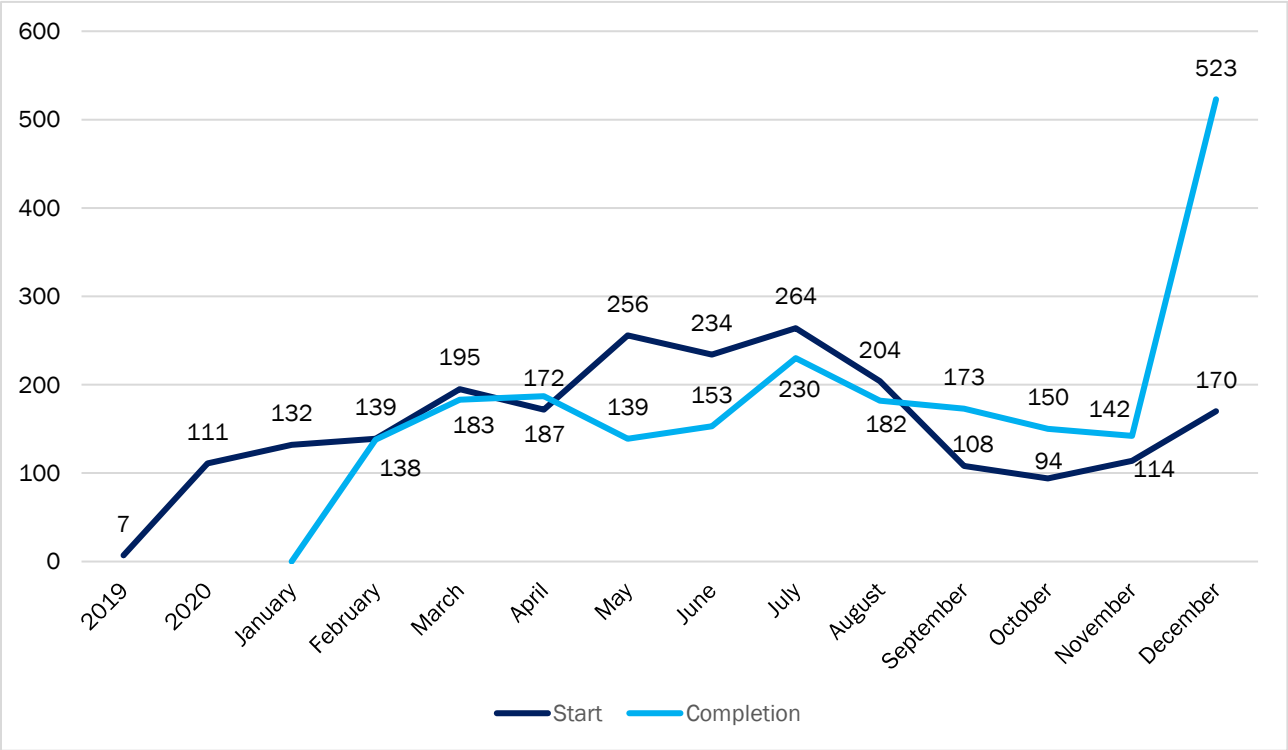
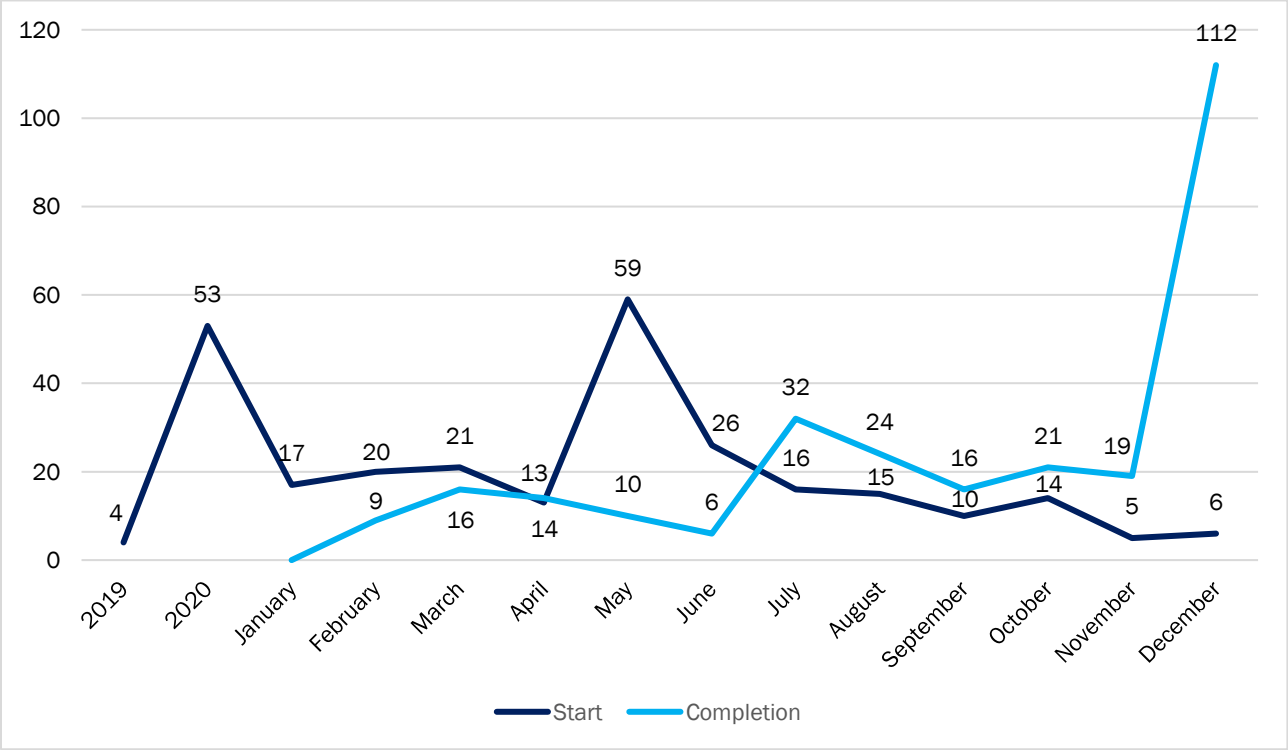


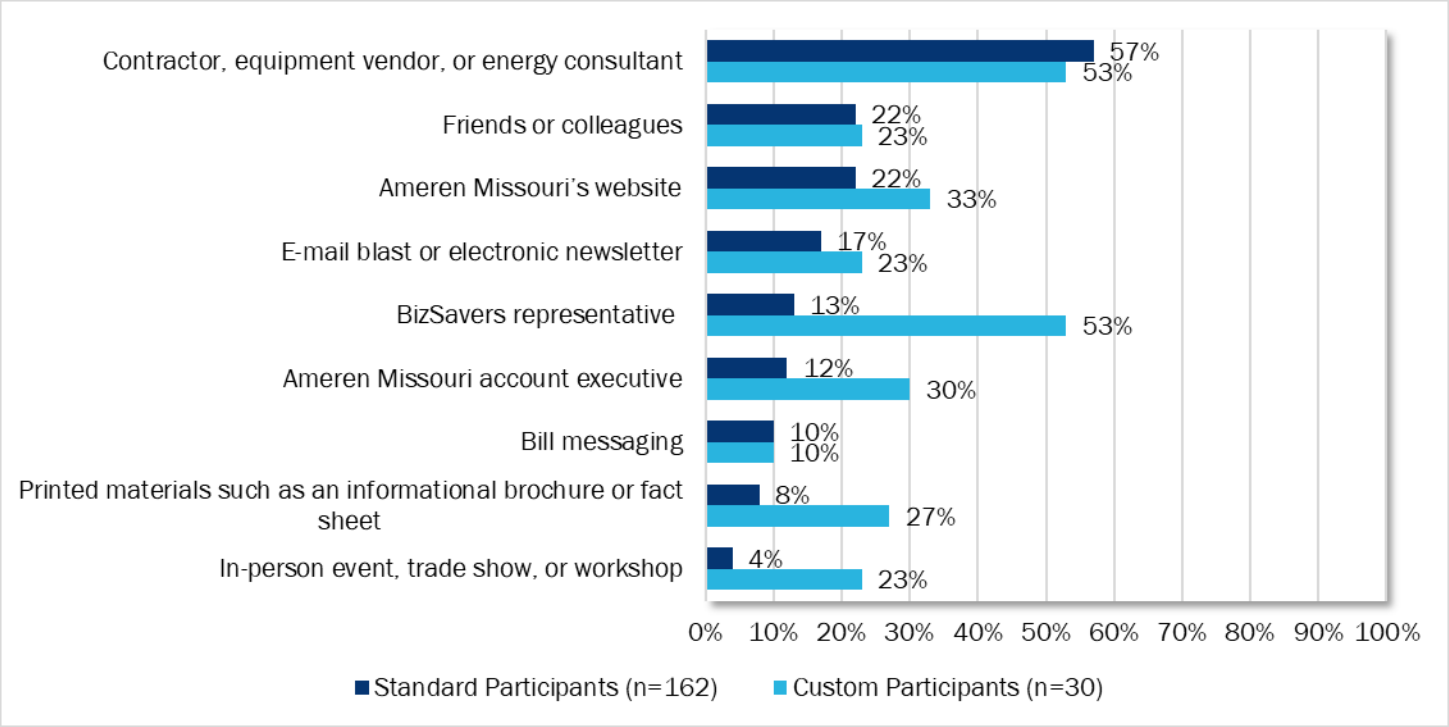
Figure 3. PY2021 Custom Program Monthly Project Starts and Completions



Sources of Program Information

In 2021, similar to 2020, more than half of participants (57% Standard; 53% 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 4). For Custom Program participants, BizSavers representatives (53%) and account executives (30%) were other 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 4. How Participants Heard About Ameren Missouri's BizSavers Program in 2021

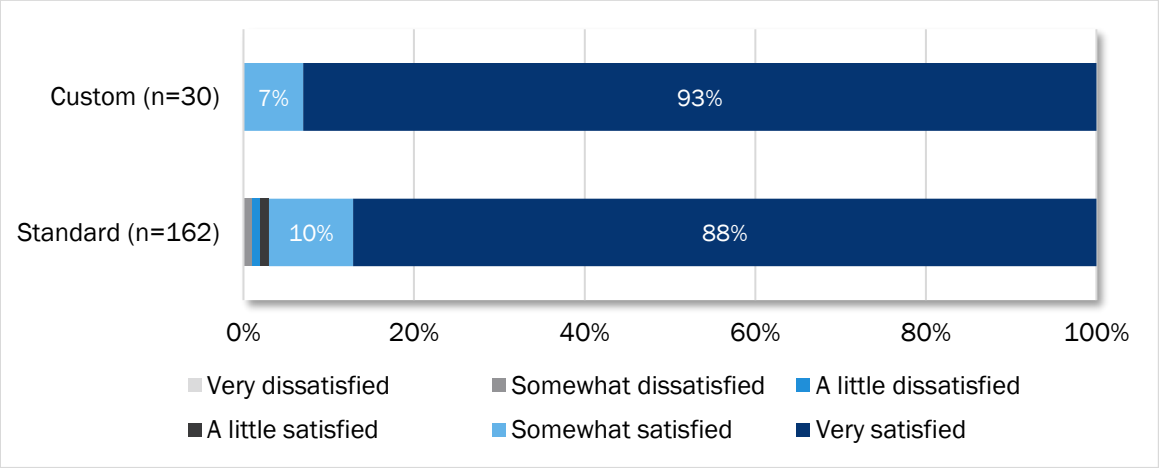


Although fewer participants heard about the BizSavers Program through an e-mail blast or electronic newsletter (as was the case in PY2019 and PY2020), more than two-fifths (44%) of all respondents indicated that this was the best way to inform their company of energy efficiency opportunities. Other preferred means of outreach commonly cited by participants include bill messaging (11%), their contractor (10%), or their Ameren Missouri account executives (10%).

Participant Satisfaction

Participant satisfaction with Ameren Missouri's BizSavers Program overall is generally high. Approximately nine of ten Custom (93%) and Standard respondents (88%) reported being very satisfied with the program overall. Only a couple of respondents with Standard projects reported being dissatisfied with the program (see Figure 5).

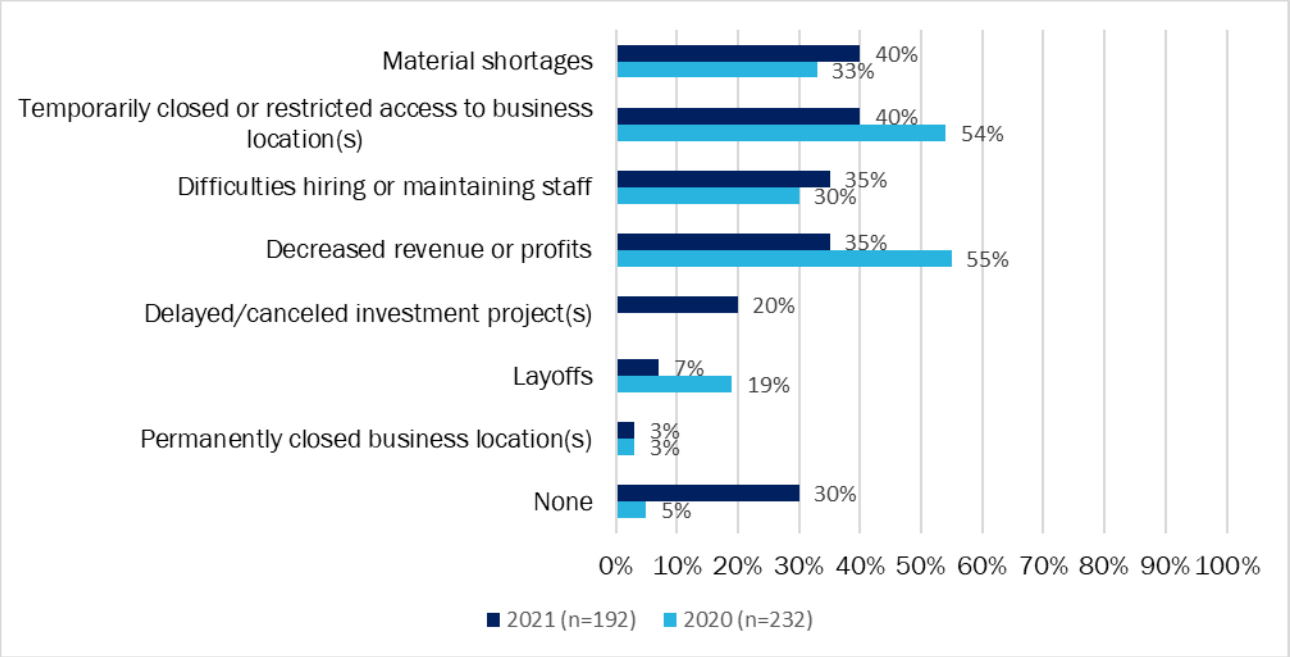
Figure 5. Participant Satisfaction with the BizSavers Program Overall



3.3.2 Impacts of COVID-19 and Supply Side Constraints

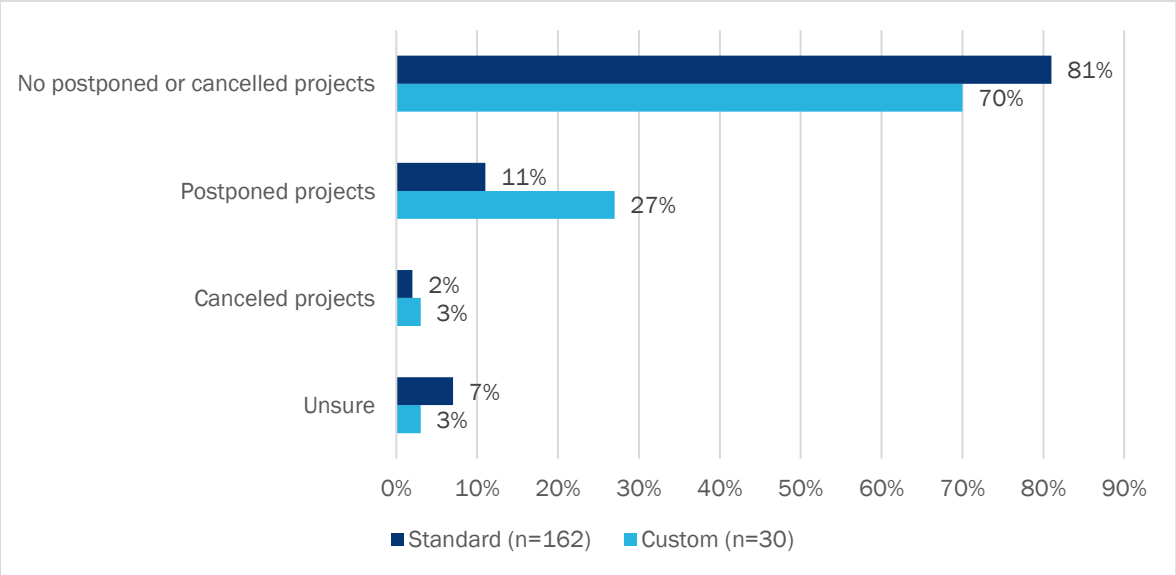
We asked participants about the impact that COVID-19 and any associated containment measures may have had on their business operations in 2021. About one-third of respondents (34%) reported a lot to a great deal of impact on their operations. In 2020, three-fifths of the respondents (60%) reported a similar level of impact, indicating that impacts have decreased significantly between 2020 and 2021. More respondents in 2021 reported experiencing material shortages and difficulties hiring or maintaining staff while fewer respondents reported experiencing temporarily closed business locations or decreased revenue due to COVID-19 compared to 2020 (see Figure 6). More respondents reported experiencing no impacts on their operations due to COVID-19 in 2021 than in 2020 (30%, vs. 5% in 2020).

Figure 6. Impacts of COVID-19



We also asked participants if supply-side constraints, such as labor and material shortages, have impacted any of their planned energy efficiency investment projects during 2021. About three-quarters of respondents did not cancel or postpone any planned projects in 2021 (see Figure 7). More Custom Program participants (27%) reported postponing a planned energy efficiency investment project compared to Standard Program participants (11%).

Figure 7. Impacts of Supply-Side Constraints



3.3.3 Gross Impact Results: Standard Program

This section summarizes gross impact results for the PY2021 Standard Incentive Program. Ex post gross savings are estimated by enduse, relying on a combination of newly developed and historical realization rates. For lighting measures, ex post gross savings are based on an engineering analysis. We conducted desk reviews and onsite visits for a sample of PY2021 projects to develop enduse-specific realization rates for HVAC measures. Calculated realization rates are based on a desk review and onsite sample of nine projects, extrapolated to the population of HVAC projects. For all other enduses we apply PY2019 realization rates, recalculated to remove HVAC measures.

Table 16 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 82,396 MWh and 20.72 MW, respectively, as well as last year ex post demand savings of 0.12 MW in the <10 Year EUL category, 3.67 MW in the 10–14 Year EUL category, and 16.92 MW in the 15+ Year EUL category.

Table 16. PY2021 Standard Program Gross Impacts

	Ex Ante Gross	Gross RR	Ex Post Gross
First Year Savings			
Energy Savings (MWh)	82,335	100.1%	82,396
Demand Savings (MW)	19.74	105.0%	20.72
Last Year Demand Savings			

	Ex Ante Gross	Gross RR	Ex Post Gross
< 10 EUL (MW)	0.12	104.0%	0.12
10–14 EUL (MW)	3.35	109.5%	3.67
15+ EUL (MW)	16.27	104.0%	16.92

Most of the PY2021 savings for the Standard Program (81%) came from LED lighting, including LED linear tube retrofits, LED fixture retrofits, and LED lighting redesign. The remaining 9% of the program ex post energy savings are from non-lighting measures, mostly from HVAC projects (over 8% of ex post energy savings) but also refrigeration, compressed air, motors, and cooking equipment (combined for less than 1%).

Table 17 summarizes first year gross savings and realization rates by enduse.

Table 17. PY2021 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	74,767	97.8%	73,124	14.20	100.6%	14.29
Other Linear LED	*33,875*	*97.7%*	*33,081*	*6.43*	*100.8%*	*6.49*
LED Replacing T12	*20,834*	*97.1%*	*20,240*	*3.96*	*100.7%*	*3.98*
Other Non-Linear LED	*13,854*	*98.6%*	*13,655*	*2.63*	*100.0%*	*2.63*
Lighting Redesign	*4,345*	*98.8%*	*4,290*	*0.83*	*100.9%*	*0.83*
Lighting Controls	*1,048*	*100.0%*	*1,048*	*0.20*	*100.2%*	*0.20*
LED Replacing Incandescent A-Lamp	*797*	*99.7%*	*795*	*0.15*	*102.3%*	*0.15*
LED Exit Sign	*14*	*99.5%*	*14*	*0.00*	*138.7%*	*0.00*
HVAC	6,901	126.6%	8,733	5.44	115.8%	6.30
Other	667	80.8%	539	0.09	129.3%	0.12
Total	**82,335**	**100.1%**	**82,396**	**19.74**	**105.0%**	**20.72**

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 applied an HCIF of 1.07, encompassing both waste heat factors and heating penalties (referred to as abbreviations WHF and IF, respectively, in the Ameren Missouri TRM). Notably, the HCIF was 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 1.08 across all 6,542 records in the ex post analysis. In addition, 1,012 of the 6,542 records (15%) 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 6,542 records in the analysis range from 0 to −0.34, resulting in an average across all sampled projects of −0.03. These average ex post WHF and IF values produce an average combined energy savings adjustment factor of 1.05, lower than the ex ante HCIF of 1.07.

- **Application of ISR and HOU Adjustment.** Based on results of the PY2019 desk reviews for the Standard Incentive Program, we applied an ISR of 99.6% and an HOU adjustment of 99.4%, for a combined adjustment of 99.0%.
- **Coincidence Factor for LED Exit Signs Replacing CFL Exit Signs.** The PY2021 Standard Incentive Program provided incentives for 135 LED exit signs that replaced CFL exit signs. Ex ante demand savings use the coincidence factor (CF) for 24/7 exterior/garage lighting (0.0001379439) instead of the TRM-prescribed value for this measure (0.0001899635). As a result, ex post demand savings for these measures are higher than ex ante savings.

Table 18 presents lighting measure last year demand impacts by measure type and EUL category. As shown, the majority (89%) 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 18. PY2021 Standard Program Annual Ex Post Energy and Demand Impacts for Lighting Measures

Measure Category	Last Year Ex Post Demand Savings (MW)			
	<10 EUL	10–14 EUL	15+ EUL	Total
Other Linear LED	-	0.64	5.85	6.49
LED Replacing T12	-	0.12	3.86	3.98
Other Non-Linear LED	0.12	0.40	2.11	2.63
Lighting Redesign	-	-	0.83	0.83
Lighting Controls	-	0.20	-	0.20
LED Replacing Incandescent A-Lamp	-	0.15	-	0.15
LED Exit Sign	0.00	-	-	0.00
Total	**0.12**	**1.52**	**12.65**	**14.29**

Non-Lighting Impacts

We conducted desk reviews and onsite visits for a sample of PY2021 Standard HVAC projects to develop enduse-specific realization rates for HVAC measures. Calculated realization rates are based on a desk review and onsite sample of nine projects, extrapolated to the population of HVAC projects. The overall gross energy and demand realizations rates for Standard HVAC measures are 126.6% and 115.8%, respectively. The energy and demand realization rates for individual sampled Standard HVAC projects ranged from 91% to 282%.

For most sampled projects, the evaluation team found the measure is installed and operating as expected. The evaluation, however, found some discrepancies between the ex ante energy savings calculations and Ameren Missouri TRM calculation methods and 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. Key discrepancies found for Standard HVAC projects are:

- **Verified Equipment Information.** When the evaluation found errors between the tracked equipment parameters (e.g., capacity and efficiency), the evaluation team re-calculated energy and demand savings using the TRM algorithms and relevant input parameter values. The evaluation team detected these errors through a combination of desk review and onsite evaluation activities. These adjustments to verified equipment parameters reduced savings.
- **Equivalent Full Load Hour (EFLH).** Energy savings algorithms for many Standard HVAC measures include an EFLH parameter that approximates the annual loading on the HVAC equipment. The Ameren Missouri TRM, Appendix H provides a table of EFLH values based on the project's Building Type and location. The ex ante savings generally use a single "C&I Average" EFLH value. The ex post values use the TRM values based on verified building type and location, consistent with the TRM. These adjustments increased or decreased savings depending on the building type and location, with a range of 94% to 216%. Overall, these adjustments resulted in an increase to savings.
- **Savings Factors.** The energy savings algorithms for Demand Control Ventilation and Thermostats use a Cooling Savings Factor (SF_cool) and deemed savings in kWh/ton respectively. The ex ante savings were based on deemed average values from the TRM Appendix F. The ex post savings use the TRM values based on verified building type and location, consistent with the TRM. These adjustments increased savings.
- **Heating Season Savings.** Some Standard HVAC measures (e.g., ASHP and Thermostats) impact both cooling and heating energy use. The evaluation found that, in some cases, the ex ante savings counted cooling savings only, even when a facility had electric heat. The ex post use TRM algorithms and verified equipment and measure information to calculate both cooling and heating savings, for buildings with verified electric heat. The addition of heating savings increased annual energy savings.

For measures in all other enduse categories, i.e., non-lighting and non-HVAC, we applied realization rates of 80.8% for energy savings and 129.3% for demand savings, based on the PY2019 Standard Program gross impact analysis, recalculated to remove HVAC projects. In PY2021, non-lighting, non-HVAC measures represented less than 1% of Standard Program ex ante energy savings.

Additional details on the desk review and onsite visit findings, ex post analysis methods, and reasons for discrepancies are available in Appendix B.

3.3.4 Gross Impact Results: Custom Program

This section summarizes gross impact results for the PY2021 Custom Incentive Program. Ex post gross savings are estimated by enduse, relying on a combination of newly developed and historical realization rates. For motor and "other" measures (where "other" consists of process and refrigeration measures) we apply the PY2020 realization rates (which had strong relative precision values). We conducted desk reviews and onsite visits for a sample of PY2021 projects to develop enduse-specific realization rates for HVAC, lighting, and compressed air measures. Calculated realization rates are based on a desk review and onsite sample of 28 projects, consisting of 14 HVAC projects, 9 lighting projects, and 5 compressed air projects, extrapolated to the population within an enduse.

Table 19 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 30,532 MWh and 13.80

MW, respectively, as well as last year ex post demand savings of 0.34 MW in the 10–14 Year EUL category and 13.46 MW in the 15+ Year EUL category.

Table 19. PY2021 Custom Program Gross Impacts

	Ex Ante Gross	Gross RR	Ex Post Gross
First Year Savings			
Energy Savings (MWh)	31,884	95.8%	30,532
Demand Savings (MW)	14.65	94.2%	13.80
Last Year Demand Savings			
< 10 EUL (MW)	-	n/a	-
10–14 EUL (MW)	0.35	97.8%	0.34
15+ EUL (MW)	14.299	94.1%	13.46

Most of the PY2021 savings for the Custom Program come from HVAC projects, with lighting and compressed air projects accounting for the next largest shares of savings. Table 20 summarizes first year gross savings and realization rates by enduse.

Table 20. PY2021 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	24,257	93.5%	22,672	13.29	93.3%	12.39
Lighting	4,314	107.1%	4,620	0.79	107.5%	0.85
Compressed Air	2,590	100.0%	2,590	0.36	100.0%	0.36
Motors	358	97.6%	349	0.12	98.6%	0.12
All Other [A]	366	82.6%	302	0.09	87.2%	0.08
Total	**31,884**	**95.8%**	**30,532**	**14.65**	**94.2%**	**13.80**

[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 cooling season operation—provides a significant amount of peak demand savings. The overall gross energy and demand realizations rates for Custom HVAC measures are 93.5% and 93.3%, respectively. The energy and demand realization rates for individual sampled Custom HVAC projects ranged from 30% to 107%, indicating a wide range of evaluation results at the project level.
  - For most projects, the measure was installed and is operating as expected. The evaluation, however, found some errors in the tracking data and discrepancies between the key parameters used in the ex ante savings analysis and the verified equipment information observed through desk review, communication with site contacts, and onsite inspections. These parameter adjustments include verified equipment efficiency ratings, building management system control setpoints, schedules, and building daily and annual operating hours.
  - For two replace-on-fail projects, the evaluation adjusted the baseline to match local code minimum efficiency requirements. Both of these Custom HVAC projects were paired with Standard HVAC projects that, per the Ameren Missouri TRM requirements, were subject to the same local code baseline as the Standard HVAC equipment.

- The evaluation adjusted the loadshape and associated Coincidence Factor (CF) for two measures: (1) ex post changed the loadshape for a Dishwasher Exhaust Fan from cooling to HVAC, and (2) ex post changed the loadshape for a plasma filtration ventilation improvement measure from cooling to HVAC since the measure affects ventilation rates and HVAC energy use in both cooling and heating seasons. Both of these adjustments reduced estimated demand savings.

- **Lighting**: The overall gross energy and demand realizations rate for Custom lighting measures are 107.1% and 107.5%, respectively. The energy and demand realization rates for individual sampled Custom Lighting projects ranged from 66% to 251%. Evaluation adjustments for lighting included:
  - Where applicable (e.g., for lighting in conditioned spaces), the evaluation team used the Ameren Missouri TRM factors to estimate the additional cooling savings and/or heating penalty based on the verified building type and HVAC equipment type. Ex ante typically used an average HVAC interaction factor of 1.07 for conditioned spaced regardless of the building type and did not include a heating penalty for electrically heated spaces.
  - For three of nine sampled projects, the evaluation made adjustments to the hours of use and installed lighting fixtures and quantities based desk reviews.
  - For two of nine sampled projects, the evaluation made adjustments to correct for discrepancies between program-tracking data and reported ex ante savings. In these cases, the project updated the savings calculations based on the project description and details verified through discussions with the implementer and site contact (when possible).
- **Compressed Air**: The gross energy and demand realizations rate for Custom Compressed Air measures are both 100.0%. The energy and demand realization rates for all five sampled Custom Compressed Air projects was 100%. For all projects, the evaluation team confirmed the installation and operation of the new compressor equipment and verified the energy savings calculations. The evaluation team attempted to collect updated compressed load data, but sites were either unable to provide this information in time for inclusion in this report, or the evaluation team determined that the load data would not be valid because site operations during the load period had been temporarily impacted by staffing shortages (related to COVID-19).

For Custom Motors and Other measures, the realization rates are based on the PY2020 evaluation. For these enduses, the PY2020 evaluation results are directly applied to PY2021 Custom projects with the same enduse.

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

3.3.5 Net Impact Results

Net-to-Gross Results

The evaluation team conducted research with 162 Standard Program participants and 30 Custom Program participants to develop NTGRs for PY2021. We estimate the program-level NTGR to be 87.1% for the Standard Program and 82.0% for the Custom Program. Table 21 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 21. Summary of Standard and Custom NTG Results

Program [A]	Free Ridership	Participant SO	Market Partner SO	NTGR [A]
Standard	14.2%	0.35%	0.91%	87.1%
Custom	19.0%	0.06%		82.0%

[A] NTGR = 1 – FR + PSO + MPSO

Free Ridership

A total of 155 Standard Program participants and 30 Custom Program participants provided valid responses to the FR questions in the participant survey and were included in the FR analysis.[25] Using the algorithm summarized in Chapter 2 we estimate program-level FR to be 14.2% for the Standard Program and 19.0% for the Custom Program.

We attempted a census of unique project contacts (at the time of sample frame development) for both programs. As such, the concept of sampling precision does not apply. Table 22 summarizes the FR estimates for the Standard and Custom programs.

Table 22. Summary of Standard and Custom FR Estimates

Program	n	Free Ridership
Standard	155	14.2%
Custom	30	19.0%

Participants' FR-related survey responses show the following:

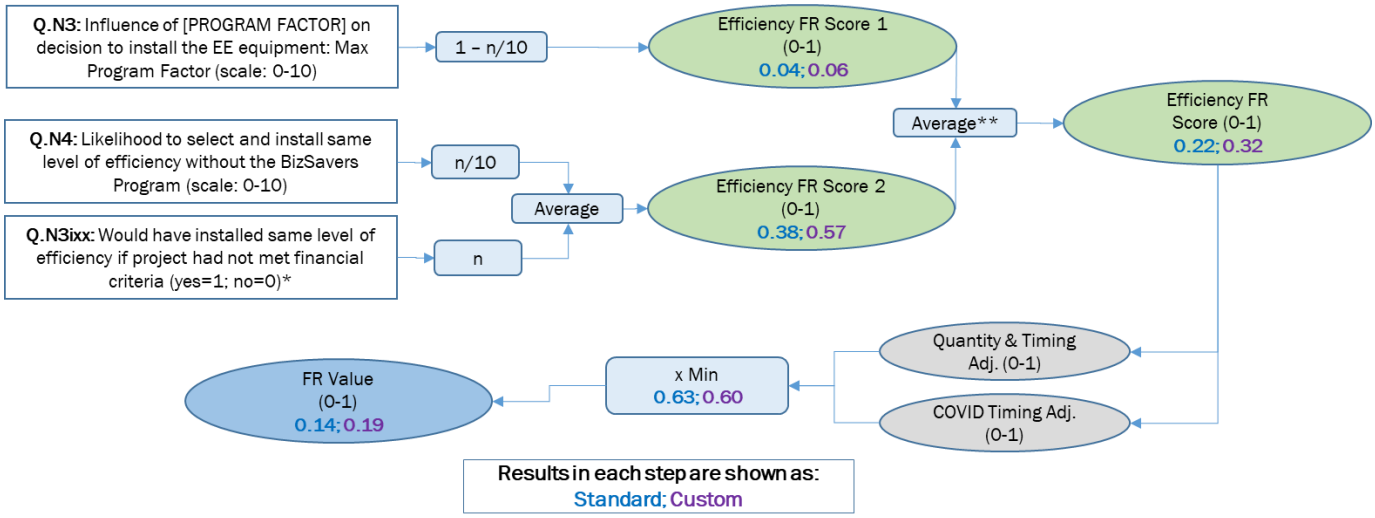
- **Efficiency:** Surveyed participants generally reported a high degree of program influence on the efficiency level of their projects, resulting in savings-weighted Efficiency FR Scores of 0.22 for the Standard Program and 0.32 for the Custom Program.
- **Quantity:** The program had a significant influence on the scope of many incented projects. Respondents reported that 53% of the Standard incented measures and 46% 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 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 0.49 for the Custom Program.[26]
- **COVID Timing Adjustment:** This is a new factor in PY2021 designed to capture a potential impact of the program in preventing project cancelations or delays due to COVID-19 and associated containment measures or broader economic impacts. On a project-by-project basis, we applied the smaller of the COVID Timing adjustment and the calculated Quantity and Timing Adjustment. While eight Standard participants and no Custom participants received a COVID Timing adjustment, in only two cases was this value smaller than the respondent's Quantity and Timing Adjustment Factor. Therefore, the impact of this adjustment is negligible.
- **Final Quantity and Timing Adjustment:** Combining the responses to the quantity, timing, and COVID Timing Adjustment questions resulted in overall Quantity and Timing Adjustments of 0.63 for the

[25] Seven Standard Program participants were excluded from the FR analysis due to incomplete responses.
[26] A higher factor means a lower adjustment, i.e., less program influence on the timing of the project.

Standard Program and 0.60 for the Custom Program, meaning that the programs can claim credit for 37% (1 – 0.63 = 0.37) of Standard savings and 40% (1 – 0.60 = 0.40) of Custom savings that would be considered FR savings based on efficiency alone.

Figure 8 summarizes FR results for the Standard and Custom programs.

Figure 8. Free Ridership Results – Standard and Custom



*Asked only of those who rated importance of financial criteria >7 and indicated that the incentive caused the project to meet their financial criteria.
** In cases where the two efficiency scores are inconsistent, the algorithm uses a weighted average, based on the level of program influence reported in other survey responses.

Participant Spillover

The PY2021 evaluation did not include development of a new participant spillover estimate. Instead, we applied a PSO rate of 0.35% for the Standard Program and 0.06% for the Custom Program, calculated as an average of the PY2019 and PY2020 evaluation PSO results.

Market Partner Spillover

The PY2021 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 PY2021 NTGRs to ex post gross savings to determine net impacts for the PY2021 Standard and Custom programs. Table 23 presents PY2021 first year ex post net impacts for the two programs, by enduse. The Standard Program generated 71,730 MWh of net energy savings and 18.03 MW of net demand savings, while the Custom Program generated 25,026 MWh of net energy savings and11.31 MW of net demand savings.

Table 23. PY2021 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	73,124	87.1%	63,658	14.29	87.1%	12.44
HVAC	8,733		7,603	6.30		5.49
Non-Lighting	539		469	0.12		0.10
Total Standard	**82,396**	**87.1%**	**71,730**	**20.72**	**87.1%**	**18.03**
Custom Incentive Program						
HVAC	22,672	82.0%	18,583	12.39	82.0%	10.16
Lighting	4,620		3,786	0.85		0.70
Compressed Air	2,590		2,123	0.36		0.29
Motors	349		286	0.12		0.10
Other	302		248	0.08		0.07
Total Custom	**30,532**	**82.0%**	**25,026**	**13.80**	**82.0%**	**11.31**

Table 24 presents PY2021 last year ex post net demand impacts, by enduse and EUL category. The Standard Program accounted for 0.11 MW in the <10 Year EUL category, 3.19 MW in the 10–14 year EUL category, and 14.73 MW in the 15+ Year EUL category, while the Custom Program accounted for 0.28 MW in the 10–14 year EUL category and 11.03 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 24. PY2021 Standard and Custom Program Annual Last Year Net Demand Impacts

Enduse	Ex Post Gross (MW)			NTGR	Ex Post Net (MW)		
	<10 EUL	10–14 EUL	15+ EUL		<10 EUL	10–14 EUL	15+ EUL
Standard Incentive Program							
Lighting	0.12	1.52	12.65	87.1%	0.11	1.32	11.01
HVAC	-	2.07	4.23		-	1.80	3.69
All Other	-	0.08	0.04		-	0.07	0.04
Total Standard	**0.12**	**3.67**	**16.92**	**87.1%**	**0.11**	**3.19**	**14.73**
Custom Incentive Program							
HVAC	-	0.18	12.21	82.0%	-	0.15	10.01
Lighting	-	0.12	0.74		-	0.09	0.61
Compressed Air	-	0.03	0.33		-	0.02	0.27
Motors	-	-	0.12		-	-	0.10
Other	-	0.02	0.06		-	0.01	0.05
Total Custom	**-**	**0.34**	**13.46**	**82.0%**	**-**	**0.28**	**11.03**

4. Small Business Direct Install Program

This chapter summarizes the PY2021 evaluation methodology and results for the SBDI Program. The PY2021 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.

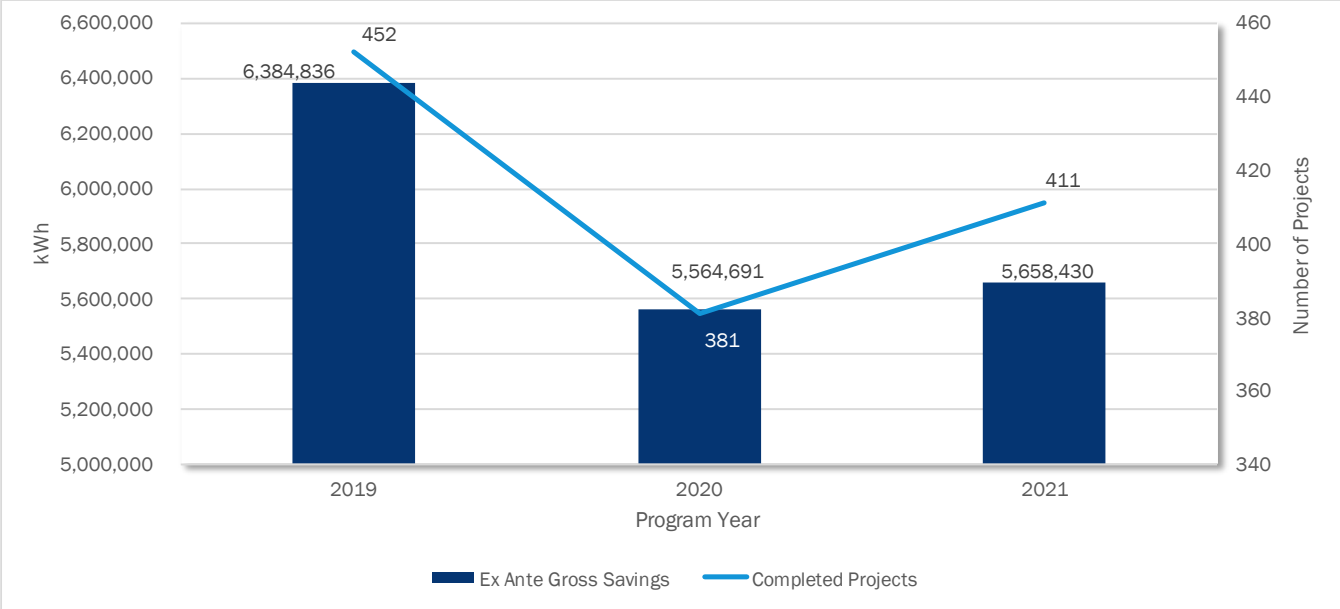
The SBDI Program is an ongoing program from MEEIA Cycle II. In PY2019, program-eligible measures were limited to LED lighting and smart thermostats. In PY2020, the program introduced additional HVAC measures (air-cooled chillers, advanced rooftop unit controls, and demand controlled ventilation), occupancy sensors, and exterior lighting (in combination with interior lighting projects). The program also increased the incentive cap in PY2020, 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. These changes remained in effect in PY2021.

4.1.1 Participation Summary

During PY2021, the SBDI Program provided incentives to 307 unique small businesses for a total of 411 projects,[27] resulting in 5,658 MWh of ex ante gross energy savings. This level of participation and savings was similar to PY2020 (381 projects and 5,565 MWh of ex ante gross savings) but represents a decrease from PY2019 (452 projects and 6,385 MWh in ex ante gross savings; see Figure 9).

[27] 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).

Figure 9. PY2021 SBDI Project Completions and 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). In PY2021 program-incented measures included LED lighting and exits signs as well as occupancy sensors, but no non-lighting technologies.

In 2021, 25% of SBDI projects were implemented at tenant-occupied buildings, a traditionally hard-to-reach population, a significant decrease from the 54% in PY2020. Overall, 20 Service Providers completed SBDI projects in PY2021 (down from 23 in PY2020), with the most active four providers accounting for 64% of all projects.

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 PY2021, contributing 3% of first year ex post net energy savings and 2% of first year ex post net demand savings.

Table 25 summarizes first year and last year annual gross and net savings for the SBDI Program in PY2021. As shown, the program achieved 43% and 49%, respectively, of Ameren Missouri's first year net energy and demand savings goals, and 31%, 6%, 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 25. PY2021 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)	5,658	98.1%	5,552	87.8%	4,875	11,340	43%
Demand Savings (MW)	1.07	101.6%	1.09	87.8%	0.96	1.97	49%
Last Year Savings							

	Ex Ante Gross	Gross RR	Ex Post Gross	NTGR	Ex Post Net	Goal/Target Net	% of Goal/Target
< 10 EUL (MW)	< 0.01	119.2%	0.01	87.8%	< 0.01	0.02	31%
10–14 EUL (MW)	0.05	101.7%	0.05	87.8%	0.05	0.81	6%
15+ EUL (MW)	1.02	101.5%	1.03	87.8%	0.91	1.14	79%

The PY2021 SBDI Program achieved gross realization rates of 98.1% and 101.6% for first year energy and demand savings, respectively. Realization rates for last year demand savings ranged between 101.5% in the 15+ Year EUL category to 119.2% in the <10 Year EUL category. The PY2021 gross impact analysis included an engineering analysis for lighting measures.

Energy realization rates 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 realization rates are driven by the ex post application of building type-specific WHFs where the ex ante analysis applies a HCIF of 1.07. In addition, the ex post analysis applied an ISR of 99.2% and an HOU adjustment of 100.7%, for a combined adjustment of 99.9%.

The PY2021 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 PY2021 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:** PY2021 saw steady program participation and savings relative to PY2020 but a downturn relative to PY2019, likely reflecting the continuing effects of the COVID-19 pandemic. As a result, the program fell well short of its savings goals, with 43% of first year net energy savings and 49% of first year net demand savings achieved. The PY2021 program was less successful in encouraging participation by renters, a traditionally hard-to-reach population, with 25% of PY2021 SBDI projects implemented in tenant-occupied buildings (compared to 54% in PY2020).
- **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 1.05, and the average ex post demand savings adjustment (WHF only) was 1.08.
  - **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 but for the cooling interaction only for demand savings. The PY2021 engineering analysis across prescriptive lighting measures in the Standard, SBDI, and BSS programs found an energy factor of 1.05 and a demand factor of 1.08.

The PY2020 evaluation had found an energy factor of 1.04 and a demand factor of 1.09. We recommend leveraging these past evaluation results to develop factors for future ex ante application.

- **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 Evaluation Methodology

Table 26 provides an overview of the PY2021 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 26. PY2021 Evaluation Activities for the SBDI Program

Evaluation Activity	Description
Program Manager and Implementer Interviews	▪ Conducted interviews in December 2020 to inform evaluation planning and in December 2021 to understand program staff's perspective on program performance.
Program Material Review	▪ Reviewed program materials to understand program changes relative to PY2020.
Engineering Analysis (Lighting Measures)	▪ Verified that ex ante savings use correct TRM algorithms and project-specific values or TRM assumptions. ▪ Developed ex post savings using TRM algorithms, site-specific parameters, and deemed savings assumptions.
Net Impact Analysis	▪ Estimated PY2021 net impacts, using the PY2019 NTGR.

4.2.1 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, site-specific parameters from the program-tracking database, and deemed savings assumptions (including application of HOU and ISR adjustment factors, based on results of the PY2019 evaluation – see Table 9 in Chapter 2).

4.3 Evaluation Results

4.3.1 Process Results

The PY2021 evaluation did not include an assessment of SBDI Program processes.

4.3.2 Gross Impact Results

This section summarizes gross impact results for the PY2021 SBDI Program. Ex post gross savings are based on an engineering analysis of lighting measures.

Table 27 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 5,552 MWh and 1.09 MW, respectively. The largest share of last year ex post demand savings was in the 15+ Year EUL category (1.03 MW, or 95%), followed by the 10–14 Year EUL category (0.05 MW, or 5%) and the <10 Year EUL categories (0.01 MW, or <1%). As noted above, all savings come from lighting measures, including linear and non-linear LED lighting, LED exit signs, and occupancy sensors.

Table 27. PY2021 SBDI Gross Impacts

	Ex Ante Gross	Gross RR	Ex Post Gross
First Year Savings			
Energy Savings (MWh)	5,658	98.1%	5,552
Demand Savings (MW)	1.07	101.6%	1.09
Last Year Savings			
< 10 EUL (MW)	< 0.01	119.2%	0.01
10–14 EUL (MW)	0.05	101.7%	0.05
15+ EUL (MW)	1.02	101.5%	1.03

As shown in the table above, gross realization rates for the SBDI Program ranged from 98.1% to 119.2%. 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 abbreviations 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 1.08 across all 1,230 records in the ex post analysis. In addition, 249 of the 1,230 records (20%) 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 1,230 records in the analysis range from 0 to −0.34, resulting in an average across all sampled projects of −0.03. These average ex post WHF and

IF values produce an average combined energy savings adjustment factor of 1.05, lower than the ex ante HCIF of 1.07.

- **Application of ISR and HOU Adjustment.** Based on results of the PY2019 desk reviews for the SBDI Program, we applied an ISR of 99.2% and an HOU adjustment of 100.7%, for a combined adjustment of 99.9%. This had minimal impacts on ex post savings.
- **Coincidence Factor for LED Exit Signs Replacing CFL Exit Signs.** The PY2021 SBDI Program provided incentives for 63 LED exit signs that replaced CFL exit signs. Ex ante demand savings use the coincidence factor (CF) for 24/7 exterior/garage lighting (0.0001379439) instead of the TRM-prescribed value for this measure (0.0001899635). As a result, ex post demand savings for these measures are higher than ex ante savings.

Table 28 presents first year ex post gross energy and demand savings by lighting measure type. As shown, more than half of both energy and demand savings come from linear LEDs replacing T12s.

Table 28. PY2021 SBDI Ex Post Gross Savings by Lighting Category

Measure Category	Energy Savings		Demand Savings	
	MWh	%	MWh	%
LED Replacing T12	2,943	53%	0.58	53%
Other Non-Linear LED	1,701	31%	0.33	30%
Other Linear LED	811	15%	0.16	15%
LED Replacing Incandescent A-Lamp	66	1%	0.01	1%
Lighting Controls	16	0%	<0.01	0%
LED Exit Sign	14	0%	<0.01	0%
Total	**5,552**	**100%**	**1.09**	**100%**

4.3.3 Net Impact Results

The PY2021 evaluation did not include development of a new NTGR for the SBDI Program. Instead, the 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 PY2021 gross impacts to determine net impacts for the PY2021 SBDI Program. Table 29 presents the first year net energy and demand impacts, showing a total of 4,875 MWh of energy savings and 0.96 MW of demand savings.

Table 29. PY2021 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	2,943	87.8%	2,584	0.58	87.8%	0.51
Other Linear LED	1,701		1,494	0.33		0.29
Other Non-Linear LED	811		712	0.16		0.14
LED Replacing Incandescent A-Lamp	66		58	0.01		0.01
LED Exit Sign	16		14	<0.01		<0.01

Measure Category	Energy Savings			Demand Savings		
	Ex Post Gross (MWh)	NTGR	Ex Post Net (MWh)	Ex Post Gross (MW)	NTGR	Ex Post Net (MW)
Lighting Controls	14		12	<0.01		<0.01
Total	**5,552**	**87.8%**	**4,875**	**1.09**	**87.8%**	**0.96**

Table 30 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 (0.91 MW, or 95%) in the 15+ Year EUL category.

Table 30. PY2021 SBDI Annual Last Year Net Demand Impacts

Measure Category	Ex Post Gross (MW)			NTGR	Ex Post Net (MW)		
	< 10	10–14	15+		< 10	10–14	15+
LED Replacing T12	-	<0.01	0.58	87.8%	-	<0.01	0.51
Other Linear LED	-	<0.01	0.33		-	<0.01	0.29
Other Non-Linear LED	<0.01	0.04	0.12		<0.01	0.03	0.11
LED Replacing Incandescent A-Lamp	-	0.01	-		-	0.01	-
LED Exit Sign	<0.01	-	-		<0.01	-	-
Lighting Controls	-	<0.01	-		-	<0.01	-
Total	**0.01**	**0.05**	**1.03**	**87.8%**	**<0.01**	**0.05**	**0.91**

5. New Construction Program

This section summarizes the PY2021 evaluation methodology and results for the New Construction Program. It should be noted that the PY2021 Evaluation Plan did not include any new gross or net impact evaluation work for this program, due to the discontinuation of the program as a stand-alone offering in PY2022. However, because of the significant growth of the program in PY2021 and the program's substantial contribution to the overall business portfolio savings, the evaluation team, in consultation with Ameren Missouri, decided to divert some evaluation resources to this program and to study both gross and net impacts of indoor agriculture projects, which comprise 82% of New Construction Program savings in PY2021.

The PY2021 evaluation of the New Construction Program included in-depth desk reviews and onsite verification for a sample of four indoor agriculture New Construction projects, representing 36% of the 11 indoor agriculture projects completed through the program in PY2021 and 64% of PY2021 indoor agriculture ex ante savings. To optimize evaluation budgets, for all other projects incented through the program (accounting for 18% of the program's PY2021 ex ante savings), we applied the PY2020 New Construction gross realization rates, recalculated to remove indoor agriculture projects. The evaluation also included assessment of program attribution of indoor agriculture New Construction projects but did not assess program attribution for other New Construction projects nor did it include an assessment of program processes.

Additional details on the evaluation methodology are presented in Chapter 2. Appendix F includes site reports for the four sampled evaluation projects.

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 and equipment efficiency standards.

In PY2021, 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.[28] LPD-exempt interior lighting measures, which have become a significant element of the program over the last two years, and all non-lighting energy efficiency measures are eligible for custom incentives. All measures incented 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 PY2021 New Construction Program is an ongoing program from MEEIA Cycle II. Incentive levels for the LPD channel remained consistent with PY2020 while custom incentives are, by design, consistent with those offered in the Custom Incentive Program. Since PY2020, indoor agriculture new construction projects have become an increasingly important segment of the program, accounting for 82% of ex ante gross savings in PY2021.

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

5.1.1 Participation Summary

In PY2021 the New Construction Program served 42 projects, including 11 indoor agriculture projects, covering four enduses. Almost all projects (95%) included lighting, and this enduse accounts for 52% of program level ex ante savings. HVAC accounts for another 47% of program ex ante savings, but this enduse is dominated by indoor agriculture projects with HVAC systems that are largely used for process purposes, i.e., they are used to support growing operations rather than for human comfort.[29] Table 31 presents PY2021 participation and ex ante gross energy savings in the New Construction Program by enduse.

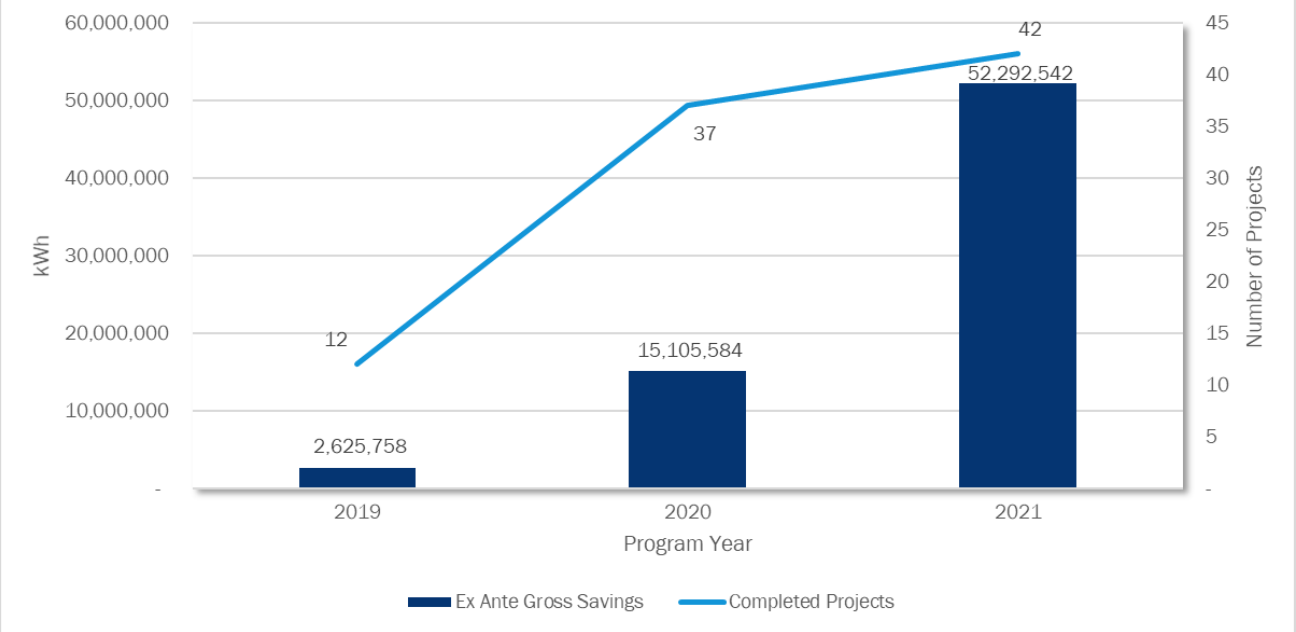
Table 31. PY2021 New Construction Participation Summary

Enduse	Projects [A]		Ex Ante Gross Savings	
	Number	%	MWh	%
Lighting	40	95%	27,003	52%
HVAC	29	69%	24,828	47%
Compressed Air	1	2%	416	1%
Building Shell	9	21%	46	<1%
Total	**42**	**100%**	**52,293**	**100%**

[A] Sums to more than 100% due to projects containing more than one enduse.

This level of participation was similar to PY2020 (42 projects) and represents an increase compared to PY2019 (12 projects). Ex ante gross savings, however, increased by 346% compared to PY2020 and 20-fold relative to PY2019 (see Figure 10).

Figure 10. New Construction Project Completions and Ex Ante Gross Savings



[29] Indoor agriculture projects account for 92% of New Construction Program ex ante gross savings in the HVAC enduse.

5.1.2 Key Impact Results

In PY2021 the New Construction Program achieved 307% and 380%, respectively, of Ameren Missouri's first year net energy savings and demand savings goals, and 12% and 417%, respectively, of Ameren Missouri's last year net demand savings targets in the 10-14 Year EUL and 15+ Year EUL categories. This indicates a significant shift in portfolio strategy, relative to the filing, prompted by the emergence of the cannabis growing industry in Ameren Missouri's service territory. Table 32 presents first year and last year annual savings achieved in PY2021.

Table 32. PY2021 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)	52,293	94.0%	49,175	75.4%	37,082	12,076	307%
Demand Savings (MW)	16.88	95.7%	16.16	75.4%	12.19	3.20	380%
Last Year Demand Savings							
<10 EUL (MW)	-	n/a	-	n/a	-	-	n/a
10–14 EUL (MW)	0.04	114.1%	0.05	74.6%	0.04	0.29	12%
15+ EUL (MW)	16.84	95.7%	16.12	75.4%	12.15	2.91	417%

The PY2021 New Construction Program achieved gross realization rates of 94.0% and 95.7% for first year energy and demand savings, respectively. Realization rates for last year demand savings were 95.7% in the 15+ Year EUL category and 114.1% in the 10–14 Year EUL category. The PY2021 gross impact analysis included desk reviews and onsite visits for four sampled indoor agriculture projects and application of PY2020 realization rates for all non-indoor agriculture projects.

The PY2021 gross energy and demand realization rates are driven by the evaluation (desk review and onsite verification) results of the four indoor agriculture projects, which produced an energy realization rate of 92.2% and a demand realization rate of 92.0%. The project-specific gross energy savings realization rates range from 87% to 99% for the four sampled indoor agriculture projects. Key drivers of realization rates include adjustments to the baseline and installed lighting equipment and space type assumptions; adjustments to the floor areas used for LPD calculations; and adjustments to the estimated HVAC system savings based on lighting system adjustments to account for lighting-HVAC interaction. For all four sampled indoor agriculture projects, the evaluation was limited by incomplete and/or inconsistent project documentation and the limited calendar time between project completion and regulatory evaluation deadlines. For two of the four projects, some equipment was not yet installed and/or the site was still ramping up to full operation, so the evaluation was not able to collect full system operating information.

For all non-indoor agriculture projects, we applied realization rates of 102.8% for energy savings and 114.1% for demand savings, based on the PY2020 New Construction Program gross impact analysis, recalculated to remove indoor agriculture projects. In PY2021, non-indoor agriculture projects represented less than 18% of New Construction Program ex ante energy savings.

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

The evaluation team estimated the PY2021 NTGR for indoor agriculture projects to be 75.6%, based on in-depth interviews with participating customers. For all non-indoor agriculture projects, we applied a

recalculated, historical NTGR of 74.6%, based on PY2019 and PY2020 evaluation results. The savings-weighted program-level NTGR is 75.4%.

5.1.3 Key Process Findings

The PY2021 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 with indoor agriculture projects, 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, three out of seven interviewed participants mentioned their interactions with a trade ally. Two other respondents indicated they learned of the program through industry trade events.
- **Participants value communication with program staff, typically through e-mail.** When asked about the best way to inform their organization of future energy efficiency opportunities through Ameren Missouri, most in-depth interview respondents (3 of 7) preferred e-mail communication or other direct communication (3 of 7). One respondent preferred communication through their Ameren Missouri Key Accounts Executive.
- **Project schedules are unaffected by program participation.** Six out of seven 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 accelerated their project's completion, but not their project's start date.

5.1.4 Conclusions and Recommendations

Based on the results of this evaluation, which focused evaluation resources on four of the 11 PY2021 indoor agriculture projects, the evaluation team offers the following conclusions and recommendations for the New Construction Program, many specific to indoor agriculture projects:

- **Conclusion #1:** The program achieved strong realization rates while significantly growing in size compared to PY2020 and PY2019. The program significantly increased ex ante gross savings, completing 42 projects representing 52,293 MWh in ex ante savings compared to 37 projects and 15,106 MWh in savings in PY2020. This increase was largely driven by the completion of several large indoor agriculture projects. Further, the program-wide energy realization rate of 94.0% represents a significant increase relative to PY2019 (74.6%) although it is lower than PY2020 (97.0%).
- **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, but not all, of the required files and additional information from either the program implementer or the trade ally upon request, but this extra step added time to the evaluation and additional burden on trade allies. Overall, the incomplete documentation (1) calls into question the implementer's process for fully validating claimed savings when reviewing and approving incentive applications; (2) creates confusion about the project scope and increases the chance of errors in the final claimed savings; (3) can create additional burden on trade allies and lead to dissatisfaction; and (4) increases evaluation cost and restricts the evaluation team's ability to fully verify savings.
  - **Recommendation:** To improve the completeness and accuracy of project documentation as well as consistency with final savings claims, we recommend the program team develop and follow guidelines for the minimum level of required documentation to be stored and accessible to program staff and evaluation contractors for each Custom 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. The implementer should consider developing and using a checklist to ensure all final documentation are captured as part of the project close-out and before a project is considered "Complete."

- **Conclusion #3:** For grow area lighting, determining the number of baseline HPS or T5 HO fixtures that would deliver the same lighting performance as the efficient LED fixture is a critical assumption for savings. However, the method used to develop these values is typically not mentioned nor are the values used for the calculation provided in the project documentation.
  - **Recommendation:** Include the completed Ameren Ag Lighting Equivalent Quantity Workbook with all indoor agricultural projects. This workbook is currently used to determine the equivalent number of baseline HPS or T5 HO fixtures for grow area LED fixtures using the LED performance characteristics. A completed copy of the workbook should be included with each project, and the assumptions and calculations for each project fixture clearly identified, along with the name of the file containing the LED fixture performance specifications.
- **Conclusion #4:** Per the *Agreement In Lieu Of Change Requests* filed under the PY2020 Ameren Missouri Annual Report Settlement, conventional HVAC demand factors are currently being used to estimate demand for the process HVAC systems serving the grow rooms, but the peak demand-to-energy ratio values are likely quite different from conventional HVAC systems focused on human comfort.
  - **Recommendation:** As part of the TRM update process, or with the use of evaluation budget earmarked for research, develop Process HVAC system peak demand factors for indoor agricultural HVACD (D-dehumidification) systems. Existing building simulation runs for the projects in this program could be used to develop the new factors.
- **Conclusion #5:** For LPD based lighting (i.e., lighting installed outside grow areas), in the absence of a local code, the program protocols allow the use of IECC 2009 LPD values. Given the many advances in lighting technology and changes in the lighting market since 2009, using an IECC 2009 baseline under any circumstances will likely overestimate savings.
  - **Recommendation:** The New Construction Program guidelines should be changed to use IECC 2018 for lighting LPD assumptions for all new construction projects, regardless of local code presence.
- **Conclusion #6:** The grow lighting and HVAC systems for indoor agriculture facilities are unique systems and applications in terms of construction and operation. The existing set of building codes and equipment standards (Codes & Standards) do not cover indoor agriculture facilities and therefore cannot be used to establish baseline conditions from which to measure realistic, expected savings. This issue is recognized in many other jurisdictions and is being addressed by the development of requirements and guidelines for these facilities.
  - **Recommendation:** Develop and/or adopt (from another jurisdiction) indoor agriculture facility baseline requirement guidelines to ensure consistency in savings calculations and evaluation.
- **Conclusion #7**: For each sampled project, many building simulation report files were provided; however, the project documentation did not contain a high-level summary of the basic HVAC system differences used for the baseline and efficient cases. Such a summary would include all HVAC system types at the site, the areas they serve, and most importantly a comparison of the key building simulation parameters used for the baseline versus efficient scenarios that can be checked and

evaluated against the actual models, mechanical schedules, spec sheets, and other project documentation.

- **Recommendation:** Provide a high-level summary and narrative of HVAC systems, baseline, and efficient scenario assumptions, and how the measures are supposed to contribute to savings. This would facilitate a more complete and accurate evaluation of project HVAC savings.

- **Conclusion #8:** The projects evaluated were all too new to have enough consumption data—a great tool for assessing the general consistency of energy use and energy savings.
  - **Recommendation:** Conduct a post-occupancy evaluation of indoor agriculture projects to validate the building simulation modeled annual energy use against actual consumption and provide some grounding for the models. This would have to be conducted as a special study or under evaluation for future years since a period of 100% operational energy use would be needed. Results from this analysis could also be used to provide benchmarking of future projects and integrated into an indoor agriculture growing facility guidance document.
- **Conclusion #9:** For indoor agricultural facilities, the LPD approach is typically only applied to part of the building. The current New Construction Program practice for projects is to use the Building Area Type approach, which is more intended for whole buildings. The Space-by-Space method allows LPDs to be specified at the space-type level and is more appropriate to this application. The Ameren New Construction guide allows for the use of both methods; however, only the Building Area Type tables are provided in the guide, and the program application workbook only allows the Building Area Type approach.
  - **Recommendation:** Use the Space-by-Space approach for LPD-based calculations in indoor agriculture facilities and/or consider adding some of the space-by-space LPD values, which might be better fits for the support area activities at these facilities.
- **Conclusion #10:** Floor areas are needed for LPD calculations, building simulation models, and even the application (total floor area and conditioned area). Almost all of the projects evaluated had floor area discrepancies and inconsistencies, especially related to LPD calculations. In one case the entire facility floor area (including grow areas) was used for the LPD calculation, and in others a tally of floor area by activity type by the evaluation team showed that the ex ante Building Area Type LPD selection did not reflect the actual activities in those support areas.
  - **Recommendation:** Provide a summary of the site activity types and their associated floor areas (a floor area inventory) for every project. The summary can be used by the program implementer to ensure consistency throughout the project documentation and can help inform the appropriate selection of a Building Area Type LPD.
- **Conclusion #11:** Some of the projects appeared to use baseline HVAC systems for the grow areas that were completely different from the efficient HVAC system, which may not be appropriate and can overestimate HVAC savings. For example, one project appeared to be using a baseline system of conventional rooftop cooling/electric resistance heating units versus the efficient case of a variable refrigerant flow (VRF) heat pump system with a dedicated outdoor air system (DOAS). There was also no justification provided in the project documentation for using the selected baseline.
  - **Recommendation:** The baseline HVAC system type for grow rooms should be the same as the efficient, installed system type. The efficient configuration of a system would then be one that uses high-efficiency equipment with an integrated design and control scheme versus one assembled from minimum efficiency equipment and separate elements with their own separate control systems, and reacting independently to space conditions. Similar to many other process measures, efficiency should reflect a change in performance not a change in system type, unless a different

system type is established via industry standard practice (ISP) research, formal guidance, or a customer's current practice for other similar existing facilities.

5.2 Evaluation Methodology

As described in Chapter 2, the evaluation team performed gross and net impact evaluation activities focused on indoor agriculture projects to assess the performance of the New Construction Program in PY2021.

Table 33 provides an overview of the New Construction Program evaluation activities. Following the table, we outline program-specific aspects of key evaluation methodologies.

Table 33. PY2021 Evaluation Activities for the New Construction Program

Evaluation Activity	Description
Program Manager and Implementer Interviews	▪ Conducted interviews in December 2020 to inform evaluation planning and in December 2021 to understand program staff's perspective on program performance.
Program Material Review	▪ Reviewed program materials to understand program changes relative to PY2020.
Participant Interviews	▪ Conducted interviews with program participants who completed indoor agriculture projects to collect data to inform participant FR.
Engineering Reviews & Onsite Verification	▪ Reviewed supporting project documentation for sampled indoor agriculture projects to verify the installed equipment and other measures, review the baseline assumptions, and examine ex ante savings methodology. ▪ Collected additional information as needed (e.g., facility occupancy or other operational information; or billing data) to verify or update the estimated savings. ▪ Performed onsite verification visits for a sample of projects to confirm quantity and continued operation of incented measures, collect additional data to develop energy savings, and verify other parameters through staff interviews. ▪ Developed ex post savings for the sample and the population of indoor agriculture projects. ▪ Developed historical realization rates for non-indoor agriculture projects.
NTG/Net Impact Analysis	▪ Developed estimates of FR for indoor agriculture projects. ▪ Developed historical FR rates for non-indoor agriculture projects. ▪ Estimated PY2021 net impacts.

5.2.1 Participant In-Depth Interview

The evaluation team conducted in-depth interviews with participants in the PY2021 New Construction Program who completed indoor agriculture projects. 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 PY2021.

The evaluation team attempted a census of PY2021 New Construction indoor agriculture projects. The interview period spanned approximately three weeks during the months of January and February of 2022. During this period, the evaluation team attempted to contact all 11 participants in the sample via e-mail and phone. Overall, we completed interviews with seven participants, all of whom are included in the analysis of participant FR.[30]

[30] For all participants who did not complete an interview, at least four contact attempts were made before being considered unreachable.

5.2.2 Engineering Desk Reviews and Onsite Visits

We conducted engineering desk reviews of a sample of four indoor agriculture PY2021 New Construction projects to review and verify savings assumptions. Three of four sites also received an onsite visit. Table 34 describes the New Construction sample selected for the gross impact evaluation.

Table 34. New Construction Gross Impact Sampling Summary

Stratum	Number of Projects			First Year Ex Ante Savings		
	Population	Sample	% Sampled	Population (MWh)	Sample (MWh)	% Sampled
Stratum 2	2	2	100%	22,593	22,593	100%
Stratum 1	9	2	22%	20,503	4,775	23%
Total	**11**	**4**	**36%**	**43,096**	**27,368**	**64%**

The review of documents focused on both ex ante savings methods and 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.
- Review of ex ante equivalent baseline lighting assumptions for LPD-exempt LED lighting in grow areas.
- Comparison of HVAC and lighting specification sheets and invoices to ex ante inputs and calculations.
- Review of mechanical, electrical, and floor plans to verify the site layout, equipment types and locations, and floor areas for LPD calculations.
- Review of ex ante building simulation model reports to try to determine the differences in the base and efficient building model HVAC systems and efficiency parameters, and to compare simulation results to ex ante claimed savings.
- Review of onsite verification materials (available for three projects) including as-installed photographs of the site, model nameplates, lighting fixtures, HVAC equipment, and screenshots from the building management system.

Based on the results of the four sampled projects, we developed savings-weighted gross realization rates that we applied to all PY2021 indoor agriculture projects. For all PY2021 non-indoor agriculture projects, we applied the PY2020 New Construction gross realization rates, recalculated to remove indoor agriculture projects, of 102.8% and 114.1% for MW and MWh, respectively.

5.2.3 NTG Analysis

The NTG analysis for the indoor agriculture projects served by the New Construction program included consideration of FR and PSO. FR is based on the PY2021 participant interviews, while PSO is based on PY2019 and PY2020 evaluation results for the New Construction program overall. The NTGR calculation uses the following formula:

$$NTGR = 1 - FR + PSO$$

Unlike the Standard and Custom programs, the FR algorithm for the New Construction Program did not include an explicit factor for program influence on quantity or timing nor for program influence on preventing/reducing COVID-19 related project delays or cancellations. 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 Construction Program had no impact on the timing of the project, including preventing/reducing COVID-19 related project delays or cancellations. We verified this assumption during our interviews.

For all non-indoor agriculture projects, we applied a recalculated, historical NTGR of 74.6%, based on PY2019 and PY2020 evaluation results. We estimated the non-indoor agriculture PY2020 NTGR to be 70.2%, calculated by removing indoor agriculture projects from the PY2020 analysis. PY2019 did not include any indoor agriculture projects in the attribution analysis, so the PY2019 NTGR value of 79.0% did not need any modification.

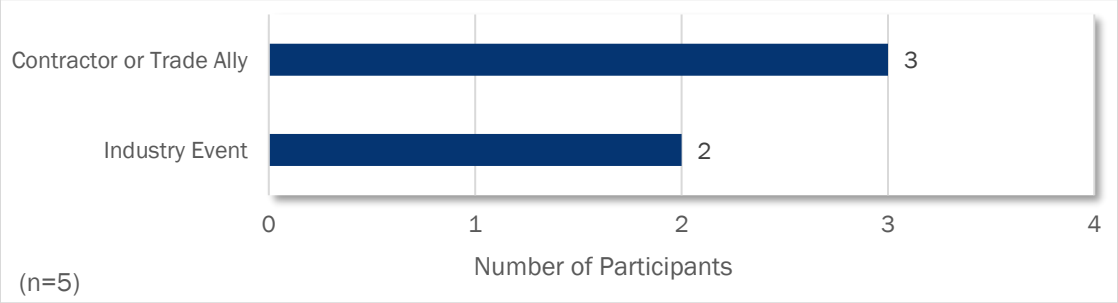
The methods used for calculating FR and PSO are summarized in Chapter 2 and are further detailed in Appendix A.

5.3 Evaluation Results

5.3.1 Process Results

As part of the PY2021 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 (Figure 11). When asked about the best way to communicate future energy efficiency opportunities to their organization, most participants (3 of 7) preferred e-mail or any direct form of direct outreach (3 of 7) and one preferred communication through their key account executive.

Figure 11. How Participants Heard About the BizSavers New Construction Program in 2021



Note: Two respondents could not recall where they had heard about the program in 2021 and are excluded from this figure.

5.3.2 Gross Impact Results

This section summarizes gross impact results for the PY2021 New Construction Program. Ex post gross savings are based on desk reviews and onsite visits for a sample of four PY2021 indoor agriculture projects and application of PY2020 realization rates for non-indoor agriculture projects.

The New Construction Program achieved first year ex post gross energy savings of 49,175 MWh and first year ex post gross demand savings of 16.16 MW, with realization rates of 94.0% and 95.7%, respectively (Table 35).

Table 35. PY2021 New Construction Program Annual Savings

	Ex Ante Gross	Gross RR	Ex Post Gross
First Year Savings			
Energy Savings (MWh)	52,293	94.0%	49,175
Demand Savings (MW)	16.88	95.7%	16.16
Last Year Savings			
< 10 EUL (MW)	-	n/a	-
10–14 EUL (MW)	0.04	114.1%	0.05
15+ EUL (MW)	16.84	95.7%	16.12

For the sampled indoor agriculture projects, 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 and information collected through onsite visits. 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 evaluated installed equipment specifications and onsite verification quantities. Adjustment to installed quantities was typically due to incomplete installation of lighting measures at a site as determined from the onsite visit.
- Adjustments to the floor areas and Building Area Type selections for the lighting power density calculations for high-efficiency lighting in the facility support spaces.
- Adjustments to the baseline definition for grow area lighting systems which are developed from a program implementer calculation workbook. The ex post analysis updated baseline assumptions for some fixtures based on manufacturer lighting performance specifications.
- Adjustments to the estimated HVAC system savings based on adjustments made to lighting savings to account for the interactive effect between lighting and HVAC loads, in lieu of rerunning the building simulation model.

These changes resulted in an energy realization rate of 92.2% and a demand realization rate of 92.0% for indoor agriculture projects.

For all non-indoor agriculture projects we applied realization rates of 102.8% for energy savings and 114.1% for demand savings, based on the PY2020 New Construction Program gross impact analysis, recalculated to remove indoor agriculture projects.

Table 36 presents first year ex post gross energy and demand savings by enduse. As shown, 52% of savings come from the lighting enduse, and 47% from HVAC. Similarly, the lighting and HVAC enduses combined represent 99% of ex post demand savings. While only 47% of energy savings come from the HVAC enduse, it is the largest enduse for demand savings, representing 69% of ex post demand savings. As noted above, however, the HVAC enduse is dominated by indoor agriculture projects with HVAC systems that are largely used for process purposes, i.e., they are used to support growing operations rather than for human comfort. Over 99.5% of demand savings are in the 15+ Year EUL category.

Table 36. PY2021 New Construction Ex Post Gross Savings by Enduse

Enduse	Energy Savings		Demand Savings	
	MWh	%	MWh	%
Lighting	25,605	52%	5.00	31%
HVAC	23,096	47%	11.08	69%
Compressed Air	427	1%	0.07	<1%
Building Shell	47	<1%	0.02	<1%
Total	**49,175**	**100%**	**16.16**	**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 F.

5.3.3 Net Impact Results

Net-to-Gross Ratio Results

The evaluation team conducted in-depth interviews with seven participants to develop an NTGR for indoor agriculture projects served by the New Construction Program. We estimate the NTGR for indoor agriculture projects to be 75.6%. For all non-indoor agriculture projects, we applied a recalculated, historical NTGR of 74.6%, based on PY2019 and PY2020 evaluation results.[31] Table 37 presents the individual NTGR components (i.e., FR and PSO) and the resulting NTGR for indoor agriculture and non-indoor agriculture projects and the program overall.

Table 37. PY2021 New Construction Program Net-to-Gross Ratio

Enduse	Free Ridership (FR)	Participant Spillover (PSO)[A]	NTGR (1-FR+PSO)
Indoor Agriculture	24.4%	0%	75.6%
Non-Indoor Agriculture	25.4%	0%	74.6%
Overall Program	24.6%	0%	75.4%

[A] PSO for indoor agriculture projects is from the PY2020 evaluation of the New Construction program. The PY2021 evaluation did not include the calculation of PSO.

Indoor Agriculture Free Ridership

We estimate the FR for PY2021 New Construction indoor agriculture projects to be 24.4%, based on interviews with seven participants. Because we attempted to reach all eleven participants for these interviews, the concept of sampling precision does not apply. The PY2021 estimated NTGR for indoor agriculture projects was higher compared to the New Construction Program overall in PY2020. Key findings from the interviews include:

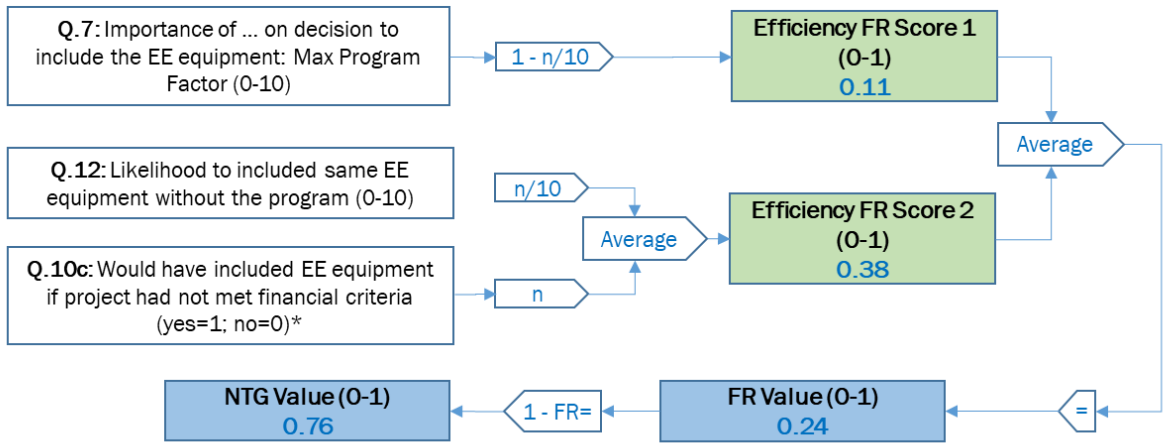
- Consistent with PY2019 and PY2020 results, participants in PY2021 reported a high level of awareness about the long-term cost savings associated with energy efficiency measures, including the expected reduced maintained costs associated with LED lighting.

[31] We estimated the non-indoor agriculture PY2020 NTGR to be 70.2%, calculated by removing indoor agriculture projects from the PY2020 analysis. PY2019 did not include any indoor agriculture projects in the attribution analysis, so the PY2019 NTGR value of 79.0% did not need any modification.

- When asked about their main reason for including energy-efficient measures, all respondents noted a desire to reduce energy costs, but over half (4 of 7) also noted the program incentive. Many respondents (3 of 7) also reported reductions in maintenance cost as a primary driver in their selection of energy-efficient equipment in their project.
- When asked how the design of their project would have been different absent the program, three of seven respondents said they would have installed standard efficiency measures, another three 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 measures in their project absent the program, only 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."
- We also explored if the New Construction Program had any impact on project timing, to test the validity of excluding a quantity and timing adjustment factor from the New Construction FR algorithm. Six of seven respondents indicated the program had no impact on their project's timing, while one respondent indicated the program accelerated their project timeline.

Figure 12 summarizes the FR results of the PY2021 NTG analysis for indoor agriculture participants.

Figure 12. Free Ridership Results – New Construction Program – Indoor Agriculture



**Asked of those who rated importance of financial criteria >7 and indicated that the incentive caused the project to meet their financial criteria*

Indoor Agriculture Participant Spillover

The PY2021 evaluation did not include development of a new participant spillover estimate. Instead, we applied the PSO rate of 0.0% for indoor agriculture projects, based on results from the PY2019 and PY2020 evaluations of the New Construction Program, both of which showed no PSO.

Net Impacts

The evaluation team applied the PY2021 NTGR for indoor agriculture projects of 75.6% to all indoor agriculture projects and the historical NTGR of 74.6% for all non-indoor agriculture projects, to calculate ex post sent savings for the New Construction Program.

Table 38 presents the resulting net savings. All but 0.04 MW of ex post net last year demand occur in the 15+ Year EUL category.

Table 38. PY2021 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	25,605	75.4%	19,288	5.00	75.4%	3.77
HVAC	23,096		17,440	11.08		8.36
Compressed Air	427		319	0.07		0.05
Building Shell	47		35	0.02		0.02
Total	**49,175**	**75.4%**	**37,082**	**16.16**	**75.4%**	**12.19**

6. Retro-Commissioning Program

This section summarizes the PY2021 evaluation methodology and results for the RCx Program. The PY2021 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 PY2021 RCx Program is an ongoing program from MEEIA Cycle II. Incentive levels and program design remained largely consistent with PY2020.

6.1.1 Participation Summary

The PY2021 RCx Program completed 23 projects, accounting for 6,953 MWh of ex ante gross energy savings. The three largest projects account for almost half of the program's energy savings and over half of the program's demand savings. Compared to PY2020, the RCx Program completed almost twice as many projects (23 projects in PY2021 compared to 12 projects in PY2020) but achieved similar ex ante savings (6,953 MWh in PY2021 compared to 6,099 MWh in PY2020). Table 39 presents PY2021 participation and gross energy savings by enduse.

Table 39. PY2021 RCx Program Participation Summary

Enduse/Channel	Projects		Ex Ante Savings	
	Number	%	Number	%
HVAC	15	65%	6,016	87%
Compressed Air	8	35%	937	13%
Total	**23**	**100%**	**6,953**	**100%**

6.1.2 Key Impact Results

In PY2021 the RCx Program achieved 53% and 69% of Ameren Missouri's first year net energy and demand savings goals, respectively, and 26% and 125% of Ameren Missouri's last year net demand savings targets in the 10–14 Year EUL and 15+ Year EUL categories, respectively.

Table 40 presents first year and last year savings achieved in PY2021.

Table 40. PY2021 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)	6,953	99.6%	6,928	92.8%	6,429	12,076	53%
Demand Savings (MW)	3.37	97.8%	3.30	92.8%	3.06	4.43	69%
Last Year Demand Savings							
< 10 EUL (MW)	-	n/a	-	n/a	-	-	n/a
10–14 EUL (MW)	0.71	97.8%	0.69	92.8%	0.64	2.49	26%
15+ EUL (MW)	2.66	97.8%	2.60	92.8%	2.42	1.94	125%

Based on desk reviews and onsite visits of a sample of PY2021 RCx projects, the program achieved 6,928 MWh and 3.30 MW in ex post gross savings. Although the PY2021 program fell short of its savings goals, the program achieved strong realization rates of 99.6% and 97.8% for energy and demand, respectively.

- Project-level realization rates for the sampled RCx projects ranged from 95% to 100% 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 small reductions in savings are due to a transcription error for one project (for which the calculated efficient case consumption was accidentally input as the energy savings) and to a change in the assigned enduse loadshape for a dishwasher exhaust fan in another project.

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

The NTGR for the RCx Program was 92.8%, including consideration of FR (7.2%) and PSO (0.00%). Free ridership was estimated 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. We applied PY2020 PSO results, which found no measurable spillover from the PY2020 RCx Program.

6.1.3 Key Process Findings

The PY2021 evaluation did not include an assessment of program processes for the RCx Program. We provide a few observation, however, based on program-tracking data and limited insights data from the PY2021 participant interviews.

- **Program Participation**: In PY2021, Ameren Missouri business customers completed 23 projects through the RCx Program. This represents a significant increase over PY2020 and PY2019, where business customers completed 12 projects and four projects, respectively. PY2021 projects, however, were smaller in PY2021 (average of 302 MWh per project) compared to PY2020 (average of 508 MWh per project).
- **Sources of Program Information**: BizSavers trade allies are essential sources of program information for RCx participants; all interviewed RCx participants reported they had heard about the program through a program trade ally in 2021. Yet, most stated their preference would be to receive notification of future energy efficiency opportunities via e-mail or 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:** Evaluation activities verified that all four sampled RCx projects were implemented and operating as expected based on available project materials. For some, but not all, of the sampled RCx projects 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 #2:** 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. Sampled projects used different formats of weather bin analyses in the ex ante calculations.
  - **Recommendation:** Consider developing a standardized weather bin analysis tool that includes both sensible and latent cooling considerations and uses standardized inputs to support future ex ante analyses. The evaluation team provided this recommendation in the PY2020 evaluation report and continues to encourage the use of standardized tools for common custom measures and applications.
- **Conclusion #3:** Three of the four sampled projects were completed in the last two months of the program year (November and December of 2021) and most of these projects involved cooling equipment and controls. The late-in-the-year project completion timing, combined with the regulatory evaluation deadlines, limits the evaluation team's ability to conduct a rigorous ex post analysis, especially for cooling-related measures because (1) the short post-installation period limits available post-installation data, and (2) there may be no post-installation cooling loads or operation to observe and measure.
  - **Recommendation:** When cooling-related Custom measures are not completed before the cooling season, the program should collect and include with the project documentation (1) pre- and post-installation trend data showing baseline heating and cooling loads, and (2) any commissioning or post-installation studies conducted for the project.

6.2 Evaluation Methodology

Table 41 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.

Table 41. PY2021 Evaluation Activities for the RCx Program

Evaluation Activity	Description
Program Manager and Implementer Interviews	▪ Conducted interviews in December 2020 to inform evaluation planning and in December 2021 to understand program staff's perspective on program performance.
Program Material Review	▪ Reviewed program materials to understand program changes relative to PY2020.

Evaluation Activity	Description
Participant Interviews	▪ Conducted interviews with program participants to collect data to inform participant FR.
Engineering Desk Reviews & Onsite Verification	▪ 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 verify other parameters through staff interviews. ▪ Collected additional data and confirmed key analysis parameters through direct outreach to participants. ▪ 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 FR. ▪ Estimated PY2021 net impacts.

6.2.1 Participant In-Depth Interviews

The evaluation team conducted in-depth interviews with program participants in the PY2021 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 FR analysis for PY2021.

The interview period spanned approximately five weeks during the months of January and February of 2022. During this period, we attempted to contact all 15 participants via e-mail and phone, i.e., a census attempt.[32] Six (40%) participants completed the interview while nine (60%) could not be reached.[33] These six participants accounted for 13 of 23 projects and nearly 60% of savings.

6.2.2 Engineering Desk Reviews and Onsite Verification

The evaluation team conducted engineering desk reviews and onsite visits for all four sampled PY2021 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 42 summarizes the sampling strategy for onsite visits for the RCx Program.

Table 42. RCx Gross Impact Sampling Summary

Enduse	Number of Projects			First Year Ex Ante Savings		
	Population	Sample	% Sampled	Population (MWh)	Sample (MWh)	% Sampled
Stratum 2	5	2	40%	4,480	2,152	48%
Stratum 1	18	2	11%	2,472	383	16%
Total	**23**	**4**	**17%**	**6,953**	**2,535**	**36%**

[32] Two participants completed four RCx projects, and two completed two RCx projects. Therefore, the population of 23 projects represents just 15 unique participants.

[33] For all participants who did not complete an interview, at least three contact attempts were made before being considered unreachable.

6.2.3 NTG Analysis

The NTG analysis for the RCx Program included consideration of FR and PSO. FR is based on the PY2021 participant interviews, while PSO is based on PY2020 evaluation results. The NTGR was calculated as follows:

$$NTGR = 1 - FR + PSO$$

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.

Additional questions were added to assess the effects of the COVID-19 pandemic on businesses, their operations, and potential energy efficiency capital projects, which were covered in the process section. The COVID-19 questions provided additional context for the FR questions but were not incorporated into the FR algorithm itself in any way.

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

All interviewed participants heard about the BizSavers RCx Program in 2021 through program trade allies. Yet, they all also stated that their preference would be to receive notification of future energy efficiency opportunities via e-mail or 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.

All respondents indicated that, since the pandemic began, COVID-19 has had at least a moderate impact on their business, and most (4 of 6) reported their business has been impacted a lot to a great deal.[34] When asked to discuss the specific disruptions, participants uniformly mentioned having staffing difficulties due to COVID-19, and all but one of the respondents indicated that they had to shut down their facilities for a period of time. Half of participants (3 of 6) reported delays in investment projects and a third (2 of 6) mentioned loss in revenue.

Half of interviewed participants (3 of 6) reported that the Ameren Missouri BizSavers RCx study specifically was impacted by COVID-19, through either study delays (three participants) or cost increases due to issues with their supplier and material shortages (one participant). Despite these issues, only one of these three participants suggested they would have considered even further delays had the Ameren Missouri BizSavers Program not existed. Additionally, the remaining three participants, whose RCx studies and projects were not

[34] Participants were asked to respond on a scale where 1 = "A great deal," 2 = "A lot," 3 = "A moderate amount," 4 = "A little," and 5 = "Not at all."

impacted by COVID-19, stated that at no point during 2020 or 2021 did they consider cancelling or delaying either the RCx study or implementation of the RCx measures due to COVID-19.

6.3.2 Gross Impact Results

This section summarizes gross impact results for the PY2021 RCx Program. Ex post gross savings are based on desk reviews and onsite verification for a sample of four projects, including two of the largest projects, which together account for almost one-third of the RCx Program energy savings.

Table 43 presents PY2021 RCx Program annual gross savings. As shown, the program achieved first year ex post gross energy and demand savings 6,928 MWh and 3.30 MW, respectively, as well as last year ex post demand savings of 0.69 MW in the 10–14 Year EUL category and 2.60 MW in the 15+ Year EUL category.

Table 43. PY2021 RCx Program Gross Impact Summary

	Ex Ante Gross	Gross RR	Ex Post Gross
First Year Savings			
Energy Savings (MWh)	6,953	99.6%	6,928
Demand Savings (MW)	3.37	97.8%	3.30
Last Year Demand Savings			
< 10 EUL (MW)	-	n/a	-
10–14 EUL (MW)	0.71	97.8%	0.69
15+ EUL (MW)	2.66	97.8%	2.60

Project-level realization rates for the sampled RCx projects ranged from 95% to 100% 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 energy realization rates of 100%. Two of the four projects had energy or demand realization rates less than 100%:

- For one project, the evaluation team found a transcription error, in which the calculated efficient case energy consumption was entered as the savings, and the calculated savings were entered as the efficient case consumption. The evaluation team corrected this error, which resulted in a small reduction to the overall energy and demand savings.
- For another project, the evaluation team found a 100% energy realization rate, but made adjustment to the enduse loadshape used to calculate ex ante savings. The ex ante savings assumed a Cooling loadshape for a dishwasher exhaust fan. The evaluation team adjusted the enduse from Cooling to HVAC, decreasing the peak demand savings.

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 G.

Table 44 presents first year ex post gross energy and demand savings by enduse. As shown, the majority of ex post gross savings comes from the HVAC enduse (86.5% of energy and 96.2% of demand).

Table 44. PY2021 RCx Program Ex Post Gross Savings by Enduse

Enduse	Energy Savings		Demand Savings	
	MWh	%	MWh	%
HVAC	5,995	86.5%	3.17	96.2%
Compressed Air	933	13.5%	0.13	3.8%
Total	**6,928**	**100%**	**3.30**	**100%**

Table 45 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 45. PY2021 RCx Annual Ex Post Demand Savings by EUL Category

Measure Category	Last Year Ex Post Demand Savings (MW)		
	10–14 EUL	15+ EUL	Total
HVAC	0.57	2.60	3.17
Compressed Air	0.13	-	0.13
Total	**0.69**	**2.60**	**3.30**

6.3.3 Net Impact Results

Net-to-Gross Results

The evaluation team conducted in-depth interviews with six participants covering 13 projects to develop an NTGR for the PY2021 Retro-Commissioning Program. Table 46 presents the individual NTGR components (i.e., FR and PSO) and the resulting NTGR for the program overall.

Table 46. Summary of PY2021 RCx NTG Results

Enduse	Free Ridership (FR)	Participant Spillover (PSO)	NTGR (1−FR+PSO)
Overall Program	7.2%	0.00	92.8%

Free Ridership

We estimate the program-level FR to be 7.2%. Since we attempted a census of all unique contacts, the concept of sampling precision does not apply.

Key findings from the interviews include:

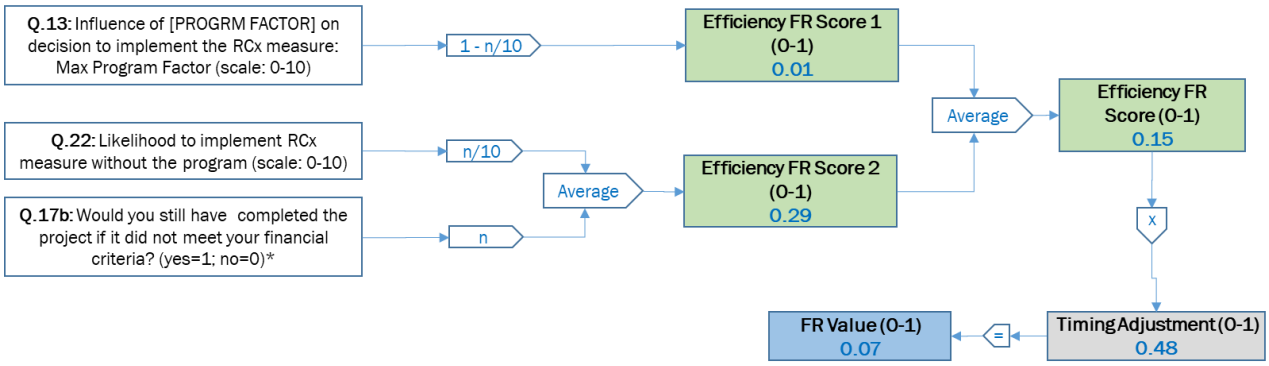
- The RCx Program seems to be most effective at identifying performance issues, which prompts participants to complete a retro-commissioning project. Nearly all interviewed participants indicated they were not fully aware of the performance issues identified in their RCx study, and it was unlikely for them to either conduct the study or implement the measures on their own, but about half revealed they were already familiar with the recommended measures or actions to rectify the identified performance issues.
- Interviewed participants consistently rated recommendations from a trade ally, incentives offered for both the study and the measures, previous experience with the program, financial criteria, and the expected energy savings as the most important factors in their decision to participate in the program.

The program has clearly resonated with participants, as all interviewees reported having previous experience with the program and mentioned their previous experience as one of the top factors for participating once again. Trade allies are a vital aspect of the RCx Program; this is particularly highlighted when these results are combined with the finding that interviewed participants exclusively heard about the program in 2021 from a trade ally. It also appears that marketing materials are not adequately reaching potential participants: only three out of six interviewees reported receiving any material at all, and of those who did receive materials, only one indicated the materials were a particularly important factor in their decision-making. Two of six interviewees mentioned that they would like to see more marketing materials for other Ameren Missouri offerings.

- Projects involving HVAC improvements were not only the most common enduse of projects completed through the program in PY2021 but also the ones where the program had the largest influence on companies' decision to perform retro-commissioning. Only one out of four respondents who completed an HVAC project claimed that they were likely to have done so without the program (i.e., provided a response of 7 or higher).[35]

Figure 13 summarizes FR results for the RCx Program, showing Efficiency FR scores and the Timing Adjustment based on interview responses. The evaluation team estimates the preliminary FR score to be 0.15 and the final time-adjusted FR value to be 0.07.

Figure 13. Free Ridership Results – Retro-Commissioning



**Asked only 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 PY2021 evaluation did not include development of a new participant spillover estimate. Instead, we applied the PSO rate of 0.0% from the PY2020 evaluation.

[35] Respondents were asked to rate the likelihood they would have implemented their RCx project on a scale from zero to ten, where zero represents "not at all likely" and ten represents "extremely likely."

Net Impacts

The evaluation team applied the PY2021 NTGR to ex post gross savings to determine net impacts for the PY2021 RCx Program. Table 47 and Table 48 present these results.

Table 47. PY2021 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	5,995	92.8%	5,563	3.17	92.8%	2.94
Compressed Air	933		866	0.13		0.12
Total	**6,928**	**92.8%**	**6,429**	**3.30**	**92.8%**	**3.06**

Table 48. PY2021 RCx Program Annual Last Year Net Demand Impacts

Enduse	Ex Post Gross (MW)		NTGR	Ex Post Net (MW)	
	10–14 EUL	15+ EUL		10–14 EUL	15+ EUL
HVAC	0.57	2.60	92.8%	0.53	2.42
Compressed Air	0.13	-		0.12	-
Total	**0.69**	**2.60**	**92.8%**	**0.64**	**2.42**

7. Business Social Services Program

This section summarizes the PY2021 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 PY2021 evaluation of the BSS Program included an engineering analysis of lighting measures. No non-lighting measures were incented through the program in PY2021. 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.

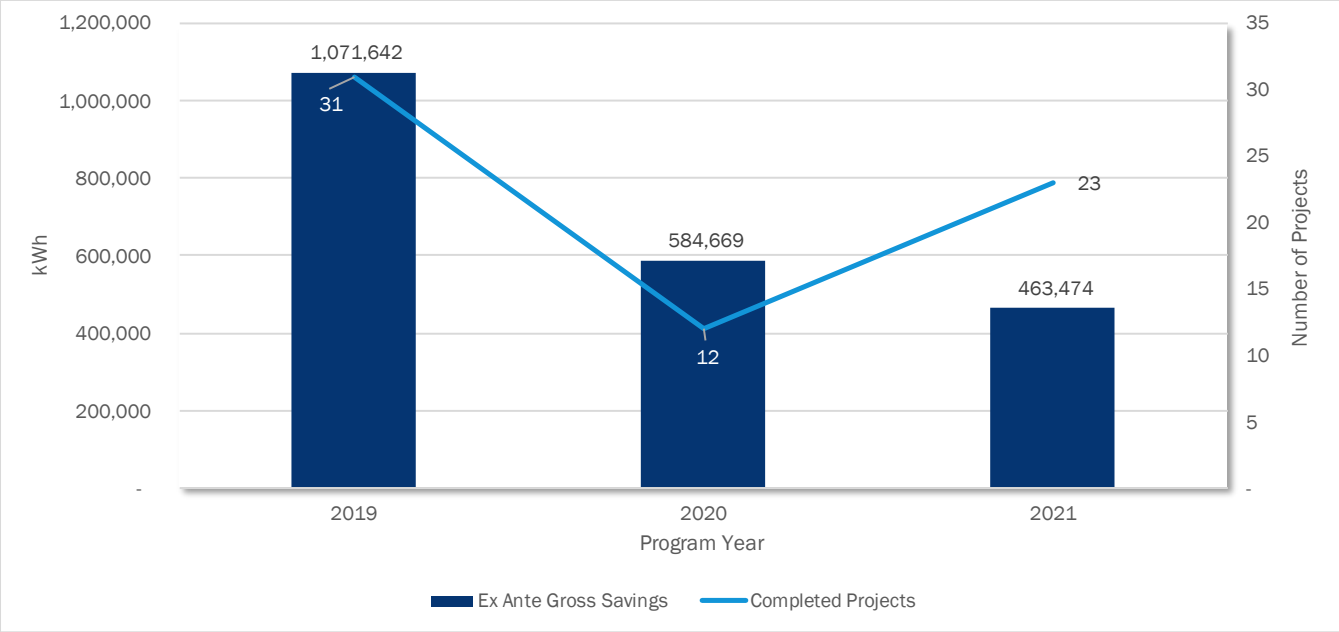
In PY2020, in response to COVID-19, the program increased the timeline for application submission from 30 days to 90 days from invoice date. This change remained in effect during PY2021. In addition, program measures and incentive levels also remained unchanged relative to PY2020.

7.1.1 Participation Summary

In PY2021, the BSS Program served 16 unique customers, all social services organizations. These customers implemented 23 energy efficiency projects accounting for 463 MWh of ex ante gross energy savings, a 21% reduction relative to PY2020 ex ante gross savings (585 MWh) and a 57% reduction relative to PY2019 ex ante gross savings (1,072 MWh) (see Figure 14). According to implementation staff, the reduction in BSS-realized savings in both PY2020 and PY2021 was intentional and designed to control the costs of the program.

PY2021 program activity consisted exclusively of LED lighting upgrades, although other measures were offered through the program.

Figure 14. PY2021 BSS Project Completions and Ex Ante Gross Savings



7.1.2 Key Impact Results

Table 49 presents first year and last year annual savings achieved in PY2021. As shown, the program achieved only 28% and 23%, respectively, of Ameren Missouri's first year net energy and demand savings goals, and 12%, 2%, and 74%, 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 49. PY2021 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)	463	101.8%	472	100.0%	472	1,700	28%
Demand Savings (MW)	0.088	102.0%	0.090	100.0%	0.090	0.39	23%
Last Year Demand Savings							
< 10 EUL (MW)	0.005	101.1%	0.005	100.0%	0.005	0.04	12%
10–14 EUL (MW)	0.004	101.5%	0.005	100.0%	0.005	0.19	2%
15+ EUL (MW)	0.079	102.1%	0.081	100.0%	0.081	0.11	74%

The PY2021 BSS Program achieved gross RRs of 101.8% and 102.0% for first year energy and demand savings, respectively. Realization rates for last year demand savings ranged between 101.1% in the < 10 Year EUL category to 102.1% in the 15+ Year EUL category.

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

ex ante analysis applies a HCIF of 1.07. In addition, the ex post analysis applied an ISR of 100.1% (the HOU adjustment for the BSS Program was 100.0%, i.e., no adjustment).

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:** In PY2021, the BSS Program supported more projects (23 compared to 12 in PY2020) but program savings continued to decline. As a result of this reduced activity, the program achieved less than one-third of its PY2021 first year energy and demand savings goals. All 23 projects included lighting measures only.
- **Conclusion #2:** The program achieved strong first year energy realization rates (101.8%) and first and last year demand realization rates (between 101.1% and 102.1%).
- **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 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) and the average ex post demand savings adjustment (WHF only) were both 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 but for the cooling interaction only for demand savings. The PY2021 engineering analysis across prescriptive lighting measures in the Standard, SBDI, and BSS programs found an energy factor of 1.05 and a demand factor of 1.08. The PY2020 evaluation had found an energy factor of 1.04 and a demand factor of 1.09. We recommend leveraging these past evaluation results to develop factors for future ex ante application.
- **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 Evaluation Methodology

Table 50 provides an overview of the PY2021 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 50. PY2021 Evaluation Activities for the BSS Program

Evaluation Activity	Description
Program Manager and Implementer Interviews	▪ Conducted interviews in December 2020 to inform evaluation planning and in December 2021 to understand program staff's perspective on program performance.
Program Material Review	▪ Reviewed program materials to understand program changes relative to PY2020.
Engineering Analysis (Lighting Measures)	▪ Verified that ex ante savings use correct TRM algorithms and project-specific values or TRM assumptions. ▪ Developed ex post savings using TRM algorithms, site-specific parameters, and deemed savings assumptions.
Net Impact Analysis	▪ Estimated PY2021 net impacts, applying an NTGR of 1.0.

7.2.1 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, site-specific parameters from the program-tracking database, and deemed savings assumptions (including application of HOU and ISR adjustment factors, based on results of the PY2019 evaluation—see Table 9 in Chapter 2).

7.3 Evaluation Results

7.3.1 Gross Impact Results

This section summarizes gross impact results for the PY2021 BSS Program. Ex post gross savings are based on an engineering analysis for BSS lighting projects. There was no uptake of non-lighting measures through the program in PY2021.

Table 51 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 472 MWh and 0.09 MW, respectively. The largest share of last year ex post demand savings was in the 15+ Year EUL category (0.08 MW, or 90%), followed by the 10–14 Year EUL and the <10 Year EUL categories (both < 0.01, or 5% each).

Table 51. PY2021 BSS Annual Savings

	Ex Ante Gross	Gross RR	Ex Post Gross
First Year Savings			
Energy Savings (MWh)	463	101.8%	472
Demand Savings (MW)	0.088	102.0%	0.090
Last Year Demand Savings			
< 10 EUL (MW)	0.005	101.1%	0.005
10–14 EUL (MW)	0.004	101.5%	0.005
15+ EUL (MW)	0.079	102.1%	0.081

As shown in the table above, gross realization rates for the BSS Program ranged from 101.1% to 102.1%. Based on the engineering analysis for lighting measures, we made the following adjustments to ex ante savings assumptions:

- **Waste Heat Factor and Heating Penalty Interactive Factor.** 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 higher ex post energy savings compared to ex ante.
  - For demand savings, the evaluation team applied building type-specific WHFs, also resulting in higher ex post demand savings compared to ex ante.

  Based on our analysis, ex post WHFs ranged from 1.04 to 1.11 with an average value of 1.09 across all 95 records in the ex post analysis. In addition, 3 of the 95 (3%) 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 95 records in the analysis range from 0 to −0.22, resulting in an average across all projects of −0.002. These average ex post WHF and IF values produced an average combined energy savings adjustment factor of 1.09, slightly higher than the ex ante HCIF of 1.07.
- **Application of ISR and HOU Adjustment.** Based on results of the PY2019 desk reviews for the SBDI Program, we applied an ISR of 100.1% and no HOU adjustment. This had minimal impacts on ex post savings.

Table 52 presents first year ex post gross energy and demand savings by measure type. As shown, over 80% of both energy and demand savings come from linear LEDs, which have an EUL of 15+ years.

Table 52. PY2021 BSS Ex Post Gross Savings by Lighting Category

Measure Category	Energy Savings		Demand Savings	
	MWh	%	MWh	%
Other Linear LED	353	75%	0.07	75%
Other Non-Linear LED	73	15%	0.01	16%
LED Replacing T12	40	8%	0.01	8%
LED Replacing Incandescent A-Lamp	6	1%	0.00	1%
Total	**472**	**100%**	**0.09**	**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.

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