

BizSavers Program Evaluation Report
PY2018 Long-Lead Projects
Volume II of II

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1. Introduction

This report is divided into two volumes presenting the results of the impact evaluation of the BizSavers Custom, Standard, and New Construction Programs for the second long-lead project completion year. Volume II presents detailed information regarding evaluation methodologies, data collection instruments, and evaluation results. Volume II is organized as follows:

- Chapter 2 presents site-level gross impact evaluation reports for each site in which measurement and verification of energy savings was performed.
- Chapter 3 contains the online participant survey instrument.
- Chapter 4 presents the heating and cooling interaction factors used in assessment of ex post energy savings of lighting measures in conditioned spaces.
- Chapter 5 contains a glossary of terms used in the evaluation report.

See report Volume I for narrative and summary information pertaining to the evaluation methods and results.

2. Site-Level Estimation of Ex Post Gross Savings

This chapter presents site-level gross impact evaluation reports for each site in which measurement and verification of energy savings was performed.

Site ID 9001

Data Collection

The participant received Standard lighting incentives from Ameren Missouri for replacing linear fluorescent tubes with direct wire LED lamps and bypassing the existing lighting ballast in a primary school building.

During the site visit, the installed lighting quantity and lighting control method were verified. The baseline fixtures had been removed, but spare lamps stored on site aligned with the wattages of the baseline fixtures. The new lamp wattage nameplates were photographed to verify the efficient lamp wattages. Further, it was noted that the electric wiring indicated the ballasts were removed for most of the fixtures and bypassed for the remaining. Lighting loggers were placed in a corridor and classrooms for ten days to meter the lighting usage during early May 2021.

Analysis Results

The evaluated savings of the incentivized lighting measures are presented in the following table.

Site 9001 Lighting Retrofit Savings and Algorithm Inputs

Measure Name/ID	Pre Qty	Post Qty	Pre Watts	Post Watts	Annual HOU	HCIF	Annual Energy (kWh)		RR
							Ex Ante	Ex Post	
4' 4L T12 to LED Fixture	194	194	164	48	1,522	1.08	38,528	37,012	96%
4' 2L T12 to LED Fixture	97	97	82	24	885	1.08	9,632	5,377	56%
2' U-Bend 2L T12 to LED Fixture	41	41	82	30	1,411	1.08	3,653	3,250	89%
3' 2L T12 to LED Retrofit Kit	3	3	74	24	3,620	1.08	256	586	229%
4' 4L T8 to LED Retrofit Kit	55	55	114	48	1,522	1.08	6,215	5,968	96%
4' 3L T8 to LED Retrofit Kit	53	53	88	36	3,620	1.08	4,718	10,774	228%
4' 2L T8 to LED Retrofit Kit	169	169	59	24	1,522	1.08	10,125	9,715	96%
8' 2L T12 to LED Retrofit Kit	8	8	138	86	3,620	1.08	712	1,626	228%
Total							73,839	74,309	101%

The heating cooling interactive factor (HCIF) includes both the waste heat factor (Whf) to include HVAC cooling savings, along with the interactive factor (IF) for the increase in energy usage for electric heat buildings.

$$kWh_{Ex Post Gross} = kWh_{savings(Whf)} - kWh_{electric heat penalty(IF)}$$

$$kWh_{savings(Whf)}$$

$$= (Qty_{pre} \times Watts_{pre} - Qty_{post} \times Watts_{post}) \times HOU_{annual} \times Whf \times \frac{1 kWh}{1,000 Wh}$$

$$kWh_{electric heat penalty(IF)} = (Qty_{pre} \times Watts_{pre} - Qty_{post} \times Watts_{post}) \times HOU_{annual} \times IF \times \frac{1 kWh}{1,000 Wh}$$

Peak coincident kW savings were calculated using the algorithm below, with the coincident factor applied to the kWh savings from each measure ID/end use.

$$kW_{peak coincident} = kWh_{savings(Whf)} \times CF$$

The ex post analysis referenced annual lighting hours of operation (ranging from 885 to 3,620) estimated through reference to data collected with light loggers that were installed from May 11 to May 19 in various areas within the school. The ex ante savings estimate was premised on 1,600 annual operating hours.

A heating and cooling interactive factor of 1.08, applicable to an educational facility in St. Louis, was applied to the preliminary estimate of ex post lighting energy savings. The ex ante savings estimate accounted for a heating and cooling interactive factor of 1.07.

The peak coincident demand reduction was determined by applying the corresponding end use kW factor to the kWh savings.

The following table presents the energy savings achieved by the measures evaluated for this site. The overall gross realization rate is 101% for energy and demand savings.

Site 9001 Energy and Peak Demand Savings

Program	End Use Category	Annual Energy (kWh)			Demand (kW)		
		Ex Ante	Ex Post	RR	Ex Ante	Ex Post	RR
Standard	Lighting	78,839	74,309	101%	14.02	14.12	101%
Total		78,839	74,309	101%	14.02	14.12	101%

Site ID 9002

Data Collection

The participant received Custom incentives from Ameren Missouri for retrofitting air distribution boxes to variable air volume (VAV) and replacing pneumatic controls with direct digital control (DDC).

For the engineering desk review, trend data was obtained from the new DDC control system for the air handling units. Also, screenshots of the equipment graphics of the new control system were reviewed for the new setpoints, minimum air flow settings, and operating schedules. Billing data was obtained from the year prior to the installation and year after the installation.

Analysis Results

The table below presents the ex ante and ex post savings of the evaluated HVAC control measures.

Site 9002 Evaluation Savings Results

<i>Measure Name</i>	<i>End Use Category</i>	<i>Annual Energy (kWh)</i>		
		<i>Ex Ante Gross</i>	<i>Ex Post Gross</i>	<i>RR</i>
HVAC Controls	Cooling	2,601	2,593	100%
HVAC Controls	HVAC	98,566	98,252	100%
Total		101,167	100,844	100%

The IPMVP Option C whole building analysis method, utilized the following linear regression equation using local NOAA weather data and site monthly billing data.

$$kWh = \text{Pre/Post flag} \times \text{Coef Pre/Post} + \text{CDD} \times \text{Coef CDD} + \text{Intercept}$$

Site 9002 Billing Usage-Weather Data Regression Terms

<i>Coefficient</i>	<i>Predictor Variables</i>	<i>Source</i>
Pre/Post	Binary flag for pre and post periods	Dates of invoiced work
CDD	Cooling Degree Days	NOAA Lambert STL Airport
Intercept	Constant Value	Regression Output

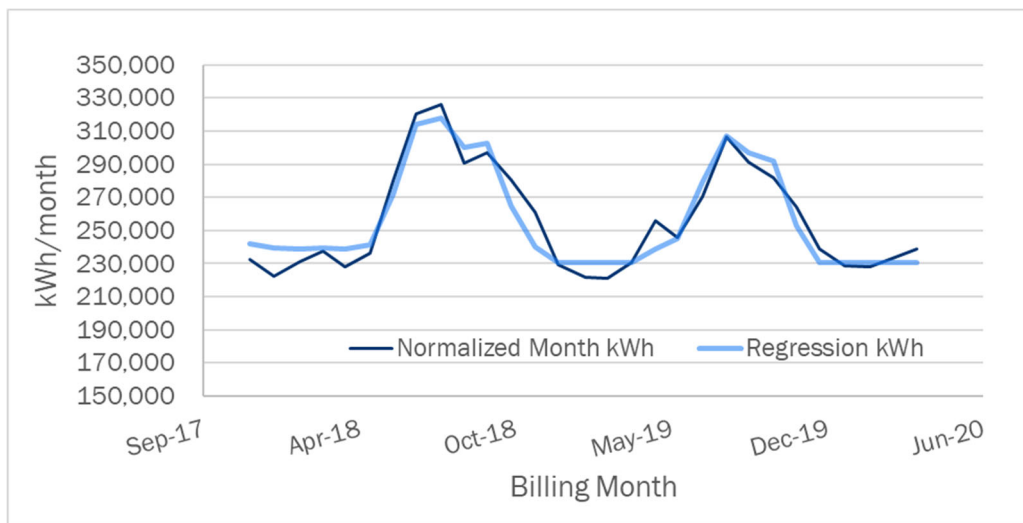
The linear regression model used the variables indicated in the table below. All coefficients used had a p-value less than 0.05. The regression equation for the model has an R-square value 0.91.

Site 9002 Billing-Weather Data Regression Variables

<i>R Square</i>	0.91		
<i>Observations</i>	30		
<i>Variable</i>	<i>Coefficients</i>	<i>P Value</i>	<i>t Stat</i>
<i>Intercept</i>	238,724	0.00000000	76.7
<i>Pre/Post</i>	(8,404)	0.02724287	-2.33
<i>CDD</i>	159	0.00000000	15.92

The following figure illustrates a comparison of actual energy use and energy use predicted through application of the regression model coefficients.

Site 9002 Billing Data, Weather Data with Regression Model



The ex post energy and demand savings are equal to 99.6% of the ex ante savings.

Site 9002 Evaluation Savings Results

Program	End Use Category	Energy Savings (kWh)			Peak Demand Savings (kW)		
		Ex Ante	Ex Post	RR	Ex Ante	Ex Post	RR
Custom	Cooling	2,601	2,593	100%	2.37	2.36	100%
Custom	HVAC	98,566	98,252	100%	43.76	43.62	100%
Total		101,167	100,844	100%	46.13	45.98	100%

Site ID 9003

Data Collection

The participant received New Construction Program incentives from Ameren Missouri for lighting measures installed in an ice rink facility.

For the engineering desk review, the quantities of each lighting product referenced in submitted invoices and lighting specification sheet wattages were compared with data included in the program application. The building type was verified based on review of the site's website. Climate zone-specific heating and cooling interactive factors were assigned. The annual hours of use were compared to the operating hours and holiday calendar, for each measure and usage area. The trade ally provided additional information on lighting schedules and the location of the flush mount LED fixtures.

Analysis Results

The ex ante and ex post savings of the evaluated lighting measures are presented in the following table.

Site 9003 Lighting Retrofit Savings and Algorithm Inputs

Measure Name/ID	Pre Qty	Post Qty	Pre Watts	Post Watts	Annual HOU	HCIF	Energy Savings (kWh)		RR
							Ex Ante	Ex Post	
LPD to BF2 - 2x2 LED PANEL	53	53	57	26	5,840	1.07	9,553	10,250	107%
LPD to BF2B - 2x2 LED PANEL W/EMERGENCY BATTERY	4	4	57	26	5,840	1.07	721	774	107%
LPD to BF3 - 2x4 LED PANEL	10	10	129	59	5,840	1.07	4,090	4,389	107%
LPD to BF3B - 2x4 LED PANEL W/ EMERGENCY BATTERY	1	1	129	59	5,840	1.07	409	439	107%
LPD to BF4 - 6" LED RECESSED DOWNLIGHT	48	48	31	14	5,840	1.07	4,659	4,999	107%
LPD to BF5 - 4 INCH UNIVERSAL NEW CONSTRUCTION DOWNLIGHT	14	14	35	16	5,840	1.07	1,553	1,666	107%
LPD to BF6 - 6" LED WALL WASH CAN LIGHT	5	5	44	20	5,840	1.07	693	744	107%
LPD to BF7 - 2x4 LED PANEL, 21	67	67	77	35	5,840	1.07	16,257	17,443	107%
LPD to BF8 - 8" LED RECESSED DOWNLIGHT	50	50	44	20	5,840	1.07	6,933	7,438	107%
LPD to BF8-18/BF8-36/BF8-40/BF8-44/BF8-48/BF9 - LED LENSED STRIPLIGHT	12	12	88	40	5,840	1.07	3,328	3,570	107%
LPD to BF10 - 8FT LED LENSED STRIPLIGHT,24	16	16	151	69	5,840	1.07	7,654	8,212	107%
LPD to BF13 - LED PENDANT,8	4	4	66	30	5,840	1.07	832	893	107%

Measure Name/ID	Pre Qty	Post Qty	Pre Watts	Post Watts	Annual HOU	HCIF	Energy Savings (kWh)		RR
							Ex Ante	Ex Post	
LPD to C6 - DOWNLIGHT	32	32	61	28	5,840	1.07	6,212	6,665	107%
LPD to F2 - 2x2 LED PANEL,34	16	16	85	39	5,840	1.07	4,326	4,612	107%
LPD to F2B - 2x2 LED PANEL W/EMERGENCY BATTERY	6	6	85	39	5,840	1.07	1,622	1,729	107%
LPD to F3 - 2x4 LED PANEL, 96	108	108	129	59	5,840	1.07	44,175	47,128	107%
LPD to F3B - 2x4 LED PANEL W/EMERGENCY BATTERY	2	2	129	59	5,840	1.07	818	873	107%
LPD to F4 - 6" LED RECESSED DOWNLIGHT, 338	312	312	31	14	5,840	1.07	30,282	33,271	110%
LPD to F5 - HIGHBAY LED	61	61	845	386	5,840	1.07	163,238	175,144	107%
LPD to F6 - HIGHBAY LED	36	36	1,800	822	5,840	1.07	205,153	220,117	107%
LPD to F7 - ROUND HIGH BAY	87	87	250	114	5,840	1.07	68,759	73,774	107%
LPD to F8 - SURFACE LED CANOPY, 80	103	103	138	60	5,840	1.07	44,986	50,199	112%
LPD to F9 - 4FT LED LENSED STRIPLIGHT,26	17	17	77	35	5,840	1.07	4,125	4,426	107%
LPD to F10 - 8FT LED LENSED STRIPLIGHT, 52	41	41	151	69	5,840	1.07	19,613	21,043	107%
LPD to F11 - VAPORTITE INDUSTRIAL, 107	64	64	147	31	5,840	1.07	29,728	46,293	156%
LPD to F11-12/ F11-16 - LINEAR RECESSED	2	2	42	19	5,840	1.07	263	283	107%
LPD to F12-M - 2 FEET AND 4 FEET LENGHTS, 46	58	58	180	78	5,840	1.07	32,972	36,682	111%
LPD to F13 - LED LOWBAY W/UPLIGHT	21	21	160	13	5,840	1.07	10,628	19,277	181%
LPD to F14 - 4FT LED DIRECT/INDIRECT STRIPLIGHT	126	126	116	53	5,840	1.07	46,297	49,674	107%
LPD to F31 - 2x4 LED PANEL	4	4	129	59	5,840	1.07	1,636	1,755	107%
LPD to MF2 - 2x2 LED PANEL	33	33	57	26	5,840	1.07	5,948	6,382	107%
LPD to 6" LED RECESSED DOWNLIGHT	33	33	31	14	5,840	1.07	3,203	3,437	107%
LPD to MF5 - 4 INCH UNIVERSAL NEW CONSTRUCTION DOWNLIGHT	29	29	35	16	5,840	1.07	3,217	3,451	107%
LPD to MF7 - 2x4 LED PANEL	12	12	77	35	5,840	1.07	2,912	3,124	107%
LPD to T1 - TRACK LIGHTING FIXTURE	38	38	44	20	5,840	1.07	5,269	5,653	107%
Total							792,064	875,807	111%

Energy savings were calculated using the equation below.

$$kWh_{savings} = (Qty_{pre} \times Watts_{pre} - Qty_{post} \times Watts_{post}) \times HOU_{annual} \times HCIF \times \frac{1 \text{ kWh}}{1,000 \text{ Wh}}$$

Peak coincident kW savings were calculated using the algorithm below, with the coincident factor applied to the kWh savings from each type of light fixture.

$$kW_{peak\ coincident} = kWh_{savings(Whf)} \times CF$$

The annual lighting hours of operation were sourced from email correspondence with the trade ally. The annual operating hours within the application (5,824) were similar to the trade ally-reported schedule (5,840).

The lighting specification sheet wattages and quantities were compared to the ex ante lighting worksheet. The quantities found in both data sources were aligned, and only a few fixture wattages were identified with wattages different than the ex ante values for the seven fixtures listed in the following table.

Site 9003 Discrepant Ex Post to Ex Ante Fixture Wattages

Fixture	Fixture Power (Watts)	
	Ex Ante	Ex Post
F2 / F2B	39	39.3
F3 / F3B	59	59.4
F4	14	13.6
F8	63	60.0
F11	67	51.0
F12	82	78.0
F13	73	43.0

A heating and cooling interactive factor of 1.07, applicable to a refrigerated retail facility in St. Louis, was applied to the preliminary estimate of ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive factors.

The peak coincident demand reduction was determined by applying the corresponding end use kW factor to the kWh savings.

The following table presents the energy savings achieved by the measures evaluated for this site. The overall gross realization rate is 111% for both energy and demand savings.

Site 9003 Energy and Peak Demand Savings

Program	End Use Category	Energy Savings (kWh)			Peak Demand Savings (kW)		
		Ex Ante	Ex Post	RR	Ex Ante	Ex Post	RR
New Construction	Lighting	792,064	875,807	111%	150.46	166.37	111%
Total		792,064	875,807	111%	150.46	166.37	111%

3. Online Participant Survey

GROUP: Participants across three programs: Standard, Custom, and New Construction

1. Our records indicate you were the main contact for the energy efficient project(s) completed at [FR_LOC1] in [YEAR].

Many of the following questions are about your organization's financial decision making and the project planning process.

Were you involved in the decision to complete this project(s)?

1. Yes, I was involved in the decision to complete the project(s)
2. No, I was involved in the project(s) but not the decision to complete the project(s)
3. No, I was not involved in the project(s)
4. No, I do not work for [ORGANIZATION] but provided services for the project(s)
88. Don't know

[DISPLAY Q2 IF Q1 = 2-4; THEN Q3, THEN SKIP TO END]

2. Could you please provide the name and contact information of the person most knowledgeable about the decision to install the energy efficient equipment at the [LOCATION]?

[OPEN ENDED] Name and Email

3. What is your job title or role?

1. Facilities Manager
2. Energy Manager
3. Other facilities management/maintenance position
4. Chief Financial Officer
5. Other financial/administrative position
6. Proprietor/Owner
7. President/CEO
8. Manager
9. Other (Specify) _____

4. Which of the following, if any, does your company have in place at [FR_LOC1]?
[Select all that apply]

1. A person or persons responsible for monitoring or managing energy usage
2. Defined energy savings goals
3. A specific policy requiring that energy efficiency be considered when purchasing equipment
4. Carbon reduction goals
5. Other – please describe: _____

- 6. None of the above
 - 88. Don't know
5. Had you applied for or received Ameren Missouri incentives for any equipment replacements or building upgrades before the one(s) you did in [YEAR]?
- 1. Yes
 - 2. No
 - 88. Don't know

[DISPLAY Q6 IF NEW CONSTRUCTION = 1]

6. You recently received incentives through Ameren Missouri's New Construction program. At what point did you learn about the availability of those incentives?
- 1. Before we even started discussing any new construction project
 - 2. After we had started discussing a project but before selecting the major energy-using equipment
 - 3. After we had started the design but before selecting the major energy-using equipment
 - 4. After we had selected the major energy-using equipment
 - 88. Don't know

Equipment Selection

[FOR EACH PART OF Q7, INSERT FOLLOWING RESPONSE OPTIONS:

1 = No interaction with this type of person or they provided no input

2 = Input had no effect on decision

3 = Small effect on decision

4 = Moderate to large effect on decision

5 = Critical effect – could not have made decision without it

88 = I don't know how the interactions affected the decision

7. How did each of the following affect your decision to install the efficient equipment?
- a. [IF STANDARD = 1 OR CUSTOM = 1 OR EMS = 1] Vendor (retailer)
 - b. [IF STANDARD = 1 OR CUSTOM = 1 OR RCX = 1 OR EMS = 1] Contractor (installer)
 - c. [IF STANDARD = 1 OR CUSTOM = 1 OR NC = 1] Designer or architect
 - d. [IF SBDI = 1] SBDI Service Provider (contractor)
 - e. Ameren Missouri staff member, such as an account representative
 - f. BizSavers program representative
 - g. [IF RCX = 1] Audit Results
 - h. [IF RCX = 1] Your RCx service provider

- i. [IF NC = 1] The “design team” process
- j. [IF NC = 1] General Contractor
- k. [IF NC = 1] The technical analysis study (energy modeling study)
- l. Someone else, please specify

[DISPLAY Q8 ONLY IF Q7L = 3 -5]

- 8. Who was the someone else that affected your decision to install the efficient equipment?

Net-To-Gross Section

Free-Ridership [Do Not Display]

- 9. Before you knew about the BizSavers Program had you purchased and installed any energy efficient equipment at the [FR_LOC1] location?
 - 1. Yes
 - 2. No
 - 88. Don't know
- 10. Has your organization purchased any significant energy efficient equipment in the last three years for which you did not apply for a financial incentive through an energy efficiency program at the [FR_LOC1] location?
 - 1. Yes. Our organization purchased energy efficient equipment but did not apply for incentive.
 - 2. No. Our organization purchased significant energy efficient equipment and applied for an incentive.
 - 3. No significant energy efficient equipment was purchased by our organization.
 - 88. Don't know
- 11. Before participating in the BizSavers Program had you implemented any equipment or measure similar to [FR_MEAS 1] at the [FR_LOC1] location?
 - 1. Yes
 - 2. No
 - 88. Don't know
- 12. Did you have plans to [INSTALL] the [FR_MEAS 1] at the [FR_LOC1] location before participating in the BizSavers Program?
 - 1. Yes
 - 2. No
 - 88. Don't know
- 13. Would you have completed the [FR_MEAS 1] project even if you had not participated in the program?
 - 1. Yes

- 2. No
- 88. Don't know

[DISPLAY Q49 IF Q5= 1]

14. How important was previous experience with the BizSavers Program in making your decision to [INSTALL] the [FR_MEAS 1] at the [FR_LOC1] location?
- 1. Very important
 - 2. Somewhat important
 - 3. Only slightly important
 - 4. Not at all important
 - 5. Did not have previous experience with the program.
 - 88. Don't know

[DISPLAY Q15 IF SBDI = 1]

15. If the Service Provider that completed the onsite energy assessment had nor not recommended [INSTALLING] the [FR_MEAS 1], how likely is it that you would have [INSTALLED] it anyway?
- 1. Definitely would have installed
 - 2. Probably would have installed
 - 3. Probably would not have installed
 - 4. Definitely would not have installed
 - 88. Don't know
16. Did a BizSavers Program or other Ameren Missouri representative recommend that you [INSTALL] the [FR_MEAS 1] at the [FR_LOC1] location?
- 1. Yes
 - 2. No
 - 88. Don't know

[DISPLAY Q17 IF Q16 = 1]

17. If the BizSavers Program representative had not recommended [INSTALLING] the [FR_MEAS 1], how likely is it that you would have [INSTALLED] it anyway?
- 1. Definitely would have installed
 - 2. Probably would have installed
 - 3. Probably would not have installed
 - 4. Definitely would not have installed
 - 88. Don't know
18. Would you have been financially able to [INSTALL] the [FR_MEAS 1] at the [FR_LOC1] location without the financial incentive from the BizSavers Program?
- 1. Yes
 - 2. No

88. Don't know

[DISPLAY Q19 IF Q18= 2]

19. To confirm, your organization would NOT have allocated the funds to complete a similar energy saving project if the program incentive was not available. Is that correct?

1. Yes, that is correct.
2. No, that is not correct.
88. Don't know

[DISPLAY Q20 IF Q19 = 2]

20. In your own words, can you tell me what your organization would have likely done if the financial incentive was not available from the program?

21. If the financial incentive from the BizSavers Program had not been available, how likely is it that you would have [INSTALLED] the [FR_MEAS 1] at the [FR_LOC1] location anyway?

1. Definitely would have installed
2. Probably would have installed
3. Probably would not have installed
4. Definitely would not have installed
88. Don't know

[DISPLAY Q22 IF QUANT > 1]

22. We would like to know whether the availability of information and financial incentives through the [PROGRAM] affected the quantity (or number of units) of [FR_MEAS1] that you purchased and [INSTALLED] at the [FR_LOC1] location.

Did you purchase and [INSTALL] more [FR_MEAS 1] than you otherwise would have without the program?

1. Yes
2. No, program did not affect quantity purchased and [INSTALLED].
88. Don't know

[DISPLAY Q23 IF ENERGY_USING = 1]

23. We would like to know whether the availability of information and financial incentives through the BizSavers Program affected the level of energy efficiency you chose for [FR_MEAS 1] at the [FR LOC1] location.

Did you choose equipment that was more energy efficient than you would have chosen because of the program?

1. Yes
2. No, program did not affect level of efficiency chosen for equipment.

88. Don't know

[DISPLAY Q24 IF Q23 = 1]

24. What type of equipment, if any, would you have installed if the program was not available?

[DISPLAY Q25 IF NC = 0]

25. We would like to know whether the availability of information and financial incentives through the BizSavers Program affected the timing of your purchase and installation of the [FR_MEAS1] at the [FR_LOC1] location.

Did you purchase and [INSTALL] the [FR_MEAS1] earlier than you otherwise would have without the program?

1. Yes

2. No, program did not affect did not affect timing of purchase and [INSTALLATION].

88. Don't know

[DISPLAY Q26 IF Q25 = 1]

26. When would you otherwise have [INSTALLED] the equipment?

1. Less than 6 months later

2. 6-12 months later

3. 1-2 years later

4. 3-5 years later

5. More than 5 years later

88. Don't know

[DISPLAY Q27 IF NUMBER OF MEASURE TYPES > 1]

27. Our records indicate you [INSTALLED_FR2] [FR_MEAS2] at the [FR_LOC2] location in addition to [FR_MEAS1] at the [FR__LOC1] location. Did both of these projects go through the same decision making process or was a separate decision made for each?

1. The same decision making process applies to both projects.

2. A different decision making process applies to each project.

3. We did not [INSTALL_FR2] [FR_MEAS2] at the [FR_LOC2] location.

88. Don't know

[IF Q27 = 1, CYCLE THROUGH Q11- Q27 FOR FR_MEAS2]

General Spillover Questions

[DISPLAY IF SPILLOVER = 0]

28. We would like to know if you have installed any additional energy efficient equipment because of your experience with the program that you DID NOT receive an incentive for.

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

1. Yes
2. No
88. Don't know

[DISPLAY Q29 IF Q28 = 1]

29. What additional equipment have you installed? [MULTI SELECT]

1. Lighting
2. Lighting controls or occupancy sensors
3. Unitary or split air conditioning system or chiller
4. Refrigeration equipment
5. Kitchen equipment
6. Something else
96. Didn't implement any measures [SKIP TO FIRMOGRAPHICS]
88. Don't know [SKIP TO FIRMOGRAPHICS]

[DISPLAY Q50 IF Q28 = 1]

50. Why didn't you apply for or receive incentives for those items? [MULTI SELECT RANDOMIZE ORDER, BUT FIX OTHER AND DON'T KNOW]

1. Didn't know whether equipment qualified for financial incentives
2. Equipment did not qualify for financial incentives
3. Too much paperwork for the financial incentive application
4. Financial incentive was insufficient
5. Didn't have time to complete paperwork for financial incentive application
6. Didn't know about financial incentives until after equipment was purchased
7. Other reason (please describe): _____
8. We did receive an incentive from Ameren Missouri for that equipment [SKIP TO FIRMOGRAPHICS]
88. Don't know

The same measure specific questions used in PY2018 were included in the survey of PY2018 long-lead decision makers.

Firmographic

51. Which of the following best describes the type of work that your firm or organization does at [FR_LOC1]?
1. Industrial
 2. Restaurant (not fast food)
 3. Fast food restaurant
 4. Retail
 5. Office
 6. Grocery and convenience
 7. School
 8. Lodging
 9. Warehouse
 10. Other – specify: _____
 88. Not sure
52. Does your organization rent, own and occupy, or own and rent the facility to someone else at this location?
1. Own
 2. Own and occupy
 3. Own and rent to someone else
 88. Don't know
53. Including all the properties, how many separate work locations does your organization own or lease space in, in Ameren Missouri territory? (A work location may consist of multiple buildings in close proximity to each other, such as a university campus – please indicate the number of locations) _____
54. Please list any other properties that could benefit from energy efficient electric or gas equipment upgrades which may qualify for an incentive. Please provide company name, contact person, and phone number and/or email address. _____
[OPEN-ENDED RESPONSE]
55. How many square feet (indoor space) is the part of the property at [LOCATION] that your firm or organization occupies? (If your firm or organization occupies the entire property, indicate the total size of that property.)
1. Less than 5,000
 2. 5,001 to 10,000
 3. 10,001 to 20,000
 4. 20,001 to 50,000
 5. 50,001 to 75,000

- 6. 75,001 to 100,000
- 7. 100,001 to 250,000
- 8. 250,001 to 500,000
- 9. 500,001 to 1,000,000
- 10. More than 1,000,000
- 88. Not sure

56. How can the BizSavers Program implementation team provide you with better service? _____ [OPEN-ENDED RESPONSE]

4. Heating and Cooling Interactive Factors

Building Type	Cooling Type	Heating Type	Cape Girardeau			Jefferson City			Kirksville			St. Louis		
			kWh HIF	kWh CIF	Peak Demand HCIF	kWh HIF	kWh CIF	Peak Demand HCIF	kWh HIF	kWh CIF	Peak Demand HCIF	kWh HIF	kWh CIF	Peak Demand HCIF
Assembly	Packaged Single Zone	Gas	0.00	0.14	1.12	0.00	0.15	1.34	0.00	0.13	1.26	0.00	0.14	1.33
Assembly	Packaged Single Zone	Heat Pump	-0.11	0.14	1.12	-0.11	0.15	1.34	-0.10	0.12	1.23	-0.11	0.14	1.31
Bio Manufacturer	Packaged Single Zone	Gas	0.00	0.10	1.54	0.00	0.11	1.57	0.00	0.10	1.49	0.00	0.11	1.59
Bio Manufacturer	Packaged Single Zone	Heat Pump	-0.05	0.11	1.54	-0.06	0.11	1.58	-0.08	0.10	1.49	-0.06	0.11	1.60
Conditioned Storage	Packaged Single Zone	Gas	0.00	0.09	2.30	0.00	0.10	2.15	0.00	0.08	2.30	0.00	0.10	1.92
Conditioned Storage	Packaged Single Zone	Heat Pump	-0.09	0.10	2.31	-0.10	0.10	2.17	-0.09	0.08	2.30	-0.09	0.10	1.94
Education (Community College)	VAV+Packaged Single Zone	Heat Pump	0.00	0.07	1.48	0.00	0.08	1.43	0.00	0.07	1.43	0.00	0.09	1.42
Education (Community College)	VAV+Packaged Single Zone	Gas	0.00	0.07	1.48	0.00	0.08	1.43	0.00	0.07	1.43	0.00	0.09	1.42
Education (High School)	Fan Coil+Packaged Single Zone	Gas	0.00	0.10	1.18	0.00	0.10	1.14	0.00	0.08	1.16	0.00	0.09	1.23
Education (High School)	Fan Coil+Packaged Single Zone	Heat Pump	-0.03	0.10	1.18	-0.03	0.10	1.14	-0.03	0.08	1.16	-0.03	0.09	1.23
Education (High School)	VAV	Gas	0.00	0.08	1.18	0.00	0.09	1.09	0.00	0.06	1.18	0.00	0.08	1.07
Education (Primary School)	Packaged Single Zone	Gas	0.00	0.09	1.11	0.00	0.09	1.14	0.00	0.08	1.17	0.00	0.09	1.17
Education (Primary School)	Packaged Single Zone	Heat Pump	-0.10	0.09	1.11	-0.11	0.09	1.14	-0.11	0.08	1.16	-0.11	0.09	1.16
Education (Relocatable Classroom)	Packaged Single Zone	Electric Resistance	-0.28	0.11	1.11	-0.30	0.11	1.12	-0.34	0.09	1.13	-0.30	0.11	1.12
Education (Relocatable Classroom)	Packaged Single Zone	Heat Pump	-0.08	0.06	1.09	-0.09	0.06	1.09	-0.09	0.05	1.11	-0.09	0.06	1.10
Education (Relocatable Classroom)	Packaged Single Zone	Gas	0.00	0.09	1.09	0.00	0.09	1.09	0.00	0.07	1.11	0.00	0.08	1.10
Education (University)	VAV	Gas	0.00	0.08	1.41	0.00	0.09	1.38	0.00	0.09	1.61	0.00	0.09	1.36
Hospital	VAV+Packaged Single Zone	Heat Pump	0.00	0.07	1.18	0.00	0.07	1.21	0.00	0.06	1.18	0.00	0.07	1.17
Hospital	VAV+Packaged Single Zone	Gas	0.00	0.07	1.18	0.00	0.07	1.21	0.00	0.06	1.18	0.00	0.07	1.17
Hotel	PVAV+PTHP+PSZ	Heat Pump	-0.01	0.20	1.29	-0.01	0.20	1.38	-0.01	0.16	1.37	-0.01	0.18	1.31
Hotel	VAV+FPFC+PHP	Heat Pump	0.00	0.11	1.23	0.00	0.11	1.21	0.00	0.10	1.36	0.00	0.11	1.43
Hotel	VAV+PTAC+PSZ	Electric Resistance	-0.16	0.20	1.30	-0.19	0.20	1.39	-0.26	0.16	1.38	-0.20	0.19	1.35
Hotel	VAV+PTHP+PSZ	Heat Pump	-0.01	0.20	1.29	-0.01	0.19	1.37	-0.01	0.16	1.36	-0.01	0.18	1.37
Light Manufacturing	Packaged Single Zone	Gas	0.00	0.09	1.52	0.00	0.10	1.49	0.00	0.08	1.48	0.00	0.09	1.46
Light Manufacturing	Packaged Single Zone	Heat Pump	-0.09	0.09	1.53	-0.09	0.10	1.50	-0.08	0.08	1.48	-0.09	0.10	1.46
Motel	Packaged Terminal AC	Electric Resistance	-0.22	0.17	1.43	-0.24	0.16	1.40	-0.29	0.15	1.38	-0.24	0.16	1.44
Motel	Packaged Terminal HP	Heat Pump	-0.04	0.16	1.41	-0.04	0.16	1.39	-0.03	0.14	1.36	-0.04	0.15	1.43
Nursing Home	Fan Coil+Packaged Single Zone	Heat Pump	0.00	0.14	1.52	0.00	0.14	1.34	0.00	0.12	1.38	0.00	0.14	1.35
Nursing Home	VAV	Gas	0.00	0.09	1.54	0.00	0.10	1.47	0.00	0.08	1.53	0.00	0.09	1.44
Nursing Home	Fan Coil+Packaged Single Zone	Gas	0.00	0.14	1.52	0.00	0.14	1.34	0.00	0.12	1.38	0.00	0.14	1.34
Office (Large)	Water Loop Heat Pump	Heat Pump	-0.06	0.24	1.39	-0.07	0.23	1.41	-0.08	0.19	1.40	-0.07	0.22	1.41
Office (Large)	VAV	Gas	0.00	0.10	1.32	0.00	0.09	1.30	0.00	0.08	1.30	0.00	0.09	1.41
Office (Small)	Packaged Single Zone	Gas	0.00	0.10	1.39	0.00	0.11	1.38	0.00	0.09	1.37	0.00	0.11	1.36
Office (Small)	Packaged Single Zone	Heat Pump	-0.09	0.11	1.39	-0.10	0.11	1.38	-0.09	0.09	1.38	-0.09	0.11	1.37
Restaurant (Fast Food)	Packaged Single Zone	Gas	0.00	0.10	1.24	0.00	0.11	1.33	0.00	0.09	1.37	0.00	0.10	1.33
Restaurant (Fast Food)	Packaged Single Zone	Heat Pump	-0.08	0.10	1.25	-0.08	0.11	1.33	-0.08	0.09	1.37	-0.08	0.10	1.34
Restaurant (Full-Service)	Packaged Single Zone	Gas	0.00	0.12	1.21	0.00	0.13	1.36	0.00	0.11	1.40	0.00	0.12	1.35
Restaurant (Full-Service)	Packaged Single Zone	Heat Pump	0.00	0.03	1.29	0.00	0.04	1.28	0.00	0.02	1.36	0.00	0.03	1.09
Retail (Large 3-Story)	VAV	Gas	0.00	0.08	1.35	0.00	0.10	1.36	0.00	0.10	1.33	0.00	0.11	1.34
Retail (Large Single-Story)	Packaged Single Zone	Gas	0.00	0.10	1.26	0.00	0.11	1.28	0.00	0.09	1.32	0.00	0.10	1.29
Retail (Large Single-Story)	Packaged Single Zone	Heat Pump	-0.09	0.10	1.28	-0.10	0.11	1.29	-0.08	0.09	1.31	-0.09	0.10	1.28
Retail (Small)	Packaged Single Zone	Gas	0.00	0.11	1.26	0.00	0.11	1.25	0.00	0.10	1.30	0.00	0.11	1.28
Retail (Small)	Packaged Single Zone	Heat Pump	-0.10	0.11	1.27	-0.10	0.12	1.26	-0.09	0.10	1.30	-0.10	0.11	1.28
Freezer Space (Low Temp)	N/A	N/A	0.00	1.50	1.50	0.00	1.50	1.50	0.00	1.50	1.50	0.00	1.50	1.50
Med. Temp Refrig. Space	N/A	N/A	0.00	1.29	1.29	0.00	1.29	1.29	0.00	1.29	1.29	0.00	1.29	1.29
High Temp Refrig. Space	N/A	N/A	0.00	1.18	1.18	0.00	1.18	1.18	0.00	1.18	1.18	0.00	1.18	1.18
Walk-in/In Store Refrigerator	N/A	N/A	0.00	1.40	1.40	0.00	1.40	1.40	0.00	1.40	1.40	0.00	1.40	1.40

5. Glossary of Terms

Adjustments: Modifications on ex ante analysis conditions (e.g. hours of lighting operation) because of observations made by ADM field technicians during the measurement and verification (M&V) on-site visit, which change baseline energy or energy demand values.

Baseline: The projected scenario where the subject project or program was not implemented. Baseline conditions are sometimes referred to as “business-as-usual” conditions. Baselines are defined as either project-specific baselines or performance standard baselines.

Confidence (level): A confidence level is a value that indicates the reliability of a calculated estimate from a sample. A higher confidence level indicates a stronger estimate that is more likely to lie within the population parameter. It is an indication of how close an estimated value derived from a sample is to the true population value of the quantity in question. The confidence level is the likelihood that the evaluation has captured the true impacts of the program within a certain range of values (i.e., precision).

Cost-effectiveness: The present value of the estimated benefits produced by an energy efficiency program compared to the estimated total costs to determine if the proposed investment or measure is desirable (e.g., whether the estimated benefits exceed the estimated costs from a societal perspective). It is an indicator of the relative performance or economic attractiveness of any energy efficiency investment or practice.

Deemed Savings: An estimate of the gross energy savings or gross energy demand savings for a single unit of an installed energy efficiency measure. This estimate (a) comes from data sources and analytical methods that are widely accepted for the particular measure and purpose, and (b) is applicable to the situation being evaluated.

Demand: The time rate of energy flow. Demand usually refers to electric power measured in kW (equals kWh/h) but can also refer to natural gas, usually as Btu/hr., kBtu/hr., therms/day, etc.

Effective Useful Life: An estimate of the median number of years that the efficiency measures installed under a program are still in place and operable.

Energy Efficiency: The use of less energy to provide the same or an improved level of service to the energy consumer in an economically efficient way or using less energy to perform the same function. “Energy conservation” is a term that has also been used, but it has the connotation of doing without a service to save energy rather than using less energy to perform the same function.

Energy Efficiency Measure: Installation of equipment, subsystems or systems, or modification of equipment, subsystems, systems, or operations on the customer side of

the meter, for the purpose of reducing energy and/or demand (and, hence, energy and/or demand costs) at a comparable level of service.

Engineering Model: Engineering equations used to calculate energy usage and savings. These models are usually based on a quantitative description of physical processes that transform delivered energy into useful work such as heat, lighting, or motor drive. In practice, these models may be reduced to simple equations in spreadsheets that calculate energy usage or savings as a function of measurable attributes of customers, facilities, or equipment (e.g., lighting use = watts × hours of use).

Evaluation: The performance of studies and activities aimed at determining the effects of a program. This includes any of a wide range of assessment activities associated with understanding or documenting program performance, assessing program or program-related markets and market operations; any of a wide range of evaluative efforts including assessing program-induced changes in energy efficiency markets, levels of demand or energy savings, and program cost-effectiveness.

Ex Ante: The saving calculated by the implementation contractor, Lockheed Martin, per the TRM. These numbers are developed prior to ADM's analysis.

Ex Post: The savings that have been verified by the EM&V contractor. This includes adjustments for equipment that may not have been installed, calculation errors, and differences in assumptions.

Free Rider: A program participant who would have implemented the program measure or practice in the absence of the program incentive. Free riders can be total (who would have implemented all of the same measures without the incentives), partial (who would have implemented some of the same measures without the incentives), or deferred (who would have implemented the measures, but at some time in the future).

Ex Ante kWh Savings: The estimation of electrical energy (kWh) expected to be saved by implementing energy efficiency measures, calculated by the implementation contractor before measures are enacted and without considering externalities like free ridership and spillovers. Savings are typically reported as annual savings.

Ex Ante Peak kW Savings: The estimation of electrical energy demand (kW) expected to be saved by implementing energy efficiency measures, calculated by the implementation contractor before measures are enacted and without considering externalities like free ridership and spillovers. Savings are typically reported as annual savings.

Ex Post Gross kWh Savings: The estimation of electrical energy (kWh) saved by implementing energy efficiency measures, calculated by ADM, after measures were enacted, and without considering externalities like free ridership and spillovers. Savings are typically reported as annual savings.

Ex Post Gross Peak kW Savings: The estimation of electrical energy demand (kW) saved by implementing energy efficiency measures, calculated by ADM, after measures were enacted, and without considering externalities like free ridership and spillovers. Savings are typically reported as annual savings.

Gross kWh Savings Realization Rate: The ratio of ex post (or “realized”) gross kWh savings over ex ante gross kWh savings.

Gross Peak kW Savings Realization Rate: The ratio of ex post (or “realized”) gross kW savings over ex ante gross kW savings.

Gross Realization Rate: The ratio of ex post gross energy savings over ex ante gross energy savings

Gross Savings: The change in energy consumption and/or demand that results directly from program-related actions taken by participants in an efficiency program, regardless of why they participated.

Impact Evaluation: An evaluation of the program-specific, directly induced changes (e.g., energy and/or demand usage) attributable to an energy efficiency program.

Interaction Factors: Changes in energy use or demand occurring beyond the measurement boundary of the M&V analysis.

kWh Savings Target: The goal of energy savings for programs and their components set by utility companies before the programs began.

Long-lead projects: Projects that received offers from the implementer in the PY2018 base period and with long-lead time components. These projects were completed in either the first year or second year of the Cycle 2 to Cycle 3 Transition Period.

Measure: Energy efficient equipment or service that is implemented to conserve energy.

Measurement: A procedure for assigning a number to an observed object or event.

Measurement and Verification (M&V): The data collection, monitoring, observations, and analysis by field technicians used for the calculation of ex post gross energy and demand savings for individual sites or projects. M&V can be a subset of program impact evaluation.

Metering: The collection of energy-consumption data over time using meters. These meters may collect information with respect to an end-use, a circuit, a piece of equipment, or a whole building (or facility). Short-term metering generally refers to data collection for no more than a few weeks. End-use metering refers specifically to separate data collection for one or more end-uses in a facility, such as lighting, air conditioning or refrigeration. Spot metering is an instantaneous measurement (rather than over time) to determine an energy-consumption rate.

Monitoring: Gathering of relevant measurement data, including but not limited to energy-consumption data, over time to evaluate equipment or system performance. Examples include chiller electric demand, inlet evaporator temperature and flow, outlet evaporator temperature, condenser inlet temperature, and ambient dry-bulb temperature and relative humidity or wet-bulb temperature, for use in developing a chiller performance map (e.g., kW/ton vs. cooling load and vs. condenser inlet temperature).

Net Ex Post kWh Savings: The estimation of electrical energy (kWh) savings from programs or measures after the measures have been installed and after adjusting for possible externalities, such as free ridership and spillovers.

Net Ex Post Peak kW Savings: The estimation of electrical energy demand (kW) savings from programs or measures after the measures have been installed and after adjusting for possible externalities, such as free ridership and spillovers.

Net Savings: The amount of energy reduced based on the project after subtracting the negative free ridership effects and adding the positive spillover effects. Therefore, net savings equal gross savings, minus free ridership, plus the summation of participant spillovers, and non-participant spillovers. It is a better estimate of how much energy reductions occurred particularly because of the program incentive(s).

Net-to-Gross-Ratio (NTGR): A factor representing net program savings divided by gross program savings. It is applied to gross program impacts to convert gross program impacts into net program load impacts that are adjusted for free ridership and spillover. Net-to-Gross-Ratio (NTGR) = $(1 - \text{Free-Ridership \%} + \text{Spillover \%})$, also defined as Net Savings / Gross Savings.

Non-participant: A consumer who was eligible but did not participate in the subject efficiency program in a given program year. Each evaluation plan should provide a definition of a non-participant as it applies to a specific evaluation.

Participant: A consumer who received a service offered through the subject efficiency program in a given program year. The term “service” is used in this definition to suggest that the service can be a wide variety of services, including financial rebates, technical assistance, product installations, training, energy efficiency information or other services, items, or conditions. Each evaluation plan should define “participant” as it applies to the specific evaluation.

Peak Demand: The maximum level of metered demand during a specified period, such as a billing month or a peak demand period.

Peak kW Savings Target: The goal of energy demand savings set by the utility company for their program or program component before the program time frame begins.

Portfolio: Either (a) a collection of similar programs addressing the same market (e.g., a portfolio of residential programs), technology (e.g., motor-efficiency programs), or

mechanisms (e.g., loan programs) or (b) the set of all programs conducted by one organization, such as a utility (and which could include programs that cover multiple markets, technologies, etc.).

Primary Effects: Effects that the project or program are intended to achieve. For efficiency programs, this is primarily a reduction in energy use per unit of output.

Process Evaluation: A systematic assessment of an energy efficiency program's process. The assessment includes documenting program operations at the time of the examination and identifying and recommending improvements to increase the program's efficiency or effectiveness for acquiring energy resources while maintaining high levels of participant satisfaction.

Program: A group of projects, with similar characteristics and installed in similar applications. Examples could include a utility program to install energy-efficient lighting in commercial buildings, a developer's program to build a subdivision of homes that have photovoltaic systems, or a state residential energy efficiency code program.

Project: An activity or course of action involving one or multiple energy efficiency measures, at a single facility or site.

Ratepayer Impact Test (RIM): RIM tests measure the distributional impacts of conservation programs from the viewpoint of all the utility's customers. The test measures what happens to average price levels due to changes in utility revenues and operating costs caused by a program. A benefit/cost ratio less than 1.0 indicates the program will influence prices upward for all customers. For a program passing the TRC but failing the RIM, average prices will increase, resulting in higher energy service costs for customers not participating in the program.

Regression Analysis: A statistical analysis of the relationship between a dependent variable (response variable) to specified independent variables (explanatory variables). The mathematical model of their relationship is the regression equation.

Reporting Period: The time following implementation of an energy efficiency activity during which savings are to be determined.

Secondary Effects: Unintended impacts of the project or program such as rebound effect (e.g., increasing energy use as it becomes more efficient and less costly to use), activity shifting (e.g., movement of generation resources to another location), and market leakage (e.g., emission changes due to changes in supply or demand of commercial markets). These secondary effects can be positive or negative.

Spillover: A positive externality related to a participant or non-participant enacting additional energy efficiency measures without an incentive because of a participant's experience in the program. Only participant spillover was considered for the long-lead projects.

Stipulated Values: See “deemed savings.”

Total Resource Cost Test (TRC): This test compares the program benefits of avoided supply costs against the costs for administering a program and the cost of upgrading equipment. This test examines efficiency from the viewpoint of an entire service territory. When a program passes the TRC, this indicates total resource costs will drop, and the total cost of energy services for an average customer will fall.

Uncertainty: The range or interval of doubt surrounding a measured or calculated value within which the true value is expected to fall with some degree of confidence.

Utility Cost Test (UCT): Also known as the Program Administrator Test (PACT), this test measures cost-effectiveness from the viewpoint of the sponsoring utility or program administrator. If avoided supply costs exceed program administrator costs, then average costs will decrease.