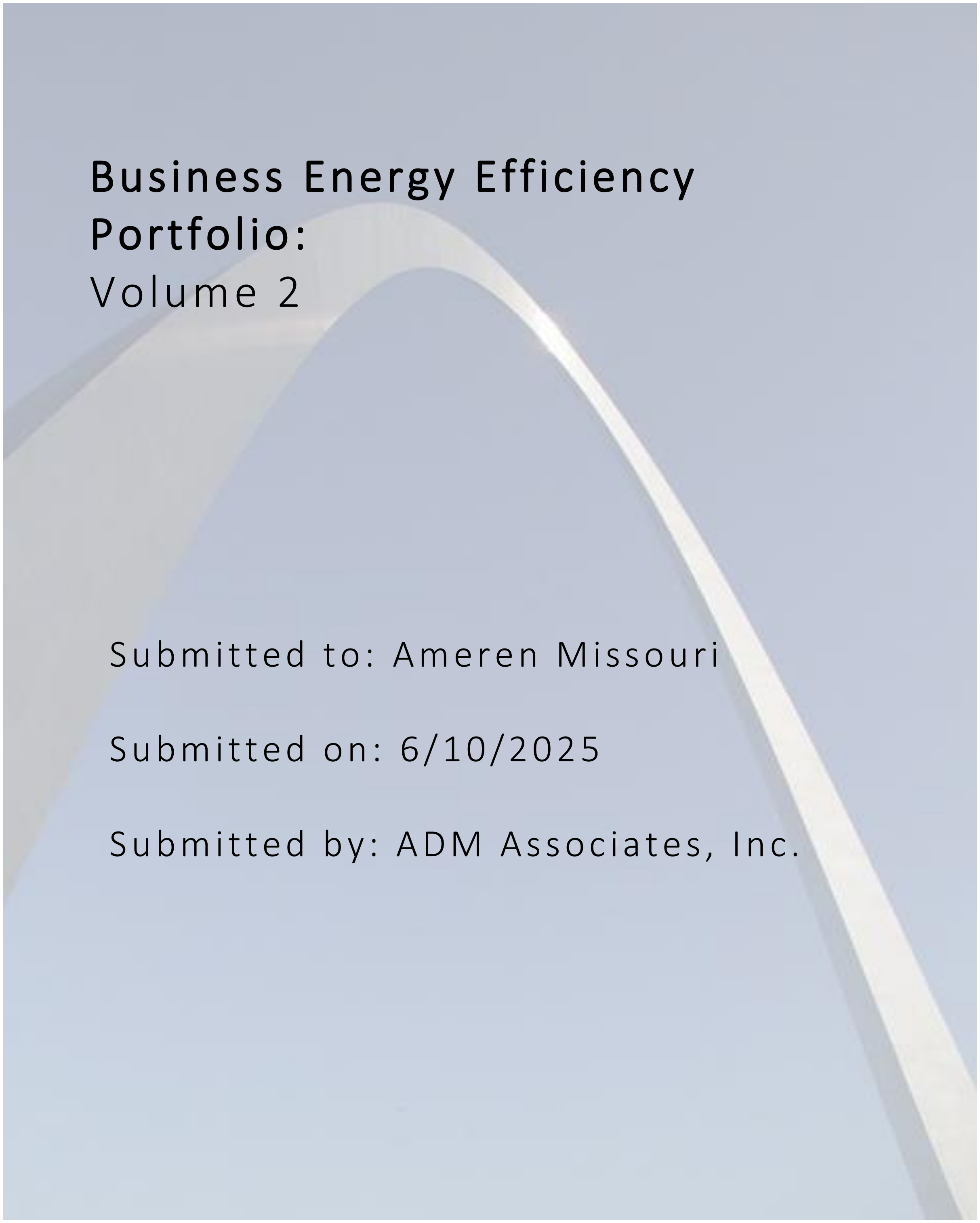

Business Energy Efficiency Portfolio:
Volume 2

Submitted to: Ameren Missouri

Submitted on: 6/10/2025

Submitted by: ADM Associates, Inc.

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1 Introduction

Under contract with Ameren Missouri, ADM Associates, Inc., (ADM) performed evaluation, measurement and verification (EM&V) activities to confirm the energy savings (kWh) and demand reduction (kW) realized through its energy efficiency programs.

This report is divided into two volumes providing information on the impact, process, and cost-effectiveness evaluation of the Ameren Missouri portfolio of residential programs implemented during the 2024 program year. Volume II contains chapters presenting detailed information regarding evaluation methodologies, data collection instruments, and evaluation results. Volume II is organized as follows:

- Chapter 2: Site-Level Estimation of Ex Post Gross Savings
- Chapter 3: M&V Site Reports
- Chapter 4: Business Participant Survey Instrument
- Chapter 5: Business Nonparticipant Survey Instrument
- Chapter 6: Trade Ally Survey Instrument
- Chapter 7: Business Participant Survey Responses
- Chapter 8: Business Nonparticipant Survey Responses
- Chapter 9: Trade Ally Survey Responses

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

2.1 Common Methods in Site Reports

2.1.1 Lighting measure calculation

The lighting savings algorithm from the *Ameren Missouri TRM, Volume 2: Commercial and Industrial Measures for the measure "LED Bulbs and Fixtures"* has been modified to include the ISR rate within the quantity variables.

$$\Delta\text{kWh}=[(\text{Watts x Qty})_{\text{base}}\text{- (Wattx Qty)}_{\text{EE}}\text{] x Hours x (Whf}_{\text{e}}\text{ - IF}_{\text{e}}\text{) x }\frac{\text{kW}}{\text{1,000 Watt}}$$

Equation 1

Where:

$\text{Watts}_{\text{base}}$	=Existing fixture or lamp wattage
Qty_{base}	=Existing fixture or lamp quantity
Watts_{EE}	= Installed fixture or lamp verified wattage
Qty_{EE}	=Installed fixture of lamp verified quantity
Whf_{e}	=Waste heat factor, energy cooling savings
IF_{e}	=Lighting to HVAC interactive factor for electric heating impact

The coincident peak demand savings are calculated by the equation:

$$\Delta\text{kW}= \Delta\text{kWh x CDF}$$

Equation 2

Where:

ΔkWh	=Energy savings
CDF	=Coincident Demand Factor

2.1.2 Facility Occupied Annual Hours

Interval billing data, weather data, time of day and day of week data are variables for the following linear regression equation.

$$
\begin{aligned}
\mathrm{kWh_{hour}} = {} & \beta_0 + \beta_{\mathrm{CDH}} \mathrm{x\ CDH} + \beta_{\mathrm{HDH}} \mathrm{x\ HDH} \\
& + \beta_{\mathrm{Weekday\ x\ Hour1\_flag}} \mathrm{x\ WeekdayFlag\ x\ Hour1\_Flag} \\
& + \dots \\
& + \beta_{Weekday\ x\ Hour24\_flag}\ x\ WeekdayFlagx\ Hour24\_Flag \\
& + \beta_{Weekend\ x\ Hour1_{flag}}\ x\ WeekendFlag\ x\ Hour1\_Flag \\
& + \dots \\
& + \beta_{Weekend\ x\ Hour24_{flag}}\ x\ WeekendFlag\ x\ Hour24\_Flag
\end{aligned}
$$

Equation 3

Where:

β_0 =Y-Intercept

β_{CDH} =Coefficient for the variable CDH, cooling degree hour

CDH =Cooling degree hour

β_{HDH} =Coefficient for the variable HDH, heating degree hour

HDH =Heating degree hour

$\beta_{WeekdayxHour1\_Flag}$ =Coefficient for the interactive variable Weekday x Hour1_Flag

WeekdayFlag x Hour1_Flag=Interactive binary variable: WeekdayFlag x Hour1_Flag

…. =iteration of variables for hours 2 through 24 for weekdays

$\beta_{Weekend\ xHour1\_Flag}$ =Coefficient for the interactive variable Weekend x Hour1_Flag

WeekendFlag x Hour1_Flag=Interactive binary variable: WeekendFlag x Hour1_Flag

…. =iteration of variables for hours 2 through 24 for weekends

2.2 List of projects

2.3 100S, 186S, and 219C

Project Summary

A program participant received Standard and Custom incentives from Ameren for replacing HID fixtures with efficient LED fixtures controlled by a dimming system in an Entertainment/Recreation building.

The ex-post gross energy savings are 422,339 kWh with an ex post gross peak demand reduction of 80.23 kW. The energy savings gross realization rate is 49%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture nameplate specifications from a pre-installation site visit, and lighting schedules provided by the participant. Verification of installed quantities was completed through tabulation of the invoiced materials and pictures obtained from the program implementer's post install site visit. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

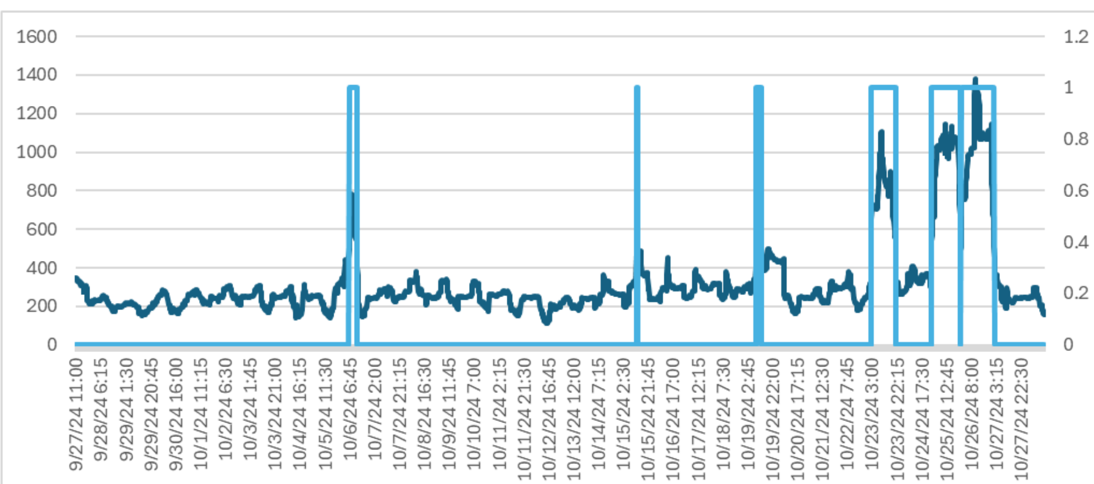
The parameters for the energy savings calculation which differed from the ex ante value and ex post are summarized in the following table.

Key Inputs to Savings Algorithm

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Lighting				
Basis of savings	Δwatts x hours	Ameren TRM	Ameren TRM	TRM measure 2.6.3: LED Bulbs and Fixtures
W_{base}	Fixture watts for 2000W HID lamp	1,926W	1836W	Pre visit: model tag, Volts x Amps
W_{base}	Fixture watts for 1000W HID lamp	1,000W	1,080W	TRM - Fixture watts by lamp size
Lighting Controls				
Basis of savings	$(W_{efficient} – (W_{efficient} \text{ x } 0.25))$ x Hours	✓		This method results in savings greater than the efficient fixture replacement
	$W_{efficient}$ x Hours x 0.25		✓	TRM Measure 2.6.10 Lighting Controls with custom ESF (0.25) based on power at dimming settings
Hours	Hours of use – Dimming Measure	2,000 hr	720 hr	Hours provided by participant for the planned events
			800 hr	Whole building AMI interval data, 2 years, weather normalized, threshold 500 kW

The lighting load accounts for a significant portion of daily energy usage. As shown in the figure below, tracking periods of energy use above the average baseline provided an additional estimate of the annual operating hours for the new lighting.

AMI Interval Data to Isolate Event Days



Site-Level Estimation of Ex Post Gross Savings

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings. Large room hours (720) and smaller room hours (1095) forecasted by the participant for planned events could not be disaggregated from the AMI hours for event days, but when weighted averaged - align with the aggregated historical AMI value hours (800).

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
HID fixtures to LED fixtures	372	200	1836	1,410	720	1.07	338,415	308,924	92%
	24	24	1610	1,410	720	1.07		3,698	
Dimming controls; 0.25 savings factor	224			1410	720	1.07	473,760	60,830	13%
HID fixtures to LED fixtures	62	21	465	466	1095	1.07	49,189	22,313	99%
	21		1080					26,573	
Total							861,364	422,339	49%

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard Lighting	49,189	48,886	99%	9.34	9.287	99%
Custom Lighting	812,175	373,453	46%	154.28	70.942	47%
Total	**861,364**	**422,339**	**49%**	**163.63**	**80.229**	**50%**

The ex-post gross energy savings are 422,339 kWh with an ex post gross peak demand reduction of 80.229 kW. The energy savings gross realization rate is 49%.

The ex ante calculation for the dimming savings of the new light fixtures appears to overestimate the reduction due to the hours of use and the calculation method. The hours of use for the new efficient fixtures is 720 hours for both the ex ante and ex post savings, but the ex ante method applied 2,000 hours of use for the same fixtures for the incremental dimming savings. The ex ante calculation method contains an error, as it counted the new annual usage as the savings.

2.4 101S and 221C

Project Summary

A program participant received Standard and New Construction Custom incentives from Ameren for efficient high volume low speed fan ventilation and LED lighting exceeding the building code allowed watts per square foot in a new warehouse building.

The ex post gross energy savings are 782,218 kWh with ex post gross coincident reductions of 163.86 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation and sourced additional characteristics from manufacturer specification sheets. The installed HVLS fan quantity was verified during the post install site visit, along with estimating the fan operation usage, which was expected to operate during all seasons.

High-volume, low-speed (HVLS) fans save energy by providing space temperature destratification and reducing the need for multiple pedestal floor-mounted fans. This site is a new construction project with no existing baseline for ventilation. The fan meets the requirements of Ameren TRM Measure 2.5.9 for *High Volume Low Speed Fans*, including the applicable blade diameter range and a VFD for speed control. Prescriptive savings per unit were referenced for this measure.

HVLS Fans Measure Key Parameters and Energy Savings

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Basis of savings	Ameren TRM	prescriptive		Measure 2.5.9: High Volume Low Speed Fan
VFD	Variable frequency drive required for measure compliance	✓	✓	Site visit verified
Dia	Fan blade diameter, feet	24’		Specification sheet
kWh	Annual savings per fan, kWh	10,018		TRM
Measure savings	Fans x quantity, kWh	60,018		calculated

The variables for the lighting energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings. All measure savings are calculated based on their share of the building code’s allowable wattage (0.66 W/SF, IECC 2015) and the warehouse building area (357,056 SF). The listed base wattage for each fixture is provided for reference and reflects its contribution toward the code-allowed power, assuming a 1:1 fixture replacement ratio.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity	Wattage	Annual Hours				

Site-Level Estimation of Ex Post Gross Savings

	Base	Efficient	Base	Efficient		Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
LPD to LED HB Fixture	244	244	488	182	4,900	1.00	720,901	364,635	~100%
LPD to LED HB Fixture	22	22	488	182	4,900	1.00		32,877	
LPD to LED HB Fixture	70	70	1019	382	4,900	1.00		218,479	
LPD to LED HB Fixture	34	34	1019	382	4,900	1.00		106,119	
Total							720,901	722,110	~100%

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Lighting NC Custom	720,901	722,110	~100%	136.9	137.2	~100%
HVLS Fan	60,108	60,108	100%	26.687	26.687	100%
Total	781,009	782,218	~100%	163.63	163.860	~100%

The ex post gross energy savings are 782,218 kWh with ex post gross coincident reductions of 163.860 kW. The energy savings gross realization rate is near 100%.

2.5 102S, 103S, 104S, and 225C

Project Summary

A program participant received Standard and Custom incentives from Ameren for retrofitting fluorescent linear tube lighting with more efficient LED linear lamps in the support areas and replacing HID fixtures with LED fixtures in the industrial areas for a manufacturing building.

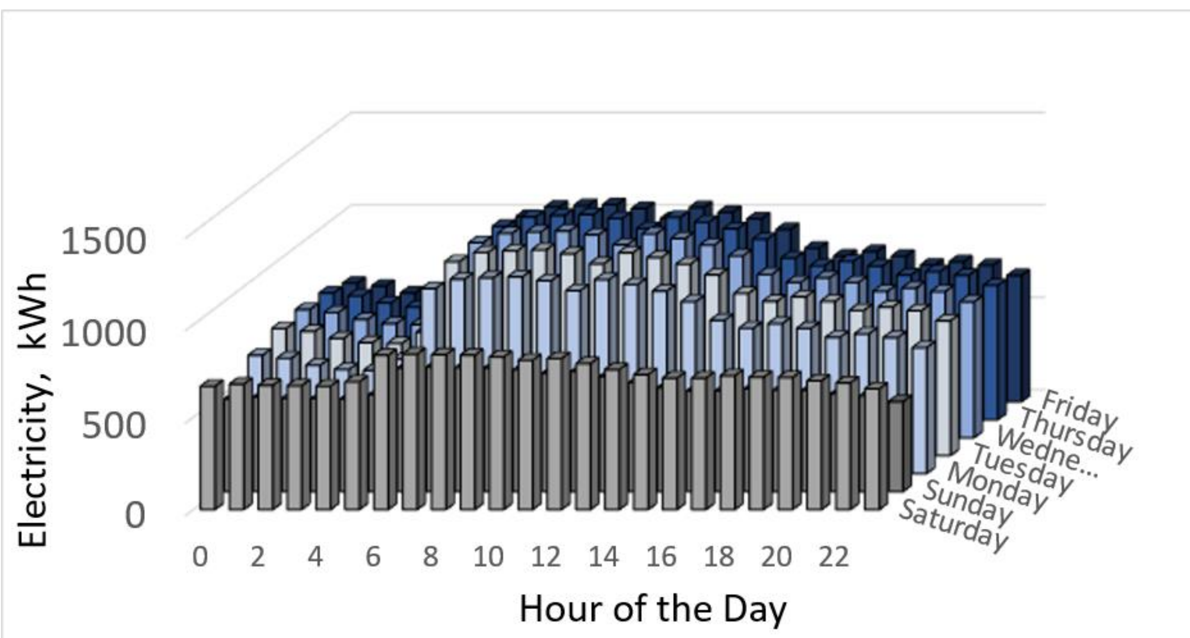
The ex-post gross energy savings are 598,056 kWh with an ex post gross peak demand reduction of 113.1kW. The energy savings gross realization rate is 93%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets, and verification by a post install on-site visit. Lighting hours of use were determined through the participant provided scheduled and verified with AMI interval data. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The figure below summarizes the building's non-weather dependent energy usage by hour of the day and day of the week, which aligns with the six day, two shift work schedule.

Facility Energy Usage, non-weather dependent



The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Site-Level Estimation of Ex Post Gross Savings

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 - 4 ft 3 Lamp to LED Type B	257	257	88	43.5	6,240	1.04	77,218	74,218	96%
T8 - 4 ft 2 Lamp to LED Type B	53	53	59	29	6,240	1.04	10,615	10,318	97%
T8 - 4 ft 3 Lamp to LED Type B	364	364	88	43.5	6,240	1.04	109,367	105,119	96%
T5HO4ft 8 Lamp to LED Fixture	8	8	468	213.5	6,240	1.04	14,316	13,213	92%
T5HO4ft 10 Lamp to LED Fixture	83	83	577	437.9	6,240	1.04	105,319	74,924	71%
T5HO4ft 10 Lamp to LED Fixture	47	47	577	313.5	6,240	1.04	90,064	80,370	89%
T5HO4ft 6 Lamp to LED Fixture	145	145	360	213.5	6,240	1.04	135,539	137,855	102%
T8 -4 ft 2 Lamp to LED Type B	26	26	59	29	6,240	1.04	5,208	5,062	97%
T8 - 4 ft 2 Lamp to LED Type B	38	38	59	29	6,240	1.04	2,097	7,398	353%
T8 - 4 ft 2 Lamp to LED Type B	18	18	59	24	6,240	1.04	3,419	4,088	120%
T8 - 4 ft 3 Lamp to LED Type B	2	2	88	36	6,240	1.04	694	675	97%
T8 - 4 ft 3 Lamp to LED Type B	29	29	88	43.5	6,240	1.04	8,713	8,375	96%
T8 - 4 ft 2 Lamp to LED Type B	38	38	59	29	6,240	1.04	7,612	7,398	97%
T5HO 4ft 6 Lamp to LED Fixture	6	6	360	213.5	6,240	1.04	5,608	5,704	102%
T5HO 4ft 8 Lamp to LED Fixture	14	14	468	213.5	6,240	1.04	25,051	23,122	92%
No occupancy sensor to Fixture Mounted Occupancy Sensor Controlling > 60 W	6	6	220	220	6,240	1.04	2,115	2,056	97%
No occupancy sensor to Fixture Mounted Occupancy Sensor Controlling > 60 W	14	14	200	200	6,240	1.04	4,487	4,361	97%
CFL to LED Non-Linear Fixture	165	165	45	24	6,240	1.04	23,135	22,486	97%
CFL to LED Non-Linear Fixture	47	47	45	24	6,240	1.04	6,590	6,405	97%
CFL to LED Non-Linear Fixture	36	36	45	24	6,240	1.04	5,048	4,906	97%
Total							**642,215**	**598,056**	**93%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	607,442	564,258	93%	115.4	106.5	92%
Custom	34,773	33,798	97%	6.6	6.6	100%
Total	**642,215**	**598,056**	**93%**	**122.0**	**113.1**	**93%**

The ex-post energy savings totaled 598,056 kWh, with a gross energy savings realization rate of 93%. The peak demand ex-post savings of 113.1 kW were greater than the ex-ante savings of 122.0kW. The primary reasons for the difference between the realized and expected savings was due to wattage differences in several measures. Ex-post efficient wattages for measures four through seven, plus fourteen and fifteen in the above table (213.5W, 437.9W, 313.5W, 213.5W, 213.5, and 213.5W, respectively) differ from the ex-ante wattages (200W, 380W, 290W, 220W, 220W, 200W, respectively). In addition, the ex-post heat factor (1.04) is less than the ex-ante factor (1.07).

2.6 105S

Project Summary

A program participant received standard incentives from Ameren for replacing HID fixtures with efficient LED fixtures in a garage building.

The ex-post gross energy savings are 576,433 kWh with an ex post gross peak demand reduction of 116.81 kW. The energy savings gross realization rate is 94%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Verification of the 24/7 lighting was verified by an unscheduled evening site visit to the garage. Verification of installed quantities was completed during the evening site visit and compared to the project invoices. There was not an interactive effect of reduced waste heat for the unconditioned garage. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
HID to LED Fixture	370	370	190	59.8	8,760	1.00	457,787	429,135	94%
HID to LED Fixture	127	127	190	59.8	8,760	1.00	157,133	147,298	94%
Total							**614,920**	**576,433**	**94%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	614,920	576,433	94%	116.812	116.812	100%
Total	**614,920**	**576,433**	**94%**	**116.812**	**116.812**	**100%**

The ex-post energy savings totaled 576,433 kWh, with a gross energy savings realization rate of 94%. The peak demand ex-post savings and ex-ante savings were 116.81 kW. The primary cause of the variance between the expected and realized kWh savings is due to the waste heat factor. The ex-post analysis used a waste heat factor of 1.00 for an unconditioned garage building while the ex-ante savings estimate used a value of 1.07.

2.7 106S

Project Summary

A program participant received Standard incentives from Ameren for replacing HID fixtures with efficient LED fixtures in a manufacturing building.

The ex-post gross energy savings are 545,993 kWh with an ex-post gross -peak demand reduction of 104.697 kW. The energy savings gross realization rate is 99%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the trade ally site visit verification photos. Lighting hours of use for the 24/7 manufacturing schedule had been verified with light logger metering during a post install site visit from a previous program year. Verification of installed quantities was through tabulation of the detailed project invoices and trade ally verification photos. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 - 4 ft - 2 Lamp to LED Fixture	30	30	82	62	8,760	1.06	5,624	5,571	99%
HID to LED Fixture	200	200	465	174	8,760	1.06	545,520	540,422	99%
Total							**551,144**	**545,993**	**99%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	551,144	545,993	99%	104.7	104.7	100%
Total	**551,144**	**545,993**	**99%**	**104.7**	**104.7**	**100%**

The ex-post energy savings totaled 545,993 kWh, with a gross energy savings realization rate of 99%. The peak demand ex-ante and ex-post savings are 104.7 kW.

2.8 107S

Project Summary

A program participant received Standard incentives from Ameren for replacing HID fixtures with efficient LED fixtures.

The ex-post gross energy savings are 510,323 kWh with an ex post gross peak demand reduction of 103.4kW. The energy savings gross realization rate is 94%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Verification of the 24/7 lighting schedule was verified by an evening site visit to the garage. Verification of installed quantities was completed during the evening site visit and compared to the project invoices. There was not an interactive effect of reduced waste heat for the unconditioned garage. The savings algorithm for energy, Equation 1 and peak coincident demand savings, Equation 2, are listed at the start of the section 2. The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
HID to LED Fixture	346	346	190	57.6	8,760	1.00	428,092	401,299	94%
HID to LED Fixture	94	94	190	57.6	8,760	1.00	116,303	109,023	94%
Total							**544,395**	**510,323**	**94%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	544,395	510,323	94%	103.4	103.4	100%
Total	**544,395**	**510,323**	**94%**	**103.4**	**103.4**	**100%**

The ex-post energy savings totaled 510,323 kWh, with a gross energy savings realization rate of 94%. The peak demand ex-post and ex-ante savings are 103.4 kW. The primary cause of the variance between the expected and realized savings is due to the waste heat factor. The ex post analysis used a waste heat factor of 1.00 for an unconditioned garage, while the ex ante analysis used a factor of 1.07.

2.9 108S, 109S, 226C

Project Summary

A program participant received Standard and Custom incentives from Ameren for replacing (8) packaged air conditioning units with (8) efficient units that exceed the local building code, implemented demand control ventilation, and upgraded dry bulb economizers to enthalpy control.

The ex post gross energy savings are 558,617 kWh with ex post gross coincident reductions of 376 kW. The energy savings gross realization rate is 107%.

Measurement and Verification Effort

HVAC Measure Key Parameters and Energy Savings

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Packaged Air Conditioners				
Basis of savings	Part load efficiency x EFLH	Ameren TRM		TRM measure 2.5.8 Single Packaged AC
$IEER_{base}$	Baseline efficiency IECC year; IEER	2015 (11.0 IEER)		St Louis County
$IEER_{efficient}$	New equipment efficiency, IEER	15.5/15.9		Project submittals
Capacity	Cooling capacity: Qty, kBTU	2 @ 1012; 6 @ 850		Site Visit
$EFLH_{cooling}$				
$kWh_{savings}$	Annual energy savings, kWh			
Enthalpy Economizers				
Basis of savings	Weather bin analysis	✓		Program implementer's HVAC tool workbook
Economizer switchover	OA temperature for dry bulb and enthalpy for bin model, °F	60/67		Δtemperature is at high end, but fits the 5 degree bin increments
Weather data	Typical year (TMY) weather dataset source	TMY3	TMYx	Onebuilding.org TMYx 2009-2023
$kWh_{savings}$	Annual energy savings, kWh	185,574	164,893	TMYx normal data & rebinned values in HVAC workbook
Demand Control Ventilation				
Basis of savings	Square feet/1000 x Energy Savings Factor	Ameren TRM		TRM measure 2.5.3 Demand Control Ventilation
Area	Square feet of space with DCV	198,516		Mechanical schedules
$SF_{cooling}$	Office, low rise, St Louis: Savings factor, kWh/1000 SF	649	649	TRM
$SF_{heating}$		0	468	TRM; All RTU's have electric resistance heat
$kWh_{savings}$	Annual energy savings, kWh	132,013	212,622	
Not Evaluated				
$IEER_{base}$	Baseline efficiency	IECC2015	FedReg2023	N/A; Capacity exceeds >240 & <760 kBTU bin

Site-Level Estimation of Ex Post Gross Savings

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard HVAC	333,237	393,724	118%	303.47	303.47	100%
Custom HVAC	185,574	164,893	89%	82.39	73.21	88%
Total	518,811	558,617	**107%**	385.87	376.68	**89%**

The ex post energy savings totaled 558,617 kWh, with a gross energy savings realization rate of 107%. The ex post demand savings of 376.68 kW resulted in an 89% realization rate.

2.10 110S

Project Summary

A program participant received Standard incentives from Ameren for replacing HID fixtures with efficient LED fixtures.

The ex-post gross energy savings are 428,481 kWh with an ex post gross peak demand reduction of 81.4 kW. The energy savings gross realization rate is 99%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets, the DLC Qualified Products List, the ENERGY STAR database, trade ally light survey, participant emails, and on-site visits. Lighting hours of use were determined through site fixture metering, AMI interval database modeling *Equation 3*, or follow-up emails with participants. Verification of installed quantities was completed through site visits, detailed project invoices, or email correspondence with participants. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4 ft 4 Lamp to LED Fixture	330	330	164	25	6,240	1.06	306,265	303,403	99%
T8UTube2Lamp to LED Fixture	50	50	56	15	6,240	1.06	13,687	13,560	99%
T12 4 ft 4 Lamp to LED Fixture	65	65	164	20	6,240	1.06	62,494	61,911	99%
T12 4 ft 2 Lamp to LED Fixture	10	10	82	20	6,240	1.06	4,140	4,101	99%
T8 4 ft 2 Lamp to LED Fixture	75	75	59	20	6,240	1.06	19,530	19,347	99%
T12 4 ft 4 Lamp to LED Fixture	20	20	164	25	6,240	1.06	17,894	18,388	103%
Exit Sign to Exit Sign	31	31	30	3	8,760	1.06	7,845	7,772	99%
Total							**431,855**	**428,481**	**99%**

Site-Level Estimation of Ex Post Gross Savings

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	431,855	428,481	99%	81.6	81.4	100%
Total	**431,855**	**428,481**	**99%**	**81.6**	**81.4**	**100%**

The ex post energy savings totaled 428,481 kWh, with a gross energy savings realization rate of 99%. The peak demand ex-post savings of 81.4 kW were less than the ex ante savings of 81.6 kW.

2.11 111S

Project Summary

A program participant received Standard incentives from Ameren for replacing HID fixtures with efficient LED fixtures.

The ex post gross energy savings are 347,889 kWh with an ex post gross peak demand reduction of 66.1 kW. The energy savings gross realization rate is 94%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets, the DLC Qualified Products List, the ENERGY STAR database, trade ally light survey, participant emails, and on-site visits. Lighting hours of use were determined through site fixture metering, AMI interval database modeling *Equation 3*, or follow-up emails with participants. Verification of installed quantities was completed through site visits, detailed project invoices, or email correspondence with participants. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12HO8ft2L to LED HB Fixture	257	21	227	200	4,380	1.04	258,452	246,614	95%
T12HO8ft2L to LED Retrofit Kit	43	43	227	42	4,380	1.04	37,282	36,237	97%
T12 4ft 4L to LED Panel Fixture	53	53	164	40	2,080	1.14	14,626	15,584	107%
T12UTub2LtoLEDPanel Fixture	6	6	72	25	2,080	1.14	628	669	106%
HID to LED HB w/ Controls	42	42	455	200	4,380	1.04	59,642	48,786	82%
Total							**370,630**	**347,889**	**94%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	370,630	347,889	94%	70.4	66.1	94%
Total	**370,630**	**347,889**	**94%**	**70.4**	**66.1**	**94%**

The ex post energy savings totaled 347,889 kWh, with a gross energy savings realization rate of 94%. The peak demand ex post savings of 66.1 kW were lower than the ex ante savings of 70.4 kW. The primary driver of this variance was the difference in the waste heat factor used in the evaluation. The ex post waste heat factors (1.04 for the warehouse and 1.14 for the office) differed from the ex ante factor of 1.07.

2.12 112S

Project Summary

Through a project represented by sample ID 112, a program participant received Standard incentives from Ameren for replacing HID fixtures with efficient LED fixtures.

The ex-post gross energy savings are 370,968 kWh with an ex post-gross demand reduction of 70.5 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets, the DLC Qualified Products List, the ENERGY STAR database, trade ally light survey, participant emails, and on-site visits. Lighting hours of use were determined through site fixture metering, AMI interval database modeling *Equation 3*, or follow-up emails with participants. Verification of installed quantities was completed through site visits, detailed project invoices, or email correspondence with participants. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
HID to LED High Bay	205	205	455	165	6,240	1.00	369,689	370,968	100%
Total							**369,689**	**370,968**	**100%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	369,689	370,968	100%	70.2	70.5	100%
Total	**369,689**	**370,968**	**100%**	**70.2**	**70.5**	**100%**

The ex-post energy savings totaled 370,968 kWh, with a gross energy savings realization rate of 100%. The peak demand ex-post savings of 70.5 kW were greater than the ex-ante savings of 70.2 kW.

Site-Level Estimation of Ex Post Gross Savings

2.13 113S and 231C

Project Summary

Through a project represented by sample ID 113 and 231, a program participant received Standard and Custom incentives from Ameren for replacing HID fixtures with efficient LED fixtures.

The ex-post gross energy savings are 366,330 kWh with an ex post gross peak demand reduction of 69.6 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets, the DLC Qualified Products List, the ENERGY STAR database, trade ally light survey, participant emails, and on-site visits. Lighting hours of use were determined through site fixture metering, AMI interval database modeling *Equation 3*, or follow-up emails with participants. Verification of installed quantities was completed through site visits, detailed project invoices, or email correspondence with participants. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
6L T5HO to LED high bay	203	203	360	214	8,760	1.00	350,962	350,961	100%
No control to network controls	34	34	215	215	8,760	1.00	15,190	15,369	101%
Total							**366,152**	**366,330**	**100%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	350,962	350,961	100%	66.7	66.7	100%
Custom	15,190	15,369	101%	2.9	2.9	100%
Total	**366,152**	**366,330**	**100%**	**69.6**	**69.6**	**100%**

The ex post energy savings totaled 366,330 kWh, with a gross energy savings realization rate of 100%. The peak demand ex ante and ex post savings are 69.6 kW.

2.14 114S

Project Summary

A program participant received Standard incentives from Ameren for replacing HID fixtures with efficient LED fixtures in a warehouse building.

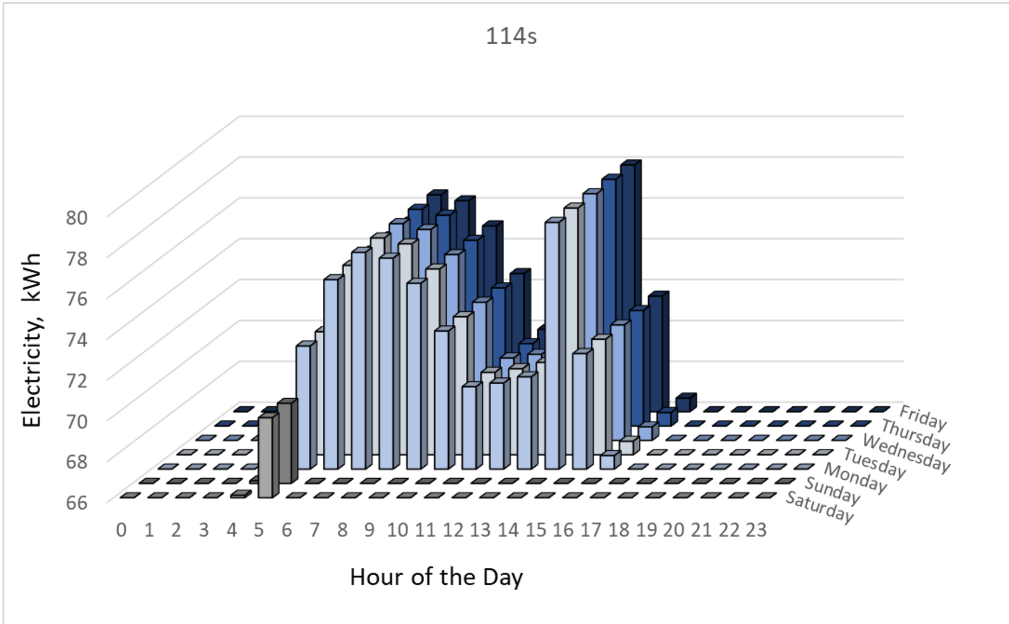
The ex post gross energy savings are 360,397 kWh with an ex post gross peak demand reduction of 68.5 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were determined during the site visit and also align with the AMI interval data modeling from *Equation 3*. Installed quantities were verified during the site visit and checked against detailed project invoices. To account for interactive effects of reduced waste heat on cooling and heating energy, Ameren TRM waste heat factors were applied in the savings calculations for a non-conditioned warehouse building. The savings algorithm for energy (*Equation 1*) and peak coincident demand (*Equation 2*), are presented at the start of the Section 2.

The interval billing data and weather data model, determined by *Equation 3* and adjusted to exclude heating and cooling energy usage, is summarized in the following figure, categorized by both day of the week and hour of the day. A threshold of 66 kWh is set in the chart to highlight periods of higher energy load, which correspond to occupied periods associated with lighting usage. The annualized hours above this threshold, excluding holidays, support the participant-provided value of 3,427 hours.

Facility Energy Usage, non-weather dependent



The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 6L to LED Type B	862	862	221	99	3,427	1.00	360,397	360,397	100%
Total							**360,397**	**360,397**	**100%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	360,397	360,397	100%	68.5	68.5	100%
Total	**360,397**	**360,397**	**100%**	**68.5**	**68.5**	**100%**

The ex post energy savings totaled 360,397 kWh, with a gross energy savings realization rate of 100%. The peak demand ex ante and ex post savings were 68.5 kW.

Site-Level Estimation of Ex Post Gross Savings

2.15 115S

Project Summary

A program participant received Standard incentives from Ameren for replacing HID fixtures with efficient LED fixtures.

The ex post gross energy savings are 325,911 kWh with an ex post gross peak demand reduction of 61.9 kW. The energy savings gross realization rate is 94%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets, the DLC Qualified Products List, the ENERGY STAR database, trade ally light survey, participant emails, and on-site visits. Lighting hours of use were determined through site fixture metering, AMI interval database modeling *Equation 3*, or follow-up emails with participants. Verification of installed quantities was completed through site visits, detailed project invoices, or email correspondence with participants. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
HID to LED Fixture	226	226	190	57.6	8,760	1.00	279,621	262,120	94%
HID to LED Fixture	55	55	190	57.6	8,760	1.00	68,050	63,790	94%
Total							**347,671**	**325,911**	**94%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	347,671	325,911	94%	66.0	61.9	94%
Total	**347,671**	**325,911**	**94%**	**66.0**	**61.9**	**94%**

The ex post energy savings totaled 325,911 kWh, with a gross energy savings realization rate of 94%. The peak demand ex post savings of 61.9 kW were lower than the ex ante savings of 66.0 kW. The primary cause of the variance between ex post and ex ante savings was the waste heat factor. The ex post analysis used a factor of 1.00 for an exterior installation, while the ex ante analysis used 1.07.

2.16 116S, 117S, 118S, and 232C

Project Summary

Through a project represented by sample ID 116, 117, 118, and 232, a program participant received Standard and Custom incentives from Ameren for retrofitting fluorescent linear tube lighting with more efficient LED linear lamps and replacing HID fixtures with LED fixtures

The ex post gross energy savings are 340,102 kWh with an ex post gross peak demand reduction of 64.6 kW. The energy savings gross realization rate is 98%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets, the DLC Qualified Products List, the ENERGY STAR database, trade ally light survey, participant emails, and on-site visits. Lighting hours of use were determined through site fixture metering, AMI interval database modeling *Equation 3*, or follow-up emails with participants. Verification of installed quantities was completed through site visits, detailed project invoices, or email correspondence with participants. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T124ft 2L to LED Fixture	8	8	82	44	3,380	1.08	1,128	1,110	98%
T8 4ft 6L to LED Type B	36	36	221	57	3,380	1.08	21,895	21,552	98%
T12 4ft 1L to LED Type B	3	3	48	9.5	3,380	1.08	423	422	100%
T12 4ft 2L to LED Type B	209	209	82	19	3,380	1.08	48,832	48,065	98%
T12 4ft 4Lto LED Type B	489	489	164	38	3,380	1.08	228,503	224,916	98%
HID to LED Fixture	124	124	114	20	3,380	1.08	43,227	42,549	98%
CFL to LED Flush Mount	17	17	40	16	3,380	1.08	1,513	1,489	98%
Total							**345,521**	**340,103**	**98%**

Site-Level Estimation of Ex Post Gross Savings

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	334,006	338,614	98%	65.3	64.3	98%
Custom	1,513	1,489	98%	0.29	0.28	98%
Total	**345,521**	**340,102**	**98%**	**65.6**	**64.6**	**98%**

The ex post energy savings totaled 340,103 kWh, with a gross energy savings realization rate of 98%. The peak demand ex post savings of 64.6 kW were lower than the ex ante savings of 65.6 kW. The verified hours of use (3,380) were lower than the ex ante hours (3,466).

2.17 119S

Project Summary

Through a project represented by sample ID 119, a program participant received Standard incentives from Ameren for replacing HID and fluorescent fixtures with efficient LED fixtures.

The ex post gross energy savings are 332,470 kWh with an ex post gross peak demand reduction of 23.6 kW. The energy savings gross realization rate is 84%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets, the DLC Qualified Products List, the ENERGY STAR database, trade ally light survey, participant emails, and on-site visits. Lighting hours of use were determined through site fixture metering, AMI interval database modeling *Equation 3*, or follow-up emails with participants. Verification of installed quantities was completed through site visits, detailed project invoices, or email correspondence with participants. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 2Lamp to LED Fixture	4	4	59	37.5	6,240	1.04	562	558	99%
T8 4ft 2Lamp to LED Fixture	72	72	59	50.7	6,240	1.04	3,847	3,878	101%
T8 4ft 2Lamp to LED Fixture	60	60	59	50.7	6,240	1.04	3,206	3,232	101%
T8 4ft 2Lamp to LED Fixture	4	4	59	36.1	6,240	1.04	455	594	131%
T8 4ft 6Lamp to LED Fixture	70	70	175	43.8	6,240	1.14	61,226	65,331	107%
T8 4ft 6Lamp to LED Fixture	56	56	175	52	6,240	1.14	45,616	48,998	107%
T8 4ft 6Lamp to LED Fixture	2	2	175	52	6,240	1.14	1,789	1,750	98%
T8 4ft 6Lamp to LED Fixture	6	6	175	52	6,240	1.14	4,888	5,250	107%
HID to LED Fixture	24	24	1080	505.6	6,240	1.04	149,187	89,463	60%
HID to LED Fixture	6	6	1080	127.9	6,240	1.04	37,256	37,072	100%
HID to LED Fixture	4	4	1080	240	6,240	1.04	24,438	23,300	95%
Total							**332,470**	**279,428**	**84%**

Site-Level Estimation of Ex Post Gross Savings

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	332,470	279,428	84%	62.50	64.68	102%
Total	**332,470**	**279,428**	**84%**	**62.50**	**65.68**	**102%**

The ex-post energy savings totaled 279,428 kWh, with a gross energy savings realization rate of 84%. The peak demand ex post savings of 65.68 kW were higher than the ex-ante savings of 62.5 kW. The primary cause of the variance between the ex-ante and ex post savings was the difference in verified efficient wattages. The variances in ex-post wattages occurred for the fourth, seventh, and ninth through eleventh measures, where the ex-post wattages (36.1W, 52W, 505.6W, 127.9W, and 240W, respectively) differed from the ex-ante wattages (42W, 41W, 149W, 150W, and 165W, respectively). With the largest variance with the ninth measure.

2.18 120S

Project Summary

A program participant received Standard incentives from Ameren for replacing fluorescent linear tube lighting with more efficient LED linear lamps.

The ex-post gross energy savings are 325,950 kWh with an ex post gross peak demand reduction of 61.9 kW. The energy savings gross realization rate is 99%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets, the DLC Qualified Products List, the ENERGY STAR database, trade ally light survey, participant emails, and on-site visits. Lighting hours of use were determined through site fixture metering, AMI interval database modeling *Equation 3*, or follow-up emails with participants. Verification of installed quantities was completed through site visits, detailed project invoices, or email correspondence with participants. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T5HO 4ft 2L to LED Type A	1025	1025	120	60	5,000	1.06	329,025	325,950	99%
Total							**329,025**	**325,950**	**99%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	329,025	325,950	99%	62.5	61.9	99%
Total	**329,025**	**325,950**	**99%**	**62.5**	**61.9**	**99%**

The ex post energy savings totaled 325,950 kWh, with a gross energy savings realization rate of 99%. The peak demand ex post savings of 61.9 kW were lower than the ex ante savings of 62.5 kW.

2.19 121S, 122S, 234C, 235C

Project Summary

A program participant received Standard and Custom incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 310,712 kWh with ex post gross coincident reductions of 115.10 kW. The energy savings gross realization rate is 98%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets, the DLC Qualified Products List, the ENERGY STAR database, trade ally light survey, participant emails, and on-site visits. Lighting hours of use were determined through site fixture metering, AMI interval database modeling *Equation 3*, or follow-up emails with participants. Verification of installed quantities was completed through site visits, detailed project invoices, or email correspondence with participants. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the Section 2.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
LPD to LED Fixture	1	1	30542	12178	8,760	1.24	234,583	199,478	98%
LPD to LED Fixture	1	1	2571	1025	2,790	1.24		5,347	
LPD to LED Fixture	1	1	4013	1600	4,380	1.24		13,104	
LPD to LED Fixture	1	1	1919	765	1,752	1.24		2,506	
LPD to LED Fixture	1	1	14456	5764	876	1.24		9,442	
Total							**234,583**	**229,877**	**98%**

HVAC Measure Key Parameters and Energy Savings

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Basis of savings	Savings Methodology	Weather bin	Weather bin	Trade ally calibrated weather bin analysis; retrofit isolation
HVAC Parameters				
Economizer switchover	OA temperature for dry bulb and enthalpy for bin model	60/67	60/67	Δtemperature is a high end, but fits the 5 degree bin increments
Weather data	Typical year (TMY) weather dataset source	TMY	TMYx	Onebuilding.org TMYx 2009-2023
IEEReff	Hotel RTU efficiency, IEER	11.0	11.2	IECC2009 Package Cooling with electric heat
IEEReff	Lobby RTU efficiency, IEER	10.6	11.0	IECC2009 Package Cooling with electric heat
Not Evaluated				
IEERbase	Custom HVAC savings base model	IECC2009	FedReg2023	Federal Regulations 2023 Mix of product manufactured prior to 1/1/2023, and in a sell through period

HVAC Measure Key Parameters and Energy Savings

Measure	Savings method	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
Heat pumps	TRM	22,793	22,793	100%
Lobby RTU enthalpy economizer	Weather bin model	5,292	4,676	88%
Hotel RTU	Weather bin model	4,100	3,514	86%
Lobby RTU	Weather bin model	8,436	6,925	82%
Variable refrigerant flow system	Weather bin model	40,314	42,668	106%
RTU	Weather bin model	259	259	100%
Total		81,194	80,835	~100%

Site-Level Estimation of Ex Post Gross Savings

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard HVAC	22,793	22,793	100%	20.76	20.76	100%
Custom HVAC	58,401	58,042	99%	52.265	52.226	~100%
Custom lighting	234,583	229,877	98%	44.56	43.67	98%
Total	**315,777**	**310,712**	**98%**	**116.03**	**115.10**	**99%**

The ex post energy savings totaled 310,712 kWh, with a gross energy savings realization rate of 98%. The ex post demand savings of 115.10 kW resulted in a 99% realization rate.

2.20 123S, 124S, 125S, 236C

Project Summary

A program participant received Standard and Custom incentives from Ameren for retrofitting fluorescent linear tube lighting with more efficient LED linear lamps and replacing HID fixtures with LED fixtures.

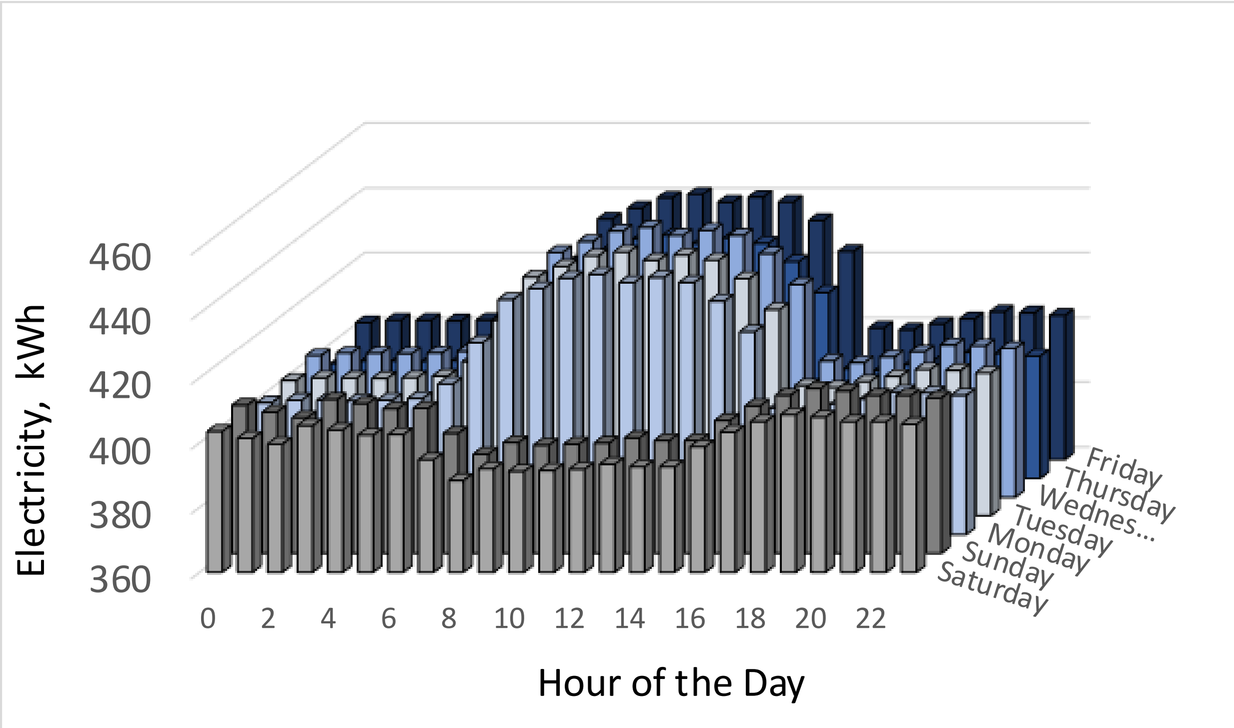
The ex post gross energy savings are 273,618 kWh with ex post gross coincident reductions of 54.1 kW. The energy savings gross realization rate is 93%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets, the DLC Qualified Products List, the ENERGY STAR database, trade ally light survey, participant emails, and on-site visits. Lighting hours of use were determined through site fixture metering, AMI interval database modeling *Equation 3*, or follow-up emails with participants. Verification of installed quantities was completed through site visits, detailed project invoices, or email correspondence with participants. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the Section 2.

The interval billing data and weather data model, determined by *Equation 3* and adjusted to exclude heating and cooling energy usage, is summarized in the following figure by both day of the week and hour of the day. The model was referenced during the site visit to inform the characterization of lighting usage areas, particularly those fully lit during operating hours.

Facility Energy Usage, non-weather dependent



The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	**Efficient**	**Base**	**Efficient**					
T8 2ft 1L to LED Type B	8	8	16	7	2,600	1.06	214	198	93%
T8 3ft 1L to LED Type B	31	31	23	12	2,600	1.06	1,015	940	93%
T5 4ft 1L to LED Type C	24	24	32	13	2,600	1.06	1,358	1,257	93%
T5 4ft 1L to LED Type B	1	1	32	13	2,600	1.06	57	52	92%
T8 4ft 1L to LED Type B	145	145	32	9.5	2,600	1.06	9,499	8,991	95%
T8 4ft 1 to LED Type B	32	32	32	15	2,600	1.06	1,620	1,499	93%
T8 4ft 1L to LED Retrofit Kit	28	28	32	23	2,600	1.06	751	695	92%
T8 4ft 2L to LED Type B	375	375	59	9.5	2,600	1.06	54,718	51,158	93%
T8 4ft 2L to LED Retrofit Kit	12	12	59	23	2,600	1.06	1,286	1,191	93%
T8 4ft 2L to LED Retrofit Kit	63	63	59	23	2,600	1.06	6,753	6,251	93%
T8 4ft 3L to LED Retrofit Kit	919	919	88	23	2,600	1.06	177,880	164,630	93%
T8 4ft 4L to LED Type B	4	4	114	38	2,600	1.06	1,239	838	68%

Site-Level Estimation of Ex Post Gross Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	**Efficient**	**Base**	**Efficient**					
T12 4ft 2L to LED Type B	2	2	82	19	2,600	1.06	428	347	81%
T8UTube 2L to LED Retrofit Kit	196	196	56	23	2,600	1.06	19,260	17,826	93%
T8UTube 2L to LED Type B	15	15	56	14	2,600	1.06	2,189	1,736	79%
No sensor to Remote Mounted Occupancy Sensor	36	36	239	239	2,600	1.06	6,157	5,691	92%
CFL to LED Non-Linear Fixture	36	36	120	16	2,600	1.06	11,149	10,318	93%
Total							**295,573**	**273,618**	**93%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	284,424	263,300	93%	54.0	52.0	96%
Custom	11,149	10,318	93%	2.1	2.1	100%
Total	**295,573**	**273,618**	**93%**	**56.1**	**54.1**	**96%**

The ex post energy savings totaled 273,618 kWh, with a gross energy savings realization rate of 93%. The peak demand ex post savings of 54.1 kW were lower than the ex ante savings of 56.1 kW. The primary cause of the variance between the ex ante and ex post savings was the difference in hours of use. The ex post hours of use (2,600), based on facility energy use data, were lower than the ex ante hours (2,783).

2.21 126S and 237C

Project Summary

Through a project represented by sample ID 126S and 237C, a program participant received RCX incentives from Ameren for identifying retro-commissioning opportunities and implementing recommended ECMs (energy conservation measures) in a restaurant/assembly building.

The ex post gross energy savings are 283,676 kWh with ex post gross coincident reductions of 196.233 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff consolidated relevant project documentation within the program implementer's database and supplemented key parameters for estimating energy savings by incorporating additional data sources. These sources included equipment submittals, mechanical drawings, AMI interval billing data, participant emails, and on-site visits. A review of the ex ante savings methodology led to either adopting the original savings basis or developing an alternative methodology. Factors considered in this process included defining the appropriate baseline, evaluating the availability of site-specific historical trended data, and determining the most accurate estimate of actual energy savings.

The analysis method for new packaged air conditioner of this sampled project is sourced from the TRM measure, *2.5.8 Single Package and Split Systems*, as follows:

$$\Delta kWh = \left[\frac{1}{IEER_{base}} - \frac{1`}{IEER_{eff}}\right] x\ kBTUh\ x\ EFLH_{cooling}\ x\ Quantity$$

The weather bin modeling performed by the trade ally for the RCx measures below were reviewed. Input data for each measure was checked against mechanical sheet data for fan motor horsepower, maximum air flow capacity. The efficiency of air handlers was based on utility billing data and total air flow. The RCx results were verified with BMS trended data and BMS screenshots for one-time measurement and finally BMS operating schedules for each piece of equipment.

HVAC Measure Key Parameters and Energy Savings

Inputs	Description	Values		Verification
		Ex Ante	Ex Post	
Basis of savings	Weather bin analysis	Bin	Bin	RCx trade ally
HVAC Parameters				
AHU1	Scheduling 24 hours to 17 hours	14,391 kWh		BMS Trend data; BMS logic screenshots
AHU2	Scheduling 24 hours to 17 hours; SF flow 3480 to 3000 CFM, Static pressure reduction	9,611		BMS logic screenshots
AHU3	Scheduling 24 hours to 17 hours	4,165		BMS Trend data; BMS logic screenshots
AHU4	Scheduling 24 hours to 17 hours	25,237		BMS Trend data; BMS logic screenshots

Site-Level Estimation of Ex Post Gross Savings

AHU5	Scheduling 24 hours to 17 hours, Static pressure reduction	20,532	BMS Trend data; BMS logic screenshots
AHU6	Scheduling 24 hours to 17 hours, Static pressure reduction	19,974	BMS logic screenshots
AHU7	Scheduling 24 hours to 17 hours	10,533	BMS Trend data; BMS logic screenshots
AHU8	Scheduling 24 hours to 17 hours	12,554	BMS Trend data; BMS logic screenshots
AHU9	Scheduling 24 hours to 17 hours	20,844	BMS Trend data; BMS logic screenshots
AHU10	Scheduling 24 hours to 17 hours	1,708	BMS Trend data; BMS logic screenshots
AHU11	Scheduling 24 hours to 17 hours	3,857	BMS Trend data; BMS logic screenshots
AHU12	Scheduling 24 hours to 17 hours	3,292	BMS Trend data; BMS logic screenshots
AHU13	Scheduling 24 hours to 17 hours	1,596	BMS Trend data; BMS logic screenshots
AHU14	Scheduling 24 hours to 17 hours	11,481	BMS logic screenshots
AHU15	Scheduling 24 hours to 17 hours	2,639	BMS Trend data; BMS logic screenshots
AHU16	Scheduling 24 hours to 17 hours, Static pressure reduction	24,976	BMS Trend data; BMS logic screenshots
RTU1	Scheduling 24 hours to 17 hours	14,243	BMS Trend data; BMS logic screenshots
RTU2	Scheduling 24 hours to 17 hours	7,068	BMS Trend data; BMS logic screenshots
RTU3	Scheduling 24 hours to 17 hours	1,470	BMS Trend data; BMS logic screenshots
RTU4	Scheduling 24 hours to 17 hours	1,236	BMS Trend data; BMS logic screenshots
CHWP5,6 Pump	Scheduling 24 hours to 17 hours	14,006	BMS Trend data; BMS logic screenshots
CHWP3,4 Pump	Scheduling 24 hours to 17 hours	48,995	BMS schedule screenshot
CoolingTower1	Scheduling 24 hours to 17 hours	565	BMS Trend data; BMS logic screenshots
CW1,2 Pump	Scheduling 24 hours to 17 hours	6,215	BMS Trend data; BMS logic screenshots
Prescriptive Measure			
$IEER_{base}$	135KBtuh to 240 kBtuh	12.2	TRM (IECC2015/2018)
$IEER_{eff}$	15.1 ton packaged AC	14.5	Manufacturer Specifications
$kWh_{savings}$	(1/IEER – 1/IEER) x EFLH x kBTUH	2,488	TRM calculation
Total: RCx & prescriptive		283,676 kWh	

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
RCx prescriptive	2,488	2,488	100 %	2.266	2.266	100 %
RCX	281,188	281,288	100%	193.967	193.967	100%
Total	**283,676**	**283,676**	**100 %**	**196.233**	196.233	100 %

Site-Level Estimation of Ex Post Gross Savings

The ex post gross energy savings are 283,676 kWh with ex post gross coincident reductions of 196.233 kW. The energy savings gross realization rate is 100%, and the demand realization rate is 100%.

2.22 127S

Project Summary

A program participant received Standard incentives from Ameren for retrofitting fluorescent linear tube lighting with more efficient LED linear lamps and replacing HID fixtures with LED fixtures in a retail store.

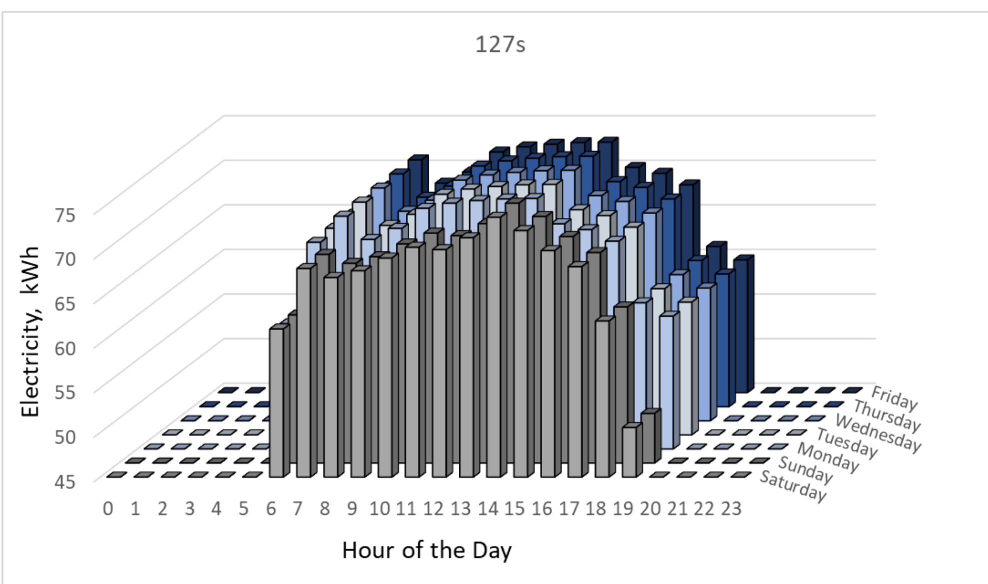
The ex post gross energy savings are 239,367 kWh with an ex post gross peak demand reduction of 45.7 kW. The energy savings gross realization rate is 85%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were determined during the site visit and also align with the AMI interval data modeling from *Equation 3*. Installed quantities were verified during the site visit and checked against detailed project invoices. To account for interactive effects of reduced waste heat on cooling and heating energy, Ameren TRM waste heat factors were applied in the savings calculations for a Dx cooled and gas heated retail building. The savings algorithm for energy (*Equation 1*) and peak coincident demand (*Equation 2*), are presented at the start of the Section 2.

The interval billing data and weather data model, determined by *Equation 3* and adjusted to exclude heating and cooling energy usage, is summarized in the following figure, categorized by both day of the week and hour of the day. A threshold of 45kWh is set in the chart to highlight periods of higher energy load, which correspond to occupied periods associated with lighting usage. The annualized hours (5,068) above this threshold, excluding holidays, are similar to the ex ante value of 5,100 hours for most areas.

Facility Energy Usage, non-weather dependent



Site-Level Estimation of Ex Post Gross Savings

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 4L to LED Retrofit Kit	3	3	114	34.1	5,068	1.08	1,932	1,312	68%
T8 4ft 4L to LED Retrofit Kit	16	16	114	34.1	5,068	1.08	7,608	6,997	92%
T8 4ft 4L to LED Retrofit Kit	3	3	114	34.1	5,068	1.08	3,318	1,312	40%
T8 4ft 4L to LED Retrofit Kit	363	363	114	34.1	5,068	1.08	159,094	158,750	100%
T8 4ft 4L to LED Retrofit Kit	28	28	114	34.1	5,068	1.08	22,064	12,245	55%
T8 4ft 4L to LED Retrofit Kit	61	61	114	56	5,068	1.08	21,926	19,365	88%
T8 4ft 2L to LED Retrofit Kit	9	9	59	28	5,068	1.08	1,621	1,527	94%
T8 2ft 2L to LED Fixture	36	36	32	20.1	5,068	1.08	2,532	2,345	93%
T8 4ft 2L to LED Retrofit Kit	4	4	59	34.1	5,068	1.08	546	545	100%
T8 2ft 2L to LED Fixture	9	9	59	25.6	5,068	1.08	1,424	1,645	116%
T8 4ft 2L to LED Fixture	5	5	59	34.1	5,068	1.08	1,359	681	50%
T8 4ft 4L to LED Retrofit Kit	6	6	114	34.1	5,068	1.08	4,499	2,624	58%
T8 4ft 4L to LED Retrofit Kit	2	2	114	34.1	5,068	1.08	1,499	875	58%
T8 4ft 4L to LED Retrofit Kit	12	12	114	34.1	5,068	1.08	7,726	5,248	68%
T8 4ft 4L to LED Retrofit Kit	2	2	114	34.1	5,068	1.08	873	875	100%
T8 4ft 4L to LED Retrofit Kit	7	7	114	46.1	5,068	1.08	4,461	2,602	58%
T8 4ft 4L to LED Retrofit Kit	46	46	114	46.1	5,068	1.08	18,936	17,096	90%
No sensor to Remote Mounted Occupancy Sensor	6	6	423	421.66	5,068	1.08	19,881	3,323	17%
Total							**281,299**	**239,367**	**85%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	281,299	239,367	85%	53.4	45.7	86%
Total	**281,299**	**239,367**	**85%**	**53.4**	**45.7**	**86%**

The ex post energy savings totaled 239,367 kWh, with a gross energy savings realization rate of 85%. The peak demand ex post savings of 45.7 kW were lower than the ex ante savings of 53.4 kW.

The primary cause of the variance between the ex ante and ex post savings was the difference in hours of use and connected wattage for the occupancy sensors. The confirmed ex post hours of use (5,068) were lower than the ex ante hours of use for most area (5,100). No areas were found to be lit in the building scheduling system for the 8760 hours in the ex ante savings for a total of 51 fixtures. Additionally, the ex post connected wattage per occupancy sensor (423W) was lower than the ex ante connected wattage (2,530W). The ex ante analysis used the total connected wattage for all sensors rather than per sensor connected load.

2.23 128S

Project Summary

A program participant received Standard incentives from Ameren for replacing HID fixtures with efficient LED fixtures within the plant growth chambers in an indoor horticultural building.

The ex post gross energy savings are 267,218 kWh with an ex-post gross peak demand reduction of 50.8 kW. The energy savings gross realization rate is 97%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets. Lighting hours of use were determined from the lighting schedule provided by the participant from an email request. To account for interactive effects of reduced waste heat on cooling and heating energy, a waste heat factor was assumed from the provided TRM values. Although an indoor agriculture factor is not provided, a factor for DX cooling and gas heat was selected for a warehouse building. The savings algorithm for energy (*Equation 1*) and peak coincident demand (*Equation 2*), are presented at the start of the Section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
HID to LED Agri Fixture	148	36	455	640	5,800	1.04	274,926	267,218	97%
Total							**274,926**	**267,218**	**97%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	274,926	267,218	97%	52.2	50.8	97%
Total	**274,926**	**267,218**	**97%**	**52.2**	**50.8**	**97%**

The ex post energy savings totaled 267,218 kWh, with a gross energy savings realization rate of 97%. The peak demand ex post savings of 50.8 kW were lower than the ex ante savings of 52.2 kW. The primary cause of the variance between the ex ante and ex post savings was the waste heat factor used in the evaluation. The indoor horticulture building does not have a corresponding waste heat factor in the

Site-Level Estimation of Ex Post Gross Savings

TRM; a value of 1.04 was selected for DX cooling, gas heating, warehouse building, which was lower than the ex ante factor (1.07).

2.24 129S and 239C

Project Summary

A program participant received Standard and Custom incentives from Ameren for retrofitting fluorescent linear tube lighting with more efficient LED linear lamps and replacing HID fixtures with LED fixtures in an office building and an industrial building.

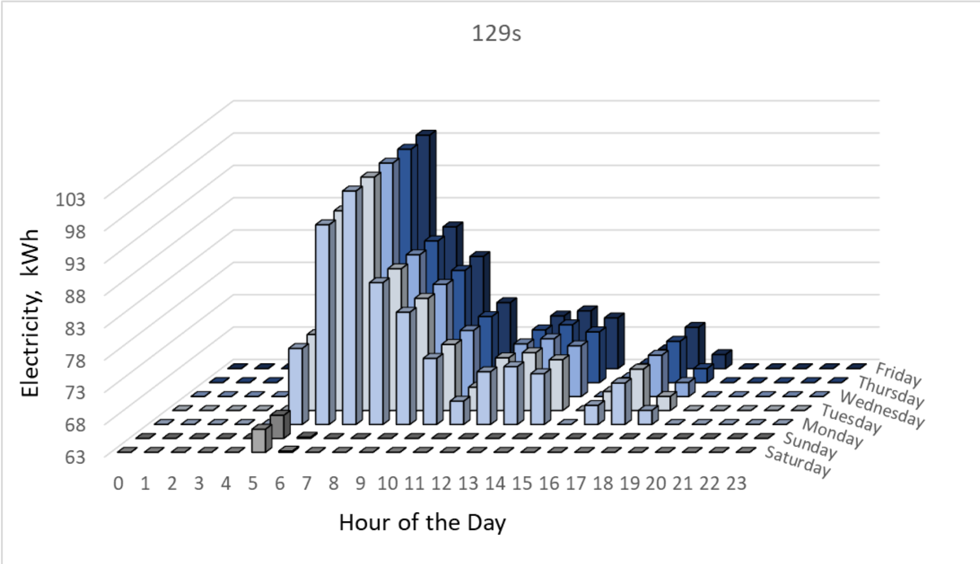
The ex post gross energy savings are 221,135 kWh with an ex post gross peak demand reduction of 42.0 kW. The energy savings gross realization rate is 84%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were determined from a phone interview with the building manager and also align with the AMI interval data modeling from *Equation 3*. Installed quantities were checked against detailed project invoices. To account for interactive effects of reduced waste heat on cooling and heating energy, Ameren TRM waste heat factors were applied in the savings calculations for a Dx cooled and gas heated industrial building, office and another heat pump conditioned office area. The savings algorithm for energy (*Equation 1*) and peak coincident demand (*Equation 2*), are presented at the start of the Section 2.

The interval billing data and weather data model, determined by *Equation 3* and adjusted to exclude heating and cooling energy usage, is summarized in the following figure, categorized by both day of the week and hour of the day. A threshold of 63 kWh is set in the chart to highlight periods of higher energy load, which correspond to occupied periods associated with lighting usage. The annualized hours (3,740) above this threshold, excluding holidays, align with the schedule provided by the building manager for the 7AM-9PM, 5 day schedule, with a few weekends per year.

Facility Energy Usage, non-weather dependent



The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T5HO 4ft 4 to LED Type B	268	268	234	100	3,740	1.04	168,306	139,683	83%
T8 4ft 4L to LED Type B	187	187	114	42	3,740	1.04	63,100	52,370	83%
T8 2ft 2L to LED Type B	12	12	32	14	3,740	1.04	1,012	840	83%
CFL to LED lamp	288	288	32	9	3,740	1.14	31,044	28,242	91%
Total							**263,462**	**221,135**	**84%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	232,418	192,893	83%	44.2	36.6	83%
Custom	31,044	28,242	91%	5.9	5.4	91%
Total	**263,462**	**221,135**	**84%**	**50.0**	**42.0**	**84%**

The ex post energy savings totaled 221,135 kWh, with a gross energy savings realization rate of 84%. The peak demand ex post savings of 42.0 kW were lower than the ex ante savings of 50.0 kW. The primary cause of the variance between the ex ante and ex post savings was the difference in hours of use. The verified ex post hours of use (3,740) were lower than the ex ante hours (4,380).

2.25 130S and 131S

Project Summary

A program participant received Standard incentives from Ameren for replacing HID fixtures with efficient LED fixtures.

The ex-post gross energy savings are 263,648 kWh with an ex-post gross peak demand reduction of 50.1 kW. The energy savings gross realization rate is 104%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets, the DLC Qualified Products List, the ENERGY STAR database, trade ally light survey, participant emails, and on-site visits. Lighting hours of use were determined through site fixture metering, AMI interval database modeling *Equation 3*, or follow-up emails with participants. Verification of installed quantities was completed through site visits, detailed project invoices, or email correspondence with participants. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 4L to LED Type B	162	162	114	42	3,900	1.14	50,026	51,858	104%
T12 4ft 4L to LED Type B	150	150	164	42	3,900	1.14	77,618	81,362	105%
T12 4ft 3L to LED Type B	170	170	122	31.5	3,900	1.14	65,266	68,402	105%
T8 4ft 3L to LED Type B	142	142	88	31.5	3,900	1.14	34,368	35,670	104%
T8 4ft 2L to LED Type B	156	156	59	21	3,900	1.14	25,389	26,356	104%
Total							**252,667**	**263,648**	**104%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	252,667	263,648	104%	48.0	50.1	104%
Total	**252,667**	**263,648**	**104%**	**48.0**	**50.1**	**104%**

The ex post energy savings totaled 263,648 kWh, with a gross energy savings realization rate of 104%. The peak demand ex post savings of 50.1 kW were higher than the ex ante savings of 48.0 kW. The primary cause of the variance between the ex ante and ex post savings was the difference in the waste heat factor. The ex post waste heat factor (1.14) for a secondary school was higher than the ex ante factor (1.07).

2.26 132S, 133S, and 240C

Project Summary

Through a project represented by sample ID 132, 133, and 240, a program participant received Standard and New Construction Custom incentives from Ameren for selecting efficient HVAC equipment and specifying lighting power less than the building code allowance for a high school building.

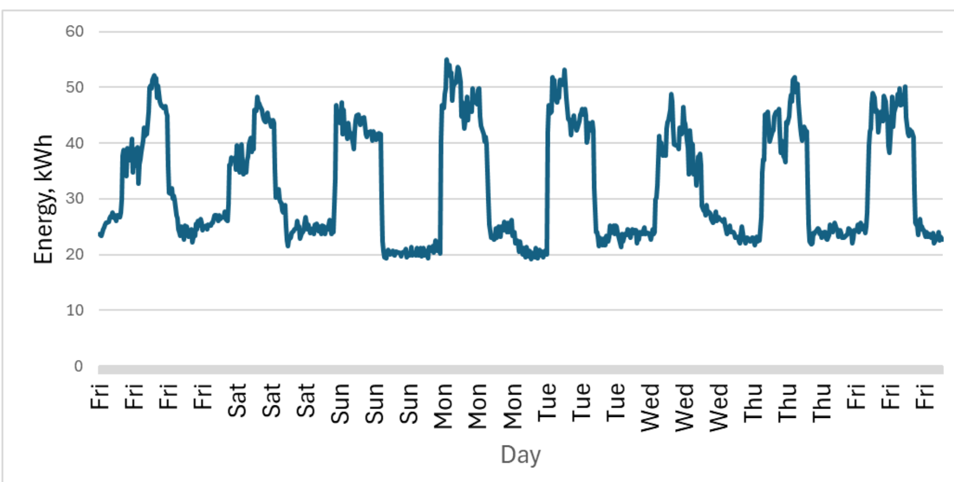
The ex post gross energy savings are 260,934 kWh with ex post gross coincident reductions of 144.90 kW. The energy savings gross realization rate is 106%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets, the DLC Qualified Products List, the ENERGY STAR database, trade ally light survey, participant emails, and on-site visits. Lighting hours of use were determined through site fixture metering, AMI interval database modeling *Equation 3*, or follow-up emails with participants. Verification of installed quantities was completed through site visits, detailed project invoices, or email correspondence with participants. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of Section 2.

The building energy usage trend informed the lighting hours of use the areas where the lights were identified as staying on until the evening custodian crew departs, for the areas of corridors and main lobby. The weekend usage for the high school building continued from start of November to March, when the data trending stopped.

Building AMI Energy



During the site visit, the suspend linear fixtures, type LA and LB were noted for the low wattage on the application. The table below lists the ex post allowed wattage revisions, to convert from per fixture to per foot x length of fixture.

Lighting Fixtures with Wattage Variance

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Basis of savings	Savings Methodology	TRM	TRM	Retrofit Isolation
Light Fixtures Quantity or Wattage Variants				
Weff	LB suspended light fixtures	Qty 8; 22W	Qty 8 @18 feet, 394W	Electrical as built drawing and site visit
Weff	LA suspended light fixtures	Qty 8; 14W	Qty 6 at 8 feet, 1114W	Electrical as built drawing and site visit

The decrease in savings from the revised wattage for the type LA and LB lamps were offset by the increase in savings for the increased hours of use in the corridors and common areas.

LPD Lighting Measure Key Parameters and Energy Saving

Measure	Quantity	Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
		Base	Efficient					
LPD to LED Fixture; corridors, common area	174	60-610	37-394	3,650	1.08	128,665	128,665	100%
LPD to LED Fixture; classrooms	971	20-193	14-100	2,790	1.24			
Total						**128,665**	**128,665**	**100%**

The baseline equipment for the packaged cooling units is referenced from IECC 2015. Both the ex ante and ex post savings utilized TRM Measure 2.5.8, Single Package and Split Systems, for the HVAC units' cooling-only savings. The energy savings equation is as follow:

$$\Delta kWh = \left[\frac{1}{IEER_{base}} - \frac{1`}{IEER_{eff}}\right] x\ kBTUh\ x\ EFLH_{cooling}\ x\ Quantity$$

The variables for the energy savings calculation are summarized in the following table.

HVAC Measure Key Parameters and Energy Savings

Inputs	Description	Values		Ex Post Source
		Ex Ante	**Ex Post**	
Basis of savings	Savings Methodology	TRM	TRM	Ameren MO TRM 2.5.8 HVAC
HVAC Parameters				
IEERbase	65KBTU to 135KBTU, gas heat	12.6	12.6	TRM (IECC2015/2018)
$IEER_{base}$	135KBTU to 240KBTU, gas heat	12.2	12.2	TRM (IECC2015/2018)
IEERbase	240KBTU to 760KBTU, gas heat	11.4	11.4	TRM (IECC2015/2018)
$EFLH_{cool}$	Secondary school building	1195	1195	Ameren MO TRM HVAC
IEERreff	65KBTU to 135KBTU, 3 units	17.6 to 19.5		AHRI ratings
IEERreff	135KBTU to 240KBTU, 2 units	18 to 19.5		AHRI ratings
IEERreff	240KBTU to 760KBTU, 10 units	18 to 19.5		AHRI ratings
Not Evaluated (all units exceed Federal Regulations 2023 efficiency)				
IEERbase	65KBTU to 135KBTU, 3 units	14.6		Federal Regulations 2023
IEERbase	135KBTU to 240KBTU, 2 units	14.0		Federal Regulations 2023
IEERbase	240KBTU to 760KBTU, 10 units	13.0		Federal Regulations 2023

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard Lighting	128,665	128,665	100%	24.44	24.44	100%
Standard HVAC	117,904	132,269	112%	107.37	120.46	112%
Total	**246,569**	**260,934**	**106%**	**131.81**	**144.90**	**110%**

The ex post gross energy savings are 260,934 kWh with ex post gross coincident reductions of 144.90 kW. The energy savings gross realization rate is 106%, and the demand realization rate is 110%. The primary differences in the saving estimates are:

The LA and LB light fixtures were identified during the ADM team site visit as having the power rating expressed as per foot of suspended fixture. The 3,000 additional watts were included in the ex post savings analysis for the baseline wattage, reducing the ex post lighting savings estimate.

The building energy usage from AMI data indicated weekend usage starting in November, and is referenced for the corridor and common area hours of use, increasing the ex post lighting savings.

The ex ante and ex post both referenced the HVAC packaged unit TRM algorithm, but only the base and installed efficiency were apparent in the application data, there may be variation in the effective cooling load hours of used referenced in the TRM.

Site-Level Estimation of Ex Post Gross Savings

2.27 134S, 135S, and 136S

Project Summary

A program participant received Standard incentives from Ameren for replacing fluorescent linear tube lighting with more efficient LED linear lamps.

The ex post gross energy savings are 202,243 kWh with an ex post gross peak demand reduction of 40.2 kW. The energy savings gross realization rate is 83%.

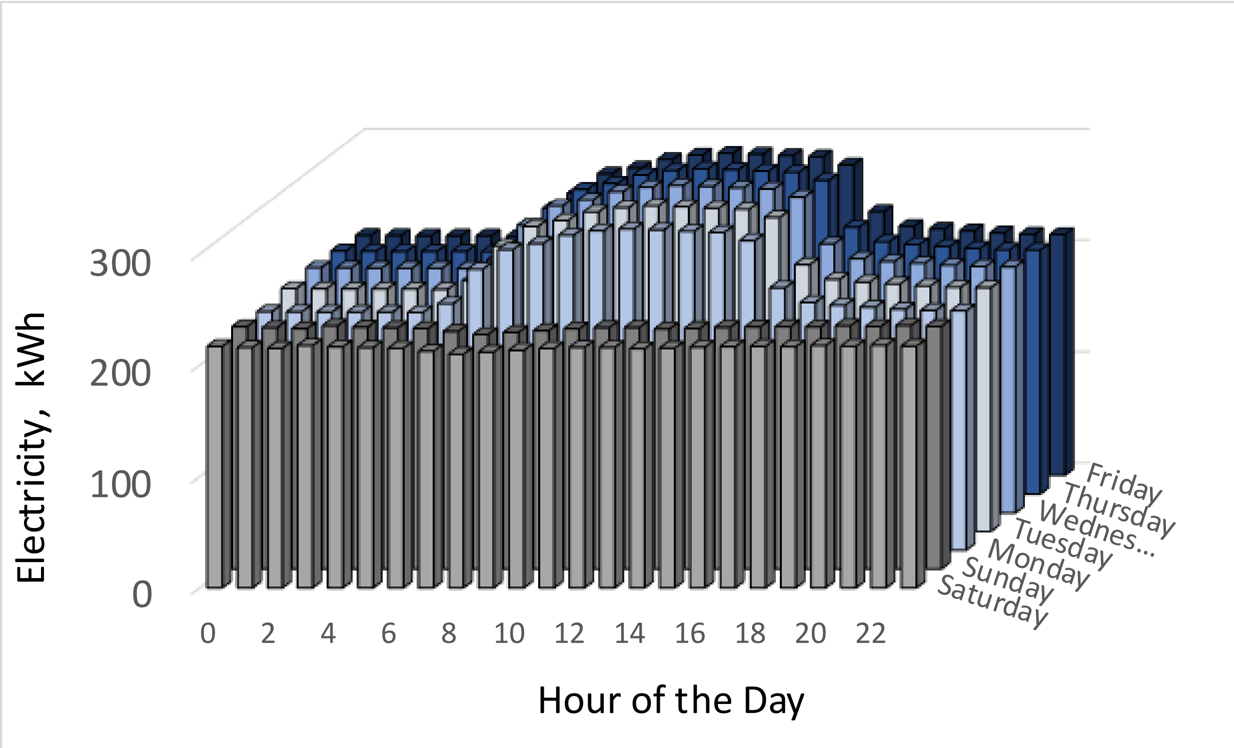
Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets, the DLC Qualified Products List, the ENERGY STAR database, trade ally light survey, participant emails, and on-site visits. Lighting hours of use were determined through site fixture metering, AMI interval database modeling *Equation 3*, or follow-up emails with participants. Verification of installed quantities was completed through site visits, detailed project invoices, or email correspondence with participants. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

The interval billing data and weather data model, determined by *Equation 3* and adjusted to exclude heating and cooling energy usage, is summarized in the following figure by both day of the week and hour of the day. The model was referenced during the site visit to inform the characterization of lighting usage areas, particularly those that are fully lit during operating hours.

Facility Energy Usage, non-weather dependent



The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 1L to LED Type B	17	17	32	9.5	2,600	1.06	1,114	1,054	95%
T8 4ft 2L to LED Type B	126	126	59	19	2,600	1.06	15,008	13,890	93%
T8 4ft 2L to LED Retrofit Kit	16	16	59	19	2,600	1.06	1,715	1,764	103%
T8 4ft 3L to LED Retrofit Kit	1016	1016	88	28.5	2,600	1.06	196,654	166,606	85%
T8 4ft 4L to LED Type B	9	9	114	38	2,600	1.06	2,036	1,885	93%
T8 8ft 4L to LED Retrofit Kit	8	8	248	38	2,600	1.06	5,288	4,630	88%
T8 3ft 1L to LED Type B	2	2	23	12	2,600	1.06	65	61	93%
T8 3ft 2L to LED Type B	14	14	46	24	2,600	1.06	917	849	93%
T8UTube2L to LED Retrofit Kit	173	173	56	32.6	2,600	1.06	20,607	11,157	54%
T12 4ft 2L to LED Type B	2	2	82	19	2,600	1.06	428	347	81%
Total							**243,832**	**202,243**	**83%**

Site-Level Estimation of Ex Post Gross Savings

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	243,832	202,243	83%	46.3	40.2	87%
Total	**243,832**	**202,243**	**83%**	**46.3**	**40.2**	**87%**

The ex post energy savings totaled 202,243 kWh, with a gross energy savings realization rate of 83%. The peak demand ex post savings of 40.2 kW were lower than the ex ante savings of 46.3 kW. The primary cause of the variance between the ex ante and ex post savings was the difference in hours of use. The ex post hours of use (2,600), based on facility energy use data, were lower than the ex ante hours (2,783).

2.28 137S

Project Summary

A program participant received Standard incentives from Ameren for replacing HID fixtures with efficient LED fixtures in a manufacturing building.

The ex post gross energy savings are 234,866 kWh with an ex post gross peak demand reduction of 44.6 kW. The energy savings gross realization rate is 97%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were determined through site an interview with the maintenance supervisor. The manufacturing site operates 24/7, with 6 holidays. Verification of installed quantities was completed through tabulation of the detailed project invoices and the interview. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations for a Dx cooled and gas heated warehouse building. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the Section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
No existing sensor to Fixture Mounted Occupancy Sensor	0	88	207	207	8,620	1.04	40,417	39,193	97%
No existing sensor to Fixture Mounted Occupancy Sensor	0	14	383	383	8,620	1.04	11,897	11,537	97%
T5HO 4ft 4L to LED HB fixture	127	88	234	207	8,620	1.04	189,449	103,113	97%
T5HO 4ft 6L to LED HB fixture	40	14	360	383	8,620	1.04		81,024	
Total							**241,763**	**234,866**	**97%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	241,763	234,866	97%	45.9	44.6	97%
Total	**241,763**	**234,866**	**97%**	**45.9**	**44.6**	**97%**

The ex post energy savings totaled 234,866 kWh, with a gross energy savings realization rate of 97%. The peak demand ex post savings of 44.6 kW were lower than the ex ante savings of 45.9 kW. The primary cause of the variance between the ex ante and ex post savings was the difference in the waste heat factor used in the evaluation. The ex post waste heat factor (1.04) selected for the best fit building of a Dx cooled warehouse building was less than the ex ante factor (1.07).

2.29 138S

Project Summary

A program participant received Standard incentives from Ameren for replacing one existing inlet modulating air compressors with one (200 Hp) VSD air compressor at a manufacturing building.

The ex-post gross energy savings are 230,256 kWh with an ex post gross peak demand reduction of 31.76 kW. The energy savings gross realization rate is 109%.

Measurement and Verification Effort

ADM staff reviewed the project documentation provided by the participant, collected manufacturer specification sheets, CAGI air compressor sheets for the two air compressor, and visited the site to verify the equipment installation and operation. AMI interval billing data was modeled with weather data to determine the typical hourly base electric load profile, to validate the operating hours.

The site operates with an air compressor plan supplying air in a common header to operations in three areas. The load is variable with demand from different types of equipment. The ex post savings and ex ante savings were both determined by the Ameren MO TRM measure, 2.2.3 VSD Air Compressor.

$$kWh = \left(CF_{base} - CF_{efficient}\right) x\ 0.9\ x\ Hp\ x\ Hours$$

Modeling Inputs and Algorithm Inputs

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Basis of savings	Savings Methodology	TRM	TRM	Ameren MO TRM 2.2.3 VSD Air Compressor
Air Compressor Modeling				
TRM Savings Methodology Inputs				
CF_{base}	Compressor factor, modulation	0.863	0.863	TRM 2.2.3 VSD Air Compressor
$CF_{efficient}$	Compressor factor, VFD	0.658	0.658	TRM 2.2.3 VSD Air Compressor
Hp	Compressor horsepower, HP	200	200	CAGI sheet
Hours	Annual hours compressor operates	prescribed	6,240	Site; AMI interval data less holidays
0.9	Factor	0.9	0.9	TRM 2.2.3 VSD Air Compressor

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Compressed Air	210,400	230,256	109%	29.023	31.762	109%
Total	**210,400**	**230,256**	**109%**	**29.023**	**31.762**	**109%**

The ex post gross energy savings totaled 230,256 kWh, with an ex post gross peak demand reduction of 31.762 kW. The gross realization rate for energy and demand savings was 109%.

The primary differences in the energy savings are:

- Both the ex ante and ex post savings utilized the TRM methodology; however, the hours of use may differ. The ex post hours were provided by the site and verified using AMI interval data for one year, including holidays.
- The program application does not collect hours of use at the measure level and may rely on a deemed value for manufacturing hours.

2.30 139S

Project Summary

A program participant received Standard incentives from Ameren for replacing fluorescent linear tube lighting with more efficient LED linear lamps in a retail store building.

The ex post gross energy savings are 212,275 kWh with an ex post gross peak demand reduction of 40.3 kW. The energy savings gross realization rate is 103%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were determined through a site visit with the facility manager. Verification of installed quantities was completed through the site visit and the detailed project invoices.. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of Section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 2L to LED Type B)	1485	1485	59	23	3,120	1.08	173,513	180,139	104%
T8 3ft 2L to LED Type B	222	222	46	24	3,120	1.08	19,269	16,457	85%
T8 2ft 2L to LED Type B	258	258	32	14	3,120	1.08	13,782	15,648	114%
T8 2ft 1L to LED Type B	1	1	16	7	3,120	1.08	27	30	112%
Total							**206,591**	**212,275**	**103%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	206,591	212,275	103%	39.2	40.3	103%
Total	**206,591**	**212,275**	**103%**	**39.2**	**40.3**	**103%**

The ex post energy savings totaled 212,275 kWh, with a gross energy savings realization rate of 103%. The peak demand ex post savings of 40.3 kW were higher than the ex ante savings of 39.2 kW. The

Site-Level Estimation of Ex Post Gross Savings

primary cause of the variance between the ex ante and ex post savings was the difference in the waste heat factor. The ex post factor for stand-alone retail (1.08) was higher than the ex ante factor (1.07).

2.31 140S and 141S

Project Summary

A program participant received Standard incentives from Ameren for replacing packaged cooling HVAC (6 units) and centrifugal water-cooled chillers (3) with equipment exceeding the TRM minimum required efficiency in a school building.

The ex post gross energy savings are 170,722 kWh with an ex post gross peak demand reduction of 155.47 kW. The energy savings gross realization rate is 83%.

Measurement and Verification Effort

The ex ante and ex post savings approaches both utilized TRM Measure *2.5.8, Single Package and Split Systems*, for the HVAC units' cooling-only savings, and TRM Measure *4.4.6, Electric Chiller*, for the chilled water equipment. Although the chiller measure is designed for single-chiller plants, the savings are reasonable, as they both are required to meet the cooling load.

The HVAC savings algorithm:

$$\Delta kWh = \left[\frac{1}{IEER_{base}} - \frac{1`}{IEER_{eff}}\right] x\ kBTUh\ x\ EFLH_{cooling}\ x\ Quantity$$

The chilled water equipment savings uses the following algorithm:

$$\Delta kWh = \left[IPLV_{base} - IPLV_{eff}\right] x\ Tons\ x\ EFLH_{cooling}\ x\ Quantity$$

The variables for the energy savings calculation are summarized in the following table.

HVAC Measure Key Parameters and Energy Savings

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Basis of savings	Savings Methodology	Ameren TRM	Ameren TRM	TRM 2.5.8 Packaged HVAC TRM 4.4.6 Electric Chiller
HVAC Parameters				
$IEER_{base}$	65 kBTU to 135 kBTU, gas heat	12.6		TRM (IECC2015)
$IEER_{base}$	>760 kBTU, gas heat	11.0		TRM (IECC2015)
$IEER_{base}$	240 kBTU to 760 kBTU, gas heat	11.4		TRM (IECC2015)
$IEER_{base}$	<65 kBTU, gas heat, 3phase, packaged	13.0	14.0	TRM (IECC2015)
$IEER_{eff}$	133 kBTU, 1 unit	15.0		AHRI ratings
$IEER_{eff}$	853 kBTU, 1 unit	13.7		AHRI ratings
$IEER_{eff}$	272 kBTU, 2 units	17.8		AHRI ratings
$IEER_{eff}$	59 kBTU, 2 units	14.0		AHRI ratings
$EFLH_{cool}$	Elementary school, hours	~873	873	Ameren MO TRM
Chiller Parameters				
$IPLV_{base}$	Part Load Efficiency, Path A, 320T	0.52		IECC2015, water cooled, centrifugal
$IPLV_{base}$	Part Load Efficiency, Path A, 270T	0.55		IECC2015, water cooled, centrifugal
$IPLV_{eff}$	Part Load Efficiency 320T	0.3324		Manufacturer ratings
$IPLV_{eff}$	Part Load Efficiency270T	0.3657		Manufacturer ratings
Not Evaluated				
$IEER_{base}$	65 kBTU to 135 kBTU, gas,1 unit, 13T	14.6		Federal Regulations 2023
$IEER_{base}$	240 kBTU to 760 kBTU, 2 units, 22T	13.0		Federal Regulations 2023
$IPLV_{base}$	Compliance to both IPLV and Full , 320T	PATH B		IECC2015, water cooled, centrifugal PATH A or B, both IPLV and Full Load Efficiency compliance
$IPLV_{base}$	Compliance to both IPLV and Full, 270T	Neither		

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard Packaged HVAC	36,610	29,822	83%	33.340	27.158	83%
Standard Chiller	169,951	140,900	83%	154.772	128.312	83%
Total	**206,561**	**170,722**	**83%**	**188.112**	**155.473**	**83%**

The ex post gross energy savings totaled 170,722 kWh, with an ex post gross peak demand reduction of 155.47 kW. The gross realization rate for energy savings was 83%.

The differences in savings are attributed to:

- The 5-ton packaged cooling unit with a SEER1 value of 14.0 meets the IECC 2015 requirement but results in zero savings.
- The difference in chilled water savings is unknown from the application data. However, since the Equivalent Full Load Hours (EFLH) is not listed, there may be a variation in the building type referenced for the EFLH value.

2.32 144S

Project Summary

A program participant received Standard incentives for replacing fluorescent linear tube lighting with more efficient LED linear lamps in a college building.

The ex post gross energy savings are 213,712 kWh with an ex post gross peak demand reduction of 40.6 kW. The energy savings gross realization rate is 107%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were determined from the phone interview the building manager, and are based on the automotive instructional repair area class schedule for both daytime and evening classes. Verification of installed quantities was completed through review of detailed project invoices and the phone interview. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T5HO 4ft 6L to LED Type A	263	263	360	162	3,600	1.14	200,589	213,712	107%
Total							**200,589**	**213,712**	**107%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	200,589	213,712	107%	38.1	40.6	107%
Total	**200,589**	**213,712**	**107%**	**38.1**	**40.6**	**107%**

The ex post energy savings totaled 213,712 kWh, with a gross energy savings realization rate of 107%. The peak demand ex post savings of 40.6 kW were higher than the ex ante savings of 38.1 kW. The primary cause of the variance between the ex ante and ex post savings was the difference in waste heat factors used in the evaluation. The ex post waste heat factor (1.14) for a school building was higher than the ex ante factor (1.07).

2.33 145S and 146S

Project Summary

Through a project represented by sample ID 145 and 146, a program participant received Standard incentives from Ameren for replacing rooftop packaged air conditioning units (22) with new efficient units exceeding the efficiency required by the local building code. Demand control ventilation was added to the new units with $C0_2$ sensing of the return air to reduce the volume of conditioned area to the space, in a large retail store building.

The ex-post gross energy savings are 215,579 kWh with an ex post gross peak demand reduction of 196.324 kW. The energy savings gross realization rate is 119 %.

Measurement and Verification Effort

ADM staff consolidated relevant project documentation within the program implementer's database and supplemented key parameters for estimating energy savings by incorporating additional data sources. These sources included equipment submittals, mechanical drawings, participant emails, and an on-site visits. A review of the ex ante savings methodology led to either adopting the original savings basis or developing an alternative methodology. Factors considered in this process included defining the appropriate baseline, evaluating the availability of site-specific historical trended data, and determining the most accurate estimate of actual energy savings.

The method for this sampled project is sourced from the TRM measure, *2.5.8 Single Package and Split Systems,* as follows:

$$\Delta kWh = \left[\frac{1}{IEER_{base}} - \frac{1`}{IEER_{eff}}\right] x\ kBTUh\ x\ EFLH_{cooling}\ x\ Quantity$$

Demand control ventilation savings for the reduced mechanical cooling of outside air utilizing CO_2 detection, is estimated with the TRM algorithm for cooling savings:

$$\Delta kWh = \frac{squarefeet}{1{,}000}\ x\ ESF_{cooling}$$

The variables for the energy savings calculation are summarized in the following table.

HVAC Measure Key Parameters and Energy Savings

Measure	Qty	Capacity ton	Efficiency IEER		EFLH	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
			Base	**Efficient**				
New Packaged Air Conditioning Units								
Packaged AC (gas heat)	1	3 T	14	22	986	941	914	97%
Packaged AC (gas heat)	3	3 T	14	22	873	2,798	2,743	98%
Packaged AC (gas heat)	1	6 T	12.6	23.3	873	2,683	2,512	94%

Site-Level Estimation of Ex Post Gross Savings

Measure	Qty	Capacity ton	Efficiency IEER		EFLH	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
			Base	**Efficient**				
Packaged AC (gas heat)	5	10 T	12.6	21	873	19,155	19,016	99%
Packaged AC (gas heat)	12	14 T	12.2	19	873	55,973	55,640	99%
Demand Control Ventilation								
	Area kSF			ESF kWh/kSF				
DCV - Packaged AC (gas heat)	7			893		4,555	6,162	135%
DCV - Packaged AC (gas heat)	21			893		13,666	18,396	135%
DCV - Packaged AC (gas heat)	7			893		4,555	6,162	135%
DCV - Packaged AC (gas heat)	34			893		22,776	30,630	134%
DCV - Packaged AC (gas heat)	82			893		54,663	73,405	134%
Total						181,765	215,579	119%

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	181,765	215,579	119%	165.53	196.32	119%
Total	**181,765**	**215,579**	**119%**	**165.53**	**196.32**	**119%**

The ex-post gross energy savings are 215,579 kWh with an ex post gross peak demand reduction of 196.324 kW. The energy and demand savings gross realization rate are 119 %. The primary difference in the two savings are:

The ex post savings for demand control ventilation sourced from the TRM considered the conditioned area for each of the packaged air conditioning units and the energy savings factor for cooling in a retail building. The ex ante ESF factor for the demand control ventilation saving's algorithm aligns closer to a strip mall retail building than a stand alone retail building.

2.34 147S

Project Summary

A program participant received Standard incentives from Ameren for replacing HID fixtures with efficient LED fixtures in a manufacturing building.

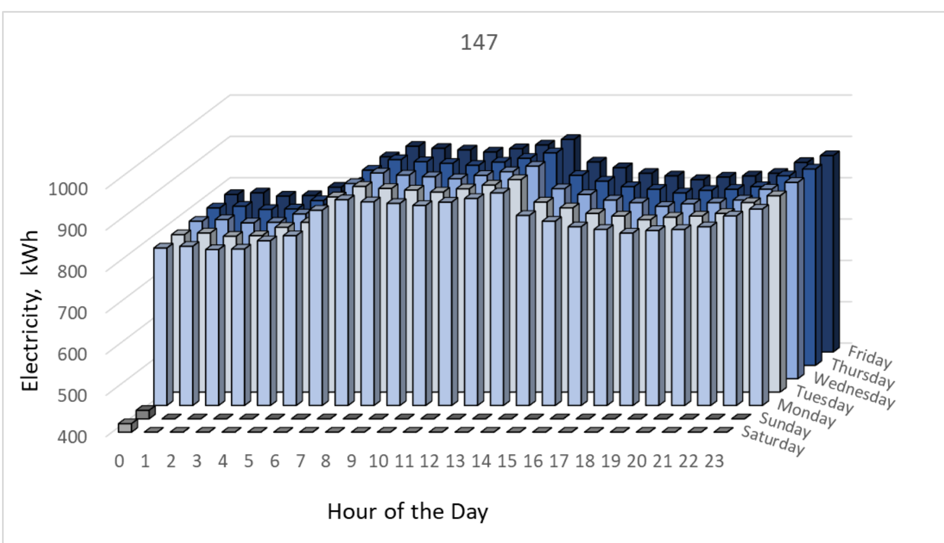
The ex post gross energy savings are 177,828 kWh with an ex post gross peak demand reduction of 33.8 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from the manufacturer datasheets, and participant emails. Lighting hours of use were verified during the site contact interview and also interval billing data modeling *Equation 3*. Verification of installed quantities was completed through review of the detailed project invoices. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the Section 2.

The interval billing data and weather data model, determined by *Equation 3*, is summarized in the following figure, categorized by both day of the week and hour of the day. There was not a temperature dependence; the chart presents total energy usage. A threshold of 400 kWh is set in the chart to highlight periods of higher energy load. The annualized hours (6,035) above this threshold, excluding holidays, contain the hours for the installed lighting hours (4,380). The hours for the warehousing usage area are less than the daily production hours.

Facility Energy Usage by day and hour



The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
HID to LED High Bay	140	140	455	165	4,380	1.00	177,828	177,828	100%
Total							**177,828**	**177,828**	**100%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	177,828	177,828	100%	33.8	33.8	100%
Total	**177,828**	**177,828**	**100%**	**33.8**	**33.8**	**100%**

The ex post energy savings totaled 177,828 kWh, with a gross energy savings realization rate of 100%. The peak demand ex post and ex ante savings are both 33.8 kW.

2.35 148S and 149S

Project Summary

A program participant received Standard incentives from Ameren for retrofitting fluorescent linear tube lighting with more efficient LED linear lamps and replacing HID fixtures with LED fixtures in a manufacturing building.

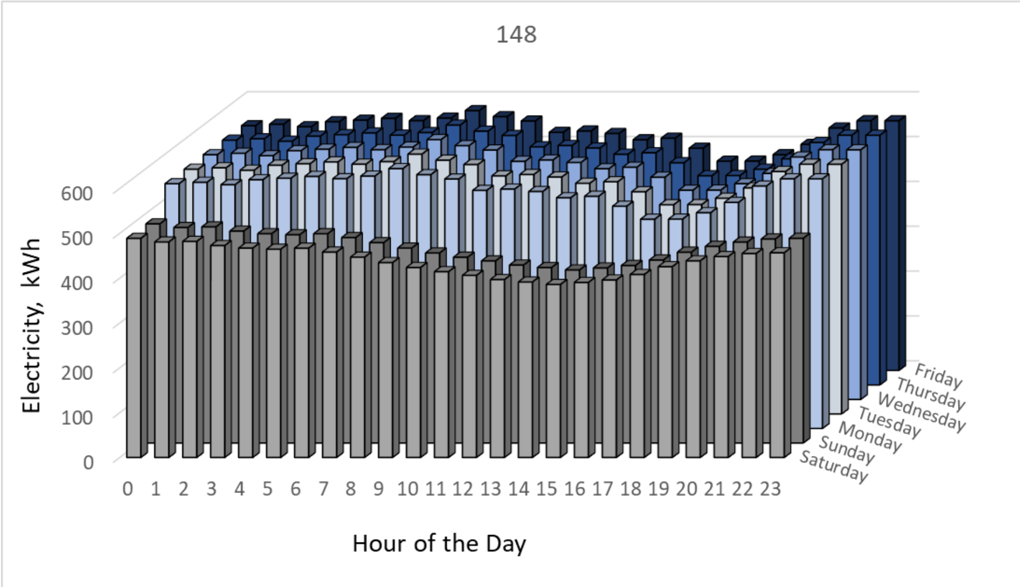
The ex post gross energy savings are 177,172 kWh with an ex post gross peak demand reduction of 33.2 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets. Lighting hours of use were determined through site fixture metering, AMI interval database modeling *Equation 3*, or follow-up emails with participants. Verification of installed quantities was completed through site visits, detailed project invoices, or email correspondence with participants. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the Section 2.

The interval billing data and weather data model, determined by *Equation 3*, is summarized in the following figure, categorized by both day of the week and hour of the day. There was not a temperature dependence; the chart presents total energy usage. The annualized hours (6,292 hrs) above a 500 kWh hourly threshold, excluding holidays, supports the participant provided hours for most areas, except a maintenance room with less hours (2000 hrs).

Facility Energy Usage by day and hour



The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	**Efficient**	**Base**	**Efficient**					
T5HO 4ft 4L to LED High Bay	85	85	234	150.2	2,000	1.04	15,280	14,816	97%
T5HO 4ft 4L to LED High Bay	9	9	234	150.2	6,292	1.04	5,090	4,935	97%
T5HO 4ft 4L to LED High Bay	48	48	234	150.2	6,292	1.04	27,146	26,321	97%
T5HO 4ft 4L to LED High Bay	37	37	234	150.2	6,292	1.04	20,924	20,289	97%
T5HO 4ft 4L to LED High Bay	23	23	234	150.2	6,292	1.04	13,008	12,612	97%
T5HO 4ft 4L to LED High Bay	8	8	234	150.2	6,292	1.04	4,525	4,387	97%
T5HO 4ft 4L to LED High Bay	11	11	234	150.2	6,292	1.04	6,221	6,032	97%
T5HO 4ft 4L to LED High Bay	4	4	234	150.2	6,292	1.04	2,262	2,193	97%
T5HO 4ft 4L to LED High Bay	1	1	234	150.2	6,292	1.04	565	548	97%
T5HO 4ft 4L to LED High Bay	4	4	234	150.2	6,292	1.04	2,262	2,193	97%
T5HO 4ft 4L to LED High Bay	5	5	234	150.2	6,292	1.04	2,828	2,742	97%
T5HO 4ft 4L to LED High Bay	4	4	234	150.2	6,292	1.04	2,262	2,193	97%
T5HO 4ft 4L to LED High Bay	20	20	234	150.2	6,292	1.04	11,311	10,967	97%
T8 4ft 2L to LED Type B	4	4	59	24	6,292	1.04	1,346	916	68%
T8 8ft 2L to LED Type B	5	5	124	24	6,292	1.04	3,332	3,272	98%

Site-Level Estimation of Ex Post Gross Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	**Efficient**	**Base**	**Efficient**					
T8 4ft 2L to LED Type B	3	3	59	24	6,292	1.04	1,010	687	68%
T8 4ft 2L to LED Type B	2	2	59	24	6,292	1.04	471	458	97%
T5 4ft 4L to LED Type B	1	1	128	48	6,292	1.04	538	523	97%
T8 4ft 2L to LED Type B	19	19	59	24	6,292	1.04	4,733	4,352	92%
T8 4ft 4L to LED Type B	9	9	114	48	6,292	1.04	4,000	3,887	97%
T5HO 4ft 4L to LED High Bay	53	53	234	133.8	6,292	1.04	29,973	34,751	116%
T5HO 4ft 4L to LED High Bay	4	4	234	150.2	6,292	1.04	2,262	2,193	97%
T5HO 4ft 4L to LED High Bay	18	18	234	150.2	6,292	1.04	10,180	9,870	97%
T5HO 4ft 4L to LED High Bay	11	11	234	150.2	6,292	1.04	6,221	6,032	97%
Total							**177,750**	**177,172**	**100%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	177,750	177,172	100%	33.8	33.2	98%
Total	**177,750**	**177,172**	**100%**	**33.8**	**33.2**	**98%**

The ex post energy savings totaled 177,172 kWh, with a gross energy savings realization rate of 100%. The peak demand ex post savings of 33.2 kW were lower than the ex ante savings of 33.8 kW.

2.36 150S

Project Summary

A program participant received Standard incentives from Ameren for replacing fluorescent linear tube lighting with more efficient LED linear lamps in a hospital building.

The ex-post gross energy savings are 178,785 kWh with an ex-post gross peak demand reduction of 34.0 kW. The energy savings gross realization rate is 104%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets. The lighting hours are weighted for the common areas operating 24/7 and some hallways which are turned off at night. Verification of installed quantities was completed through a site visit, and the detailed project invoices. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the Section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 3ft 2L to LED Type B	87	87	46	24	7,300	1.11	14,951	15,509	104%
T8 4ft 2L to LED Type B	650	650	59	28	7,300	1.11	157,392	163,275	104%
Total							**172,343**	**178,785**	**104%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	172,343	178,785	104%	32.7	34.0	104%
Total	**172,343**	**178,785**	**104%**	**32.7**	**34.0**	**104%**

The ex post energy savings totaled 178,785 kWh, with a gross energy savings realization rate of 104%. The peak demand ex post savings of 34.0 kW were higher than the ex ante savings of 32.7 kW. The primary cause of the variance between the ex ante and ex post savings was the difference in waste heat factors. The ex post analysis used a waste heat factor for hospital building (1.11), which was higher than the ex ante factor of 1.07.

2.37 151S and 152S

Project Summary

A program participant received Standard incentives from Ameren for retrofitting fluorescent linear tube lighting with more efficient LED linear lamps and replacing HID fixtures with LED fixtures in a warehouse building.

The ex post gross energy savings are 165,187 kWh with an ex post gross peak demand reduction of 31.4 kW. The energy savings gross realization rate is 97%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were verified during the site manager interview. Verification of installed quantities was completed through review of the detailed project invoices. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T5HO 4ft 6L to LED Type B	129	129	360	150	2,650	1.04	76,813	74,660	97%
T8 4ft 4L to LED Type B	50	50	114	42	2,650	1.04	10,208	9,922	97%
T8 4ft 4L to LED Type B	23	23	114	42	2,650	1.04	4,695	4,564	97%
T8 4ft 2L to LED Type B	7	7	59	21	2,650	1.04	753	733	97%
HID to LED High Bay	78	78	455	150	2,650	1.04	67,457	65,565	97%
Exit Sign to LED Exit Sign	10	10	25	3	8,760	1.04	2,062	2,004	97%
No existing sensor to Remote Mounted Occupancy Sensor	78	78	150	150	2,650	1.04	7,962	7,739	97%
Total							**169,950**	**165,187**	**97%**

Result

Realized Gross Energy and Demand Savings

Site-Level Estimation of Ex Post Gross Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	169,950	165,187	97%	32.2	31.4	98%
Total	**169,950**	**165,187**	**97%**	**32.2**	**31.4**	**98%**

The ex post energy savings totaled 165,187 kWh, with a gross energy savings realization rate of 97%. The peak demand ex post savings of 31.4 kW were lower than the ex ante savings of 32.2 kW. The primary cause of the variance between the ex ante and ex post savings was the difference in the waste heat factor used in the evaluation. The ex post waste heat factor for an industrial/warehouse site (1.04) was lower than the ex ante factor of 1.07.

2.38 153S

Project Summary

A program participant received Standard incentives from Ameren for replacing fluorescent linear tube lighting with more efficient LED linear lamps in retail store building.

The ex post gross energy savings are 169,415 kWh with an ex-post gross peak demand reduction of 31.89 kW. The energy savings gross realization rate is 101%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were verified with the store operating hours. Verification of installed quantities was completed through an unscheduled site visit during the store opening hours. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the Section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	**Efficient**	**Base**	**Efficient**					
T8 4ft 2L to LED Type B	3	3	59	28	4,056	1.08	403	407	101%
T8 4ft 2L to LED Type B	1	1	59	28	4,056	1.08	134	136	101%
T8 4ft 2L to LED Type B	1	1	59	28	4,056	1.08	134	136	101%
T8 4ft 2L to LED Type B	1	1	59	28	4,056	1.08	134	136	101%
T8 4ft 2L to LED Type B	2	2	59	28	4,056	1.08	270	272	101%
T8 4ft 2L to LED Type B	1	1	59	28	4,056	1.08	134	136	101%
T8 4ft 4L to LED Type B	2	2	114	56	4,056	1.08	504	508	101%
T8 4ft 4L to LED Type B	1	1	114	56	4,056	1.08	251	254	101%
T8 4ft 4L to LED Type B	558	558	114	56	4,056	1.08	140,457	141,770	101%
T8 4ft 4L to LED Type B	42	42	114	56	4,056	1.08	10,572	10,671	101%
T8 4ft 4L to LED Type B	1	1	114	56	4,056	1.08	251	254	101%
T8 4ft 4L to LED Type B	4	4	114	56	4,056	1.08	1,007	1,016	101%
T8 4ft 4L to LED Type B	3	3	114	56	4,056	1.08	755	762	101%
T8 4ft 4L to LED Type B	10	10	114	56	4,056	1.08	2,518	2,541	101%

Site-Level Estimation of Ex Post Gross Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	**Efficient**	**Base**	**Efficient**					
T8 4ft 4L to LED Type B	19	19	114	56	4,056	1.08	4,782	4,827	101%
T8 4ft 4L to LED Type B	6	6	114	56	4,056	1.08	1,510	1,524	101%
T8 4ft 4L to LED Type B	5	5	114	56	4,056	1.08	1,258	1,270	101%
T8 4ft 4L to LED Type B	6	6	114	56	4,056	1.08	1,510	1,524	101%
T8 4ft 4L to LED Type B	5	5	114	56	4,056	1.08	1,258	1,270	101%
Total							**167,842**	**169,415**	**101%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	167,842	169,415	101%	31.88	31.89	100%
Total	**167,842**	**169,415**	**101%**	**31.88**	**31.89**	**100%**

The ex post energy savings totaled 169,415 kWh, with a gross energy savings realization rate of 101%. The peak demand ex post savings of 31.89 kW were slightly higher than the ex ante savings of 31.88 kW.

2.39 154S and 155S

Project Summary

A program participant received Standard incentives from Ameren for retrofitting fluorescent linear tube lighting with more efficient LED linear lamps and replacing HID fixtures with LED fixtures in a retail store building.

The ex-post gross energy savings are 160.606 kWh with an ex-post gross peak demand reduction of 29.97 kW. The energy savings gross realization rate is 101%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were determined by the retail store hours of operation less two holidays. Verification of installed quantities was completed through an unscheduled site visit during normal store hours. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of Section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 4L to LED Retrofit Kit	253	253	114	34.1	4,964	1.08	107,505	108,373	101%
T8 3ft 4L to LED Type B	1	1	92	44	4,964	1.08	256	257	101%
T8 3ft 2L to LED Type B	14	14	46	22	4,964	1.08	1,785	1,801	101%
T8 4ft 2L to LED Type B	110	110	59	26	4,964	1.08	19,280	19,461	101%
T8 4ft 4L to LED Type B	11	11	114	52	4,964	1.08	3,623	3,656	101%
T8 2ft 2L to LED Fixture	19	19	32	20.1	4,964	1.08	1,211	1,212	100%
T8 4ft 2L to LED Fixture	9	9	59	25.6	4,964	1.08	1,387	1,612	116%
T8 4ft 2L to LED Retrofit Kit	2	2	59	34.1	4,964	1.08	265	267	101%
T8 4ft 4L to LED Retrofit Kit	14	14	114	34.1	4,964	1.08	5,949	5,997	101%
T8 4ft 4L to LED Retrofit Kit	4	4	114	34.1	4,964	1.08	1,700	1,713	101%
T8 4ft 2L to LED Retrofit Kit	10	10	59	46.1	4,964	1.08	691	692	100%
T8 4ft 4L to LED Retrofit Kit	33	33	114	46.1	4,964	1.08	11,920	12,013	101%
T8 4ft 2L to LED Retrofit Kit	4	4	59	24.5	4,964	1.08	723	740	102%

Site-Level Estimation of Ex Post Gross Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	**Efficient**	**Base**	**Efficient**					
T8 4ft 1L to LED Retrofit Kit	4	4	32	24.5	4,964	1.08	149	161	108%
No existing sensor to Remote Mounted Occupancy Sensor	5	5	412	412	4,964	1.08	2,627	2,651	101%
Total							**159,071**	**160,606**	**101%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	159,071	160,606	101%	30.22	29.97	99%
Total	**159,071**	**160,606**	**101%**	**30.22**	**29.97**	**99%**

The ex post energy savings totaled 160,606 kWh, with a gross energy savings realization rate of 101%. The peak demand ex post savings of 29.97 kW were lower than the ex ante savings of 30.22 kW.

2.40 156S

Project Summary

A program participant received Standard incentives from Ameren for replacing existing less efficient PCM fan motors with ECM fan motors (106) for the walk in low temperature and medium temperature refrigerated units and replacing (3) constant speed fan motors with a new ECM motor and VFD controller in a convenience store building.

The ex-post gross energy savings are 81,881 kWh with an ex post gross peak demand reduction of 13.883 kW. The energy savings gross realization rate is 52%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, and determined the actual motor fractional horsepower from the manufacturer's specification website. The method to evaluate the savings for the fractional horsepower motors was with TRM measure - *2.9.4 Electronically Commutated Motors* algorithm.

$$\Delta kWh = Quantity_{motors}\ x\ Savings_{motor}$$

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Refrigeration and VFD Measures Key Parameters and Energy Savings

Measure	TRM motor size bin	Savings per Motor kWh	Quantity	**Unit**	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
ECM motor 1/25 HP	1/15 – 1/20 HP	1,064	46	motor	64,814	48,944	76%
ECM motor 1/47 HP	16W	408	60	motor	85,540	24,480	29%
VFD and motor	1 HP	2,819	3 (3hp)	motor	8,457	8,457	100%
Total					**157,811**	**81,881**	**52%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Refrigeration Motors	157,811	81,881	52%	24.357	13.883	57%
Total	**157,811**	**81,881**	**52%**	**24.357**	**13.883**	**57%**

The ex-post gross energy savings are 81,881 kWh with an ex post gross peak demand reduction of 13.883 kW. The energy savings gross realization rate is 52%, demand realization rate 57%. The primary difference in the savings estimate:

Both the ex ante and ex post savings methods referenced the applicable TRM measure for ECM fan savings. The ex post savings for the first measure was based on the TRM measure bin size “1/15-1/20 HP” (0.05 to 0.07) for the 1/25 HP fan (0.04 HP). The ex ante savings may be based on the larger bin size at 1/5 HP.

The ex post savings for the second measure was based on the TRM measure bin size “16W“(0.02HP) for the 1/47 HP motor (0.02 HP). The ex ante savings may be based on the larger bin size at 1/5 HP.

2.41 157S and 243C

Project Summary

A program participant received Standard incentives from Ameren for replacing fluorescent linear tube lighting with more efficient LED linear lamps in a healthcare clinic building.

The ex-post gross energy savings are 158,655 kWh with an ex-post gross peak demand reduction of 30.14 kW. The energy savings gross realization rate is 102 %.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were verified via an email exchange with the trade ally, then an unscheduled site visit. The installed lighting location was the corridors and stairs. Verification of installed quantities was completed through the site visits and review of the detailed product invoices. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 4Lamp to LED Type B	283	283	114	42	4,860	1.14	111,846	112,891	101%
T8 UTube2L to LED Type B	109	109	56	36	4,860	1.14	11,336	12,078	107%
CFL to LED Non-Linear LED	160	160	50	12	4,860	1.14	31,617	33,686	107%
Total							**154,799**	**158,655**	**102%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	154,799	158,655	102%	29.41	30.14	102%
Total	**154,799**	**158,655**	**102%**	**29.41**	**30.14**	**102%**

Site-Level Estimation of Ex Post Gross Savings

The ex-post energy savings totaled 158,655 kWh, with a gross energy and demand savings realization rate of 102 %.

2.42 158S and 159S

Project Summary

A program participant received prescriptive incentives from Ameren for replacing (5) packaged air conditioning units with (5) new units that exceed the building code minimum efficiency requirement, and added demand control ventilation to the zones with the new air conditioning units in an office building.

The ex post gross energy savings are 113,717 kWh with ex post gross coincident reductions of 79.97 kW. The energy savings gross realization rate is 74%.

Measurement and Verification Effort

ADM staff consolidated relevant project documentation within the program implementer's database and supplemented key parameters for estimating energy savings by incorporating additional data sources. These sources included equipment submittals, mechanical drawings, AMI interval billing data, participant emails, and on-site visits. A review of the ex ante savings methodology led to either adopting the original savings basis or developing an alternative methodology. Factors considered in this process included defining the appropriate baseline, evaluating the availability of site-specific historical trended data, and determining the most accurate estimate of actual energy savings.

The method for this sampled project is sourced from the TRM measure, *2.5.8 Single Package and Split Unitary Air Conditioner,* as follows:

$$\Delta kWh = \left[\frac{1}{IEER_{base}} - \frac{1`}{IEER_{eff}}\right] x\ kBTUh\ x\ EFLH_{cooling}\ x\ Quantity$$

The demand control ventilation savings method is sourced from the TRM measure, *2.5.3 Demand Control Ventilation*, as follows:

$$\Delta kWh = Area\ (kSF) x\ ESF$$

The variables for the energy savings calculation are summarized in the following table.

HVAC Measure Key Parameters and Energy Savings

Inputs	Description	Values		Ex Post Source
		Ex Ante	**Ex Post**	
HVAC Parameters				
Basis of savings	Savings Methodology	Ameren TRM		2.5.8 Single Package and Split Unitary Air Conditioner
$IEER_{base}$	240 kBTU to 760 kBTU	11.4	11.6	TRM (IECC2015/2018)-electric heat
$IEER_{base}$	135 kBTU to 240 kBTU	12.2	12.4	TRM (IECC2015/2018)-electric heat
$EFLH_{cool}$	Medium office building	1386		Ameren MO TRM HVAC
$IEER_{eff}$	480 kBTU, 4 units	15.7		AHRI ratings

Site-Level Estimation of Ex Post Gross Savings

Inputs	Description	Values		Ex Post Source
		Ex Ante	**Ex Post**	
$IEER_{eff}$	174 kBTU, 1 unit	14.7		AHRI ratings
$kWh_{savings}$	480 kBTU, 4 units; kWh	45,893	59,909	Model tag 480 kBTU vs 454 kBTU
$kWh_{savings}$	174 kBTU, 1 unit; kWh	2,554	3,043	Electric heat baseline IEER 12.4
Demand Control Ventilation				
Basis of savings	Savings Methodology	Ameren TRM		2.5.3 Demand Control Ventilation
Area	KSF	55		Floor plans
$ESF_{cooling}$		N/A	611	TRM table-Mid rise office
$ESF_{heating}$		N/A	312	TRM table-Mid rise office
Not Evaluated as a Baseline				
$IEER_{base}$	240 kBTU to 760 kBTU	13.2		Federal Regulations 2023
$IEER_{base}$	135 kBTU to 240 kBTU	14.2		Federal Regulations 2023

*installed unit efficiency did exceed Federal Regulations 2023

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Prescriptive HVAC	152,672	113,717	74%	90.394	79.868	88%
Total	**152,672**	**113,717**	**74%**	**90.394**	**79.868**	**88%**

The ex post gross energy savings are 113,717 kWh with ex post gross coincident reductions of 79.87 kW. The energy savings gross realization rate is 74%, and the demand realization rate is 88%. The ex ante demand control ventilation savings method did not express the savings factors per 1,000 square feet. The ex post savings method sourced the values for cooling and electric resistance heating from the TRM table for a mid-rise office building in St. Louis. The peak demand savings realization rate, higher than the energy rate is due to disaggregating the demand control ventilation end use to both cooling and heating for their respective energy savings; whereas the ex ante method assigned the HVAC end use factor to the sum of the energy savings.

2.43 160S and 161S

Project Summary

A program participant received incentives from Ameren for replacing (3) packaged air conditioning units with more efficient units and adding demand control ventilation by CO_2 sensing return air in a religious/school building.

The ex post gross energy savings are 178,338 kWh with ex post gross coincident reductions of 105.20 kW. The energy savings gross realization rate is 130%.

Measurement and Verification Effort

ADM staff consolidated relevant project documentation within the program implementer's database and supplemented key parameters for estimating energy savings by incorporating additional data sources. These sources included equipment submittals and the mechanical drawings. A review of the ex ante savings methodology led to either adopting the original savings basis or developing an alternative methodology. Factors considered in this process included defining the appropriate baseline, evaluating the availability of site-specific historical trended data, and determining the most accurate estimate of actual energy savings. During the site visit, it was determined there is not a BMS system to obtain trended data, as the control system is within the new packaged air conditioning units, without a viewable interface.

The method for this sampled project is sourced from the TRM measure, 2.5.8 Single Package and Split Systems, as follows:

$$\Delta kWh = \left[\frac{1}{IEER_{base}} - \frac{1`}{IEER_{eff}}\right] x\ kBTUh\ x\ EFLH_{cooling}\ x\ Quantity$$

The demand control ventilation savings method is sourced from the TRM measure, *2.5.3 Demand Control Ventilation*, as follows:

$$\Delta kWh = Area\ (kSF) x\ ESF$$

Although, the current building energy code for this county is IECC2021, the change occurred in the year 2023, which overlapped the period for specifying and purchasing the packaged air conditioning equipment, defaulting to previous IECC2018. The savings baseline is sourced from the TRM which references IECC2015/2018 code requirements.

The variables for the energy savings calculation are summarized in the following table.

HVAC Measure Key Parameters and Energy Savings

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
HVAC Parameters				

Basis of savings	Savings Methodology	Ameren TRM	Ameren TRM	2.5.8 Single Package and Split Unitary Air Conditioner
$IEER_{base}$	240 kBTU to 760 kBTU	11.4	11.6	TRM (IECC2015/2018)-electric heat
$IEER_{base}$	65 kBTU to 135 kBTU	12.6		TRM (IECC2015/2018)
$IEER_{base}$	240 kBTU to 760 kBTU	11.4		TRM (IECC2015/2018)
$EFLH_{cooling}$	Cooling hours	N/A	1195	TRM-primary school
$IEER_{efficient}$	720 kBTU, 2 units	17.6		AHRI & submittals
$IEER_{efficient}$	123kBTU, 1 unit	14.6		AHRI & submittals
$IEER_{efficient}$	278 kBTU, 1 unit	13		AHRI & submittals
$kWh_{savings}$	720 kBTU, 2 units, kWh	41,538	50,572	720 kBTU model tag vs 640 kBTU
$kWh_{savings}$	123 kBTU, 1 unit, kWH	1,353	1,598	123 kBTU model tag vs 118 kBTU
$kWh_{savings}$	278 kBTU, 1 unit, kWH	3,027	3,587	278 kBTU model tag vs 266 kBTU
Demand Control Ventilation				
Area	Building conditioned area, kSF	48		Real estate records
$ESF_{cooling}$	Energy savings factor	NA	774	TRM Religious building 774 kWh per kSF
$kWh_{savings}$	DCV energy savings, kWh	90,960	122,581	

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard HVAC	136,878	178,338	130%	82.202	105.201	128%
Total	**136,878**	**178,338**	**130%**	**82.202**	**105.201**	**128%**

The ex post gross energy savings totaled 178,338 kWh, with ex post gross coincident peak demand reductions of 105.201 kW. The energy savings gross realization rate was 130%, and the demand realization rate was 128%.

The reason for the difference between ex post and ex ante savings is unclear. Both the ex ante and ex post savings are based on the TRM algorithmic inputs. Inputs for base efficiency, installed efficient equipment, and building area are visible, but other factors such as the Energy Savings Factor (ESF) and Effective Full Load Hours (EFLH) are not explicitly stated.

2.44 162S and 163S

Project Summary

A program participant received Standard incentives from Ameren for retrofitting fluorescent linear tube lighting with more efficient LED linear lamps and replacing (5) packaged air conditioning units with (5) above building code compliant units in a retail store building.

The ex post gross energy savings are 134,230 kWh with an ex post gross peak demand reduction of 31.00 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were determined by the store operating hours and the extra hours for stocking identified by the store manager during the site visit, less four holidays. Verification of installed quantities was completed through the site visits and review of the detailed project invoices. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of Section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	**Efficient**	**Base**	**Efficient**					
T8 4ft 4L to LED Fixture	2	2	114	53.1	4,550	1.08	548	599	109%
T8 4ft 4L to LED Fixture	2	2	114	53.1	4,550	1.08	548	599	109%
T8 4ft 4L to LED Fixture	3	3	114	32.2	4,550	1.08	1,146	1,206	105%
T8 4ft 4L to LED Fixture	4	4	114	32.2	4,550	1.08	1,528	1,608	105%
T5HO 4ft 4L to LED Fixture	67	67	234	49.5	4,550	1.08	60,362	60,744	101%
T5HO 4ft 4L to LED Fixture	23	23	234	49.5	4,550	1.08	20,722	20,853	101%
T5HO 4ft 2L to LED Fixture	4	4	120	99	4,550	1.08	411	413	100%
T5HO 4ft 2L to LED Fixture	7	7	120	99	4,550	1.08	720	722	100%
T5HO 4ft 4L to LED Fixture	28	28	234	49.5	4,550	1.08	25,226	25,386	101%
T5HO 4ft 4L to LED Fixture	10	10	234	49.5	4,550	1.08	9,009	9,066	101%
Exit Sign CFL to LED Exit Sign	13	13	21	3	8,760	1.08	2,193	2,214	101%
No existing sensor to Fixture Mounted Occupancy Sensor	35	35	60	60	4,550	1.08	2,468	2,477	100%
Total							**124,881**	**125,885**	**101%**

Site-Level Estimation of Ex Post Gross Savings

Savings for the packaged air conditioner were estimated with the TRM algorithm and referenced the code compliant unit for the baseline.

HVAC Equipment Energy Savings

Measure	Qty	Capacity kBTU	Efficiency		EFLH	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
			Base	Efficient				
Packaged air conditioner	5	114	12.6	15.5	986	8,912	8,345	94%
Total						**8,912**	**8,345**	**94%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard Lighting	124,881	125,885	101%	23.6	23.4	99%
Standard HVAC	8,912	8,345	94%	8.12	7.60	94%
Total	**133,793**	**134,230**	**100%**	**31.73**	**31.00**	**98%**

The ex post energy savings totaled 134,230 kWh, with a gross energy savings realization rate of 100%. The peak demand ex post savings of 31.00 kW were similar to the total ex ante savings of 31.73 kW.

2.45 164S and 223C

Project Summary

Through a project represented by sample ID 164 and 223, a program participant received standard and custom incentives from Ameren implementing energy conservation measures identified in the retro-commissioning study. For this project, the participant enabled demand control ventilation for RTUs 1 to 5.

The ex-post gross energy savings are 783,476 kWh with an ex post gross peak demand reduction of 311 kW. The energy savings gross realization rate is 102%.

Measurement and Verification Effort

ADM staff consolidated relevant project documentation within the program implementer's database and supplemented key parameters for estimating energy savings by incorporating additional data sources. These sources included equipment submittals, mechanical drawings, and a post installation virtual site visit. A review of the ex-ante savings methodology led to either adopting the original savings basis or developing an alternative methodology. Factors considered in this process included defining the appropriate baseline, evaluating the availability of site-specific historical trended data, and determining the most accurate estimate of actual energy savings.

During the virtual visit with the trade ally who completed the RCx study and ECM measure implementation, data was reviewed to support the persistence of the following programming revisions in the BAS:

- RTU 1-5: Scheduled weekend off
- RTU 1-5: Minimum fan speed lowered
- RTU 2, 3, 4: Static pressure reset based on damper position
- Economizer setpoint adjusted from 55°F to 65°F

The pre and post conditions were verified in the trade ally's weather bin analysis. Also, the following item was verified.

- Weather data normals sourced from TMYx

The data was modeled in the bin tool to account for the implemented changes.

Pre and Post Model Energy Usage by RTU

Unit	Energy (kWh)		
	Pre	Post	Savings
RTU-1	225,039	40,122	184,917
RTU-2	132,617	47,364	85,253
RTU-3	315,489	68,358	247,131
RTU-4	64,795	34,474	30,321
RTU-5	885,736	221,299	664,437

After these measures were finalized, demand control ventilation (DCV) was implemented for the area covered by these units. Savings were determined using the prescriptive method, calculated as area (54,500 square feet)/1000 × savings factor.

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	664,437	664,437	100%	295.00	295.00	100%
Standard DCV	103,278	103,278	100%	14.51	16.42	113%
Total	**769,637**	**783,476**	**102%**	**309.51**	**311.42**	**100%**

The ex-post energy savings totaled 783,476 kWh, with a gross energy savings realization rate of 102%.

2.46 165S

Project Summary

A program participant received Custom incentives from Ameren for retrofitting fluorescent linear tube lighting with more efficient LED linear lamps and occupancy sensor installation in a retail store building.

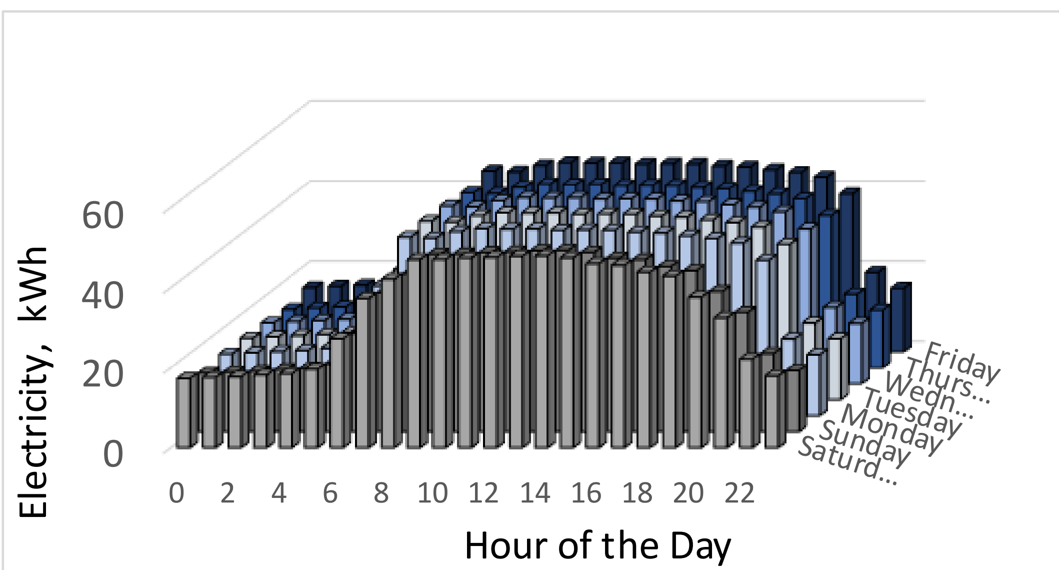
The ex post gross energy savings are 98,128 kWh with an ex post gross-peak demand reduction of 18.372 kW. The energy savings gross realization rate is 95%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were determined through the AMI interval database modeling *Equation 3*, and reviewed with the store manager during the site visit. Verification of installed quantities was completed through site visit and detailed project invoices. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The interval billing data and weather data modeling of facility energy (*Equation 3*), adjusted to exclude heating and cooling energy usage, is summarized in the following figure by both day of the week and hour of the day. The model was referenced during the site visit to inform the characterization of lighting usage areas, particularly those fully lit during operating hours.

Facility Energy Usage, non-weather dependent



The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 2L to LED Retrofit Kit	5	5	59	34	5,100	1.08	683	689	101%
T8 4ft 6LHB to LED Fixture	105	105	221	111	5,100	1.08	63,028	63,513	101%
T8 4ft 4L to LED Retrofit Kit	43	43	114	56	5,100	1.08	15,017	13,737	91%
T8 4ft 2L to LED Retrofit Kit	2	2	59	28	5,100	1.08	361	341	95%
T8 2ft 2L to LED Fixture	35	35	32	20	5,100	1.08	2,292	2,294	100%
T8 4ft 2L to LED Retrofit Kit	25	25	59	34	5,100	1.08	3,411	3,443	101%
T8 4ft 2L to LED Retrofit Kit	6	6	59	34	5,100	1.08	819	826	101%
T8 4ft 2L to LED Fixture	1	1	59	60	5,100	1.08	71	-6	-8%
T8 4ft 4L to LED Fixture	2	2	114	60	5,100	1.08	743	595	80%
T8 4ft 4L to LED Retrofit Kit	30	30	114	46	5,100	1.08	11,132	11,236	101%
No existing sensor to Remote Mounted Occupancy Sensor	4	4	276	276	5,100	1.08	5,784	1,459	25%
Total							**103,341**	**98,128**	**95%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	103,341	98,128	95%	19.6	18.4	94%
Total	**103,341**	**98,128**	**95%**	**19.6**	**18.4**	**94%**

The ex post energy savings totaled 98,128 kWh, with a gross energy savings realization rate of 95%. The peak demand ex post savings of 18.4 kW were lower than the ex ante savings of 19.6 kW.

The primary cause of the variance between the ex ante and ex post savings was differences in efficient wattages and the connected load for the occupancy sensors. The confirmed efficient wattages for the measures in rows three, four, eight, and nine (56W, 28W, 60W, and 60W, respectively) were higher than the ex ante wattages (50W, 26W, 46W, and 46W, respectively).

Additionally, the controlled wattage per occupancy sensor (276W) was lower than the ex ante controlled wattage (1,104W). The application assumed that each sensor controlled the total wattage of 1,104W.

2.47 166S

Project Summary

A program participant received incentives from Ameren for adding demand control ventilation controls to their existing air conditioning equipment at an elementary school building.

The ex post gross energy savings are 103,278 kWh with ex post gross coincident reductions of 45.85 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

While completing other retro commissioning measures, demand control ventilation was also installed in existing air handling equipment. The outdoor air ventilation rate was lowered in response to CO_2 level detection with the return air ducts. The TRM measure for demand control ventilation was referenced in the ex ante and ex post savings method, then validated with BAS building automation system trended data for each of the five rooftop units conditioning the school.

The method for this sampled project is sourced from the TRM measure, *2.5.3 Demand Control Ventilation*, as follows:

$$\Delta kWh = Area\ (kSF) x\ ESF$$

The product of the school building area with demand control ventilation, (58.6 kSF) and the sum of the savings factor for both cooling (481) and electric resistance heating (1298) is 103,278 kWh.

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
HVAC : DCV	103,278	103,278	100%	45.854	45.854	100%
Total	**103,278**	**103,278**	**100%**	**45.854**	**45.854**	**100%**

The ex post gross energy savings are 103,278 kWh with ex post gross coincident reductions of 45.85 kW. The energy and demand savings gross realization rate are 100%.

2.48 167S, 168S, 245C, and 246C

Project Summary

Through a project represented by sample ID 167, 168, 245, and 246, a program participant received standard and new construction custom incentives from Ameren for installing lighting with a total wattage less than the allowed code total wattage based on the building square feet. Also, HVAC equipment was installed exceeding the minimum code efficiency.

The ex post gross energy savings are 85,630 kWh with ex post gross coincident reductions of 43.52 kW. The energy savings gross realization rate is 98%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets, the DLC Qualified Products List, the construction lighting submittals and from the CodeCheck system. Lighting hours of use for each type of usage area was determined during the site visit, along with the control method. Verification of the installed quantity was completed during the site visit. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings. The weighted annual hours include the indoor parking garage illuminated 24/7, shared areas 24/7, hours for work areas with occupancy sensors reduced by 24%.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Total Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
LPD to LED Fixtures	1	1	18797	15899	5,300	1.06	37,949	37,718	99%
Total							**37,949**	**37,718**	**99%**

The energy savings for the sampled HVAC upgrade project were calculated using TRM Measure *2.5.8 Single Package and Split Systems*, as follows:

$$\Delta kWh = \left[\frac{1}{IEER_{base}} - \frac{1`}{IEER_{eff}}\right] x\ kBTUh\ x\ EFLH_{cooling}\ x\ Quantity$$

The savings method developed by the program implementer for increasing outdoor economizer periods—from code-compliant dry bulb controls to enthalpy control—was reviewed for the ex post savings. Revisions to the implementer’s weather bin modeling are noted in the following table.

HVAC Measure Key Parameters and Energy Savings

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Basis of savings	Savings Methodology	Ameren TRM & Weather bin model		TRM 2.5.8 Packaged Unitary AC Weather bin model
HVAC Parameters				
$IEER_{base}$	RTU2 code compliant efficiency	14.4	14.2	TRM (IECC2015/2018)
EFLH	Typical meteorological year weather	TMY	TMYx	Revised model with TMYx
All others	Capacity, quantity, efficiency	Equal	Equal	IECC2015, submittal specs
Not Evaluated as Baseline (all units exceed Federal Regulations 2023 efficiency)				
$IEER_{base}$	65 kBtu to 135 kBtu, gas	14.6		Federal Regulations 2023
$IEER_{base}$	135 kBtu to 240 kBtu, gas	14.0		Federal Regulations 2023
$IEER_{base}$	240 kBtu to 760 kBtu, gas	13.0		Federal Regulations 2023

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
HVAC Prescriptive	49,831	47,912	96%	35.368	36.351	103%
Lighting Custom - NC	37,949	37,718	99%	7.21	7.17	99%
Total	**87,780**	**85,630**	**98%**	**42.577**	**43.516**	**102%**

The ex post energy savings totaled 85,630 kWh, with a gross energy savings realization rate of 98% and a demand realization rate of 102%.

The baseline for HVAC savings is from the TRM measure *2.5.8 Single Package and Split System Unitary Air Conditioners,* which specifies the local building code. The installed units exceeded the Federal Efficiency Guidelines for equipment manufactured after January 2023, but the baseline for energy savings is the lesser code based IEER efficiency level.

2.49 169S and 170S

Project Summary

A program participant received Standard incentives from Ameren for replacing fluorescent linear tube lighting with more efficient LED linear lamps in an office building.

The ex post gross energy savings are 77,714 kWh with an ex post gross peak demand reduction of 14.76 kW. The energy savings gross realization rate is 102%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. The lighting hours of use were verified during the site manager interview. Verification of installed quantities was completed through review of the detailed project invoices. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 2L to LED Type B	230	230	82	19	2,040	1.04	31,628	30,742	97%
T12 4ft 4L to LED Type B	20	20	164	38	2,040	1.04	5,501	5,346	97%
T12 4ft 4L to LED Retrofit Kit	5	5	164	24.4	2,040	1.04	1,528	1,481	97%
T12 4ft 4L to LED Type B	137	137	164	38	2,040	1.14	37,680	40,145	107%
Total							**76,337**	**77,714**	**102%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	76,337	77,714	102%	14.5	14.76	102%
Total	**76,337**	**77,714**	**102%**	**14.5**	**14.76**	**102%**

The ex post energy savings totaled 77,714 kWh, with a gross energy savings realization rate of 102%. The peak demand ex post savings of 14.76 kW were higher than the ex ante savings of 14.5 kW.

2.50 171S

Project Summary

A program participant received Standard incentives from Ameren for upgrading the (3) constant speed fans for the cooling towers with VFD variable speed controls in a public service building.

The ex-post gross energy savings are 71,744 kWh with an ex post gross peak demand reduction of 31.934 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

The fan control method was identified via email exchange with the trade ally. The existing cooling tower fans receive the same start stop signal and operated together for the heat rejection process for the water cooled chillers.

For this project, savings were estimated using the algorithm and inputs from the TRM measure, *2.8.5 Variable Frequency Drives for Pumps and Fans on Hydronic HVAC Systems,* as follows:

$$\Delta kWh = \frac{BHP}{Efficiency_{motor}}\ x\ (Hours\ )\ x\ ESF\ xQty$$

Where :

BHP , brake horsepower =50

Qty, quantity fans =3

ESF, cooling tower fans = 0.126

Motor efficiency = 0.93

Hours, other building category =3,539

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard VFD	71,925	71744	100%	31.934	31.853	100%
Total	**71,925**	**71744**	**100%**	**31.934**	**31.853**	**100%**

The ex-post gross energy savings are 71,744 kWh with an ex post gross peak demand reduction of 31.934 kW. The energy and savings gross realization rate are 100%.

2.51 172S

Project Summary

A program participant received Standard incentives from Ameren for replacing fluorescent linear tube lighting with more efficient LED linear lamps in an industrial building.

The ex-post gross energy savings are 62,328 kWh with an ex post gross peak demand reduction of 11.84 kW. The energy savings gross realization rate is 97%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were verified with the maintenance shop manager for the shop and warehouse area. Verification of installed quantities was completed by review of the detailed project invoices. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T5 4ft 6L to LED HB Fixture	155	155	192	97	4,070	1.04	64,126	62,328	97%
Total							**64,126**	**62,328**	**97%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	64,126	62,328	97%	12.18	11.84	97%
Total	**64,126**	**62,328**	**97%**	**12.18**	**11.84**	**97%**

The ex post energy savings totaled 62,328 kWh, with a gross energy savings realization rate of 97%. The peak demand ex post savings of 11.84 kW were lower than the ex ante savings of 12.18 kW.

The primary cause of the variance between the ex ante and ex post savings was the difference in waste heat factors used in the evaluation. The ex post waste heat factor for the DX cooled and gas heated industrial facility (1.04) was lower than the ex ante factor (1.07).

2.52 173S and 174S

Project Summary

A program participant received Standard incentives from Ameren for replacing fluorescent linear tube lighting with more efficient LED linear lamps in an office building.

The ex post gross energy savings are 46,635 kWh with an ex post gross peak demand reduction of 8.86 kW. The energy savings gross realization rate is 74%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were first checked with the published operating hours, then contacted the participant to determine the difference in the application stated hours. Verification of installed quantities was completed through a review of detailed project invoices and during the participant phone interview. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 4L to LED Type B	98	98	164	38	3,120	1.11	57,870	42,764	74%
T12 8ft 2L to LED Type B	17	17	138	80	3,120	1.11	4,620	3,415	74%
T12UTube1L to LED Type A/B	4	4	48	15	3,120	1.11	618	457	74%
Total							**63,108**	**46,635**	**74%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	63,108	46,635	74%	11.99	8.86	74%
Total	**63,108**	**46,635**	**74%**	**11.99**	**8.86**	**74%**

The ex post energy savings totaled 46,635 kWh, with a gross energy savings realization rate of 74%. The peak demand ex post savings of 8.86 kW were lower than the ex ante savings of 11.99 kW.

Site-Level Estimation of Ex Post Gross Savings

The primary cause of the variance between the ex ante and ex post savings was the difference in hours of use. The confirmed ex post hours of use (3,120) were lower than the ex ante hours of use (4,380).

2.53 175S

Project Summary

A program participant received standard incentives for replacing existing cased door refrigeration units with ENERGY STAR rated multi door units in a retail store building.

The ex-post gross energy savings are 36,095 kWh with an ex post gross peak demand reduction of 4.90 kW. The energy savings gross realization rate is 59%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating refrigeration equipment energy savings. The baseline for cased door medium temperature and low temperature refrigeration units is set by the federal efficiency guidelines, variable by volume of unit, interior temperature and type of door.

The baseline of savings for ENERGY STAR refrigerator and freezer by volume are found in the Ameren TRM measure *2.9.1 Commercial Sold & Glass Door Refrigerators and Freezers*, for equipment manufactured after the year 2017. The efficient case of savings by equipment model is found in the ENERGY STAR database for commercial refrigerators and freezers. The following formula from the Ameren TRM was referenced to estimate the savings.

$$kWh = \left[(A\,x\,V + B)base - \left(\frac{kWh}{day}\right)ES\right]x\ Days$$

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings. All measures are based on operating 365 days per year.

Case Refrigeration Units Key Parameters and Energy Savings

Refrigerated Case Model/Door Type	QTY	Refrigeration Type		Base Model Energy per day	ENERGY STAR kWh per day	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
		Ex Ante	Ex Post					
TRM3M Glass door	2	Freezer	Refrigerator	0.1V + 0.86 116 kWh	7.1 kWh	11,768	3,897	33%
TRM4M Glass door	4	Freezer	Freezer	0.29V + 2.95 154 kWh	33.6 kWh	23,537	20,672	88%
TRM4L Glass door	4	Freezer	Refrigerator	0.1V + 0.86 16.3 kWh	8.7 kWh	23,537	11,178	47%
T-49-HC Solid door	1	Freezer	Refrigerator	0.05V + 1.36 3.5 kWh	2.6 kWh	2,403	348	14%
Total						**61,245**	**36,095**	**59%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	61,245	36,095	59%	8.31	4.900	59%
Total	**61,245**	**36,095**	**59%**	**8.31**	**4.900**	**59%**

The ex-post gross energy savings are 36,095 kWh with an ex post gross peak demand reduction of 4.90 kW. The energy and demand savings gross realization rate are 59%. The primary difference in the energy savings are:

The ex ante and ex post savings both referenced the federal guidelines for day energy consumption by the volume of the unit and type of refrigeration. The applicant selected “freezer” for the type of refrigeration for all of the units. The ex post savings reviewed the product specification for the model numbers ending in “M” for medium temperature refrigerator and “L” for low temperature freezer, and selected the appropriate algorithm for the baseline case.

2.54 176S and 177S

Project Summary

A program participant received Custom incentives from Ameren for retrofitting fluorescent linear tube lighting with more efficient LED linear lamps and occupancy sensor installation in a banking building.

The ex-post gross energy savings are 60,171 kWh with an ex post gross peak demand reduction of 11.43 kW. The energy savings gross realization rate is 99%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. The lighting hours operating at 24/7 were verified during an email exchange with the participant for the common areas and elevators. Verification of installed quantities was completed through a review of the detailed project invoices. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 2L to LED Type B	150	150	59	19	8,760	1.06	56,239	55,714	99%
T8 2ft 2L to LED Type B	12	12	32	18	8,760	1.06	1,575	1,560	99%
T8 U-Tube 2L to LED Type A/B	12	12	56	30	8,760	1.06	2,924	2,897	99%
Total							**60,738**	**60,171**	**99%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	60,738	60,171	99%	11.54	11.43	99%
Total	**60,738**	**60,171**	**99%**	**11.54**	**11.43**	**99%**

The ex post energy savings totaled 60,171 kWh, with a gross energy savings realization rate of 99%. The peak demand ex post savings of 11.43 kW were lower than the ex ante savings of 11.54 kW

Site-Level Estimation of Ex Post Gross Savings

2.55 178S

Project Summary

A program participant received Standard incentives from Ameren for retrofitting fluorescent linear tube lighting with more efficient LED linear lamps, occupancy sensor installation in an office building.

The ex post gross energy savings are 59,463 kWh with an ex post gross peak demand reduction of 11.3kW. The energy savings gross realization rate is 99%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were verified through follow-up emails with the participant. Verification of installed quantities was completed through review of the detailed project invoices and an email correspondence with the participant. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T5HO 4ft 2L to LED Type B	260	260	120	48	2,080	1.06	41,664	41,274	99%
T8 4ft 4L to LED Type B	125	125	114	48	2,080	1.06	18,361	18,190	99%
Total							**60,025**	**59,463**	**99%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	60,025	59,463	99%	11.4	11.3	99%
Total	**60,025**	**59,463**	**99%**	**11.4**	**11.3**	**99%**

The ex post energy savings totaled 59,463 kWh, with a gross energy savings realization rate of 99%. The peak demand ex post savings of 11.3 kW were lower than the ex ante savings of 11.4 kW.

2.56 179S and 180S

Project Summary

A program participant received Standard incentives from Ameren for replacing HID fixtures with efficient LED fixtures in warehouse building and office building.

The ex-post gross energy savings are 50,915 kWh with an ex-post gross peak demand reduction of 5.21 kW. The energy savings gross realization rate is 91 %.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were determined from follow-up emails with participant. Verification of installed quantities was completed through a review of the detailed project invoices. The HVAC type for each building was confirmed by the participant. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T5 HO - 4 ft - 4 Lamp to LED Fixture	13	13	234	155	4,642	0.93	4,803	4,434	92%
T8 - 4 ft - 6 L High Bay to LED Fixture	6	6	221	155	4,642	0.93	1,852	1,710	92%
T8 - 4 ft - 2 Lamp to LED Fixture	24	24	59	30	2,700	1.02	1,879	1,917	102%
T5 HO - 4 ft - 6 Lamp to LED Fixture	19	19	360	155	4,642	0.93	18,217	16,815	92%
T5 HO - 4 ft - 4 Lamp to LED Fixture	8	8	234	155	4,642	0.93	2,956	2,728	92%
No existing occupancy sensor to Fixture Mounted Occupancy Sensor Controlling > 60 W	0	150	150	150	4,642	0.93	26,098	23,312	89%
Total							**55,805**	**50,915**	**91%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)	Coincident Peak Demand Savings (kW)

Site-Level Estimation of Ex Post Gross Savings

	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard Lighting	55,805	50,915	91%	10.60	5.24	49%
Standard HVAC	348	383	110%	0.317	0.170	54%
Total	**56,153**	**51,298**	**91%**	**10.918**	**5.414**	**50%**

The ex-post energy savings totaled 51,298 kWh, with a gross energy savings realization rate of 91 %. The peak demand ex-post savings of 5.41kW were fewer than the ex-ante savings of 10.91 kW. The primary cause of the lighting variance between the expected and realized savings is the difference in waste heat factors used in evaluation. The ex-post waste heat factor (0.93 and 1.02) for warehouse and small office with the HVAC type of heat pump is less than the ex-ante factor (1.07).

2.57 181S and 182S

Project Summary

Through a project represented by sample ID181, ID182, a program participant received prescriptive and from Ameren for replacing packaged air conditioning units, air source heat pumps and adding demand control ventilation to the kitchen area in a high school building.

The ex post gross energy savings are 62,585 kWh with ex post gross coincident reductions of 31.84 kW. The energy savings gross realization rate is 114%.

Measurement and Verification Effort

ADM staff consolidated relevant project documentation within the program implementer’s database and supplemented key parameters for estimating energy savings by incorporating additional data sources. These sources included equipment submittals, mechanical drawings, AMI interval billing data, participant emails, and on-site visits. A review of the ex-ante savings methodology led to either adopting the original savings basis or developing an alternative methodology. Factors considered in this process included defining the appropriate baseline, evaluating the availability of site-specific historical trended data, and determining the most accurate estimate of actual energy savings.

The savings analysis method for this sampled project is based on TRM Measure *2.5.8: Single Package and Split Systems*, as follows:

$$\Delta kWh = \left[\frac{1}{IEER_{base}} - \frac{1`}{IEER_{eff}}\right] x\ kBTUh\ x\ EFLH_{cooling}\ x\ Quantity$$

The method for estimating demand control ventilation for the areas covered by the HVAC units receiving CO_2 sensors and outdoor air damper controls, referenced from the TRM measure *2.5.3 Demand Control Ventilation:*

$$\Delta kWh = \frac{square\ feet}{1000}\ x\ SF$$

Lastly, savings for the reduction in conditioned kitchen hood makeup air were calculated using IL TRM v12 Measure *4.2.16 Kitchen Demand Ventilation* Controls.

$$\Delta kWh = hp_{exhaust\ fan}\ x\ SF$$

The variables for the energy savings calculation are summarized in the following table.

HVAC Measure Key Parameters and Energy Savings

Measure	Qty	Capacity ton	Efficiency IEER		EFLH	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
			Base	Efficient				
Packaged Heat pump	1	19 T	11.4	18.2	873	7,703	6,386	83%
Packaged Heat pump	2	10 T	11.8	18.6	873	7,673	6,362	83%
Packaged Heat pump	1	7 T	11.8	20.2	873	3,084	2,547	83%
Packaged AC	1	16 T	12.2	18.8	873	5,636	4,673	83%
Packaged AC	5	14 T	12.2	12.5	873	343	284	83%
Demand Control Ventilation								
Area	Qty	Size			SF			
Building	1	51SF			398	9,475	19,502	213%
Kitchen hood makeup air	1	5 hp			4,423	20,985	22,115	105%
Total						**54,899**	**62,870**	**115%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard HVAC	54,899	62,870	115%	30.658	31.841	104%
Total	54,899	62,870	115%	**30.658**	**31.841**	**104%**

The ex post gross energy savings totaled 62,870 kWh, with ex post gross coincident peak demand reductions of 31.841 kW. The energy savings gross realization rate was 114%, and the demand realization rate was 104%.

The difference between ex ante and ex post whole-building demand control ventilation savings was not identified. The ex post savings calculation referenced a building area of 50.8 kSF and the TRM energy savings factor of 398 kWh for cooling energy per 1,000 square feet."

2.58 183S

Project Summary

A program participant received prescriptive incentives from Ameren for replacing (6) air source heat pumps with new variable refrigerant flow (VRF) heat pumps exceeding the efficiency level set by the local building code in a retail store building.

The ex post gross energy savings are 52,425 kWh with ex post gross coincident reductions of 47.743 kW. The energy savings gross realization rate is 98%.

Measurement and Verification Effort

ADM staff consolidated relevant project documentation within the program implementer's database and supplemented key parameters for estimating energy savings by incorporating additional data sources. These sources included equipment submittals, mechanical drawings, and the AHRI directory. A review of the ex ante savings methodology led to either adopting the original savings basis or developing an alternative methodology. Factors considered in this process included defining the appropriate baseline, evaluating the absence of site-specific historical trended data, and determining the most accurate estimate of actual energy savings.

The method for this sampled project is sourced from the TRM measure, *2.5.8 Single Package and Split Systems* for the cooling savings, as the heating COP was similar for the existing and efficient, as follows:

$$\Delta kWh = \left[\frac{1}{IEER_{base}} - \frac{1`}{IEER_{eff}}\right] x\ kBTUh\ x\ EFLH_{cooling}\ x\ Quantity$$

The variables for the energy savings calculation are summarized in the following table.

HVAC Measure Key Parameters and Energy Savings

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Basis of savings	Savings Methodology	TRM	TRM	Ameren MO TRM 2.5.8 HVAC
HVAC Parameters				
$IEER_{base}$ COP_{base}	135 kBTU to 240 kBTU	11.4 IEER 3.2COP		TRM (IECC2015/2018)
$EFLH_{cool}$	Retail store building	986	986	Ameren MO TRM HVAC
$IEER_{eff}$	160 kBTU, 5 units	31.2		AHRI ratings
$IEER_{eff}$	138 kBTU, 1 unit	30.4		AHRI ratings
Not Evaluated as a Baseline(all units did exceed Federal Regulations 2023 efficiency)				
IEERbase	135KBTU to 240KBTU, 2 units	14.0		Federal Regulations 2023

Result

Site-Level Estimation of Ex Post Gross Savings

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Prescriptive HVAC	54,850	52,425	96%	49.94	47.74	96%
Total	54,850	52,425	96%	49.94	47.74	96%

The ex post gross energy savings are 52,425 kWh with ex post gross coincident reductions of 47.74 kW. The energy and demand gross savings realization rate are 96%.

2.59 184S and 185S

Project Summary

Through a project represented by sample IDs 184S and 185S, a program participant received incentives from Ameren for retrofitting fluorescent linear tube lighting with more efficient LED linear lamps in a warehouse building and office building.

The ex post gross energy savings are 52,590 kWh with an ex post gross peak demand reduction of 9.99 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. The lighting hours of use was verified with follow-up emails with the participant. Verification of installed quantities was completed through a review of the detailed project invoices and email correspondence with the participants. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12HO8ft2L to LED HB Fixture	7	7	227	158.3	2,080	1.04	1,059	1,040	98%
T12 4ft 4L to LED Type B	8	8	164	38	2,080	1.11	2,244	2,327	104%
T12 4ft 4L to LED 2x2 Fixture	56	56	164	31.5	2,080	1.11	16,452	17,131	104%
HID to LED HB Fixture	50	50	455	158.3	2,080	1.04	32,939	32,091	97%
Total							**52,694**	**52,590**	**100%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	52,694	52,590	100%	10.01	9.99	100%
Total	**52,694**	**52,590**	**100%**	**10.01**	**9.99**	**100%**

The ex post energy savings totaled 52,590 kWh, with a gross energy savings realization rate of 100%. The peak demand ex post savings of 9.99 kW were slightly lower than the ex ante savings of 10.01 kW.

2.60 187S, 188S, and 189S

Project Summary

Through a project represented by sample IDs 187S, 188S, and 189S, a program participant received custom incentives from Ameren for retrofitting fluorescent linear tube lighting with more efficient LED linear lamps and replacing HID fixtures with LED fixtures in a retail store building.

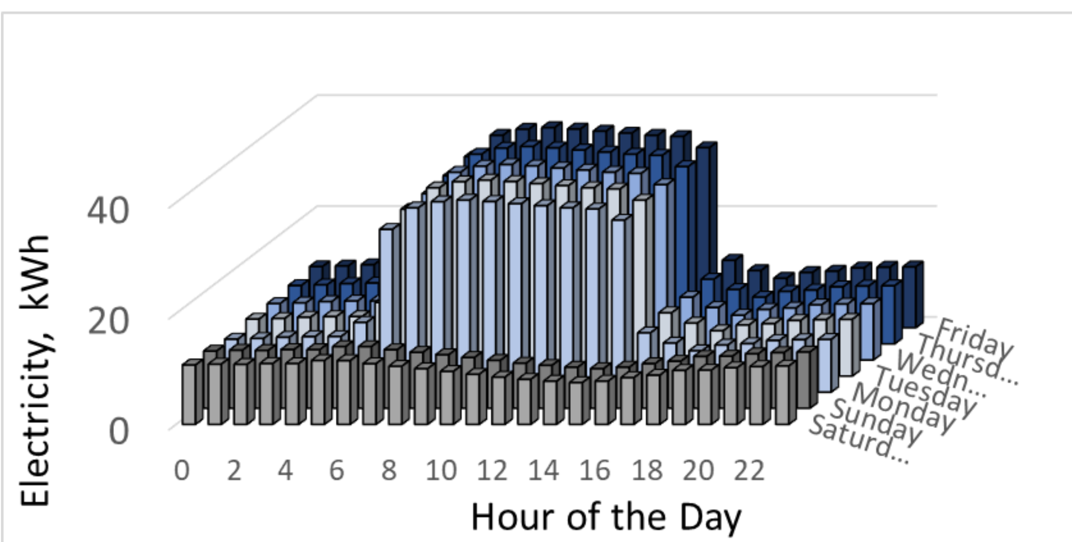
The ex post gross energy savings are 56,366 kWh with an ex post gross peak demand reduction of 5.82 kW. The energy savings gross realization rate is 118%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were determined AMI interval database modeling *Equation 3*, and a follow-up phone call with the participant. Verification of installed quantities was completed by a review of the detailed project invoices and a phone interview with the participant. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The interval billing data and weather data modeling of facility energy (*Equation 3*), adjusted to exclude heating and cooling energy usage, is summarized in the following figure by both day of the week and hour of the day. The model was referenced during the participant interview to inform the characterization of lighting usage areas, particularly those fully lit during operating hours.

Facility Energy Usage, non-weather dependent



The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	**Efficient**	**Base**	**Efficient**					
T8 UTube3L to LED Kit	1	1	89	26	1,820	1.06	126	122	96%
T8 UTube2L to LED Fixture	1	1	56	26	1,820	1.06	66	58	88%
T8 4ft 2L to LED Kit	2	2	59	22.3	1,820	1.06	154	142	92%
T8 4ft 3L to LED Kit	1	1	88	22.3	364	1.06	26	25	97%
T8 4ft 3L to LED Kit	63	63	88	22.3	1,820	1.06	8,173	7,985	98%
T8 4ft 4L to LED Kit	6	6	114	22.3	1,820	1.06	1,062	1,061	100%
T8 4ft 3L to LED Kit	5	5	88	22.3	1,820	1.06	649	634	98%
T8 4ft 3L to LED Kit	3	3	88	22.3	6,132	1.06	1,311	1,281	98%
T8 4ft 4L to LED Kit	1	1	114	22.3	1,820	1.06	177	177	100%
T8 4ft 2L to LED Kit	6	6	59	29	1,820	1.06	403	347	86%
T8 4ft 3L to LED Kit	6	6	88	29	1,820	1.06	720	683	95%
T8 2ft 2L to LED Fixture	1	1	32	26.3	1,820	1.04	22	11	49%
T8 4ft 1L to LED Fixture	1	1	32	26.3	1,820	1.06	22	11	50%
T8 4ft 4L to LED Fixture	213	116	114	87	1,820	1.04	25,826	26,859	104%
T8 4ft 1L to LED Kit	22	22	32	13.2	2,600	1.06	1,265	1,140	90%
T8 4ft 1L to LED Retrofit Kit	1	1	32	13.2	520	1.06	10	10	104%
T8 4ft 1L to LED Retrofit Kit	18	18	32	13.2	2,600	1.06	890	933	105%
T8 4ft 1L to LED Retrofit Kit	1	1	32	30.5	1,820	1.04	15	3	19%
T12 4ft 1L to LED Retrofit Kit	2	2	48	30.5	1,820	1.04	89	66	74%
T8 4ft 1L to LED Retrofit Kit	2	2	114	61	1,820	1.04	193	201	104%
No existing sensor to Fixture Mounted Occupancy Sensor	18	18	61	61	1,820	1.04	474	499	105%
No existing sensor to Fixture Mounted occupancy Sensor	116	116	87	87	1,820	1.04	4,360	4,585	105%
Total							**47,519**	**56,366**	**102%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	47,519	56,366	118%	9.03	5.82	64%

Site-Level Estimation of Ex Post Gross Savings

Total	47,519	56,366	**118%**	9.03	5.82	**64%**

The ex post energy savings totaled 56.366 kWh, with a gross energy savings realization rate of 118%. The peak demand ex post savings of 5.8 kW were lower than the ex ante savings of 9.03 kW.

The primary cause of the variance between the ex ante and ex post savings was the hours of use provided by the participant for each area during a phone interview were less than the ex ante hours.

2.61 190S, 191S, 192S

Project Summary

Through a project represented by sample IDs 190S, 191S, and 192S, a program participant received custom incentives from Ameren for retrofitting fluorescent linear tube lighting with more efficient LED linear lamps and replacing HID fixtures with LED fixtures in a healthcare building.

The ex post gross energy savings are 47,896 kWh with an ex post gross peak demand reduction of 9.1 kW. The energy savings gross realization rate is 103%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets, and the trade ally light survey. Lighting hours of use were verified with a follow-up email with participant. Verification of installed quantities was completed by a review of the detailed project invoices and an unscheduled site visit during normal operating hours. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 4Lamp to LED Fixture	66	66	114	30.91	3,036	1.11	17,795	18,481	104%
T8 4ft 3L to LED Fixture	93	93	88	30.91	3,036	1.11	17,221	17,892	104%
T8UTub2L to LED Fixture	48	48	56	26.6	3,036	1.11	4,522	4,756	105%
T8 4ft 2L to LED Type B	7	7	59	21	3,036	1.11	865	896	104%
T8 2ft 2L to LED Fixture	5	5	32	27	3,036	1.11	276	84	31%
T12 2ft 1L to LED Type B	10	10	28	9	3,036	1.11	584	640	110%
T8 3ft 3L to LED Type B	3	3	69	36	3,036	1.11	438	334	76%
HID to LED Fixture	14	14	114	12	3,036	1.11	4,638	4,812	104%
Total							**46,339**	**47,896**	**103%**

Result

Realized Gross Energy and Demand Savings

	Gross Energy Savings (kWh)	Coincident Peak Demand Savings (kW)

Measure Category	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	46,339	47,896	103%	8.8	9.1	103%
Total	**46,339**	**47,896**	**103%**	**8.8**	**9.1**	**103%**

The ex post energy savings totaled 47,896 kWh, with a gross energy savings realization rate of 103%. The peak demand ex post savings of 9.1 kW were higher than the ex ante savings of 8.8 kW.

The primary cause of the variance between the ex ante and ex post savings was the difference in the waste heat factor used in the evaluation. The ex post waste heat factor (1.11 for a health-care facility) was higher than the ex ante factor of 1.07.

2.62 193S

Project Summary

Through a project represented by sample ID 193S, a program participant received custom incentives from Ameren for retrofitting fluorescent linear tube lighting with more efficient LED fixtures in a manufacturing building.

The ex-post gross energy savings are 39,862 kWh with an ex post gross peak demand reduction of 7.57 kW. The energy savings gross realization rate is 86%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the trade ally post installation lighting survey. Lighting hours of use were verified through site fixture metering for the same usage area from a previous program year and a follow-up email with the engineering manager. Verification of installed quantities was completed through a review of the detailed project invoices and email correspondence with the participants. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	**Efficient**	**Base**	**Efficient**					
T8 4ft 2L to LED Linear Fixture	74	74	59	23.4	3,120	1.06	8,894	8,712	98%
T8 4ft 2L to LED Linear Fixture	6	6	59	23.4	3,120	1.06	720	706	98%
T8 4ft 2L to LED Retrofit Kit	8	8	59	23	3,120	1.06	962	952	99%
T8 4ft 4L to LED Retrofit Kit	4	4	114	31	3,120	1.06	1,109	1,098	99%
T8 4ft 4L to LED Retrofit Kit	4	4	114	31	3,120	1.06	1,109	1,098	99%
T8 4ft 4L to LED 2x2 Fixture	31	45	114	26.67	3,120	1.06	11,094	7,719	88%
T8 4ft 4L to LED 2x2 Fixture	5	5	114	26.67	3,120	1.06		1,444	
T8 UT 2L to LED 2x2 Fixture	4	4	56	26.67	3,120	1.06		388	
T12 4ft 2L to LED 2x2 Fixture	1	1	82	26.67	3,120	1.06		183	
T8 4ft 4L to LED 2x2 Fixture	75	174	114	26.67	3,120	1.06	22,341	12,929	79%
T8 4ft 4L to LED 2x2 Fixture	11	11	114	26.67	3,120	1.06		3,177	

Site-Level Estimation of Ex Post Gross Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Bas e	Efficien t	Base	Efficien t					
T8 UT 2L to LED 2x2 Fixture	15	15	56	26.67	3,120	1.06		1,455	
Total							**46,229**	**39,862**	**86%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	46,229	39,862	86%	8.78	7.57	86%
Total	**46,229**	**39,862**	**86%**	**8.78**	**7.57**	**86%**

The ex post energy savings totaled 39,862 kWh, with a gross energy savings realization rate of 86%. The peak demand ex post savings of 7.57 kW were lower than the ex ante savings of 8.78 kW.

The primary cause of the variance between the ex ante and ex post savings was an error in the expected savings for the second and third groupings of measures listed above. These measures were part of the redesign standard program, and the expected savings could not be recreated with the data provided in the post installation lighting survey.

2.63 194S

Project Summary

Through a project represented by sample ID 194S, a program participant received Standard incentives from Ameren for installing variable frequency drives, (3 VFD) to the motors for the cooling tower fans in an office building.

The ex post gross energy savings are 40,245 kWh with ex post gross coincident reductions of 36.65 kW. The energy savings gross realization rate is 98%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating equipment savings with additional data sources. These included AHRI data sheets, equipment submittals, engineering weather bins analysis, and photo documents. Additional contact, as necessary, was made with the project contact at the site and through scheduled site visits.

For this project, savings were estimated using the algorithm and inputs from the TRM measure, *2.8.5 Variable Frequency Drives for Pumps and Fans on Hydronic HVAC Systems,* as follows:

$$\Delta kWh = \frac{BHP}{Efficiency_{motor}} \; x \; (Hours \; x \; Diversity \; x \; Duty) \; x \; ESF \; xQty$$

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Basis of savings	Savings Methodology	Ameren TRM		2.8.5 Variable frequency drives for fans
HVAC Parameters				
BHP	Brake horsepower , one fan, hp	1	0	Spec sheets
Efficiency	Motor efficiency	0.9	0.95	
Hours	Annual hours, 8760	8760	8760	Large hotel
Diversity, Duty	2/3 and 0.65	Unknown	.6 x .65	TRM
ESF	Cooling tower fan	0.126	0.126	TRM
Qty	VFD	3	3	invoice

A program participant received incentives from Ameren for replacing (3) packaged air conditioning units with more efficient units and adding demand control ventilation by CO_2 sensing return air in a religious/school building.

The ex post gross energy savings are 178,338 kWh with ex post gross coincident reductions of 105.20 kW. The energy savings gross realization rate is 130%.

Measurement and Verification Effort

Site-Level Estimation of Ex Post Gross Savings

ADM staff consolidated relevant project documentation within the program implementer's database and supplemented key parameters for estimating energy savings by incorporating additional data sources. These sources included equipment submittals and the mechanical drawings. A review of the ex ante savings methodology led to either adopting the original savings basis or developing an alternative methodology. Factors considered in this process included defining the appropriate baseline, evaluating the availability of site-specific historical trended data, and determining the most accurate estimate of actual energy savings. During the site visit, it was determined there is not a BMS system to obtain trended data, as the control system is within the new packaged air conditioning units, without a viewable interface.

The method for this sampled project is sourced from the TRM measure, 2.5.8 Single Package and Split Systems, as follows:

$$\Delta kWh = \left[\frac{1}{IEER_{base}} - \frac{1`}{IEER_{eff}}\right] x\ kBTUh\ x\ EFLH_{cooling}\ x\ Quantity$$

The demand control ventilation savings method is sourced from the TRM measure, *2.5.3 Demand Control Ventilation*, as follows:

$$\Delta kWh = Area\ (kSF) x\ ESF$$

Although, the current building energy code for this county is IECC2021, the change occurred in the year 2023, which overlapped the period for specifying and purchasing the packaged air conditioning equipment, defaulting to previous IECC2018. The savings baseline is sourced from the TRM which references IECC2015/2018 code requirements.

The variables for the energy savings calculation are summarized in the following table.

HVAC Measure Key Parameters and Energy Savings

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
HVAC Parameters				
Basis of savings	Savings Methodology	Ameren TRM	Ameren TRM	2.5.8 Single Package and Split Unitary Air Conditioner
$IEER_{base}$	240 kBTU to 760 kBTU	11.4	11.4	TRM (IECC2015/2018)
$EFLH_{cooling}$	Cooling hours	1159		TRM-small office
$IEER_{efficient}$	375 kBTU, 2 units	16.1		AHRI & submittals
$kWh_{savings}$	375 kBTU, 2 units, kWh	22,451	22,236	375 kBTU model tag
Demand Control Ventilation				
Area	Building conditioned area, kSF	28		Real estate records
$ESF_{cooling}$	Energy savings factor	NA	649	TRM Low Rise Building
$kWh_{savings}$	DCV energy savings, kWh	18,456	18,012	

Site-Level Estimation of Ex Post Gross Savings

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	40,907	40,245	98%	37.253	36.651	98%
Total	**40,907**	**40,245**	**98%**	**37.253**	**36.651**	**98%**

The ex post gross energy savings are 40,245 kWh with ex post gross coincident reductions of 36.65 kW. The energy savings gross realization rate is 98%.

2.64 195S

Project Summary

A program participant received Standard incentives from for Ameren for installing efficient high volume low speed fan ventilation in a manufacturing building.

The ex post gross energy savings are 40,032 kWh with ex post gross coincident reductions of 17.773 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

High-volume, low-speed (HVLS) fans save energy by providing space temperature destratification and reducing the need for multiple pedestal floor-mounted fans. This site is a new construction project with no existing baseline. The fan meets the requirements of Ameren TRM Measure 2.5.9 for *High Volume low speed fans*, including the applicable blade diameter range and a VFD for speed control. Prescriptive savings per unit were referenced for this measure.

HVLS Fans Measure Key Parameters and Energy Savings

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Basis of savings	Savings Methodology	prescriptive		Ameren MO TRM 2.5.9 High Volume Low Speed Fan
VFD	Variable frequency drive required for measure compliance	Y	Y	TRM
Dia	Fan blade diameter	24’	24’	Specification sheet
kWh	Annual savings per fan	10,018	10,018	TRM
Measure savings	Fans x quantity	40,072	40,032	calculated

Result

Realized Gross Energy and Demand Savings

	Gross Energy Savings (kWh)	Coincident Peak Demand Savings (kW)

Site-Level Estimation of Ex Post Gross Savings

Measure Category	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
HVLS Fan	40,072	40,032	100%	17.791	17.774	100%
Total	40,072	40,032	100%	17.791	17.774	100%

The ex post gross energy savings are 40,072 kWh with ex post gross coincident reductions of 17.774 kW. The energy and demand savings gross realization rate are 100%.

2.65 196S

Project Summary

Through a project represented by sample ID 196S, a program participant received custom incentives from Ameren for retrofitting fluorescent linear tube lighting with more efficient LED linear lamps in a healthcare building.

The ex post gross energy savings are 37,518 kWh with an ex post gross peak demand reduction of 7.1 kW. The energy savings gross realization rate is 104%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were estimated based on the typical office hours of the various medical offices. Verification of installed quantities was completed through a review of the detailed project invoices. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 3L to LED Type B	250	250	88	36	2,600	1.11	36,166	37,518	104%
Total							**36,166**	**37,518**	**104%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	36,166	37,518	104%	6.87	7.13	104%
Total	**36,166**	**37,518**	**104%**	**6.87**	**7.13**	**104%**

The ex-post energy savings totaled 37,518 kWh, with a gross energy savings realization rate of 104 %. The peak demand ex-post savings of 7.13 kW were greater than the ex-ante savings of 6.87 kW. The primary cause of the variance between the expected and realized savings is the difference in waste heat factors used in the evaluation. The ex-post waste heat factor (1.11) for a healthcare facility is greater than the ex-ante factor (1.07).

2.66 197S

Project Summary

A program participant received Standard incentives from Ameren for adding VFD control to the motor for their condenser water pump in a large hotel building.

The ex-post gross energy savings are 48,673 kWh with an ex post gross peak demand reduction of 29.361 kW. The energy savings gross realization rate is 150%.

Measurement and Verification Effort

The condenser water pump was verified to run nearly continuously for this large multi story hotel building.

For this project, savings were estimated using the algorithm and inputs from the TRM measure, *2.8.5 Variable Frequency Drives for Pumps and Fans on Hydronic HVAC Systems,* as follows:

$$\Delta kWh = \frac{BHP}{Efficiency_{motor}}\ x\ (Hours\ )\ x\ ESFx\ LFxQty$$

Where :

BHP , brake horsepower =25

Qty, pump motors =1

ESF, hydronic pumps = 0.33890

Motor efficiency = 0.936

Hours, “large hotel building” = 8308

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Pump VFD	32,240	48,673	150%	29.360	44.326	150%
Total	32,240	48,673	150%	29.360	44.326	150%

The ex-post gross energy savings are 48,673 kWh with an ex post gross peak demand reduction of 44.326 kW. The energy and savings gross realization rate are 150%.

2.67 198S and 199S

Project Summary

Through a project represented by sample ID 198 and 199, a program participant received custom incentives from Ameren for retrofitting fluorescent linear tube lighting and HID high bay fixtures with more efficient LED linear retrofit kits and fixtures..

The ex-post gross energy savings are 30,874 kWh with an ex post gross peak demand reduction of 5.848 kW. The energy savings gross realization rate is 97%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were verified with the participant through a phone interview. Verification of installed quantities was completed through a review of the detailed project invoice. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T5 HO - 4 ft - 6 Lamp to Direct Wire (Type B)	27	27	360	144	2,080	1.04	12,980	12,616	97%
T12 - 8 ft - 2 Lamp to Direct Wire (Type B)	13	13	138	80	2,080	1.04	1,679	1,631	97%
Metal Halide to Direct Wire LED	55	55	284	145	2,080	1.04	17,015	16,538	97%
Total							31,674	30,784	97%

Result

Realized Gross Energy and Demand Savings

	Gross Energy Savings (kWh)	Coincident Peak Demand Savings (kW)

Site-Level Estimation of Ex Post Gross Savings

Measure Category	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	31,674	30,784	97%	6.017	5.848	97%
Total	31,674	30,784	97%	6.017	5.848	**97%**

The ex-post energy savings totaled 30,784 kWh, with a gross energy savings realization rate of 97%. The peak demand realization rate is also 97%.

2.68 200S

Project Summary

Through a project represented by sample ID 200, a program participant received custom incentives from Ameren for retrofitting fluorescent linear tube lighting with more efficient LED linear lamps.

The ex post gross energy savings are 17,083 kWh with an ex post gross peak demand reduction of 3.25 kW. The energy savings gross realization rate is 54%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were verified with the participant through a phone interview. Verification of installed quantities was completed through a review of the detailed project invoice. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of Section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 4L to LED Type B	76	76	114	42	2,548	1.08	27,783	15,058	54%
T8 4ft 2L to LED Type B	5	5	59	21	2,548	1.08	965	523	54%
T8 4ft 4L to LED Type B	3	3	114	42	2,548	1.08	1,097	594	54%
T8 4ft 4L to LED Type B	1	1	114	42	2,548	1.08	366	198	54%
T8 4ft 4L to LED Type B	1	1	114	42	2,548	1.08	366	198	54%
T8 4ft 4L to LED Type B	1	1	114	42	2,548	1.08	366	198	54%
T8 4ft 2L to LED Type B	3	3	59	21	2,548	1.08	579	314	54%
Total							**31,522**	**17,083**	**54%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)	Coincident Peak Demand Savings (kW)

Site-Level Estimation of Ex Post Gross Savings

	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard - Lighting	31,522	17,083	54%	5.99	3.25	54%
Total	**31,522**	**17,083**	**54%**	**5.99**	**3.25**	**54%**

The ex-post energy savings totaled 17,083 kWh, with a gross energy savings realization rate of 54 %. The peak demand ex-post savings of 3.25kW were greater than the ex-ante savings of 5.99kW. The primary cause of the variance between the expected and realized savings is the difference in hours of use. The verified ex-post hours of use (2,548) are fewer than the ex-ante hours (4,745).

2.69 201S

Project Summary

Through a project represented by sample ID 201, a program participant received Custom incentives from Ameren for retrofitting fluorescent linear tube lighting with more efficient LED linear lamps and replacing HID fixtures with LED fixtures.

The ex-post gross energy savings are 22,133 kWh with an ex post gross peak demand reduction of 4.2 kW. The energy savings gross realization rate is 104%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were verified with the participant through a phone interview. Verification of installed quantities was completed through a review of the detailed project invoice. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 4L to LED 2x4 Fixture	103	103	114	38	2,458	1.11	20,588	21,358	104%
T8UTube2L to LED 2x2 Fixture	1	1	56	25	2,458	1.11	82	85	103%
T8 4ft 4L to LED 2x4 Fixture	1	1	114	70	2,458	1.11	116	120	103%
T8 4ft 1L to LED Type A/B	11	11	32	15	2,458	1.11	491	510	104%
T8 3ft 1L to LED Type A/B	2	2	23	12	2,458	1.11	58	60	103%
Total							**21,335**	**22,133**	**104%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate

Site-Level Estimation of Ex Post Gross Savings

Standard	21,335	22,133	104%	4.05	4.2	104%
Total	**21,335**	**22,133**	**104%**	**4.05**	**4.2**	**104%**

The ex post energy savings totaled 22,133 kWh, with a gross energy savings realization rate of 104%. The peak demand ex post savings of 4.2 kW were higher than the ex ante savings of 4.05 kW.

The primary cause of the variance between the ex ante and ex post savings was the difference in waste heat factors used in the evaluation. The ex post waste heat factor (1.11 for a retail facility) was higher than the ex ante factor of 1.07.

2.70 203S

Project Summary

Through a project represented by sample ID 203S, a program participant received Standard incentives from Ameren for retrofitting fluorescent linear tube lighting with LED fixtures.

The ex post gross energy savings are 10,558 kWh with an ex post gross peak demand reduction of 2.01 kW. The energy savings gross realization rate is 97%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were determined during the post installation site visit. Verification of installed quantities was also completed during the site visit and also through a review of the detailed project invoices. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 4L to LED 2x4 Fixture	30	30	164	28.1	2,490	1.04	10,870	10,558	97%
Total							**10,870**	**10,558**	**97%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	10,870	10,558	97%	2.06	2.01	97%
Total	**10,870**	**10,558**	**97%**	**2.06**	**2.01**	**97%**

The ex post energy savings totaled 10,558 kWh, with a gross energy savings realization rate of 97%. The peak demand ex post savings of 2.01 kW were lower than the ex ante savings of 2.06 kW.

The primary cause of the variance between the ex ante and ex post savings was the difference in waste heat factors used in the evaluation. The ex post waste heat factor (1.04 for an industrial facility) was lower than the ex ante factor of 1.07.

2.71 204S

Project Summary

Through a project represented by sample ID 204S, a program participant received Standard incentives from Ameren for lighting redesign.

The ex-post gross energy savings are 10,860 kWh with an ex post gross peak demand reduction of 2.06 kW. The energy savings gross realization rate is 101%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were determined during the post installation site visit. Verification of installed quantities was also completed during the site visit and also through a review of the detailed project invoices. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 3L to LED 2x4 Fixture	49	33	88	27.2	2,800	1.08	10,794	10,860	101%
T8 4ft 2L to redesign	3	0	59	0					
Total							**10,794**	**10,860**	**101%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	10,794	10,860	101%	2.05	2.06	101%
Total	**10,794**	**10,860**	**101%**	**2.05**	**2.06**	**101%**

The ex post energy savings totaled 10,860 kWh, with a gross energy savings realization rate of 101%. The peak demand ex post savings of 2.06 kW were slightly higher than the ex ante savings of 2.05 kW.

2.72 205S and 206S

Project Summary

Through a project represented by sample ID 205, and 206, a program participant received Standard incentives from Ameren for replacing fluorescent linear tube lighting with LED fixtures.

The ex-post gross energy savings are 10,584 kWh with an ex post gross peak demand reduction of 2.04kW. The energy savings gross realization rate is 100 %.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets, the DLC Qualified Products List, the ENERGY STAR database, trade ally light survey, participant emails, and on-site visits. Lighting hours of use were determined through site fixture metering, AMI interval database modeling *Equation 3*, or follow-up emails with participants. Verification of installed quantities was completed through site visits, detailed project invoices, or email correspondence with participants. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 4L to LED Retrofit Kit	4	4	114	50	2,500	1.00	640	640	100%
T8 4ft 4L to LED Retrofit Kit	2	2	114	50	2,500	1.00	320	320	100%
T8 4ft 6LHB to LED Fixture	4	4	221	185	2,500	1.00	360	360	100%
T5HO4ft 6L to LED Fixture	3	3	360	170	2,500	1.00	1,425	1,425	100%
T5HO4ft 6L to LED Fixture	11	11	360	170	2,500	1.00	5,225	5,225	100%
T8 4ft 2L to LED Retrofit Kit	1	1	59	37.5	2,500	1.00	55	54	98%
T8 4ft 4L to LED Retrofit Kit	3	3	114	50	2,500	1.00	480	480	100%
T8 4ft 4L to LED Retrofit Kit	2	2	114	50	2,500	1.00	320	320	100%
T8 4ft 4L to LED Retrofit Kit	4	4	114	50	2,500	1.00	640	640	100%
T8 4ft 4L to LED Retrofit Kit	1	1	114	50	2,500	1.00	160	160	100%
T8 4ft 4L to LED Retrofit Kit	2	2	114	50	2,500	1.00	320	320	100%
T8 4ft 4L to LED Retrofit Kit	2	2	114	50	2,500	1.00	320	320	100%

Site-Level Estimation of Ex Post Gross Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	**Efficient**	**Base**	**Efficient**					
T12UTu2L to LED Retrofit Kit	4	4	72	40	2,500	1.00	320	320	100%
Total							**10,585**	**10,584**	**100%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	10,585	10,584	100%	2.01	2.04	101%
Total	**10,585**	**10,584**	**100%**	**2.01**	**2.04**	**101%**

The ex-post energy savings totaled 10,584 kWh, with a gross energy savings realization rate of 100 %. The peak demand ex-post savings of 2.04kW were greater than the ex-ante savings of 2.01kW.

2.73 207S

Project Summary

Through a project represented by sample ID 207S, a program participant received Standard incentives from Ameren for replacing fluorescent linear tube lighting with LED fixtures.

The ex post gross energy savings are 9,390 kWh with an ex post gross peak demand reduction of 1.78 kW. The energy savings gross realization rate is 104%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were verified with the participant through a phone interview. Verification of installed quantities was completed through a review of the detailed project invoice. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of Section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 4L to LED Fixture	25	25	164	28.1	2,490	1.11	9,059	9,390	104%
Total							**9,059**	**9,390**	**104%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	9,059	9,390	104%	1.72	1.78	104%
Total	**9,059**	**9,390**	**104%**	**1.72**	**1.78**	**104%**

The ex post energy savings totaled 9,390 kWh, with a gross energy savings realization rate of 104%. The peak demand ex post savings of 1.78 kW were higher than the ex ante savings of 1.72 kW.

The primary cause of the variance between the ex ante and ex post savings was the difference in waste heat factors used in the evaluation. The ex post waste heat factor (1.11 for a small office) was higher than the ex ante factor of 1.07.

2.74 208S

Project Summary

Through a project represented by sample ID 207S, a program participant received Standard incentives from Ameren for replacing fluorescent linear tube lighting with LED fixtures.

The ex post gross energy savings are 7,512 kWh with an ex post gross peak demand reduction of 1.43 kW. The energy savings gross realization rate is 104%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were verified with the participant through a phone interview. Verification of installed quantities was completed through a review of the detailed project invoice. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of Section 2.

The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 4L to LED Fixture	20	20	164	28.1	2,490	1.11	7,247	7,512	104%
Total							**7,247**	**7,512**	**104%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	7,247	7,512	104%	1.38	1.43	104%
Total	**7,247**	**7,512**	**104%**	**1.38**	**1.43**	**104%**

The ex post energy savings totaled 7,512 kWh, with a gross energy savings realization rate of 104%. The peak demand ex post savings of 1.43 kW were higher than the ex ante savings of 1.38 kW.

The primary cause of the variance between the ex ante and ex post savings was the difference in the waste heat factor used in the evaluation. The ex post waste heat factor (1.11 for a small office) was higher than the ex ante factor of 1.07.

2.75 200C and 201C

Project Summary

Through two projects represented by sample ID 200 and ID 201 a program participant received custom incentives from Ameren for specifying and installing HVAC equipment exceeding the local building code with enthalpy economizers. The 2nd project incentivized the regenerative braking DC drives and variable speed drives installed within three new coil processing lines.

The ex post gross energy savings are 4,707,734 kWh with ex post gross coincident reductions of 1,464.21 kW. The energy savings gross realization rate is 75%.

Measurement and Verification Effort

ADM staff visited the site late in the program year to verify the operation of the regenerative drives on motors of a coil winding/unwinding process. The plant was still in the startup phase, with the operation of equipment alternating between the three processes, and when running, at reduced speed. The power data collected is not considered to represent the future production rate.

The base case is a similar line operating with AC variable speed drives that require both acceleration and braking. Energy is required to produce the breaking force to the motor from the AC drive. The wasted energy is transferred to heat. The installed case consists of regenerative drives that uses the same breaking energy returned as DC power on a common bus. The motor drives operate in the modes of acceleration, deceleration, constant speed or off.

Additional data requests to the participant resulted in a one-time measurement of regenerative drives operating at a similar facility, but trended data was not available.

The calculation methodology was deemed acceptable after the inclusion of a variable for the motor load factor, though the greatest uncertainty lay in the 30% ERF factor applied to the DC drive case for the net utility power required after regeneration. The motors/drives not on the DC regen bus, and their respective motors/drives from the AC Drive case are excluded in the following equation, as their values are equal for both cases.

$$kWh_{savings} = kWh_{AC\ Drives} - kWh_{DC\ Regen\ Drives}$$

$$kWh_{Drives} = kW_{motor}\ x\ DF\ x\ ERF\ x\ Hours\ x\ LF$$

Where:

kW_{motor} =Motor Input Power, kW
DF =Diversity factor based on proportion of time motor is operating;
Equal for both AC Drive case and DC Drive case; Varies by motor function
ERF =Energy regenerative factor; Net utility energy required
AC Drive case value is 1; DC Drive case value is 0.3
Hours = Annual hours the processing line operates
LF = Motor load factor , Equal for AC Drive case and DC Drive case
Ex-Ante: 1; Ex-Post:0.75

Site-Level Estimation of Ex Post Gross Savings

Regenerative DC VFD Process Line Energy Savings

Line, Motor	KW	Diversity Factor	Energy Regen Factor	Line Annual Hours	Ex Ante kWh	TRM Motor Load Factor	Ex Post kWh
Line1, Motor 1	75	0.95	0.7	5400	269,325	0.75	201,994
Line1, Motor 2	7.5	0.75	0.7	5400	21,263	0.75	15,947
Line1, Motor 3	15	0.75	0.7	5400	42,525	0.75	31,894
Line1, Motor 4	55	0.95	0.7	5400	197,505	0.75	148,129
Line1, Motor 5	11	0.75	0.7	5400	31,185	0.75	23,389
Line1, Motor 6	15	0.75	0.7	5400	42,525	0.75	31,894
Line1, Motor 7	7.5	0.75	0.7	5400	21,263	0.75	15,947
Line1, Motor 8	11	0.75	0.7	5400	31,185	0.75	23,389
Line1, Motor 9	30	0.75	0.7	5400	85,050	0.75	63,788
Line1, Motor 10	15	0.75	0.7	5400	42,525	0.75	31,894
Line1, Motor 11	30	0.75	0.7	5400	85,050	0.75	63,788
Line1, Motor 12	15	0.75	0.7	5400	42,525	0.75	31,894
Line1, Motor 13	55	0.95	0.7	5400	197,505	0.75	148,129
Line1, Motor 14	15	0.75	0.7	5400	42,525	0.75	31,894
Line1, Motor 15	18.5	0.75	0.7	5400	52,448	0.75	39,336
Line1, Motor 16	30	0.75	0.7	5400	85,050	0.75	63,788
Line1, Motor 17	3	0.33	0.7	5400	3,742	0.75	2,807
Line1, Motor 18	250	0.95	0.7	5400	897,750	0.75	673,313
Line1, Motor 19	37	0.75	0.7	5400	104,895	0.75	78,671
Line1, Motor 20	18.5	0.75	0.7	5400	52,448	0.75	39,336
Line1, Motor 21	15	0.75	0.7	5400	42,525	0.75	31,894
Line1, Motor 22	7.5	0.75	0.7	5400	21,263	0.75	15,947
Line2, Motor 1	100	0.95	0.7	2300	152,950	0.75	114,713
Line2, Motor 2	120	0.95	0.7	2300	183,540	0.75	137,655
Line2, Motor 3	70	0.95	0.7	2300	107,065	0.75	80,299
Line2, Motor 4	70	0.95	0.7	2300	107,065	0.75	80,299
Line2, Motor 5	70	0.95	0.7	2300	107,065	0.75	80,299
Line2, Motor 6	215	0.95	0.7	2300	328,843	0.75	246,632
Line3, Motor 1	95	0.95	0.7	2700	170,573	0.75	127,929
Line3, Motor 2	42	0.95	0.7	2700	75,411	0.75	56,558
Line3, Motor 3	85	0.95	0.7	2700	152,618	0.75	114,463
Line3, Motor 4	170	0.95	0.7	2700	305,235	0.75	228,926

Site-Level Estimation of Ex Post Gross Savings

Line, Motor	KW	Diversity Factor	Energy Regen Factor	Line Annual Hours	Ex Ante kWh	TRM Motor Load Factor	Ex Post kWh
Line3, Motor 5	340	0.95	0.7	2700	610,470	0.75	457,853
Line3, Motor 6	410	0.95	0.7	2700	736,155	0.75	552,116
Line3, Motor 7	205	0.95	0.7	2700	368,078	0.75	276,058
Line3, Motor 8	100	0.95	0.7	2700	179,550	0.75	134,663
Line3, Motor 9	50	0.95	0.7	2700	89,775	0.75	67,331
Line3, Motor 10	160	0.33	0.7	2700	99,792	0.75	74,844
Total					**6,186,258**	**29**	**4,639,693**

During the site visit, the motors were observed to not operate at full load based on the VFD display power compared to the motor rated power; the TRM based motor load factor of 0.75 is an approximation for the various partial motor loads. The inclusion of this factor results in ex post savings of 4,639,693 kWh which is less than the ex ante savings of 6,186,258 kWh.

The DC regenerative drives are housed in transportable cargo containers, with the air conditioned by rooftop HVAC units. The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

HVAC units.

Measure Category		Gross Energy Savings (kWh)		
		Ex Ante	Ex Post	Realization Rate
Enthalpy Economizer RTUHP-1,2,3 After Proposed Units	52	31,335	18,764	60%
Efficient HVAC Units RTUHP-1,2,3	52	26,470	26,470	100%
Efficient HVAC Units RTU-1, 2, 3	20	6,320	6,320	100%
Enthalpy Economizer RTU-1, 2, 3 - After Proposed Units	20	11,228	9,895	88%
Efficient HVAC Units MSIU-1, 2, 3	9	6,284	6,592	105%
Total		81,637	68,041	83%

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom Cooling	6,320	6,320	100%	5.76	5.76	100%
Custom HVAC	75,317	61,721	82%	33.44	27.40	82%
Custom Process	6,186,259	4,639,693	75%	853.36	1,431.05	168%
Total	6,267,896	4,707,734	75%	892.55	1,464.21	164%

Site-Level Estimation of Ex Post Gross Savings

The ex post gross energy savings are 4,707,734 kWh with ex post gross coincident reductions of 1,464.21 kW. The energy and demand savings gross realization rate is 95%.

2.76 202C, 203C, and 204C

Project Summary

Through a project represented by samples ID 202C, 203C, and 204C, a program participant received custom incentives from Ameren for specifying and installing an indoor agricultural lighting system with higher efficiency than the alternative system lighting (high pressure sodium, mercury vapor and T5 linear fluorescent lighting. Also, HVAC and dehumidification equipment was specified and installed that exceeds the code based total building performance compliance method. A cooling reduction for less waste heat for the efficient LED lighting was also realized.

The ex post gross energy savings of the installed system over a minimally efficient system are 5,587,311 kWh with ex post gross coincident reductions of 915.66 kW. The energy savings gross realization rate is 94%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture specifications (e.g., wattage, lifetime, PPF) from manufacturer datasheets, the DLC Qualified Products List, and a completed on-site visit. Lighting hours of use were determined through a review of the lighting control system. Verification of installed quantities was completed through the site visit, and detailed project invoices. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The baseline lighting system was determined using the program PPF Calculator, which establishes the equivalent number of baseline fixtures for minimally efficient high-pressure sodium (HPS), mercury vapor (MV), and T5 linear fluorescent lighting. The application of HPS and MV lighting remains valid in 2024, as site visits to other indoor agricultural new construction buildings confirmed that HPS and MV lighting were still specified and installed due to preferences for the lighting color spectrum. The PPF calculator was developed by ADM and TRC in 2021, based on lighting studies from Fluence Bio Engineering. The study determined the equivalent quantity of baseline fixtures based on their PPFD (photosynthetic photon flux density); since most grow LED lighting specifications are based on PPF (photosynthetic photon flux), the calculator inputs are in units of µMol/s for their respective PPF.

$$HPS\ Equivalent\ Qty_{Baseline} = \frac{PPF_{Efficient}}{PPF_{Reference}}\ x\ Fixture\ Ratio$$

Where:

$PPF_{efficient}$ = Photosynthetic photon flux, µMol/s

$PPF_{Reference}$ = Photosynthetic photon flux, µMol/s from study reference; 1700 µMol/s

Fixture Ratio = Lighting study Base to Efficient fixture ratio

The PPF calculator inputs in the following table were used to determine the equivalent quantity of 1060 watt HPS fixtures for the project in the flowering rooms. In the flowering rooms, the project installed LED fixtures with a PPF 1663 µMol/s and 620 W.

PPF Calculator Equivalent Baseline HPS Fixtures Based on Efficient PPF Value for Grow Rooms

Source	Baseline, HPS Watts	Baseline HPS PPFD	Efficient Study Fixture Watts	Efficient Study Fixture PPFD	Efficient Study Fixture PPF	Fixture Ratio
Program PPF Calculator	1060	944	631	958	1700	1

The calculator inputs to determine the quantity of equivalent baseline T5 fixtures for the vegetative rooms are in the following table. In the vegetative grow rooms, the project installed fixtures with a PPF and wattage of 705 PPF – 284 W, 816 PPF – 322 W, 860 PPF – 348 W, 1088 PPF -412 W, 1088 PPF- 429W.

PPF Calculator Equivalent Baseline T5 Fixtures Based on Efficient PPF Value for Vegetative Rooms

Source	Baseline, T5 Watts	Baseline HPS PPFD	Efficient Study Fixture Watts	Efficient Study Fixture PPFD	Efficient Study Fixture PPF	Fixture Ratio
Program PPF Calculator	432	511	342	529	860	2

The baseline alternative for the LED dimming measure was reviewed by the evaluation team. The evaluation boundary for the dimming measure included light intensity control in both the baseline case and efficient case. Lower light intensity is required in the early growth phase. Growers of this product at other sites visited accomplish the lower lighting level by alternating rows of lit light fixtures versus dark light fixtures. With the dimming equipment, there would actually be an energy loss for dimming equipment losses compared to the baseline switched alternating row lighting control method.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings. The waste heat factor was set to a value of 1.0, as the waste heat savings were quantified by the HVAC building modeling and simulations.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
HID to LED Ag Fixture	88	90	1060	620	6,570	1.00		246,244	
T5HO4'8L to LED Ag Fixture	350	139	432	412	6,570	1.00		617,133	
T5HO4'8L to LED Ag Fixture	49	26	432	315	6,570	1.00	2,785,912	85,265	100%
T5HO4'8L to LED Ag Fixture	12	4	432	500	6,570	1.00		20,919	
T5HO4'8L to LED Ag Fixture	16	8	432	348	6,570	1.00		27,121	
No Dimming to Dimming	1	0	0	0		1.00	372,200	0	0%

Site-Level Estimation of Ex Post Gross Savings

Total		3,158,112	2,785,912	88%

The participant's trade ally completed a detailed review of construction drawings and created the building model for the load design and space conditioning in software package *Trane Trace3D Plus*. The initial simulation and the alternative as-built model runs were the basis of the energy savings. The evaluation included the review of the proposed and as-built model files.

Reviewed Items for Building Simulation Modeling

Check Item	Ex Ante Model	Ex Post Model	Remarks
Code Standard	IECC 2015	IECC 2015	
Compliance Path	Performance Rating building simulation ASHRAE 90.0-2013 Appendix G	Same Mandatory requirements were also met	IECC mandatory requirements were also met
Baseline HVAC System	Packaged rooftop VAV Reheat DX cooling	Packaged rooftop VAV Reheat DX cooling	
As Built HVAC System	AHU Chilled water cooling	AHU Chilled Water cooling	Heat recovery chillers installed
Load Design	Thermal blocks (zones)	Thermal blocks (zones)	
Weather Normals	TMYx; St Louis	TMYx: St Louis	
Building Envelope	As-built	As-built	Savings not quantified

The table below is a summary of the end use's modeled in the baseline run and the alternative as-built model run. No changes were identified for the Trace3D Plus model inputs by the evaluation team. The efficient lighting waste heat factor was not utilized for the lighting measures, but are included within the cooling end use savings. Savings for the building envelope exceeding code were not quantified, with the envelope constant for both the pre and post simulations.

HVAC Savings Based on Building Modeling

End Use	Baseline Model	As Built Model	Savings, kWh
Cooling	4,493,511	2,399,183	2,094,328
Fans	1,395,366	505,021	890,345
Heating	28	142	(115)
Pumps	-	183,159	(183,159)
Total	5,888,905	3,087,505	2,801,399

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom - Lighting	3,158,112	2,785,912	88%	600	529	88%
Custom - HVAC	2,801,399	2,801,399	100%	529	529	100%
Total	5,959,511	5,587,311	94%	986	915	93%

The ex-post energy savings for the indoor agriculture building compared to a baseline building for the HVAC, and equivalent HPS/T5 fixtures for the LED grow lighting, total to 5,587,311 kWh, with a gross energy savings realization rate of 94%. The primary difference in the savings are:

LED light dimming as a measure achieved zero realized savings. The evaluation boundary includes light intensity control as a requirement for the growth cycle. The evaluation team identified no incremental savings for controlling the light intensity by switch control of alternating rows or areas over dimmed light control.

2.77 205C and 206C

Project Summary

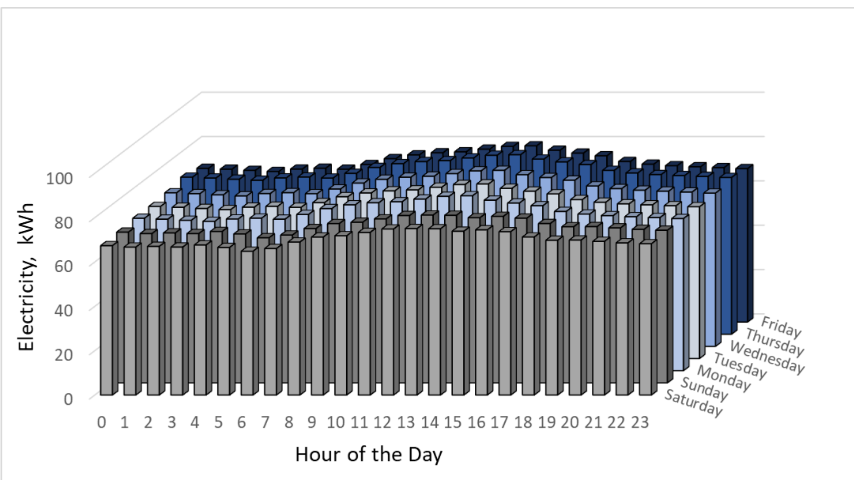
Through a project represented by sample ID 205C and 206C, a program participant received custom incentives from Ameren for the energy efficient equipment in the renovation of existing warehouse space to indoor agriculture. The savings are based on the same code compliant building envelope built with code compliant HVAC, humidification and high intensity lighting.

The ex post gross energy savings are 4,980,356 kWh with ex post gross coincident reductions of 822.42 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were verified with the participant through a phone interview. Verification of installed quantities was completed through a review of the detailed project invoice. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

The interval billing data and weather data model determined by Equation 3, reduced to exclude heating and cooling energy usage is summarized in the following figure, by both day of the week and hour of the day. The model was referenced to inform the characterization of lighting usage areas, primarily those fully lit during operating hours.



The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings.

Site-Level Estimation of Ex Post Gross Savings

The site was detail modeled in Trane Trace 3D Plus by the trade ally.

The equipment list for the code compliant and installed was verified.

The inclusion of the waste heat factor in the modeling was noted, and not included as a waste heat factor with the lighting measures.

	Base Model	Installed Model	Savings
Cooling	3,799,418	2,142,030	1,657,388
Fans	1,477,148	755,669	721,478
Total			2,377,322

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
LPD to LED Ag Fixture	1335	912	1060	900	4,380	1.00	2,603,034	2,603,034	100%
Total							**2,603,034**	**2,603,034**	**100%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom - Lighting	2,603,034	2,603,034	100%	494.48	494.48	100%
Custom - HVAC	2,377,322	2,377,322	100%	327.94	327.937	100%
Total	**4,980,356**	**4,980,356**	**100%**	**822.42**	**822.419**	**100%**

The ex-post energy savings amounted to 4,980,356 kWh, with a gross energy savings realization rate of 100%. The peak demand ex-post savings of 10.17 kW was greater than the ex-ante savings of 9.54 kW. The ex-ante estimates were based on the appropriate lighting power density for the site with hours of 4.368. The ex-post analysis converted the overall LPD into per line base wattages to represent each measure line shown above. For the second through the fifth measures the ex-post wattages (37.5W, 50.56W, 16W, and 135W, respectively) differ from the application wattages (28W, 28W, 14W, and 158W, respectively). The confirmed hours of use per measure area (ranging from 1,245 to 2,491) are fewer than the ex-ante hours (4,368).

Site-Level Estimation of Ex Post Gross Savings

2.78 207C and 208C

Project Summary

Through a project represented by samples ID 207C and 208C, a program participant received Custom incentives from replacing existing process chillers with more efficient chillers and installing VFD drives.

The ex-post gross energy savings are 1,980,340 kWh with an ex post gross peak demand reduction of 273.176 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff reviewed the project documentation provided by the participant. Trending had been performed in the pre period for the chiller power and flow, along with pump operations. The ADM staff received additional clarification on their questions related to any assumptions made in the savings workbook. The savings inputs are summarized below:

Modeling Inputs and Algorithm Inputs

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Basis of savings	Engineering bin analysis	Bin	Bin	Trade ally
New Chillers				
EER existing	Metered efficiency of chillers, EER	7	7	Participant data
EER new	IPLV	16	16	Submittals

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Compressed Air	1,980,340	1,980,340	100%	273.176	273.176	100%
Total	**1,980,340**	**1,980,340**	**100%**	**273.176**	**273.176**	**100%**

The ex post gross energy savings totaled 1,980,340 kWh, with an ex post gross peak demand reduction of 273.18 kW. The energy and demand savings gross realization rates were 100%.

SECOND VERSION BELOW:

Through a project represented by sample ID , a program participant received custom incentives from Ameren for reducing the fluid pump energy and heat rejection energy for a manufacturing process. Operating chillers were replaced with more efficient chillers, and the heat rejection pump flow was redesigned.

The ex post gross energy savings are 1,980,340 kWh with ex post gross coincident reductions of 273.176 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

Pump Measure Key Parameters and Energy Savings

Measure	Quantity		Analysis Method	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient				
10hp pumps to removed	2	0	Load bins	82,244	82,244	100%
20 hp pumps to removed	2	0	Load bins	199,298	199,298	100%
50 hp pumps to VFD control	4	4	Load bins	530,632	530,632	100%
Chillers replaced	3	3	Load bins	1,168,166	1,168,166	100%
Total				1,168,166	1,168,166	100%

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom	1,980,340	1,980,340	100%	273.176	273.176	100%
Total	1,980,340	1,980,340	100%	**273.176**	273.176	100%

2.79 209C and 210C

Project Summary

Through a project represented by sample IDs 209C and 210C, a program participant received Custom incentives from Ameren for installing efficient lighting that exceeds the wattage per square foot required by the local building code during construction of a new building for indoor agriculture. Also, efficient dehumidification units were specified for the rooftop.

The ex post gross energy savings are 1,747,459 kWh with ex post gross coincident reductions of 5.72 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff aggregated the applicable data from the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from DesignLights.org or EnergyStar.gov.

The installed fixture/lamp quantities were verified during the site visit, along with the determination of lighting operation by usage area. Lighting fixtures and lamps were assigned to specific usage area schedules, and grow room and vegetative room lighting cycles were confirmed.

The trade ally prepared Trace3D modeling for both the base case and installed case. The evaluation team reviewed the model inputs and outputs, identifying necessary revisions. The table below summarizes the modeling baseline and installed case and presents the savings for the HVAC measures.

Trace3D Model Annual Summary, Pre and Post

Measure Category	Gross Energy Savings (kWh)		
	Baseline	Installed	Savings
Cooling	3,441,164	1,724,228	1,716,936
Fans	12,411	12,039	372
HVAC	3,453,592	1,736,267	1,717,325
Lighting	5,318,428	5,288,153	30,275
Equipment	11,886	11,886	-
Non HVAC	5,330,314	5,300,039	30,275
Total	17,567,778	14,072,612	3,495,166

The variables for the lighting energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings. The waste heat factor is set to a value of 1, as the interactive lighting effects are captured in the TraneTrace3D modeling.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
LPD to LED Ag Fixture	16	96	431	36	8,760	1.00	30,274	30,134	100%
Total							**30,274**	**30,134**	**100%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom Lighting	30,274	30,134	100%	5.75	5.72	100%
Custom HVAC	1,717,325	1,717,325	100%	236.90	236.90	100%
Total	**1,747,599**	**1,747,459**	**100%**	**242.65**	**242.62**	**100%**

The ex post energy savings totaled 1,747,459 kWh, with a gross energy and demand savings realization rate of 100%.

2.80 211C

Project Summary

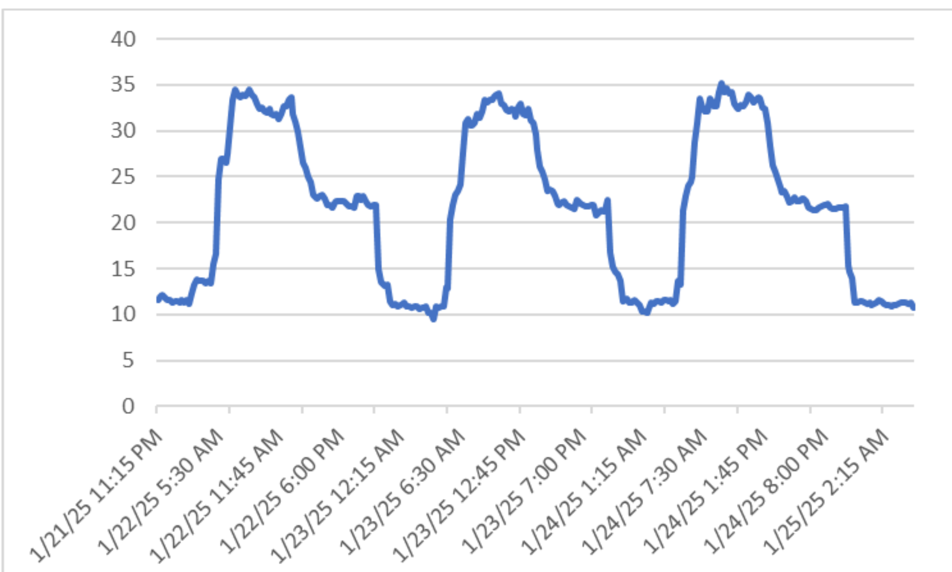
Through a project represented by sample ID 211C, a program participant received custom incentives from Ameren for the design and build of a school building exceeding the local building code.

The ex post gross energy savings are 1,523,880 kWh with ex post gross coincident reductions of 908.21 kW. The energy savings gross realization rate is 99%.

Measurement and Verification Effort

ADM staff consolidated relevant project documents within the program implementer's database and supplemented key parameters for estimating lighting savings with additional data sources. These included light fixture and lamp specifications (e.g., wattage, lifetime, lumens) from manufacturer datasheets and the DLC Qualified Products List. Lighting hours of use were verified with the participant through a phone interview and compared to the AMI interval weather data model. Verification of installed quantities was completed through a review of the detailed project invoice. To capture the interactive effects of reduced waste heat and its impact on cooling or heating energy, Ameren TRM waste heat factors were applied to the savings calculations. The savings algorithm for energy, *Equation 1* and peak coincident demand savings, *Equation 2*, are listed at the start of the section 2.

AMI Interval Data Trend



The parameters for the energy savings calculation are summarized in the following table along with the realized energy savings. The building model created by the trade ally in Trane Trace 3D was adopted as the basis of savings.

Review of Inputs for HVAC Modeling and Lighting LPD

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Basis of savings	Savings Methodology	Trace3D	Trace3D	Prepared .mdz files
	Building code IECC level	2015	2015	Plans submitted prior to county change to 2021
Whole Building Modeling				
END USE	Baseline model	Efficient Model	Savings	Ex Post Revision Notes
Cooling	1,192,342	1,053,337	139,005	Ok
Fans	1,191,961	752,101	439,860	Ok
Heat Rejection	78,736	49,547	29,189	Ok
Interior Lighting	646,265	320,146	326,119	Removed waste heat factor from LPD savings
Cooling	1,192,342	1,053,337	139,005	Ok
Fans	1,191,961	752,101	439,860	Ok
Heat Rejection	78,736	49,547	29,189	Ok
Heating	2,779	2,756	23	Ok
Lighting Power Density				
Area	Building interior area	410,000	375,000	Building model for HVAC square feet conditioned (interior)
Whf	Waste heat factor	1.0	1.0	Waste heat lighting interactive savings included in building model
Wattsbase	SA exterior fixture watts	36	0	Not interior lighting

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Lighting	630,518	575,388	91%	119.78	109.30	91%
Cooling	139,005	139,005	100%	737.19	737.19	100%
HVAC	809,487	809,487	100%	61.72	61.72	100%
Total	**1,579,010**	**1,523,880**	**97%**	**918.68**	**908.21**	**99%**

The ex post gross energy savings are 1,523,880 kWh with ex post gross coincident reductions of 908.21 kW. The energy savings gross realization rate is 99%.

2.81 212C

Project Summary

Through a project represented by sample ID 212C, a program participant received Custom incentives from Ameren for installing efficient lighting that exceeds the wattage per square foot required by the local building code during construction of a new building.

The ex post gross energy savings are 1,427,234 kWh with ex post gross coincident reductions of 271.12kW. The energy savings gross realization rate is 104 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
LPD to LED HB Fixture	1275	1275	390	133	2,827	1.04	1,372,051	964,609	104%
LPD to LED HB Fixture	575	575	390	133	2,827	1.04		435,020	
LPD to LED Panel Fixture	100	100	142	48.53	2,827	1.04		27,606	
Total							**1,372,051**	**1,427,234**	**104%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom - NC	1,372,051	1,427,234	104%	260.64	271.12	104%
Total	**1,372,051**	**1,427,234**	**104%**	**260.64**	**271.12**	**104%**

The ex post energy savings totaled 1,427,234 kWh, with a gross energy savings realization rate of 104%. The peak demand ex post savings of 271.12 kW were higher than the ex ante savings of 260.64 kW.

The primary difference between the ex ante and ex post savings was due to the waste heat factor used in the evaluation. The ex post waste heat factor (1.04 for a warehouse) was lower than the ex ante factor of 1.07.

2.82 213C

Project Summary

Through a project represented by sample ID 213C, a program participant received Custom incentives from Ameren for installing efficient lighting that exceeds the wattage per square foot required by the local building code during major renovation of an indoor agricultural building.

The ex-post gross energy savings are 1,358,161 kWh with ex post gross coincident reductions of 258.0 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff aggregated the applicable data from project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from DesignLights.org.

The installed fixture/lamp quantities were verified during the site visit, along with the determination of lighting operation by usage area. Lighting fixtures and lamps were assigned to specific usage area schedules, and holiday schedules were assigned based on the company's observed annual holidays.

The reduced heat load was accounted for by applying the area-specific waste heat factor for cooling and the interactive heating factor when electric heat was present, to the energy savings calculations.

The baseline lighting system was determined using the PPF Calculator, which establishes the equivalent number of baseline fixtures for minimally efficient high-pressure sodium (HPS), mercury vapor (MV), and T5 linear fluorescent lighting. The application of HPS and MV lighting remains valid in 2024, as site visits to other indoor agricultural new construction buildings confirmed that HPS and MV lighting were still specified and installed due to preferences for the lighting color spectrum.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
LPD to LED Ag Fixture	492	478	1060	635	4,380	1.00	1,358,162	954,796	100%
LPD to LED Ag Fixture	180	80	432	340	6,570	1.00		332,179	
LPD to LED Ag Fixture	24	23	1060	635	6,570	1.00		71,186	
Total							**1,358,162**	**1,358,161**	**100%**

Result

Realized Gross Energy and Demand Savings

	Gross Energy Savings (kWh)	Coincident Peak Demand Savings (kW)

Site-Level Estimation of Ex Post Gross Savings

Measure Category	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom - NC	1,358,162	1,358,161	100%	258.0	258.0	100%
Total	**1,358,162**	**1,358,161**	**100%**	**258.0**	**258.0**	**100%**

The ex post energy savings totaled 1,358,161 kWh, with a gross energy savings realization rate of 100%. The peak demand ex post and ex ante savings were 258.0 kW.

Verification of lighting hours of use from modeling interval data was not completed for this project, as the site is not yet fully operational in producing agricultural products.

2.83 214C

Project Summary

Through a project represented by sample ID 214C, a program participant received Custom incentives from Ameren for replacing two water cooled chillers (200 ton, 705 ton) with more efficient chillers and redesigning the primary chiller water flow loop in a manufacturing building.

The ex-post gross energy savings are 950,214 kWh with an ex post gross peak demand reduction of 527.567 kW The energy savings gross realization rate is 83%.

Measurement and Verification Effort

ADM staff reviewed the project documentation provided by the participant, collected manufacturer specification sheets, CAGI air compressor sheets for the two air compressor, and contacted the site for verification of the installation. The baseline equipment is referenced from the IECC2018 for the packaged cooling units and the water cooled chilled water equipment.

The program implementer prepared the detailed bin models for the packaged air conditioners, enthalpy economizer and chiller. Significant items of the bin model and TRM algorithm inputs are noted in the following table.

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Basis of savings	Savings Methodology	Bin model	TRM& Bin model	Ameren MO TRM 2.5.8 HVAC Ameren MO TRM 4.4.6 Chiller
HVAC Parameters				
All inputs	Capacity, base efficiency, installed efficiency are equal	1	1	IECC2018, submittals
Chiller Parameters				
$Power_{chiler}$	Chiller power, full load, kW	700	700	Submittals
$Power_{bin\ analysis}$	Sum of power 1 hour per sum of hours in bin, kW	1200	NA	Review of weather bin analysis for chiller loading
Enthalpy Economizers				
$Power_{ventilator}$	Demand control ventilation schedule utilizes powered ventilators	0	1	Mechanicals
Temperature	Typical meteorological weather source	TMY	TMYx	Betterbuilding.org

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom Cooling	1,150,209	950,214	83%	694.948	527.567	76%
Total	**1,150,209**	**950,214**	**83%**	**694.948**	**527.567**	**76%**

The ex-post gross energy savings are 950,214 kWh with an ex post gross peak demand reduction of 527.567. The energy savings gross realization rate is 83%.

2.84 215C

Project Summary

Through a project represented by sample ID 215C, a program participant received Custom incentives from Ameren for replacing two water cooled chillers (200 ton, 705 ton) with more efficient chillers and redesigning the primary chiller water flow loop in a manufacturing building.

The ex-post gross energy savings are 963,314 kWh with an ex post gross peak demand reduction of 877.28. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff reviewed the project documentation provided by the participant, collected manufacturer specification sheets, CAGI air compressor sheets for the two air compressor, and visited the site for verification of the installation. The baseline equipment is referenced from the IECC2015 for the packaged cooling units and the water cooled chilled water equipment.

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Basis of savings	Savings Methodology	TRM	TRM	Ameren MO TRM 2.5.8 HVAC Ameren MO TRM 4.4.6 Chiller
HVAC Parameters				
$IEER_{base}$	65KBTU to 135KBTU, gas heat	12.6	12.6	TRM (IECC2015/2018)
$IEER_{base}$	>760KBTU, gas heat	11.0	11.0	TRM (IECC2015/2018)
$IEER_{base}$	240KBTU to 760KBTU, gas heat	11.4	11.4	TRM (IECC2015/2018)
$IEER_{base}$	<65KBTU, gas heat, 3phase, packaged	13.0	14.0	TRM (IECC2015/2018)
IEEReff	65KBTU to 135KBTU, 1 unit, 13T	13.7	13.7	AHRI ratings
IEEReff	>760KBTU, 1 unit, 71T	13.7	13.7	AHRI ratings
IEEReff	240KBTU to 760KBTU, 2 units, 22T	17.8	17.8	AHRI ratings
IEEReff	<65KBTU, 2 units, 5T	13.7	13.7	AHRI ratings
$EFLH_{cool}$	Elementary school	~873	873	Ameren MO TRM
Chiller Parameters				
$IPLV_{base}$	Part Load Efficiency, Path A, 320T	0.52	0.52	IECC2015, water cooled, centrifugal
$IPLV_{base}$	Part Load Efficiency, Path A, 270T	0.55	0.55	IECC2015, water cooled, centrifugal
IPLVeff	Part Load Efficiency 320T	0.3324	0.3324	Manufacturer ratings
IPLVeff	Part Load Efficiency270T	0.3657	0.3657	Manufacturer ratings
Not Evaluated				
IEEReff	65KBTU to 135KBTU, 1 unit, 13T	14.6		Federal Regulations 2023
IEEReff	240KBTU to 760KBTU, 2 units, 22T	14		Federal Regulations 2023
IPLVbase	Compliance to both IPLV and Full , 320T	PATH B		IECC2015, water cooled, centrifugal PATH A or B, both IPLV and Full Load Efficiency compliance
IPLVbase	Compliance to both IPLV and Full, 270T	Neither		

$$\Delta kWh = \left[\frac{1}{IEER_{base}} - \frac{1`}{IEER_{eff}}\right] x\ kBTUh\ x\ EFLH_{cooling}\ x\ Quantity$$

The chilled water equipment savings us the following algorithm:

$$\Delta kWh = \left[IPLV_{base} - IPLV_{eff}\right] x\ Tons\ x\ EFLH_{cooling}\ x\ Quantity$$

The variables for the energy savings calculation are summarized in the following table along .

Site-Level Estimation of Ex Post Gross Savings

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom Cooling	963,315	963,315	100%	877.276	877.276	100%
Total	**963,315**	**963,315**	**100%**	**877.276**	**877.276**	**100%**

The ex-post gross energy savings are 963,314 kWh with an ex post gross peak demand reduction of 877.276. The energy savings gross realization rate is 100 %.

2.85 216C and 217C

Project Summary

Through a project represented by sample ID 216C and 217C, a program participant received Custom incentives from improvements to the chilled water system meeting the load for space cooling and process cooling at a manufacturing building. Related air cooled chillers will be idled with water sourced from the loop.

The ex-post gross energy savings are 933,008 kWh with an ex post gross peak demand reduction of 624.73 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

The trade ally prepared a model and calibrated it to billing data, incorporating the existing chiller plant, additional air-cooled chillers, and system modifications. The model accounted for primary-secondary pumping rerouting and automatic controls, which resulted in reducing the chiller load of one chiller on most operating days.

Modeling Inputs and Algorithm Inputs

Inputs	Base Energy	Installed Equipment	Energy savings, kWh
Chilled water plan automatic changeover between chillers	1,947,216	1,605,397	341,819
Energy Valves	278,041	251,821	26,220
Primary / Secondary CHW Plant	261,426	66,884	194,542
CHW Flow to / from 2 other chillers	913,044	542,616	370,428
			933,008

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Chilled Water	933,008	933,008	100%	624.73	624.73	100%
Total	**933,008**	**933,008**	**100%**	**624.73**	**624.73**	**100%**

The ex-post gross energy savings are 933,008 kWh with an ex post gross peak demand reduction of 624.73 kW. The energy savings gross realization rate is 100%.

2.86 218C

Project Summary

Through a project represented by sample ID 218C, a program participant received Custom incentives from Ameren for installing efficient lighting that exceeds the wattage per square foot required by the local building code during construction of a new building.

The ex post gross energy savings are 827,645 kWh with ex post gross coincident reductions of 157.22 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff aggregated the applicable data from project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from DesignLights.org.

The installed fixture/lamp quantities were verified during the site visit, along with an assessment of lighting operation by usage area. Lighting fixtures and lamps were assigned to specific usage area schedules, and holiday schedules were aligned with the company's observed annual holidays.

The reduced heat load was accounted for by applying the area-specific waste heat factor for cooling and interactive effects.

The baseline lighting system was determined using the PPF Calculator, which calculates the equivalent number of baseline fixtures for minimally efficient high-pressure sodium (HPS), mercury vapor (MV), and T5 linear fluorescent lighting. The application of HPS and MV lighting remains valid in 2024, as site visits to other indoor agricultural new construction buildings confirmed that HPS and MV lighting were still specified and installed due to preferences for their lighting color spectrum.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
LPD to LED Ag Fixture	466	305	1060	1000	4,380	1.00	827,645	827,645	100%
Total							**827,645**	**827,645**	**100%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom - NC	827,645	827,645	100%	157.22	157.22	100%
Total	**827,645**	**827,645**	**100%**	**157.22**	**157.22**	**100%**

The ex post energy savings totaled 827,645 kWh, with a gross energy savings realization rate of 100%. The peak demand ex post and ex ante savings were 157.22 kW.

2.87 220C

Project Summary

Through a project represented by sample ID 220C, a program participant received prescriptive incentives from Ameren for replacing an existing ice rink chiller and compressors at the end of its life with an efficient system.

The ex post gross energy savings are 788,295 kWh with ex post gross coincident reductions of 107.09 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff consolidated relevant project documentation within the program implementer's database and supplemented key parameters for estimating energy savings by incorporating additional data sources. These sources included equipment submittals, mechanical drawings, AMI interval billing data, participant emails, and on-site visits. A review of the ex ante savings methodology led to either adopting the original savings basis or developing an alternative methodology. Factors considered in this process included defining the appropriate baseline, evaluating the availability of site-specific historical trended data, and determining the most accurate estimate of actual energy savings.

ADM staff visited the site to verify the equipment installation and to determine the operating schedule, and gather manufacturer nameplate data. The existing system contained the refrigerant R-22 which is ozone depleting and banned under the Montreal Protocol. As the system is at end of life, the baseline is a minimally efficient alternative refrigerant. With another refrigerant the baseline model has increased energy usage. The trade ally prepared an 8760 bin hour model of the baseline usage and the efficient equipment. The method was determined to be a realistic model of the current operation with both equipment types and applied, and the savings model adopted for the ex post savings.

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Refrigeration	788,925	788,925	100%	107.09	107.09	100%
Total	788,925	788,925	**100%**	107.09	107.09	**100%**

The ex post gross energy savings totaled 788,295 kWh, with ex post gross coincident peak demand reductions of 107.09 kW. The energy and demand gross realization rate was 100%.

The ex ante chiller plant model could not be modified to compare the same chiller type (centrifugal) in.

2.88 222C

Project Summary

Through a project represented by sample ID 222C, a program participant received Custom incentives from replacing the guest room energy management system and thermostats with a new guestroom energy management system with thermostats.

The ex-post gross energy savings are 686,200 kWh with an ex post gross peak demand reduction of d304.66 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff reviewed the project documentation provided by the participant. The staff recalled that the hotel has a guestroom energy management system and thermostats for each of the 900 guest rooms, that was also incentivized by the Ameren energy efficiency program in the year 2010. As the EUL for the GREM measure is 15 years, the system is approaching the end of it's life. The local building code is IECC 2018, and GREM has been required for new construction hotels since IECC2015. As this project was not accompanied with work that would trigger building planning approval, the baseline for the ex post savings was also set to a manual setback thermostat. The savings per hotel room are based on the demo room data and also referenced for the ex post savings estimate.

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Compressed Air	686,200	686,200	100%	304.66	304.66	100%
Total	686,200	686,200	100%	304.66	304.66	100%

The ex post gross energy savings totaled 686,200 kWh, with an ex post gross peak demand reduction of 304.66 kW. The energy and demand savings gross realization rates were 100%.

2.89 224C

Project Summary

Through a project represented by sample ID 224C, a program participant received custom incentives from Ameren for specifying and install efficient lighting during the construction of a warehouse building.

The ex post gross energy savings are 661,565 kWh with ex post gross coincident reductions of 125.67 kW. The energy savings gross realization rate is 101%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

AMI interval data collected for the period since the building was constructed identified that the current usage hours is higher than the initial applicant hours.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
LPD to LED HB Fixture	375	375	655	182.71	2,827	1.00	655,370	501,185	101%
LPD to LED HB Fixture	120	120	655	182.71	2,827	1.00		160,379	
Total							**655,370**	**661,565**	**101%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom - NC	655,370	661,565	95%	124.50	125.67	101%
Total	655,370	661,565	**95%**	124.50	125.67	**101%**

The ex-post energy savings amounted to 661,565 kWh, with a gross energy savings realization rate of 101%. The hours of used developed from the AMI billing model (2,827) were higher than the ex ante hours (2,600).

2.90 227C

Project Summary

Through a project represented by sample ID 227 a program participant received custom incentives from Ameren for implementing demand control ventilation in lab space with high air exchange rates.

The ex-post gross energy savings are 262,861 kWh with an ex post gross peak demand reduction of 36.360 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

The site provided laboratory airflow data, including air volume, reheat time, reheat volume, and static pressure. The lab schedules were aggregated with typical meteorological data to model the pre-period.

The post-period airflow was compared to the initial period to estimate energy savings. The scope of work covered four laboratory air handling units (AHUs):

- Typical supply fan demand power was reduced from 25 kW to 18 kW.
- Air changes were reset from 6 air changes per hour to 4 air changes per hour.
- Reduced airflow was implemented for AHU-1, AHU-2, AHU-3, and AHU-4.

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Cooling air flow reductions	307,335	307,335	100%	279.885	279.885	100%
Fan air flow reductions	158,870	158,870	100%	70.536	70.536	100%
Total	**466,205**	**466,205**	**100%**	**350.421**	**350.421**	**100%**

The ex-post gross energy savings are 466,205 kWh with an ex post gross peak demand reduction of 350.421 kW. The energy and demand savings gross realization rate are 100%.

2.91 228C and 229C

223Summary

Through a project represented by sample ID 228C and ID 229C, a program participant received Custom incentives from Ameren for replacing four working computer room air conditioners (CRAC) and replacing one failed CRAC in data center of an office building, with efficient units that included pumped refrigerant economizers.

The ex-post gross energy savings are 453,063 kWh with an ex post gross peak demand reduction of 201.152 kW. The energy savings gross realization rate is 100 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, and sourced minimum efficiency sensible COP data from the ASHRAE 90.01 2013 and IECC2015.

The baseline and installed unit were modeled with a site specific energy study with 5 degree outdoor air temperature bins by the trade ally. The installed CRAC units have a higher sensible COP efficiency and have free cooling. The free cooling pumps refrigerant without compression from the indoor units to the outdoor condensers.

CRAC Cooling Units Installed

Baseline	Installed	Quantity	Base Energy, kWh	Installed Equipment, kWh	Energy savings per unit, kWh
Existing, 42kW No economizer	Installed, 50 kW Pumped refrigerant economizer	1	84.487	47,076	37,411
Existing, 77kW No economizer	Installed, 85 kW Pumped refrigerant economizer	3	190,297	86,384	103,913
Normal Replacement, 77kW	Installed, 85kW Pumped refrigerant economizer	1	190,297	86,384	103,913

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom	453,063	453,063	100%	201.152	201.152	100%
Total	453,063	453,063	100%	201.152	201.152	100%

The ex-post energy savings totaled 453,063 kWh, with a gross energy savings realization rate of 100 %. The peak demand ex-post savings are 201.152 kW with a 100% realization rate.

2.92 230C

Project Summary

Through a project represented by sample ID 230, a program participant received Custom incentives from Ameren for replacing existing modulating air compressors with (2) VSD air compressors.

The ex post gross energy savings are 318,816 kWh with an ex post gross peak demand reduction of 43.979 kW. The energy savings gross realization rate is 73%.

Measurement and Verification Effort

ADM staff reviewed the project documentation provided by the participant, collected manufacturer specification sheets, CAGI air compressor sheets for the two air compressor, and contacted the participant for additional information. AMI interval billing data was modeled with weather data to determine the typical hourly base electric load profile, to validate the operating hours.

The site operates with (3) air compressors but presented the base case with 200 additional CFM to support additional manufacturing initiatives. The base case presented consisted of two (200 Hp) rotary air compressors, and the efficient case of two (175 Hp) rotary VSD air compressors. The savings were estimated by a model provided by the trade ally. ADM staff reviewed the significant inputs to the model in the table below, noting the parameters that were not held constant in the base and efficient case.

Due to the uncertainty of the air compressor model, the ex post savings were determined by the Ameren MO TRM measure, 2.2.3 VSD Air Compressor as an approach to estimating the energy savings.

$$kWh = \left(CF_{base} - CF_{efficient}\right) x\ 0.9\ x\ Hp\ x\ Hours$$

Modeling Inputs and Algorithm Inputs

Inputs	Description	Values		Ex Post Source
		Ex Ante	**Ex Post**	
Basis of savings	Savings Methodology	Modeling tool	TRM	Ameren MO TRM 2.2.3 VSD Air Compressor
Air Compressor Modeling				
Base pressure	Discharge pressure, psi	115	110	IPMVP Option A, Retrofit Isolation
Eff pressure	Discharge pressure, psi	110	110	
Base CFM	Full capacity airflow, CFM	900	759	
Eff CFM	Full capacity airflow, CFM	759	759	
Base dryer	Air dryer power, kw	0	>0	
Eff dryer	Air dryer power, kW	1.5	1.5	
TRM Savings Methodology Inputs				
CF_{base}	Compressor factor, modulation		0.863	2.2.3 VSD Air Compressor
$CF_{efficient}$	Compressor factor, VFD		0.658	2.2.3 VSD Air Compressor
Hp	Compressor horsepower, HP		200	CAGI sheet
Hours	Annual hours compressor operates		8,640	Site; AMI interval data

Site-Level Estimation of Ex Post Gross Savings

Inputs	Description	Values		Ex Post Source
		Ex Ante	**Ex Post**	
0.9	Factor		0.9	2.2.3 VSD Air Compressor

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Compressed Air	434,344	318,816	73%	59.915	43.979	73%
Total	**434,344**	**318,816**	**73%**	**59.915**	**43.979**	**73%**

The ex post energy savings totaled 318,816 kWh, with a gross energy savings realization rate of 73%.

The same compressed air end-use factor was applied to both ex ante and ex post energy savings, with ex ante savings of 59.915 kW and ex post savings of 43.979 kW. The ex post savings methodology followed the Ameren MO TRM for VSD air compressors. However, a review of the ex ante air compressor modeling inputs indicated that parameters such as airflow, air dryer specifications, and compressor horsepower were not held constant between the base and efficient cases, nor were adjustments made to account for these differences.

2.93 233C

Project Summary

Through a project represented by sample ID 233, a program participant received Custom incentives from Ameren for replacing one existing inlet modulating air compressors with one VSD air compressor at a manufacturing building.

The ex-post gross energy savings are 323,244 kWh with an ex post gross peak demand reduction of 44.590 kW. The energy savings gross realization rate is 94 %.

Measurement and Verification Effort

ADM staff reviewed the project documentation provided by the participant, collected manufacturer specification sheets, CAGI air compressor sheets for the two air compressor, and visited the site for verification of the installation.

The site operates with one (150 Hp) inlet modulation air compressor and replaced with one (150 Hp) variable speed drive air compressor. The inputs for the ex ante air compressor modeling workbook were reviewed for the base case and installed condition. The modeling workbook is manufacturer specific, which specified the nearest match air compressor model for the required output CFM.

Due to the uncertainty of the air compressor model, the ex post savings were then determined by the Ameren MO TRM measure, 2.2.3 VSD Air Compressor as an approach to estimating the energy savings.

$$kWh = \left(CF_{base} - CF_{efficient}\right) x\ 0.9\ x\ Hp\ x\ Hours$$

Modeling Inputs and Algorithm Inputs

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Basis of savings	Savings Methodology	Modeling tool	TRM	Ameren MO TRM 2.2.3 VSD Air Compressor
Air Compressor Modeling				
Base compressor	Modeling tool selection criteria compared to installed, CFM	750 CFM, 1025 CFM		Manufacturer specific air compressor selection workbook with savings
Efficient Compressor	Equipment rated full flow compared to model, CFM	902 CFM, 1025 CFM		
Discharge pressure	Equipment maximum air pressure compared to model pressure, PSI	145 PSI, 110 PSI		
TRM Savings Methodology Inputs				
CF_{base}	Compressor factor, modulation		0.863	2.2.3 VSD Air Compressor
$CF_{efficient}$	Compressor factor, VFD		0.658	2.2.3 VSD Air Compressor
Hp	Compressor horsepower, HP		200	CAGI sheet
Hours	Annual hours compressor operates		8,600	Site; AMI interval data
0.9	Factor		0.9	2.2.3 VSD Air Compressor

Site-Level Estimation of Ex Post Gross Savings

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Compressed Air	344,700	323,244	94%	47.549	44.590	94%
Total	**344,700**	**323,244**	**94%**	**47.549**	**44.590**	**94%**

The ex-post gross energy savings are 323,244 kWh with an ex post gross peak demand reduction of 44.590 kW. The energy savings gross realization rate is 94 %. The primary differences in the energy savings are:

- The ex post savings methodology is based on the Ameren MO TRM for VSD air compressors, whereas the review of the inputs for the ex-ante air compressor modeling indicated that the parameters (air flow, pressure) were not held to the same value in the base and efficient case, nor had adjustments to account for the difference.

2.94 238C

Project Summary

Through a project represented by sample ID238, a program participant received prescriptive incentives from Ameren for selecting an efficient water cooled chiller replacement exceeding the building code part load value for a large hotel building.

The ex post gross energy savings are 238,502 kWh with ex post gross coincident reductions of 217.20 kW. The energy savings gross realization rate is 90%.

Measurement and Verification Effort

ADM staff consolidated relevant project documentation within the program implementer's database and supplemented key parameters for estimating energy savings by incorporating additional data sources. These sources included equipment submittals, mechanical drawings, AMI interval billing data, participant emails, and on-site visits. A review of the ex ante savings methodology led to either adopting the original savings basis or developing an alternative methodology. Factors considered in this process included defining the appropriate baseline, evaluating the availability of site-specific historical trended data, and determining the most accurate estimate of actual energy savings.

The method for this sampled project is sourced from TRM measure, 2.5.5 Electric Chiller as follows:

$$\Delta kWh = \left[IPLV_{base} - IPLV_{eff}\right] - \ x\ Tons\ x\ EFLH_{cooling}\ x\ Quantity$$

The model submitted by the applicant was reviewed but not used for the savings methodology, as it appeared to compare a baseline reciprocating chiller to an efficient centrifugal chiller.

For retrofit isolation analysis, the preferred approach is to model the same chiller type in both the pre- and post-periods. The TRM algorithm was selected as a conservative approach to estimate energy savings.

The variables for the energy savings calculation are summarized in the following table.

HVAC Measure Key Parameters and Energy Savings

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Basis of savings	Savings Methodology	Model	TRM	Ameren MO TRM 2.5.5 Chiller
HVAC Parameters				
IPLVbase	Chiller type reciprocating	1	0	Retrofit isolation analysis, evaluation envelope
$IIPLV_{efficient}$	Chiller type centrifugal	1	0	IECC2015
IPLVbase	Centrifugal, IPLV 0.520	0	1	IECC2018
$IPLV_{efficient}$	Centrifugal, IPLV 0.320	0	1	Chiller submittal

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard HVAC	264,563	238,502	90%	240.93	217.20	90%
Total	**264,563**	**238,502**	**90%**	**240.**93	**217.**20	**90%**

The ex post gross energy savings totaled 238,502 kWh, with ex post gross coincident peak demand reductions of 217.200 kW. The energy and demand gross realization rate was 90%.

The ex ante chiller plant model could not be modified to compare the same chiller type (centrifugal) in both the base case and installed case. As a result, a conservative approach was taken by referencing the TRM, utilizing the installed part-load efficiency, 2018 IECC code IPLV efficiency, and the EFLH for a large hotel building.

2.95 241C and 242C

Project Summary

Through a project represented by sample ID 241 and 242, a program participant received custom incentives from Ameren for specifying and installing efficient lighting and HVAC equipment exceeding the local building code efficiency requirements for a multifamily (assisted living) building.

The ex post gross energy savings are 200,403 kWh with ex post gross coincident reductions of 111.93 kW. The energy savings gross realization rate is 95%.

Measurement and Verification Effort

ADM staff aggregated the applicable data from project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from DesignLights.org.

The installed fixture/lamp quantities were verified during the site visit, along with an assessment of lighting operation by usage area. Lighting fixtures and lamps were assigned to specific usage area schedules, and holiday schedules were aligned with the company's observed annual holidays.

The reduced heat load was accounted for by applying the area-specific waste heat factor for cooling and the interactive heating factor when electric heat was present, to the energy savings calculations.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Project Measure Key Parameters and Energy Savings

Inputs	Description	Values		Ex Post Source
		Ex Ante	**Ex Post**	
Basis of savings	ΔkwattsxHours	Y	Y	Site visit; Construction documents
Lighting				
LPD	Multifamily lighting power density	0.87	1,2,3	Trade ally flow bin model from pre period air compressor metering.
Power	Metered power, kW	Varies	varies	
Flow	Air flow by compressor, CFM	Varies	varies	
Hours	Annual compressed air hours	8760	8760	Site; AMI interval data
LPD	Multifamily lighting power density	0.87	0.87	IECC2015 prevailing code when plan submitted
Hours	Hours by usage area: 1,000-7,300	Y	Y	Same hours developed during site visit
$Watts_{base}$	Code allowed watts	74,934	74,934	Based on area 146,930 SF
$Watts_{efficient}$	Total watts for common and living units	58,192	58,192	Lighting schedule
HVAC				
Basis of savings	Weather bin model	Y	Y	Program implementer workbook

Inputs	Description	Values		Ex Post Source
		Ex Ante	**Ex Post**	
$SEER_{base}SEER_{eff}$	RTU2, RTU12 packaged	13/13.4	14/14	Spec for SEER2 13.4 converted to SEER to align with IECC2015 units and correct base unit (packaged, not split)
Capacity, tons	Kitchen air makeup capacity	8	3x2	Site visit pictures
$SEER_{base}SEER_{eff}$	Kitchen air make up efficiency	13/13.4	13/14	Spec for SEER2 13.4 converted to SEER to align with IECC2015 units <65K
Weather data	Normals weather data for bin analysis	NOAA	TMYx	Betterbuilding.org(NOAA base)

Measure Category	Gross Energy Savings (kWh)		
	Ex Ante	Ex Post	Realization Rate
RTU1 dry bulb to enthalpy economizer	2446	2,402	98%
RTU2,5,9,10,11,12 dry bulb to enthalpy economizer	10,858	9,757	90%
RTU3,4,6,7,8,13 dry bulb to enthalpy economizer	22,602	20,123	89%
RTUs efficiency over code	17,147	17,563,	102%
DSS units efficiency over code	4,285	2,766	65%
Kitchen makeup AC over code	1,294	796	62%
PTACs, VTACs over code	73,798	69,976	95%
Total	132,430	125,383	95%

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom Lighting	77,030	77,030	100%	14.633	14.63	100%
Custom HVAC	132,430	125,383	94%	103.945	97.29	94%
Total	**209,460**	**200,403**	**95%**	**118.478**	**111.93**	**95%**

The ex post gross energy savings are 200,403 kWh with ex post gross coincident reductions of 111.93 kW. The energy and demand savings gross realization rate are 95%.

Ex post savings were calculated using a current set of normal weather data applied to the weather bin analysis for all HVAC measures. Additionally, the efficiency for units under 65 kBtu was converted to SEER when originally provided as SEER2.

Site-Level Estimation of Ex Post Gross Savings

2.96 244C

Project Summary

Through a project represented by sample ID 244 a program participant received Custom incentives from Ameren for replacing (4) packaged air conditioning units and (1) split air conditioning unit with more efficient units, while adding demand control ventilation with CO2 sensing and outdoor air control.

The ex post gross energy savings are 154,300 kWh with ex post gross coincident reductions of 21.285 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff consolidated relevant project documentation within the program implementer's database and supplemented key parameters for estimating energy savings by incorporating additional data sources. These sources included equipment submittals, mechanical drawings, and questions to the trade ally via email. A review of the ex ante savings methodology led to either adopting the original savings basis or developing an alternative methodology. Factors considered in this process included defining the appropriate baseline, evaluating the availability of site-specific historical trended data, and determining the most accurate estimate of actual energy savings.

The method for this sampled project is based on the TRM measure 2.5.8 Single Package and Split Systems, as outlined below:

$$\Delta kWh = \left[\frac{1}{IEER_{base}} - \frac{1`}{IEER_{eff}}\right] x\ kBTUh\ x\ EFLH_{cooling}\ x\ Quantity$$

The variables for the energy savings calculation are summarized in the following table along .

HVAC Measure Key Parameters and Energy Savings

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Basis of savings	Savings Methodology	TRM	TRM	Ameren MO TRM 2.5.8 HVAC
HVAC Parameters				
IEERbase	RTU 480KBTU, gas heat	11.6		TRM (IECC2015/2018)
$IEER_{base}$	RTU 174KBTU, gas heat	12.4		TRM (IECC2015/2018)
$EFLH_{cool}$	Office building	1386		Ameren MO TRM HVAC
IEEReff	RTU 480KBTU, gas heat	15.7		AHRI ratings
IEEReff	RTU 174KBTU, gas heat	14.7		AHRI ratings
Not Evaluated (all units exceed Federal Regulations 2023 efficiency)				
IEERbase	65KBTU to 135KBTU, 3 units	14.6		Federal Regulations 2023
IEERbase	135KBTU to 240KBTU, 2 units	14.0		Federal Regulations 2023

Site-Level Estimation of Ex Post Gross Savings

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
HVAC	154,300	154,300	100%	21.285	21.285	100%
Total	**154,300**	**154,300**	**100%**	**21.285**	**21.285**	**100%**

The ex-post energy savings totaled 154,300 kWh, with a gross energy and demand savings realization rate of 100%.

2.97 247C

Project Summary

Through a project represented by sample ID 247, a program participant received custom incentives from Ameren for installing guest room energy management thermostats in a hotel building.

The ex post gross energy savings are 122,581 kWh with ex post gross coincident reductions of 54.424 kW. The energy savings gross realization rate is 181%.

Measurement and Verification Effort

Guest room energy management thermostat were installed at the end of 2023 and beginning of 2024.

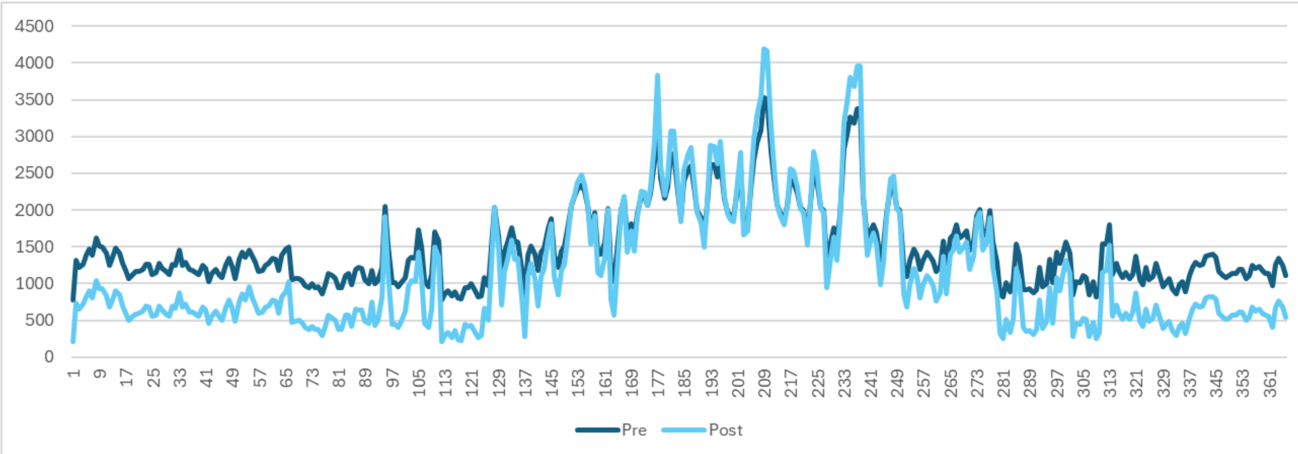
Whole building analysis was selected to determine the savings, as the project was completed early in the program year. Following the data in the table below, the pre period daily billing data was regressed with Heating Degree Days and Cooling Degree days. There was a good fit for the regressed series, so a comparison was made to estimate the energy savings, for a typical year (TMYx).

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Start	End	B constant	HDD coef	CDD coef
Pre period	Jan 23	Dec 23	773	1	1
t-stat			17	32	25
R^2			0.72		
p-value			<0.000001	<0.000001	<0.000001
Post period	Jan 24	Dec 24	208	1	2
t-stat			7	62	56
R2			0.88		
p-value			<0.000001	<0.000001	<0.000001
Annual savings (TMYx)	122,581 kWh				

Regressed Energy Usage for Pre and Post Periods



The delta kWh between the trend lines indicates the GREM is achieving better setbacks during shoulder months and the heating season. This has occurred at other GREM projects as the air conditioning units are "right size" for the application, and have a long recovery period to reach the setpoint.

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom	67,835	122,581	181%	30.118	54.424	181%
Total	67,835	122,581	181%	30.118	54.424	181%

The ex-post energy savings amounted to 122,581 kWh, with a gross energy savings realization rate of 181%. The peak demand ex-post savings of 54.424 is 181% of the ex-ante peak.

2.98 248C

Project Summary

Through a project represented by sample ID 248, a program participant received Custom incentives from Ameren for retrofitting existing LED lighting with more efficient LED linear lamps.

The ex post gross energy savings are 6,628 kWh with an ex post gross peak demand reduction of 1.26 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings. The retrofit measure is disaggregated in the table to consider the portion of lighting that operates before store opening for stocking the store shelves.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
LED 4’ 1L to LED Linear Tube	346	346	12	8.5	5,068	1.08	6,603	6,628	100%
Total							**6,603**	**6,628**	**100%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom	6,603	6,628	100%	1.25	1.26	100%
Total	**6,603**	**6,628**	**100%**	**1.25**	**1.26**	**100%**

The ex-post energy savings totaled 6,628 kWh, with a gross energy savings realization rate of 100%. The peak demand ex-post savings of 1.26kW were greater than the ex-ante savings of 1.26kW.

2.99 249C

Project Summary

Through a project represented by sample ID 249, a program participant received Custom incentives from Ameren for retrofitting existing LED lighting with more efficient LED linear lamps.

The ex-post gross energy savings are 6,422 kWh with an ex-post peak demand reduction of 1.22 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
LED 4’ 1L to LED 4’ linear	361	361	12	8.5	4,706	1.08	6,397	6,422	100%
Total							**6,397**	**6,422**	**100%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom	6,397	6,422	100%	1.22	1.22	100%
Total	**6,397**	**6,422**	**100%**	**1.22**	**1.22**	**100%**

The ex-post energy savings totaled 6,422 kWh, with a gross energy savings realization rate of 100%. The peak demand ex-post and ex-ante savings of 1.22 kW.

2.100 300B and 301B

Project Summary

Through a project represented by sample ID 300 and 301, a program participant received BSS Custom incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

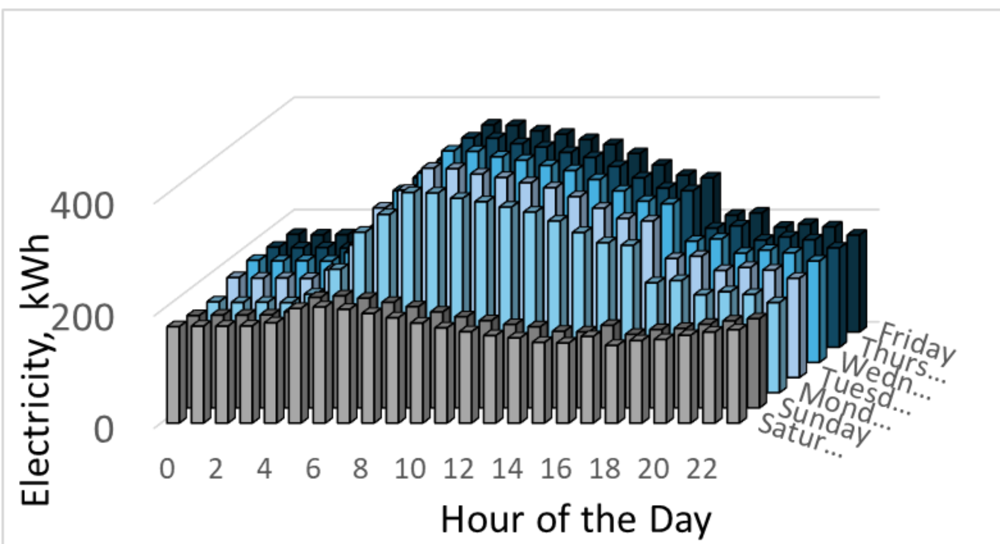
The ex post gross energy savings are 846,853 kWh with ex post gross coincident reductions of 160.79 kW. The energy savings gross realization rate is 107%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The interval billing data and weather data model, determined by Equation 3 and adjusted to exclude heating and cooling energy usage, is summarized in the following figure by day of the week and hour of the day. The model was referenced during the site visit to help characterize lighting usage areas, particularly those fully lit during operating hours.

Facility Energy Usage, non-weather dependent



The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 2L to LED Type B	1322	1322	59	19	2,600	1.14	147,112	156,736	107%
T8 4ft 3L to LED Type B	218	218	88	28.5	2,600	1.14	35,782	38,446	107%
T8 4ft 4L to LED Type B	2294	2294	114	38	2,600	1.14	485,026	516,756	107%
T12UTube2L to LED Type B	468	468	72	26	3,000	1.14	69,105	73,626	107%
T12UTube2L to LED Type B	381	381	56	26	3,500	1.14	42,805	45,606	107%
T8 4ft 1L to LED Type B	39	39	32	9.5	8,760	1.14	8,042	8,763	109%
T8 2ft 2L to LED Type B	5	5	32	18	2,600	1.14	223	207	93%
T8 2ft 1L to LED Type B	3	3	16	9	2,600	1.14	67	62	93%
Exit Sign to LED Exit Sign	18	18	40	3	8,760	1.14	5,834	6,651	114%
Total							**793,996**	**846,853**	**107%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
BSS	793,996	846,853	107%	150.53	160.79	107%
Total	**793,996**	**846,853**	**107%**	**150.53**	**160.79**	**107%**

The ex post energy savings totaled 846,853 kWh, with a gross energy savings realization rate of 107%. The peak demand ex post savings of 160.79 kW were higher than the ex ante savings of 150.53 kW.

The primary variance between the ex ante and ex post savings was due to the difference in the waste heat factor used in the evaluation. The ex post waste heat factor (1.14 for a secondary school) was higher than the ex ante factor of 1.07.

2.101 302B and 303B

Project Summary

Through a project represented by sample ID 302 and 303, a program participant received BSS Custom incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 361,768 kWh with ex post gross coincident reductions of 68.72 kW. The energy savings gross realization rate is 107%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 2L to LED Type B	233	233	59	19	2,600	1.14	25,928	27,624	107%
T8 4ft 3L to LED Type B	1288	1288	88	28.5	2,600	1.14	211,410	227,149	107%
T8 4ft 4L to LED Type B	421	421	114	38	2,600	1.14	89,012	94,836	107%
T12 4ft 2L to LED Type B	42	42	82	19	1,500	1.14	4,247	4,525	107%
T8UTube2L to LED Type B	12	12	56	26	1,800	1.14	693	739	107%
T8UTube3L to LED Type B	12	12	89	39	1,800	1.14	1,156	1,231	107%
HID to LED Mogel	12	12	284	54	1,800	1.14	5,316	5,664	107%
Total							**337,762**	**361,768**	**107%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom	337,762	361,768	107%	64.16	68.72	107%
Total	**337,762**	**361,768**	**107%**	**64.16**	**68.72**	**107%**

Site-Level Estimation of Ex Post Gross Savings

The ex post energy savings totaled 361,768 kWh, with a gross energy savings realization rate of 107%. The peak demand ex post savings of 68.72 kW were higher than the ex ante savings of 64.16 kW.

The primary variance between the ex ante and ex post savings was due to the difference in the waste heat factor used in the evaluation. The ex post waste heat factor (1.14 for a secondary school) was higher than the ex ante factor of 1.07.

2.102 304B

Project Summary

Through a project represented by sample ID 304, a program participant received BSS Custom incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 357,705 kWh with ex post gross coincident reductions of 67.95 kW. The energy savings gross realization rate is 107%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 2L to LED Type B	262	262	59	19	3,500	1.14	39,248	41,815	107%
T8 4ft 3L to LED Type B	841	841	88	28.5	3,500	1.14	185,823	199,658	107%
T8 4ft 4L to LED Type B	79	79	114	38	3,500	1.14	22,485	23,956	107%
T8 4ft 6L to LED Type B	7	7	175	57	3,500	1.14	3,093	3,296	107%
T8 2ft 4L to LED Retrofit Kit	97	97	64	18	3,500	1.14	16,710	17,803	107%
T5HO4ft 6L to LED HB Fixture	50	50	360	101	3,500	1.14	48,685	51,671	106%
T5HO4ft 4L to LED HB Fixture	12	12	234	101	3,500	1.14	6,022	6,368	106%
T5HO 4ft 1L to LED Type B	74	74	59	14.5	3,500	1.14	12,194	13,139	108%
Total							**334,260**	**357,705**	**107%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom	334,260	357,705	107%	63.5	67.95	107%
Total	**334,260**	**357,705**	**107%**	**63.5**	**67.95**	**107%**

Site-Level Estimation of Ex Post Gross Savings

The ex-post energy savings amounted to 357,705 kWh, with a gross energy savings realization rate of 107%. The peak demand ex-post savings of 67.95 kW was greater than the ex-ante savings of 63.5kW.

The primary variance between the ex ante and ex post savings was due to the difference in the waste heat factor used in the evaluation. The ex post waste heat factor (1.14 for a secondary school) was higher than the ex ante factor of 1.07.

2.103 305B

Project Summary

Through a project represented by sample ID 305, a program participant received BSS Custom incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 257,075 kWh with ex post gross coincident reductions of 48.83 kW. The energy savings gross realization rate is 106%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 4L to LED Type B	874	874	114	38	2,080	1.14	147,833	157,505	107%
T8 4ft 2L to LED Type B	343	343	59	19	2,080	1.14	30,536	32,533	107%
T8 4ft 3L to LED Type B	124	124	88	28.5	2,080	1.14	16,282	17,495	107%
T8 4ft 1L to LED Type B	3	3	32	9.5	2,080	1.14	148	160	108%
T5HO4ft 4L to LED HB Fixture	136	136	234	101	2,080	1.14	40,559	42,890	106%
T8 UTube2L to LED Retrofit Kit	74	74	56	19	2,080	1.14	6,258	6,492	104%
Total							**241,616**	**257,075**	**106%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom	241,616	257,075	106%	45.90	48.83	106%
Total	**241,616**	**257,075**	**106%**	**45.90**	**48.83**	**106%**

The ex-post energy savings amounted to 257,075 kWh, with a gross energy savings realization rate of 106%. The peak demand ex-post savings of 48.83 kW was greater than the ex-ante savings of 45.90 kW. The primary variance between the expected and realized savings stems from the difference in the waste heat factor used in the evaluation. The ex-post waste heat factor (1.14) for a secondary school is greater than the ex-ante factor (1.07).

2.104 306B and 307B

Project Summary

Through a project represented by sample ID 306 and 307, a program participant received BSS Custom incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 234,986 kWh with ex post gross coincident reductions of 44.64 kW. The energy savings gross realization rate is 101%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 2L to LED Type B	133	133	59	19	3,000	1.08	17,077	17,237	101%
T8 4ft 3L to LED Type B	791	791	88	28.5	3,000	1.08	149,807	152,489	102%
T12 4ft 4L to LED Type B	16	16	164	38	3,000	1.08	6,471	6,532	101%
T12 4ft 2L to LED Retrofit Kit	78	78	82	18	3,000	1.08	16,024	16,174	101%
T12 8 ft 1L to LED Type B	42	42	83	40	3,000	1.08	5,797	5,851	101%
HID to LED HB Fixture	32	32	455	101	3,000	1.08	36,466	36,703	101%
Total							**231,642**	**234,986**	**101%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom	231,642	234,986	101%	44.0	44.64	101%
Total	**231,642**	**234,986**	**101%**	**44.0**	**44.64**	**101%**

The ex-post energy savings amounted to 234,986 kWh, with a gross energy savings realization rate of 101%. The peak demand ex-post savings of 44.64 kW was greater than the ex-ante savings of 44.0 kW.

2.105 308B

Project Summary

Through a project represented by sample ID 308, a program participant received BSS Custom incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 321,593 kWh with ex post gross coincident reductions of 61.09 kW. The energy savings gross realization rate is 144%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.or. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
4' 4LT12 to LED linear lamp	151	151	164	38	8,760	1.14	132,326	190,001	144%
4' 3LT12 to LED linear lamp	1	1	122	29	8,760	1.14	646	929	144%
4' 2LT12 to LED linear lamp	109	109	82	19	8,760	1.14	47,759	68,577	144%
U' 2LT12 to LED kit	67	67	72	18	8,760	1.14	25,163	36,131	144%
U' 3LT12 to LED kit	10	10	115	18	8,760	1.14	6,746	9,687	144%
2' 1LT12 to LED kit	1	1	28	9	8,760	1.14	132	190	144%
MH to LED lamp	7	7	284	54	8,760	1.14	11,198	16,078	144%
Total							**223,970**	**321,592**	**144%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	223,970	321,593	144%	42.55	61.09	151%
Total	**223,970**	**321,593**	**144%**	**42.55**	**61.09**	**151%**

The ex-post energy savings amounted to 321,593 kWh, with a gross energy savings realization rate of 144%. The peak demand ex-post savings of 61.09 kW was greater than the ex-ante savings of 40.42 kW.

Site-Level Estimation of Ex Post Gross Savings

The primary variance between the expected and realized savings stems from the difference in hours of use. The confirmed ex-post hours (8,760) are greater than the ex-ante estimate hours (6,500). The facility is a jailhouse where all lighting is utilized 24/7.

2.106 309B

Project Summary

Through a project represented by sample ID 309, a program participant received BSS Custom incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 228,145 kWh with ex post gross coincident reductions of 43.34 kW. The energy savings gross realization rate is 107%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 3L to LED Type B	46	46	88	28.5	3,000	1.14	8,712	9,361	107%
T8 4ft 2L to LED Type B	123	123	59	19	3,000	1.14	15,793	16,826	107%
T8 4ft 4L to LED Type B	775	775	114	38	3,000	1.14	189,069	201,438	107%
T8 UTube2L to LED Retrofit Kit	4	4	56	18	3,000	1.14	488	520	107%
Total							**214,062**	**228,145**	**107%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom	214,062	228,145	107%	40.66	43.34	107%
Total	**214,062**	**228,145**	**107%**	**40.66**	**43.34**	**107%**

The ex-post energy savings amounted to 228,145 kWh, with a gross energy savings realization rate of 107%. The peak demand ex-post savings of 43.34 kW was greater than the ex-ante savings of 40.66 kW.

Site-Level Estimation of Ex Post Gross Savings

The primary variance between the expected and realized savings stems from the difference in the waste heat factor used for evaluation. The ex-post waste heat factor (1.14) for secondary school is greater than the ex-ante factor (1.07).

2.107 310B

Project Summary

Through a project represented by sample ID 310, a program participant received BSS incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

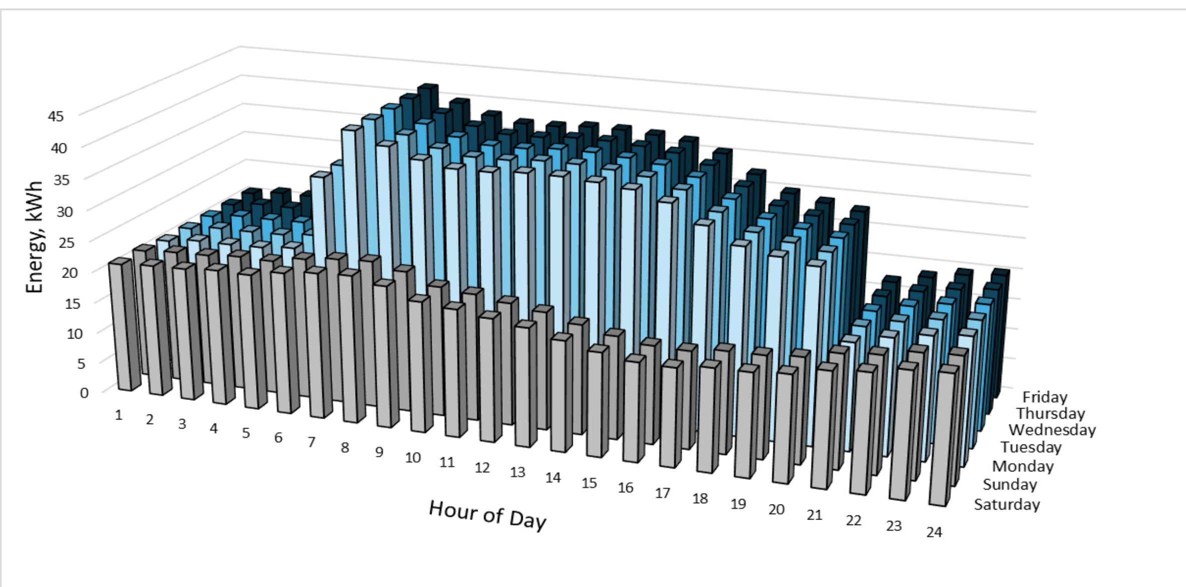
The ex post gross energy savings are 281,268 kWh with ex post gross coincident reductions of 53.43 kW. The energy savings gross realization rate is 139%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The interval billing data and weather data model determined by *Equation 3*, reduced to exclude heating and cooling energy usage is summarized in the following figure, by both day of the week and hour of the day. The model was referenced during the site visit, to inform the characterization of lighting usage areas, primarily those fully lit during operating hours.

Facility Energy Usage, non-weather dependent



The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
4' 3LT8 to LED linear lamp	238	238	88	29	2,400	1.14	31,253	38,419	123%
4' 2LT8 to LED linear lamp	853	853	59	19	2,500	1.14	75,937	97,242	128%
4' 4LT8 to LED linear lamp	397	397	114	38	3,200	1.14	67,151	110,067	164%
U' 2LT8 to LED kit	5	5	56	18	2,500	1.14	423	542	128%
4' 1LT8 to LED linear lamp	28	28	32	10	2,500	1.14	1,372	1,756	128%
4' 8LT8 to LED linear lamp	54	54	292	76	2,500	1.14	25,959	33,242	128%
Total							**202,095**	**281,268**	**139%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	202,095	281,268	139%	38.39	53.43	139%
Total	**202,095**	**281,268**	**139%**	**38.39**	**53.43**	**139%**

The ex post gross energy savings are 202,095 kWh with ex post gross coincident reductions of 53.43 kW. The energy savings gross realization rate is 139%. The primary difference in the savings estimate:

- The ex post hours of use (2,500 to 3,200) are greater than the ex ante hours (2,028). During the site visit the rooms utilized for the Summer sessions were identified. The larger hours of use aligns with the facility base load energy model for the summer months and the school year months.

2.108 311B

Project Summary

Through a project represented by sample ID 311, a program participant received BSS Custom incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 194,434 kWh with ex post gross coincident reductions of 36.94 kW. The energy savings gross realization rate is 101%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T5HO4ft 4L to LED HB Fixture	18	18	234	101	2,080	1.08	5,368	5,378	100%
T8 4ft 2L to LED Type B	518	518	59	19	2,080	1.08	46,115	46,545	101%
T8 4ft 4L to LED Type B	713	713	114	38	2,080	1.08	120,601	121,728	101%
T8UTube2L to LED Retrofit Kit	2	2	56	18	2,080	1.08	169	171	101%
T8 2ft 2L to LED Retrofit Kit	16	16	32	18	2,080	1.08	499	503	101%
T8 4ft 1L to LED Type B	42	42	32	9.5	2,080	1.08	2,057	2,123	103%
T8 4ft 6L to LED Type B	49	49	221	57.6	2,080	1.08	17,885	17,986	101%
Total							**192,694**	**194,434**	**101%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom	192,694	194,434	101%	36.6	36.94	101%
Total	**192,694**	**194,434**	**101%**	**36.6**	**36.94**	**101%**

The ex-post energy savings amounted to 194,434 kWh, with a gross energy savings realization rate of 101%. The peak demand ex-post savings of 36.94 kW was greater than the ex-ante savings of 36.6 kW.

2.109 312B

Project Summary

Through a project represented by sample ID 312, a program participant received BSS Custom incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 158,703 kWh with ex post gross coincident reductions of 30.15 kW. The energy savings gross realization rate is 102%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 2L to LED Type B	130	130	59	19	3,500	1.08	19,474	19,656	101%
T8 4ft 3L to LED Type B	508	508	88	28.5	3,500	1.08	112,245	114,254	102%
T8 4ft 1L to LED Type B	14	14	32	9.5	3,500	1.08	1,153	1,191	103%
T8 2ft 2L to LED Retrofit Kit	2	2	32	18	3,500	1.08	105	106	101%
T5HO 4ft 6L to LED Type B	24	24	360	101	3,500	1.08	23,369	23,496	101%
Total							**156,346**	**158,703**	**102%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom	156,346	158,703	102%	29.7	30.15	102%
Total	**156,346**	**158,703**	**102%**	**29.7**	**30.15**	**102%**

The ex-post energy savings amounted to 158,703 kWh, with a gross energy savings realization rate of 102%. The peak demand ex-post savings of 30.15 kW was greater than the ex-ante savings of 29.7 kW.

2.110 313B and 314B

Project Summary

Through a project represented by sample ID 313 and 314, a program participant received BSS Custom incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 147,208 kWh with ex post gross coincident reductions of 27.96 kW. The energy savings gross realization rate is 101%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.orgThe installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 2L to LED Type B	81	81	59	19	3,000	1.08	10,400	10,498	101%
T8 4ft 3L to LED Type B	458	458	88	28.5	3,000	1.08	86,741	88,293	102%
T8 4ft 1L to LED Type B	55	55	32	9.5	3,000	1.08	3,884	4,010	103%
T8 4ft 2L to LED Type B	22	22	59	19	3,000	1.08	2,825	2,851	101%
T8UTube 2L to LED Retrofit Kit	86	86	56	18	3,000	1.08	10,490	10,588	101%
HID to LED HB Fixture	27	27	455	101	3,000	1.08	30,768	30,968	101%
Total							**145,108**	**147,208**	**101%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom	145,108	147,208	101%	27.57	27.96	101%
Total	**145,108**	**147,208**	**101%**	**27.57**	**27.96**	**101%**

The ex-post energy savings amounted to 147,208 kWh, with a gross energy savings realization rate of 101%. The peak demand ex-post savings of 27.96 kW was greater than the ex-ante savings of 27.57 kW.

2.111 315B and 316B

Project Summary

Through a project represented by sample ID 315 and 316, a program participant received BSS Custom incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

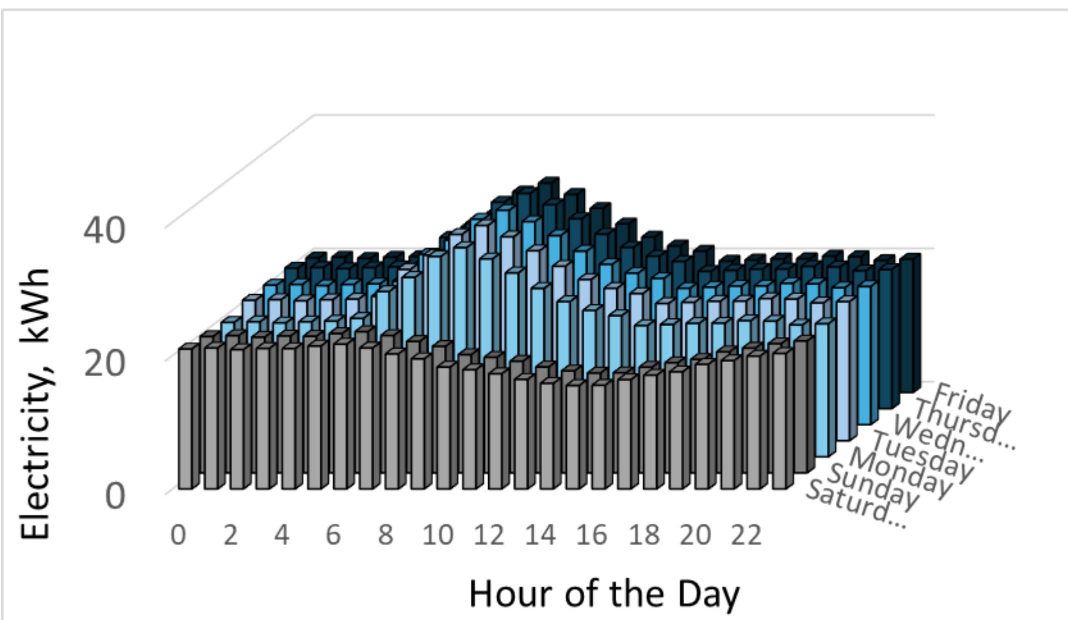
The ex post gross energy savings are 138,168 kWh with ex post gross coincident reductions of 26.25 kW. The energy savings gross realization rate is 101%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The interval billing data and weather data model determined by Equation 3, reduced to exclude heating and cooling energy usage is summarized in the following figure, by both day of the week and hour of the day. The model was referenced during the site visit, to inform the characterization of lighting usage areas, primarily those fully lit during operating hours.

Facility Energy Usage, non-weather dependent



The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 2L to LED Type B	56	56	82	19	3,000	1.08	11,325	11,431	101%
T12 4ft 3L to LED Type B	168	168	122	28.5	3,000	1.08	50,153	50,894	101%
T12 4ft 4L to LED Type B	64	64	164	38	3,000	1.08	25,885	26,127	101%
T12UTub2L to LED Retrofit Kit	2	2	72	18	3,000	1.08	347	350	101%
T8 4ft 2L to LED Type B	84	84	59	19	3,000	1.08	10,786	10,886	101%
T8 4ft 4L to LED Type B	13	13	114	38	3,000	1.08	3,171	3,201	101%
T8 4ft 3L to LED Type B	183	183	88	28.5	3,000	1.08	34,658	35,279	102%
Total							**136,325**	**138,168**	**101%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom	136,325	138,168	101%	25.9	26.25	101%
Total	**136,325**	**138,168**	**101%**	**25.9**	**26.25**	**101%**

The ex-post energy savings amounted to 138,168 kWh, with a gross energy savings realization rate of 101 %. The peak demand for ex-post savings of 26.26kW was greater than the ex-ante savings of 25.9kW.

2.112 317B

Project Summary

Through a project represented by sample ID 317, a program participant received BSS Custom incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 105,827 kWh with ex post gross coincident reductions of 20.1kW. The energy savings gross realization rate is 101 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 2L to LED Type B	337	337	59	19	3,500	1.08	50,483	50,954	101%
T8 4ft 3L to LED Type B	193	193	88	28.5	3,500	1.08	42,644	43,408	102%
T5HO4ft 1L to LED Type B	34	34	59	14.5	3,500	1.08	5,603	5,719	102%
T8 4ft 4L to LED Type B	20	20	114	38	3,500	1.08	5,692	5,746	101%
Total							**104,422**	**105,827**	**101%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom	104,422	105,827	101%	19.84	20.1	101%
Total	**104,422**	**105,827**	**101%**	**19.84**	**20.1**	**101%**

The ex-post energy savings amounted to 105,827kWh, with a gross energy savings realization rate of 101 %. The peak demand ex-post savings of 20.1kW was greater than the ex-ante savings of 19.84kW.

Site-Level Estimation of Ex Post Gross Savings

2.113 318B and 319B

Project Summary

Through a project represented by sample ID 318 and 319, a program participant received BSS Custom incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 85,454 kWh with ex post gross coincident reductions of 16.2kW. The energy savings gross realization rate is 101%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 2L to LED Type B	411	411	59	19	2,600	1.08	45,736	46,164	101%
T8 4ft 3L to LED Type B	22	22	88	28.5	2,600	1.08	3,611	3,676	102%
T8 4ft 1L to LED Type B	9	9	32	9.5	2,600	1.08	551	569	103%
T8 UTube2L to LED Type B	45	45	56	26	3,000	1.08	4,334	4,374	101%
HID to LED Fixture	32	32	455	100	2,500	1.08	30,388	30,672	101%
Total							**84,620**	**85,454**	**101%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
BSS	84,620	85,454	101%	16.1	16.2	101%
Total	**84,620**	**85,454**	**101%**	**16.1**	**16.2**	**101%**

The ex-post energy savings amounted to 85,454 kWh, with a gross energy savings realization rate of 101%. The peak demand ex-post savings of 16.2kW was greater than the ex-ante savings of 16.1kW

2.114 320B

Project Summary

Through a project represented by sample ID 320, a program participant received BSS incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 48,420 kWh with ex post gross coincident reductions of 9.20 kW. The energy savings gross realization rate is 101%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The interval billing data and weather data model determined by *Equation 3*, compared to the actual energy usage informed the tabulation of unoccupied weekdays, to account for holidays and periods when summer school was not scheduled. These 29 days occurring Monday to Friday were reduced from the weekday occupied model.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
MH to LED fixture	49	49	455	150	3,000	1.08	47,973	48,420	101%
Total							**47,973**	**48,420**	**101%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Standard	47,973	48,420	101%	9.11	9.20	101%
Total	**47,973**	**48,420**	**101%**	**9.11**	**9.20**	**101%**

The ex-post energy savings amounted to 48,420 kWh, with a gross energy savings realization rate of 101%. The peak demand ex-post savings of 9.20 kW was greater than the ex-ante savings of 9.11 kW. The Site-Level Estimation of Ex Post Gross Savings primary difference between the expected and realized savings stems from the difference in the interactive factor. The ex-ante estimate used 1.07 while the ex-post analysis used 1.08

2.115 321B and 322B

Project Summary

Through a project represented by sample ID 321 and 322, a program participant received BSS incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures and lamps.

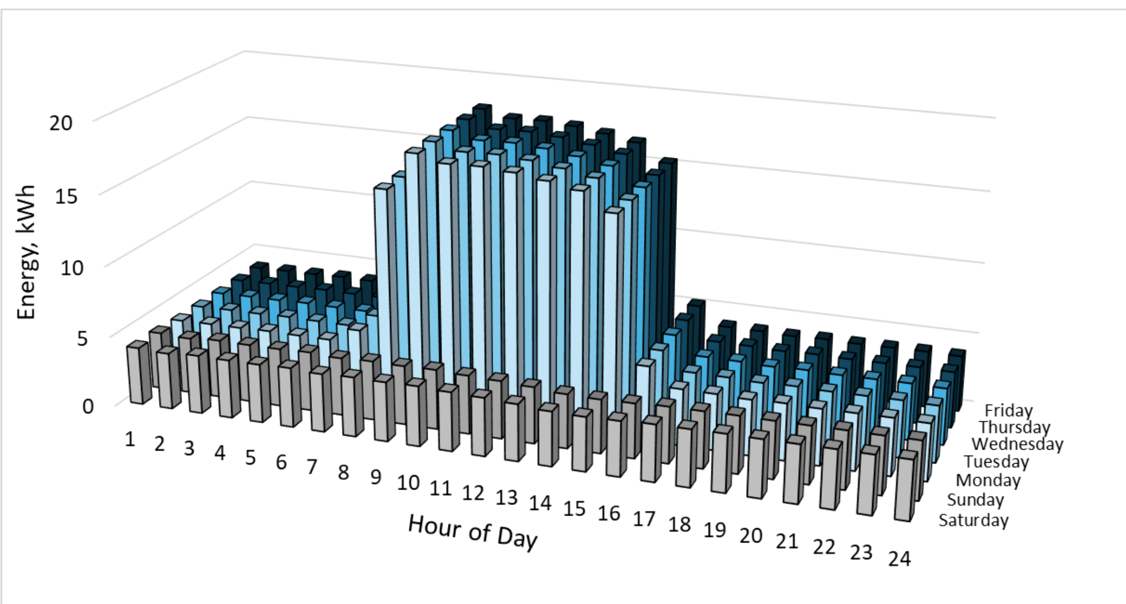
The ex post gross energy savings are 49,547 kWh with ex post gross coincident reductions of 9.41 kW. The energy savings gross realization rate is 107%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when non-electric heat was present, to the energy savings.

The interval billing data and weather data model determined by *Equation 3*, reduced to exclude heating and cooling energy usage is summarized in the following figure, by both day of the week and hour of the day. The model was referenced during the site visit, to inform the characterization of lighting usage areas, primarily those fully lit during operating hours.

Facility Energy Usage, non-weather dependent



The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Site-Level Estimation of Ex Post Gross Savings

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4' 2L to LED Type B	396	396	59	19	2,258	1.08	35,253	38,634	110%
T8 4' 4L to LED Type B	11	11	114	38	2,030	1.08	1,861	1,833	98%
T12 4' 2L to LED Type B	5	5	82	19	1,522	1.08	701	518	74%
T12 4' 4L to LED Type B	31	31	164	38	2,030	1.08	8,694	8,562	98%
Total							**46,509**	**49,547**	**107%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	Ex Post	Realization Rate
BSS	46,509	49,547	107%	8.84	9.41	106%
Total	**46,509**	**49,547**	**107%**	**8.84**	**9.41**	**106%**

The ex-post energy savings amounted to 49,547 kWh, with a gross energy savings realization rate of 107%. The peak demand ex-post savings of 9.41 kW was greater than the ex-ante savings of 8.84 kW. The primary variance between the expected and realized savings stems from the verified hours of operation for the first measure (2,258) were greater than the ex-ante hours (2,080).

2.116 323B and 324B

Project Summary

Through a project represented by sample ID 323 and 324, a program participant received BSS Custom incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 26,903 kWh with ex post gross coincident reductions of 5.1kW. The energy savings gross realization rate is 101%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 4L to LED Type B	46	46	164	38	2,080	1.08	12,900	13,020	101%
T12 4ft 2L to LED Type B	7	7	82	19	2,080	1.08	981	991	101%
T12HO 8ft 2L to Retrofit Kit	1	1	227	36	2,080	1.08	425	429	101%
T8 4ft 4L to LED Type B	73	73	114	38	2,080	1.08	12,348	12,463	101%
Total							**26,654**	**26,903**	**101%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
BSS	26,654	26,903	101%	5.1	5.11	101%
Total	**26,654**	**26,903**	**101%**	**5.1**	**5.11**	**101%**

The ex-post energy savings amounted to 26,903 kWh, with a gross energy savings realization rate of 101 %. The peak demand ex-post savings of 5.11kW was greater than the ex-ante savings of 5.1kW.

Site-Level Estimation of Ex Post Gross Savings

2.117 325B, 326B, and 327B

Project Summary

Through two projects represented by sample ID 325, 326, and 327, a program participant received BSS incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures and LED lamps.

The ex post gross energy savings are 28,225 kWh with ex post gross coincident reductions of 5.36 kW. The energy savings gross realization rate is 94%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The hours of use for each area were provided during the walkthrough from the site visit. The values in the following table are the weighted hours by the installed watts per area.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
4L T12 Flo to LED tube B	32	32	164	38	1,800	1.08	8,974	7,838	87%
2L T12 8'Flo to LED tube B	4	4	227	36	1,800	1.08	1,700	1,485	87%
2L T8 Flo to Lamp tube B	3	3	59	19	2,600	1.08	266	337	127%
HID to LED high bay	10	10	455	110	2,100	1.08	7,901	7,825	99%
1L T12 Flo to LED tube B	2	2	48	10	2,600	1.08	169	213	126%
2L T12 Flo to LED tube B	63	63	82	19	2,600	1.08	8,833	7,716	87%
1L T12HO Flo to LED kit	5	5	227	36	2,600	1.08	2,126	2,682	126%
2L 2' T12 Flo to LED kit	1	1	56	10	2,600	1.08	102	129	126%
Total							30,071	28,225	94%

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate

Site-Level Estimation of Ex Post Gross Savings

SBDI	30,071	28,225	94%	5.71	5.36	94%
Total	**30,071**	**28,225**	**94%**	**5.71**	**5.36**	**94%**

The ex post gross energy savings are 28,225 kWh with ex post gross coincident reductions of 5.36 kW. The energy and demand savings gross realization rate are 94%. The primary difference in the savings estimate is the lower hours of use for some areas captured during the site visit.

2.118 328B

Project Summary

Through a project represented by sample ID 328, a program participant received BSS incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

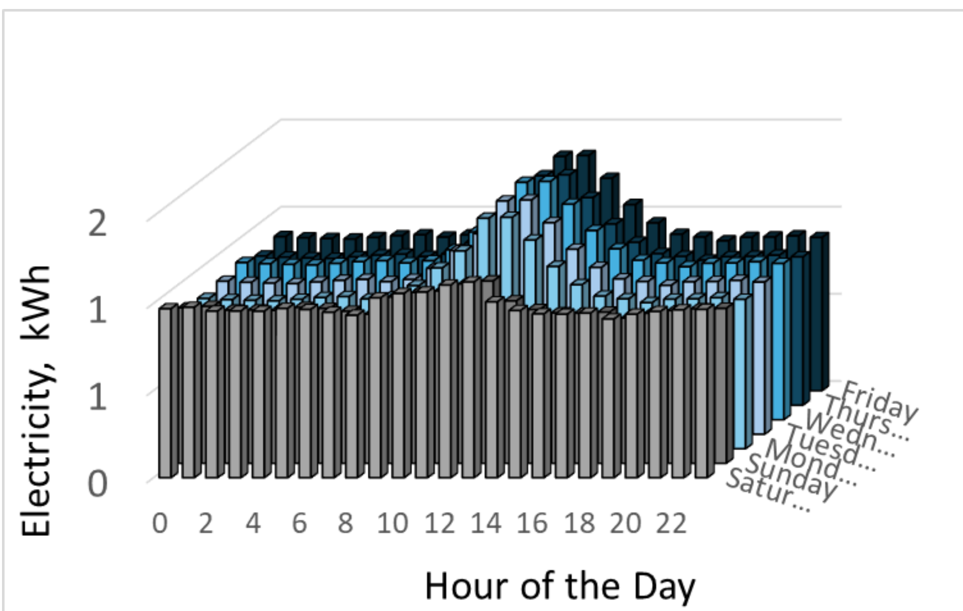
The ex post gross energy savings are 6,426 kWh with ex post gross coincident reductions of 1.22 kW. The energy savings gross realization rate is 101%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The interval billing data and weather data model determined by *Equation 3*, reduced to exclude heating and cooling energy usage is summarized in the following figure, by both day of the week and hour of the day. The model was referenced during the site visit, to inform the characterization of lighting usage areas, primarily those fully lit during operating hours.

Facility Energy Usage, non-weather dependent



The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 1L to LED Type B	75	75	48	9.5	2,080	1.07	6,343	6,426	101%
Total							**6,343**	**6,426**	**101%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom	6,343	6,426	101%	1.2	1.22	101%
Total	**6,343**	**6,426**	**101%**	**1.2**	**1.22**	**101%**

The ex-post energy savings amounted to 6,426 kWh, with a gross energy savings realization rate of 101%. The peak demand ex-post savings of 1.22kW was greater than the ex-ante savings of 1.2kW.

2.119 400B, 401B, and 402B

Project Summary

Through a project represented by sample ID 400, 401, and 402, a program participant received Small Business Direct Install incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 237,922 kWh with ex post gross coincident reductions of 45.2kW. The energy savings gross realization rate is 98%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 4L to LED Retrofit Kit	107	107	164	24	6,240	1.04		97,214	99%
T12 4ft 2L to LED Retrofit Kit	7	7	82	22	6,240	1.04		2,726	96%
T12 8ft 2L to LED Retrofit Kit	47	47	138	44	6,240	1.04		28,671	95%
T12 8ft 4L to LED Retrofit Kit	13	13	276	88	6,240	1.04		15,861	96%
T5HO4ft 8L to LED Retrofit Kit	2	2	468	88	6,240	1.04		4,932	96%
HID to LED HB Fixture	40	40	455	150	6,240	1.04		79,173	97%
No sensor to Fixture Mounted Occupancy Sensor	40	40	150	150	6,240	1.04		9,345	97%
Total							**243,358**	**237,922**	**97%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom	243,358	237,922	97%	46.41	45.2	97%
Total	**243,358**	**237,922**	**97%**	**46.41**	**45.2**	**97%**

The ex-post energy savings amounted to 237,922 kWh, with a gross energy savings realization rate of 98%. The peak demand ex-post savings of 45.2kW was less than the ex-ante savings of 46.41kW. The primary variance between the expected and realized savings stems from the difference in the waste heat factor used in evaluation. The ex-post waste heat factor (1.04) for a warehouse is less than the ex-ante factor (1.07).

2.120 403D and 404D

Project Summary

Through a project represented by sample IDs 403D and 404D, a program participant received Small Business Direct Install incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

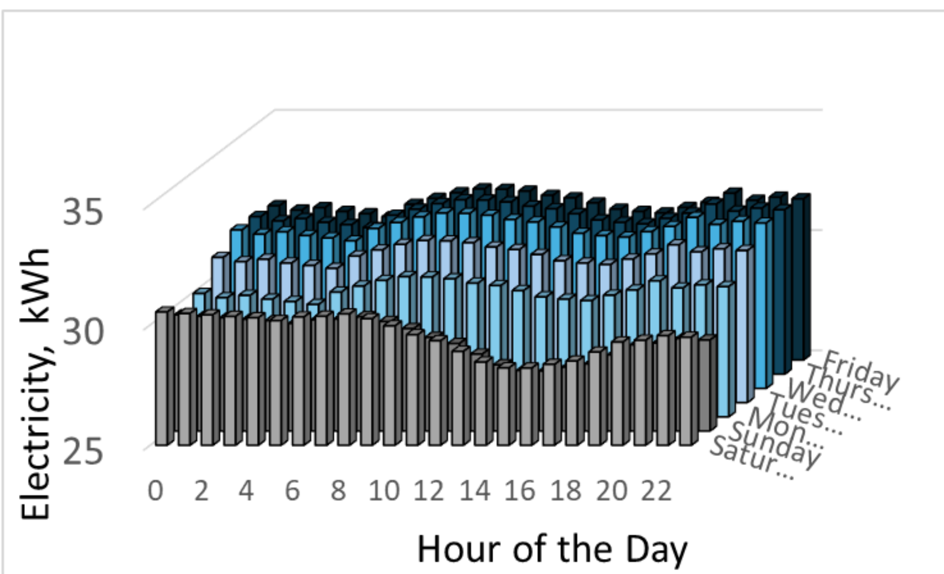
The ex post gross energy savings are 133,860 kWh with ex post gross coincident reductions of 25.43kW. The energy savings gross realization rate is 97 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The interval billing data and weather data model determined by *Equation 3*, reduced to exclude heating and cooling energy usage is summarized in the following figure, by both day of the week and hour of the day. The model was referenced during the site visit, to inform the characterization of lighting usage areas, primarily those fully lit during operating hours.

Facility Energy Usage, non-weather dependent



The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 4L to LED Fixture	90	90	164	50	3,200	1.04	35,130	34,145	97%
HID to LED HB Fixture	68	68	455	220	6,000	1.04	102,592	99,715	97%
Total							**137,722**	**133,860**	**97%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	137,722	133,860	97%	26.16	25.43	97%
Total	**137,722**	**133,860**	**97%**	**26.16**	**25.43**	**97%**

The ex-post energy savings amounted to 133,860 kWh, with a gross energy savings realization rate of 97 %. The peak demand ex-post savings of 25.43kW was greater than the ex-ante savings of 26.16kW. The primary variance between the expected and realized savings stems from the difference in the waste heat factor used in evaluation. The ex-post waste heat factor (1.04) for a warehouse is less than the ex-ante factor (1.07).

2.121 405D, 406D, and 407D

Project Summary

Through a project represented by sample ID 405, 406, and 407, a program participant received Small Business Direct Install incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 136,383 kWh with ex post gross coincident reductions of 25.91 kW. The energy savings gross realization rate is 104 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 4L to LED Type B	284	284	164	38	3,000	1.11	114,867	119,161	104%
T12 4ft 2L to LED Type A/B	80	80	82	30	3,000	1.11	13,354	13,853	104%
T12 4ft 2L to LED Type B	4	4	82	19	3,000	1.11	809	839	104%
T8 4ft 4L to LED Type B	10	10	114	38	3,000	1.11	2,440	2,531	104%
Total							**131,470**	**136,383**	**104%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	131,470	136,383	104%	24.97	25.91	104%
Total	**131,470**	**136,383**	**104%**	**24.97**	**25.91**	**104%**

The ex-post energy savings amounted to 136,383 kWh, with a gross energy savings realization rate of 104 %. The peak demand ex-post savings of 25.91 kW was greater than the ex-ante savings of 24.97kW. The primary difference in the expected and realized savings is due to waste heat factor used in the evaluation. The ex-post waste heat factor (1.11) for office is greater than the ex-ante factor (1.07).

2.122 408D, 409D, and 410D

Project Summary

Through a project represented by sample ID 408, 409, and 410, a program participant received small business direct install incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures and lamps.

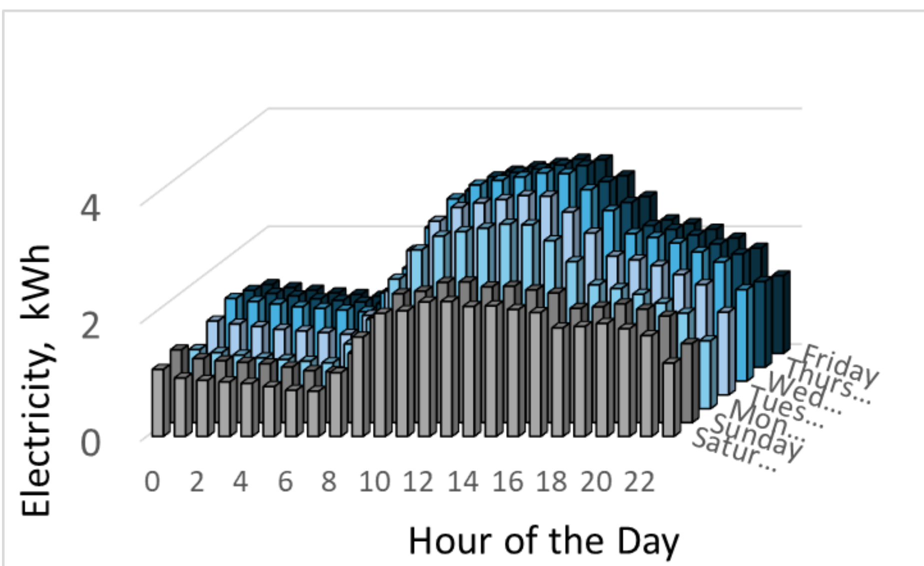
The ex post gross energy savings are 111,616 kWh with ex post gross coincident reductions of 21.2 kW. The energy savings gross realization rate is 91%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when non-electric heat was present, to the energy savings.

The interval billing data and weather data model determined by *Equation 3*, reduced to exclude heating and cooling energy usage is summarized in the following figure, by both day of the week and hour of the day. The model was referenced during the site visit, to inform the characterization of lighting usage areas, primarily those fully lit during operating hours.

Facility Energy Usage, non-weather dependent



The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
8ft T12HO 2L to LED lamp	201	390	227	12	1,840	1.08	89,379	81,370	91%
8ft T12HO 2L to LED lamp	16	16	227	24	1,840	1.08	7,090	6,454	91%
8ft T12HO 2L to LED lamp	13	24	227	12	1,840	1.08	5,812	4,720	81%
T12 4' 2L to LED lamp	6	6	82	19	1,840	1.08	825	751	91%
T12 2' 2L to LED lamp	5	5	56	12	208	1.08	118	49	42%
8' 2L to LED lamp	3	4	138	12	1,840	1.08	799	727	91%
8' 2L to LED fixture	7	8	138	12	1,840	1.08	1,899	1,729	91%
8' 2L to LED lamp	33	33	138	12	1,840	1.08	9,076	8,263	91%
HID to LED fixture	15	15	455	202	1840	1.08	7,553	7,552	100%
Total							**122,551**	**111,616**	**91%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	122,551	111,616	91%	23.28	21.2	91%
Total	**122,551**	**111,616**	**91%**	**23.28**	**21.2**	**91%**

The ex-post energy savings amounted to 111,616 kWh, with a gross energy savings realization rate of 91%. The peak demand ex-post savings of 21.20 kW was less than the ex-ante savings of 23.28kW. The primary variance between the expected and realized savings stems from the hours of use. The actual hours of use (1,840 and 208) are fewer than the ex-ante hours (2,040 and 500), as identified during the site visit and supported with the AMI interval data model by day of the week.

2.123 411D, 412D, and 413D

Project Summary

Through a project represented by sample ID 411, 412, and 413, a program participant received Small Business Direct Install incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 106,208 kWh with ex post gross coincident reductions of 20.18kW. The energy savings gross realization rate is 97 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 4L to LED Type B	179	179	114	38	3,500	1.04	50,947	49,519	97%
T8 4ft 2L to LED Type B	75	75	59	19	3,500	1.04	11,235	10,920	97%
T8UTube2L to LED Retrofit Kit	25	25	56	18	3,500	1.04	3,558	3,458	97%
T12 4ft 4L to LED Type B	44	44	164	38	3,500	1.04	20,762	20,180	97%
T12HO8ft2L to LED Retrofit Kit	32	32	227	37	3,500	1.04	22,889	22,131	97%
Total							**109,391**	**106,208**	**97%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	109,391	106,208	97%	20.78	20.18	97%
Total	**109,391**	**106,208**	**97%**	**20.78**	**20.18**	**97%**

The ex-post energy savings amounted to 106,208 kWh, with a gross energy savings realization rate of 97 %. The peak demand ex-post savings of 20.18kW was less than the ex-ante savings of 20.78kW. The primary variance between the expected and realized savings stems from the difference in the waste heat factor used in evaluation. The ex-post waste heat factor (1.04) for industrial space is less than the ex-ante factor (1.07).

2.124 414D and 415D

Project Summary

Through a project represented by sample ID 414 and 415, a program participant received Small Business Direct Install incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures occupancy sensors.

The ex post gross energy savings are 85,927 kWh with ex post gross coincident reductions of 16.32kW. The energy savings gross realization rate is 88 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 4L to LED Type B	40	40	164	46	2,600	1.02	13,131	12,517	95%
T8 4ft 2L to LED Type B	1	1	59	23	8,760	0.93	338	293	87%
T12HO 8ft 2L to LED Type B	54	54	227	80	8,760	0.93	74,405	64,669	87%
No sensor to Ceiling Mounted Occupancy Sensor	2	2	2160	2160	8,760	0.93	9,718	8,447	87%
Total							**97,592**	**85,927**	**88%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	97,592	85,927	88%	18.54	16.32	88%
Total	**97,592**	**85,927**	**88%**	**18.54**	**16.32**	**88%**

The ex-post energy savings amounted to 85,927 kWh, with a gross energy savings realization rate of 88 %. The peak demand ex-post savings of 16.32 kW was less than the ex-ante savings of 18.54 kW. The primary difference in the expected and realized savings is due to the waste heat factor used in the evaluation. The ex-post waste heat factor (1.02 and 0.93) for an air conditioned electrically heated small office and warehouse was less than the ex-ante factor (1.07).

2.125 416D and 417D

Project Summary

Through a project represented by sample ID 416 and 417, a program participant received Small Business Direct Install incentives from Ameren for retrofitting existing HID lighting with more efficient LED fixtures and occupancy sensors.

The ex post gross energy savings are 88,184 kWh with ex post gross coincident reductions of 16.75 kW. The energy savings gross realization rate is 97 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
HID to LED HB Fixture	44	44	455	90	4,380	1.04	75,267	73,157	97%
HID to LED Fixture	9	17	284	12.2	4,380	1.04	11,022	10,698	97%
No sensor to Fixture Mounted Occupancy Sensor	44	44	90	90	4,380	1.04	4,454	4,329	97%
Total							**90,743**	**88,184**	**97%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	90,743	88,184	97%	17.24	16.75	97%
Total	**90,743**	**88,184**	**97%**	**17.24**	**16.75**	**97%**

The ex-post energy savings amounted to 88,184 kWh, with a gross energy savings realization rate of 97%. The peak demand ex-post savings of 16.75kW was less than the ex-ante savings of 17.24kW. The primary difference in the expected and realized savings is due to the waste heat factor used in the evaluation. The ex-post waste heat factor (1.04) for a warehouse is less than the ex-ante factor (1.07).

2.126 418D

Project Summary

Through a project represented by sample ID 418, a program participant received Small Business Direct Install incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 69,009 kWh with ex post gross coincident reductions of 13.11kW. The energy savings gross realization rate is 93 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T5HO 4ft 6L to LED HB Fixture	71	71	360	90	2,892	0.99	59,321	54,885	93%
T12 4ft 4L to LED 2x2 Fixture	30	30	164	35.8	2,892	0.99	11,883	11,011	93%
T12 4ft 4L to LED 2x4 Fixture	8	8	164	28.1	2,892	0.99	3,366	3,113	92%
Total							**74,570**	**69,009**	**93%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	74,570	69,009	93%	14.17	13.11	93%
Total	**74,570**	**69,009**	**93%**	**14.17**	**13.11**	**93%**

The ex-post energy savings amounted to 69,009 kWh, with a gross energy savings realization rate of 93 %. The peak demand ex-post savings of 13.11kW was greater than the ex-ante savings of 14.17kW. The primary difference in the expected and realized savings is due to the waste heat factor used in the evaluation. The ex-post waste heat factor (0.99) for air-conditioned electric heated retail store is less than the ex-ante factor (1.07).

Site-Level Estimation of Ex Post Gross Savings

2.127 419D and 420D

Project Summary

Through a project represented by sample ID 419 and 420, a program participant received Small Business Direct Install incentives from Ameren for retrofitting existing lighting with more efficient LED lamps and fixtures.

The ex post gross energy savings are 73,972 kWh with ex post gross coincident reductions of 14.05kW. The energy savings gross realization rate is 104 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 4L to LED Type B	165	165	164	38	2,444	1.11	54,368	56,400	104%
T12UTube2L to LED Retrofit Kit	28	28	72	12	2,444	1.11	4,393	4,558	104%
T12 4ft 4L to LED 2x2 Fixture	12	12	164	18.5	2,444	1.11	4,582	4,737	103%
T12 4ft 4L to LED 2x4 Fixture	15	15	164	28.1	2,444	1.11	5,335	5,530	104%
T12HO8ft2L to LED Retrofit Kit	5	5	227	24.4	2,444	1.11	2,655	2,748	104%
Total							**71,333**	**73,972**	**104%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	71,333	73,972	104%	13.55	14.05	104%
Total	**71,333**	**73,972**	**104%**	**13.55**	**14.05**	**104%**

The ex-post energy savings amounted to 73,972 kWh, with a gross energy savings realization rate of 104 %. The peak demand ex-post savings of 14.05kW was greater than the ex-ante savings of 13.55kW. The primary difference in the expected and realized savings is due to the waste heat factor used in the evaluation. The ex-post waste heat factor (1.11) for a retail facility is greater than the ex-ante factor (1.07).

2.128 421D and 422D

Project Summary

Through a project represented by sample ID 421 and 422, a program participant received SBDI incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures and replacing manual adjustable thermostats with smart learning thermostats.

The ex post gross energy savings are 65,972 kWh with ex post gross coincident reductions of 16.049 kW. The energy savings gross realization rate is 98%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 3L to LED Type B	124	124	122	28.5	4,000	1.11	54,664	51,477	94%
T12 4ft 2L to LED Type B	25	25	82	19	5,500	1.11	9,268	9,615	104%
Total							**63,932**	**61,093**	**96%**

Savings for the smart thermostats installed were estimated with the TRM measure, *2.5.1 Small Commercial Learning Thermostats*

$$\Delta kWh = \frac{1}{eff}\ x\ (EFLH_{cool}\ )\ x\ \frac{BTUh_{cool}}{1{,}000}\ x\ ESF_{cool}$$

Lighting Measure Key Parameters and Energy Savings

Measure	Qty	Efficiency SEER	EFLH cool	Capacity kBTUh	ESF cool	Ex Post Gross (kWh)
Smart Thermostat	4	14	3,413	36	0.139	4,880
Total						4,880

Site-Level Estimation of Ex Post Gross Savings

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI - HVAC	3,491	4,880	140%	3.179	4.444	140%
SBDI - Lighting	63,932	61,093	96%	12.145	11.605	96%
Total	67,423	65,972	98%	15.324	16.049	105%

The ex-post energy savings totaled 65,972 kWh, with a gross energy savings realization rate of 98 %. The peak demand ex-post savings of 16.049 has a 105% realization rate. The primary difference in the lighting expected and realized savings is due to the waste heat factor used in evaluation. The ex-post waste heat factor (1.11) for office is greater than the ex-ante factor (1.07).

2.129 423D

Project Summary

Through a project represented by sample ID 423, a program participant received Small Business Direct Install incentives from Ameren for retrofitting existing lighting with more efficient LED linear lamps.

The ex post gross energy savings are 65,927 kWh with ex post gross coincident reductions of 12.52kW. The energy savings gross realization rate is 101 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 8ft 2L to LED Type B	230	230	138	80	4,576	1.08	65,317	65,927	101%
Total							**65,317**	**65,927**	**101%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	65,317	65,927	101%	12.41	12.52	101%
Total	**65,317**	**65,927**	**101%**	**12.41**	**12.52**	**101%**

The ex-post energy savings amounted to 65,927 kWh, with a gross energy savings realization rate of 101 %. The peak demand ex-post savings of 12.52kW was greater than the ex-ante savings of 12.41kW.

2.130 424D and 425D

Project Summary

Through a project represented by sample ID 424 and 425, a program participant received Small Business Direct Install incentives from Ameren for retrofitting existing lighting with more efficient LED lamps and fixtures.

The ex post gross energy savings are 55,618 kWh with ex post gross coincident reductions of 10.57kW. The energy savings gross realization rate is 98 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4f4L to LED Troffer Fixture	32	32	164	30	2,000	1.11	9,176	9,519	104%
T12 4ft 2L to LED Wrap Fixture	12	12	82	27	2,000	1.11	1,412	1,465	104%
T12 4ft 6L to LED Type B	8	8	258	57	2,000	1.04	3,441	3,345	97%
T12 4ft 2L to LED Type B	2	2	82	19	800	1.04	108	105	97%
HID to LED HB Fixture	48	48	455	80	2,200	1.04	42,372	41,184	97%
Total							**56,509**	**55,618**	**98%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	56,509	55,618	98%	10.73	10.57	98%
Total	**56,509**	**55,618**	**98%**	**10.73**	**10.57**	**98%**

The ex-post energy savings amounted to 55,618kWh, with a gross energy savings realization rate of 98 %. The peak demand ex-post savings of 10.57kW was less than the ex-ante savings of 10.73kW.

2.131 426D and 427D

Project Summary

Through a project represented by sample ID 426 and 427, a program participant received Small Business Direct Install incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 56,546 kWh with ex post gross coincident reductions of 10.74kW. The energy savings gross realization rate is 101 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 4L to LED Fixture	4	4	164	19.1	200	1.08	124	125	101%
HID to LED Downlight Fixture	92	92	190	8	3,120	1.08	55,899	56,421	101%
Total							**56,023**	**56,546**	**101%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	56,023	56,546	101%	10.64	10.74	101%
Total	**56,023**	**56,546**	**101%**	**10.64**	**10.74**	**101%**

The ex-post energy savings amounted to 56,546kWh, with a gross energy savings realization rate of 101 %. The peak demand ex-post savings of 10.74kW was greater than the ex-ante savings of 10.64kW.

2.132 428D

Project Summary

Through a project represented by sample ID 428, a program participant received Small Business Direct Install incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

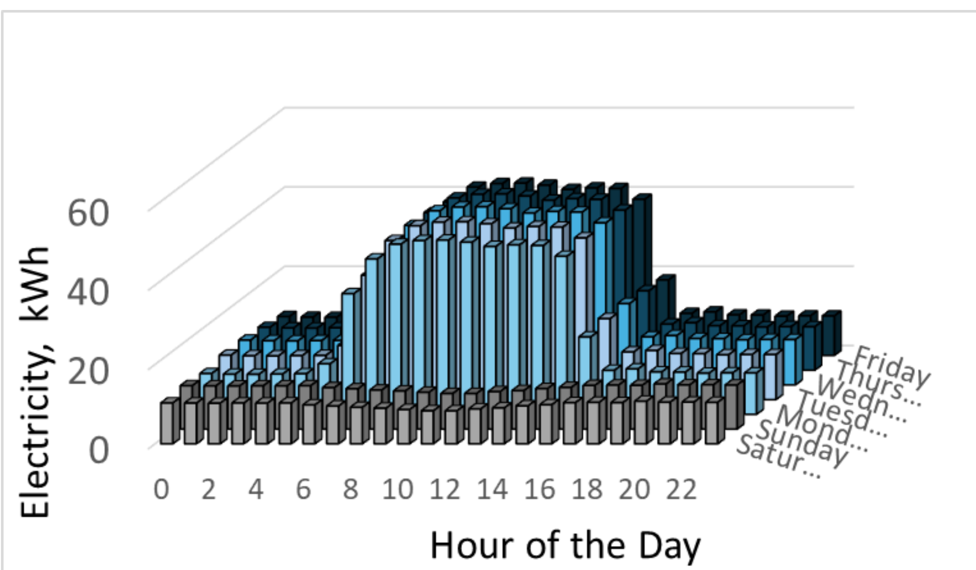
The ex post gross energy savings are 51,268 kWh with ex post gross coincident reductions of 9.74kW. The energy savings gross realization rate is 97 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The interval billing data and weather data model determined by *Equation 3*, reduced to exclude heating and cooling energy usage is summarized in the following figure, by both day of the week and hour of the day. The model was referenced during the site visit, to inform the characterization of lighting usage areas, primarily those fully lit during operating hours.

Facility Energy Usage, non-weather dependent



The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T5HO 4ft 6L to LED HB Fixture	64	64	360	160	2,600	1.04	35,610	34,611	97%
T5HO 4ft8L to LED HB Fixture	20	20	468	160	2,600	1.04	17,137	16,657	97%
Total							**52,747**	**51,268**	**97%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	52,747	51,268	97%	10.02	9.74	97%
Total	**52,747**	**51,268**	**97%**	**10.02**	**9.74**	**97%**

The ex-post energy savings amounted to 51,268 kWh, with a gross energy savings realization rate of 97 %. The peak demand ex-post savings of 9.74 kW was less than the ex-ante savings of 10.02kW. The primary variance between the expected and realized savings stems from the difference in the waste heat factor used in evaluation. The ex-post waste heat factor (1.04) for industrial space is less than the ex-ante factor (1.07).

2.133 429D and 430D

Project Summary

Through a project represented by sample ID 429 and 430, a program participant received Small Business Direct Install incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 45,624kWh with ex post gross coincident reductions of 8.67kW. The energy savings gross realization rate is 95 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 4L to LED Type B	93	93	164	28.5	2,250	1.08	32,134	30,622	95%
T12 4ft 2L to LED Type B	22	22	82	19	2,250	1.08	3,547	3,368	95%
T12 8ft 2L to LED Type B	18	18	138	24	2,250	1.08	5,253	4,986	95%
T8 4ft 4L to LED Type B	32	32	114	28.5	2,250	1.08	6,961	6,648	96%
Total							**47,895**	**45,624**	**95%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	47,895	45,624	95%	9.10	8.67	95%
Total	**47,895**	**45,624**	**95%**	**9.10**	**8.67**	**95%**

The ex-post energy savings amounted to 45,624 kWh, with a gross energy savings realization rate of 95 %. The peak demand ex-post savings of 8.67kW was less than the ex-ante savings of 9.1kW. The primary difference between the expected and realized savings is due to the hours of use. The verified hours of use (2,250) were fewer than the ex-ante hours (2,392).

2.134 431D, 432D, and 433D

Project Summary

Through a project represented by sample ID 431, 432, and 433, a program participant SBDI incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures.

The ex post gross energy savings are 35,452 kWh with ex post gross coincident reductions of 6.73kW. The energy savings gross realization rate is 75 %.

Measurement and Verification Effort

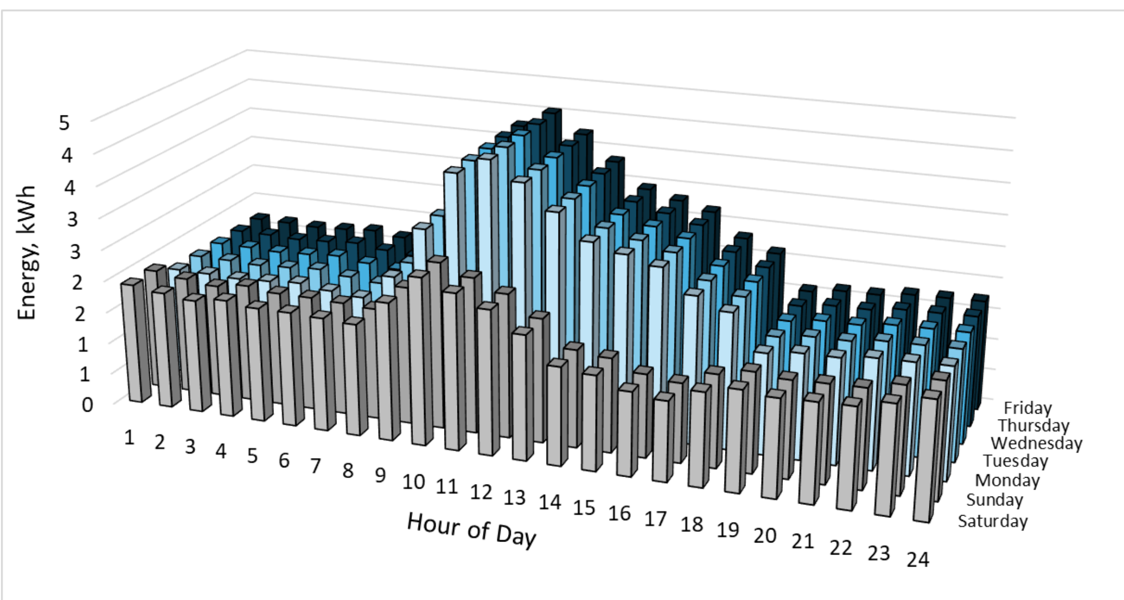
ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for cooling and interactive heating factor when electric heat was present, to the energy savings.

This facility is not a working school but has a church with Sunday school and has summer programs.

Lights - 50% 1300 hours, 40% 2926 hours, 10% 800 hours

The interval billing data and weather data model determined by *Equation 3*, reduced to exclude heating and cooling energy usage is summarized in the following figure, by both day of the week and hour of the day. The model was referenced during the site visit, to inform the characterization of lighting usage areas, primarily those fully lit during operating hours.

Facility Energy Usage, non-weather dependent



The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12UTube2L to LED Type B	4	4	72	30	2,926	1.08	809	531	66%
T12 2ft 3L to LED Type B	2	2	62	27	2,926	1.08	424	221	52%
T12 4ft 4L to LED Type B	81	81	164	60	2,000	1.08	27,041	18,196	67%
T12 2ft 2L to LED Fixture	9	9	56	20	2,926	1.08	1,560	1,024	66%
T12 2ft 2 to LED Fixture	12	12	56	20	2,926	1.08	2,080	1,365	66%
T12 4ft 4L to LED Type B	10	10	164	60	2,926	1.08	5,008	3,286	66%
HID to LED HB Fixture	24	24	295	160	2,000	1.08	6,934	6,998	101%
Exit Sign CFL to LED Exit Sign	11	11	40	3.2	8,760	1.08	3,565	3,830	107%
Total							**47,421**	**35,452**	**75%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	47,421	35,452	75%	8.82	6.73	76%
Total	**47,421**	**35,452**	**75%**	**8.82**	**6.73**	**76%**

The ex-post energy savings amounted to 35,452 kWh, with a gross energy savings realization rate of 75 %. The peak demand ex-post savings of 6.73kW was less than the ex-ante savings of 8.82kW. The primary difference between the expected and realized savings is due to the hours of use. The facility is not a full-time school but has more summer program activities. The verified hours of use (2,826 and 2,000) are fewer than the ex-ante hours (4,500 and 3,000).

2.135 434D and 435D

Project Summary

Through a project represented by sample ID 434 and 435, a program participant received Small Business Direct Install incentives from Ameren for retrofitting existing lighting with more efficient LED lamps and fixtures in a warehouse building.

The ex post gross energy savings are 31,267 kWh with ex post gross coincident reductions of 5.78kW. The energy savings gross realization rate is 85 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for heat pump heating and cooling to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 4L to LED Strip Fixture	5	5	114	76	3,000	0.93	610	530	87%
T12 8ft 2L to LED Strip Fixture	1	1	138	76	3,000	0.93	199	173	87%
T8 4ft 4L to LED Strip Fixture	8	8	114	76	3,000	0.93	976	848	87%
T8HO 8ft 2L to LED Fixture	6	6	160	78	3,000	0.93	2,607	1,373	53%
T8 4ft 4L to LED Strip Fixture	27	27	114	76	3,000	0.93	3,293	2,863	87%
T12 8ft 2L to LED Strip Fixture	5	5	138	76	3,000	0.93	995	865	87%
T12HO 4ft2L to LED Strip Fixture	1	1	133	76	3,000	0.93	183	159	87%
T8 4ft 4L to LED Strip Fixture	15	15	114	76	3,000	0.93	1,830	1,590	87%
T12 8ft 2L to LED Strip Fixture	4	4	138	76	3,000	0.93	796	692	87%
T8 4ft 3L to LED Type B	4	4	88	28.5	3,000	0.93	758	664	88%
T8 U-Tube 2L to LED Type B	2	2	56	26	3,000	0.93	193	167	87%
T8 4ft 4L to LED Type B	56	56	114	38	3,000	0.93	13,662	11,874	87%
T8 U-Tube 2L to LED Type B	6	6	56	26	3,000	0.93	578	502	87%
T8 4ft 2L to LED Type B	1	1	59	19	2,000	0.93	86	74	87%
T8 4ft 4L to LED Type B	1	1	114	38	3,000	0.93	244	212	87%
T8 U-Tube 2L to LED Type B	2	2	56	26	3,000	0.93	193	167	87%

Site-Level Estimation of Ex Post Gross Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	**Efficient**	**Base**	**Efficient**					
T8 4ft 3L to LED Type B	12	12	88	28.5	3,000	0.93	2,273	1,992	88%
T8 U-Tube 2L to LED Type B	5	5	56	26	3,000	0.93	482	419	87%
T8 4ft 3L to LED Type B	6	6	88	28.5	3,000	0.93	1,136	996	88%
T8 U-Tube 2L to LED Type B	2	2	56	26	3,000	0.93	193	167	87%
T8 4ft 3L to LED Type B	4	4	88	28.5	3,000	0.93	758	664	88%
Exit Sign CFL to LED Exit Sign	2	2	40	3	8,760	0.93	648	603	93%
No sensor to Fixture Mounted Occupancy Sensor	66	66	76	76	3,000	0.93	3,864	3,359	87%
No sensor to Fixture Mounted Occupancy Sensor	6	6	78	78	3,000	0.93	361	313	87%
Total							**36,918**	**31,267**	**85%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	36,918	31,267	85%	6.98	5.78	83%
Total	**36,918**	**31,267**	**85%**	**6.98**	**5.78**	**83%**

The ex-post energy savings amounted to 31,267 kWh, with a gross energy savings realization rate of 85 %. The peak demand ex-post savings of 5.78kW was less than the ex-ante savings of 6.98kW. The primary difference in the expected and realized savings is due to the waste heat factor used in the evaluation. The ex-post waste heat factor (0.93) for an air-conditioned, electrically heated warehouse is less than the ex-ante factor (1.07).

2.136 436D and 437D

Project Summary

Through a project represented by sample ID 436 and 437, a program participant received small business direct install incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures and lamps in an office building.

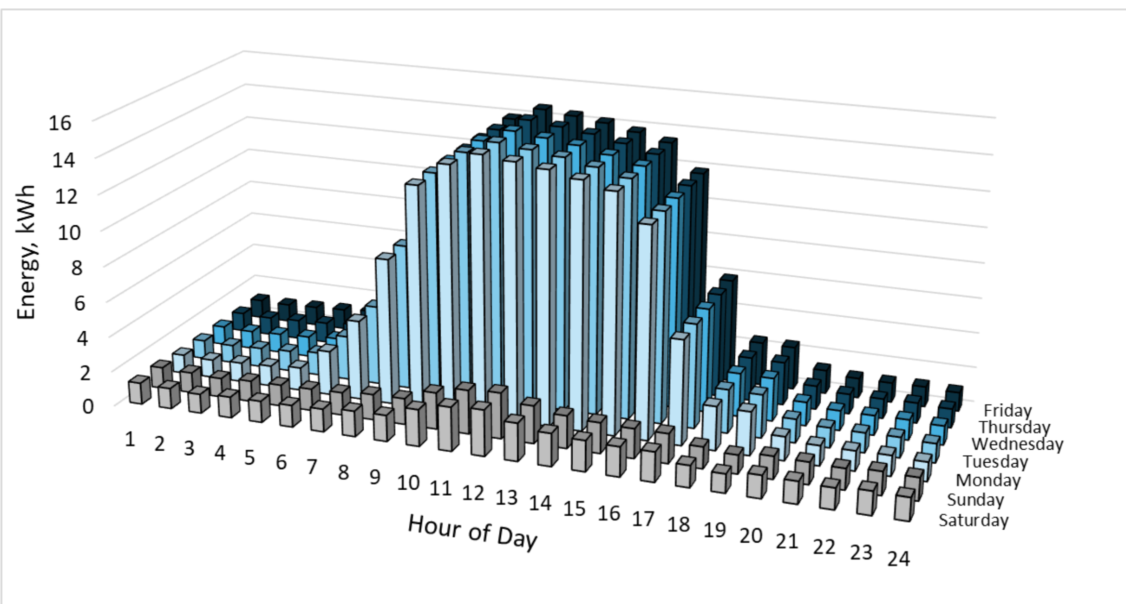
The ex-post gross energy savings are 31,134 kWh with ex post gross coincident reductions of 5.91kW. The energy savings gross realization rate is 96%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for heat pump heating and cooling to the energy savings.

The interval billing data and weather data model determined by *Equation 3*, reduced to exclude heating and cooling energy usage is summarized in the following figure, by both day of the week and hour of the day. The model was referenced during the site visit, to inform the characterization of lighting usage areas, primarily those fully lit during operating hours.

Facility Energy Usage, non-weather dependent



The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
4' 4L to LED lamp	114	114	164	38	2,125	1.02	30,567	31,134	102%
4' 2L to LED kit	-	-	-	-	-	1.02	1,869	0	0%
Total							**32,436**	**31,134**	**96%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	32,436	31,134	96%	6.16	5.91	96%
Total	**32,436**	**31,134**	**96%**	**6.16**	**5.91**	**96%**

The ex-post energy savings amounted to 31,134 kWh, with a gross energy savings realization rate of 96%. The primary variance between the expected and realized energy savings is the difference in hours of use. The confirmed ex-post hours (2,125) are greater than the ex-ante estimate hours (2,080). In addition, the second measure of 2-lamp fixtures did not exist within the facility. The contact confirmed they have only had 4-lamp fixtures, and the evaluation adjusted the quantity of 4L fixtures to match those within the facility. The peak demand ex-post savings of 5.91 kW was less than the ex-ante savings of 6.16 kW due to the absence of the 2L fixture installation.

2.137 438D, 439D, and 440D

Project Summary

Through a project represented by sample ID 438, 439, and 440, a program participant received Small Business Direct Install incentives from Ameren for retrofitting existing lighting with more efficient LED lamps and fixtures in a warehouse building.

The ex post gross energy savings are 30,637 kWh with ex post gross coincident reductions of 5.82kW. The energy savings gross realization rate is 97 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation and sourced additional lighting fixture characteristics from manufacturer specification sheets. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for Dx cooling and gas heating to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 4L to LED Type B	1	1	164	38	2,580	1.04	350	338	97%
T12 4ft 2L to LED Type B	1	1	82	19	2,580	1.04	175	169	97%
T12 4ft 4L to LED Troffer	22	22	164	30	2,580	1.04	8,202	7,910	96%
HID to LED HB Fixture	22	22	455	90	2,580	1.04	22,339	21,546	96%
Exit Sign CFL to LED Exit Sign	2	2	40	3	8,760	1.04	648	674	104%
Total							**31,714**	**30,637**	**97%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	31,714	30,637	97%	5.99	5.82	97%
Total	**31,714**	**30,637**	**97%**	**5.99**	**5.82**	**97%**

The ex-post energy savings amounted to 30,637 kWh, with a gross energy savings realization rate of 97 %. The peak demand ex-post savings of 5.82kW was less than the ex-ante savings of 5.99kW. The primary difference in the expected and realized savings is due to the waste heat factor used in the evaluation. The ex-post waste heat factor (1.04) for a Dx cooled warehouse facility is less than the ex-ante factor (1.07).

2.138 441D

Project Summary

Through a project represented by sample ID 441, a program participant received small business direct install incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures and lamps in a retail building.

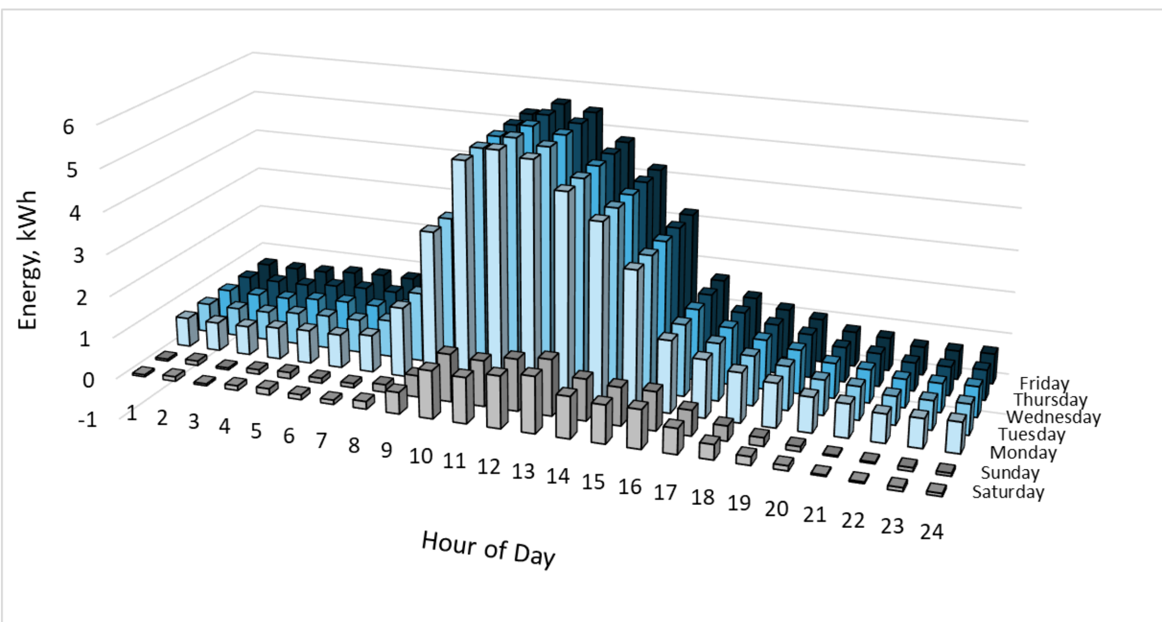
The ex post gross energy savings are 24,021 kWh with ex post gross coincident reductions of 4.56kW. The energy savings gross realization rate is 92%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for heat pump cooling and heating to the energy savings.

The interval billing data and weather data model determined by *Equation 3*, reduced to exclude heating and cooling energy usage is summarized in the following figure, by both day of the week and hour of the day. The model was referenced during the site visit, to inform the characterization of lighting usage areas, primarily those fully lit during operating hours.

Facility Energy Usage, non-weather dependent



The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
4' 4L to LED lamp	91	91	164	58	2,380	0.99	24,688	22,728	92%
4' 2L to LED lamp	9	9	82	29	2,380	0.99	1,221	1,124	92%
U-tube 2L to LED lamp	2	2	72	36	2,380	0.99	184	170	92%
Total							**26,093**	**24,021**	**92%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	26,093	24,021	92%	4.96	4.56	92%
Total	**26,093**	**24,021**	**92%**	**4.96**	**4.56**	**92%**

The ex-post energy savings amounted to 24,021 kWh, with a gross energy savings realization rate of 92%. The peak demand ex-post savings of 4.56kW was less than the ex-ante savings of 4.96kW. The primary difference between the expected and realized savings is in the waste heat factor used in evaluation. The ex-post waste heat factor (0.99) for a standalone retail store with a heat pump is less than the ex-ante factor (1.07).

2.139 442D

Project Summary

Through a project represented by sample ID 442, a program participant received Small Business Direct Install incentives from Ameren installed four ENERGY STAR® new reach-in low temperature self-contained refrigeration units in a retail building.

The ex post gross energy savings are 20,672 kWh with ex post gross coincident reductions of 2.81kW. The energy savings gross realization rate is 88 %.

Measurement and Verification Effort

The evaluation team gathered the project documentation, manufacturer specification data sheets, and the program tracking data list of incentivized measures to understand the project scope and contacted the participant for verification of the installation. A non-scheduled site visit was also completed during the normal store hours to verify the installed freezers for four separate units with four doors each. The baseline of savings for ENERGY STAR refrigerator and freezer by volume are found in the Ameren TRM measure *2.9.1 Commercial Sold & Glass Door Refrigerators and Freezers*, for equipment manufactured after the year 2017. The efficient case of savings by equipment model is found in the ENERGY STAR database for commercial refrigerators and freezers. The following formula from the Ameren TRM was referenced to estimate the savings.

$$kWh = \left[(A\ x\ V + B)base - \left(\frac{kWh}{day}\right)ES\right] x\ Days$$

Refrigeration Measure Key Parameters and Energy Savings

Variable	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
kWh	Savings Methodology	Retrofit isolation		Ameren MO TRM
A B	Constants	N/A N/A	0.29 2.95	TRM table
V	Interior Volume, cubic feet	>50	154	Specification sheet
kWh per day	Energy usage per day	N/A	33 kWh	ENERGY STAR database
Days	Days of refrigeration per year	365		Operating schedule

The results of the evaluation for the ex-ante and ex-post savings are listed in the following table.

Refrigeration Measure Energy Savings

Measure	Volume Cubic feet	Quantity	Annual kWh		Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
			Base	ENERGY STAR			
ENERGYSTAR Glass Freezer	154.4	4	47.7	33.6	23,537	20,672	88%
Total					**23,537**	**20,672**	**88%**

Site-Level Estimation of Ex Post Gross Savings

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	23,537	20,672	88%	3.2	2.81	88%
Total	**23,537**	**20,672**	**88%**	**3.2**	**2.81**	**88%**

The ex-post energy savings amounted to 20,672kWh, with a gross energy savings realization rate of 88 %. The peak demand ex-post savings of 2.81kW was less than the ex-ante savings of 3.2kW. The ex post savings utilized the actual value from the ENERGY Star database for the daily energy use of the installed freezer. The ex ante prescriptive savings are generalized for all models of the volume size range.

2.140 443D

Project Summary

Through a project represented by sample ID 443, a program participant received Small Business Direct Install incentives from Ameren installed four ENERGY STAR® new reach-in low temperature self-contained refrigeration units in a retail building.

The ex post gross energy savings are 20,472 kWh with ex post gross coincident reductions of 2.81 kW. The energy savings gross realization rate is 88%.

Measurement and Verification Effort

The evaluation team gathered the project documentation, manufacturer specification data sheets, and the program tracking data list of incentivized measures to understand the project scope and contacted the participant for verification of the installation. A non-scheduled site visit was also completed during the normal store hours to verify the installed freezers for four separate units with four doors each. The baseline of savings for ENERGY STAR refrigerator and freezer by volume are found in the Ameren TRM measure *2.9.1 Commercial Sold & Glass Door Refrigerators and Freezers*, for equipment manufactured after the year 2017. The efficient case of savings by equipment model is found in the ENERGY STAR database for commercial refrigerators and freezers. The following formula from the Ameren TRM was referenced to estimate the savings.

$$kWh = \left[(A\ x\ V + B)_{base} - \left(\frac{kWh}{day}\right)_{ES}\right] x\ Days$$

Refrigeration Measure Key Parameters and Energy Savings

Variable	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
kWh	Savings Methodology	Ameren TRM		Measure 2.9.1 Commercial Solid & Glass Door Refrigerator
A B	Constants	N/A N/A	0.29 2.95	TRM table
V	Interior Volume, cubic feet	>50	154	Specification sheet
kWh per day	Energy usage per day	N/A	33 kWh	ENERGY STAR database
Days	Days of refrigeration per year	365	365	Operating schedule

The results of the evaluation for the ex-ante and ex-post savings are listed in the following table.

Refrigeration Measure Energy Savings

Measure	**Volume Cubic feet**	Quantit y	Annual kWh		Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
			Base	ENERGY STAR			

Site-Level Estimation of Ex Post Gross Savings

ENERGYSTAR Glass Freezer	154.4	4	47.7	33.6	23,537	20,672	88%
Total					**23,537**	**20,672**	**88%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	23,537	20,672	88%	3.2	2.81	88%
Total	**23,537**	**20,672**	**88%**	**3.2**	**2.81**	**88%**

The ex-post energy savings amounted to 20,672kWh, with a gross energy savings realization rate of 88 %. The peak demand ex-post savings of 2.81kW was less than the ex-ante savings of 3.2kW. The ex post savings utilized the actual value from the ENERGY Star database for the daily energy use of the installed freezer. The ex ante prescriptive savings are generalized for all models of the volume size range.

2.141 444D and 445D

Project Summary

Through a project represented by sample ID 444 and 445, a program participant received Small Business Direct Install incentives from Ameren for retrofitting existing lighting with more efficient LED lamps and fixtures in a warehouse building.

The ex post gross energy savings are 15,057 kWh with ex post gross coincident reductions of 2.86kW. The energy savings gross realization rate is 101 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, and sourced additional lighting fixture characteristics from manufacturer specification sheets. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for DX cooling and the gas heating factor to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 4L to LED Type B	26	26	164	38	1,850	1.08	6,484	6,545	101%
HID to LED HB Fixture	12	12	455	100	1,850	1.08	8,433	8,511	101%
Total							**14,917**	**15,057**	**101%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	14,917	15,057	101%	2.83	2.86	101%
Total	**14,917**	**15,057**	**101%**	**2.83**	**2.86**	**101%**

The ex-post energy savings amounted to 15,057 kWh, with a gross energy savings realization rate of 101 %. The peak demand ex-post savings of 2.86kW was greater than the ex-ante savings of 2.83kW

2.142 446D and 447D

Project Summary

Through a project represented by sample ID 446 and 447, a program participant received SBDI incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures in a manufacturing building.

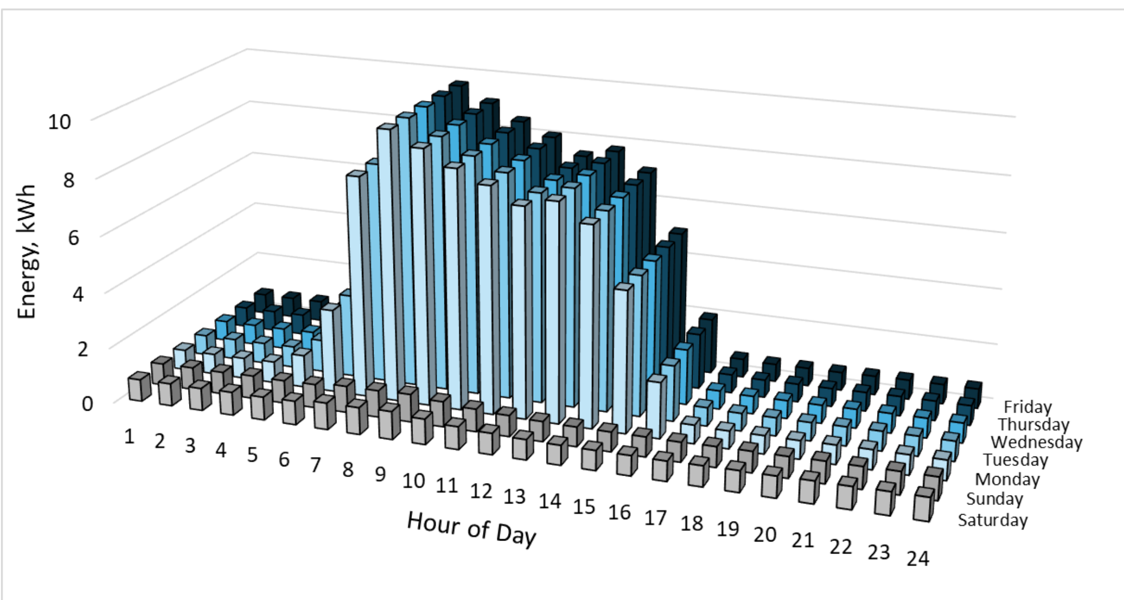
The ex post gross energy savings are 8,723 kWh with ex post gross coincident reductions of 1.66kW. The energy savings gross realization rate is 60%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets, and obtained certified operating wattages from designlights.org. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for no mechanical cooling and no heating, to the energy savings.

The interval billing data and weather data model determined by *Equation 3*, reduced to exclude heating and cooling energy usage is summarized in the following figure, by both day of the week and hour of the day. The model was referenced during the site visit, to inform the characterization of lighting usage areas, primarily those fully lit during operating hours.

Facility Energy Usage, non-weather dependent



The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12HO 8ft 2L to LED HB Fixture	18	11	227	105	2,564	1.00	12,545	7,515	60%
T12HO 8ft 2L to LED Type B	1	1	227	80	2,564	1.00	629	377	60%
T8 4ft 4L to LED Type B	6	6	114	60	2,564	1.00	1,387	831	60%
Total							**14,561**	**8,723**	**60%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	14,561	8,723	60%	2.77	1.66	60%
Total	**14,561**	**8,723**	**60%**	**2.77**	**1.66**	**60%**

The ex-post energy savings amounted to 8,723 kWh, with a gross energy savings realization rate of 60%. The peak demand ex-post savings of 1.6kW was less than the ex-ante savings of 2.77kW. The primary difference in the expected and realized savings is due to the overestimation in hours of use. The confirmed hours (2,564) are fewer than the ex-ante hours (4,000). In addition, the area is unconditioned with a waste heat factor (1.00) for industrial that is less than the ex-ante factor (1.07).

2.143 448D and 449D

Project Summary

Through a project represented by sample ID 448 and 449, a program participant received Small Business Direct Install incentives from Ameren for retrofitting existing lighting with more efficient LED lamps and fixtures in a healthcare clinic building.

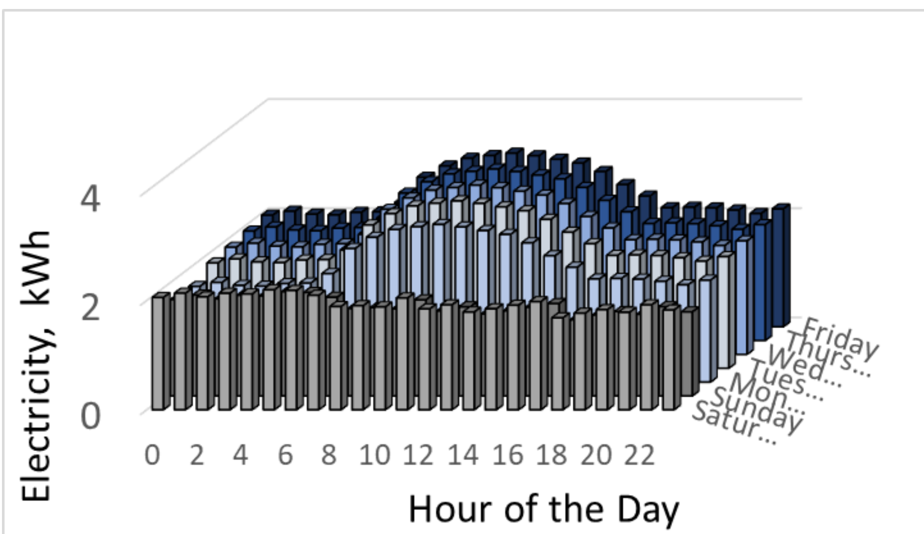
The ex-post gross energy savings are 14,098 kWh with ex-post gross coincident reductions of 2.68kW. The energy savings gross realization rate is 98 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, and sourced additional lighting fixture characteristics from manufacturer specification sheets. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for DX cooling and a gas heating factor to the energy savings.

The interval billing data and weather data model determined by *Equation 3*, reduced to exclude heating and cooling energy usage is summarized in the following figure, by both day of the week and hour of the day. The model was referenced during the site visit, to inform the characterization of lighting usage areas, primarily those fully lit during operating hours.

Facility Energy Usage, non-weather dependent



The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T8 4ft 2L to LED 1x4 Fixture	20	20	59	25	4,380	1.06	3,186	3,157	99%
T8 2ft 2L to LED Type B	1	1	32	18	4,380	1.06	65	65	100%
T8 4ft 4L to LED 2x4 Fixture	8	8	114	30	4,380	1.06	3,150	3,120	99%
T8 UTube 2L to LED 2x2 Fixture	1	1	56	25	4,380	1.06	144	144	100%
T8 4ft 2L to LED Type B	1	1	59	19	4,380	1.06	187	186	99%
T8 8ft 2L to LED Type B	1	1	124	48	4,380	1.06	356	353	99%
T8 4ft 4L to LED 2x4 Fixture	18	18	114	30	4,380	1.06	7,087	7,020	99%
No sensor to Remote Mounted Occupancy Sensor	0	1	48	48	4,380	1.06	169	53	32%
Total							**14,344**	**14,098**	**98%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	14,344	14,098	98%	2.72	2.68	98%
Total	**14,344**	**14,098**	**98%**	**2.72**	**2.68**	**98%**

The ex-post energy savings amounted to 14,098 kWh, with a gross energy savings realization rate of 98%. The peak demand ex-post savings of 2.68kW was less than the ex-ante savings of 2.72kW. The new occupancy sensor load was identified during the site visit as controlling 48 watts, less than the prescriptive measure characteristics.

2.144 450D, 451D, and 452D

Project Summary

Through a project represented by sample ID 450, 451, and 452, a program participant received SBDI incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures in a retail/warehouse building.

The ex post gross energy savings are 8,475 kWh with ex post gross coincident reductions of 1.61kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from the manufacturer specification sheets. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for DX cooling and gas heating, to the energy savings.

The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 4L to LED Panel Fixture	14	14	164	28.1	1,300	1.11	2,648	2,745	104%
T12 4ft 2L to LED Type B	2	2	82	19	1,300	1.11	175	182	104%
T12 4ft 4L to LED Type B	4	4	164	38	300	1.04	162	157	97%
HID to LED HB Fixture	24	24	455	88	500	1.04	4,712	4,580	97%
Exit Sign CFL to LED Exit Sign	2	2	35	5	8,760	1.04	525	547	104%
No existing sensor to Remote Mounted Occupancy Sensor	3	3	704	704	500	1.04	271	264	97%
Total							**8,493**	**8,475**	**100%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	8,493	8,475	100%	1.59	1.61	102%
Total	**8,493**	**8,475**	**100%**	**1.59**	**1.61**	**102%**

The ex-post energy savings amounted to 8,475 kWh, with a gross energy savings realization rate of 100%. The peak demand ex-post savings of 1.61kW was greater than the ex-ante savings of 1.59kW. There were some differences in the waste heat factor, with he ex post applying 1.11 to the DC cooled, gas heated office area and 1.04 to the warehouse area, compared to the ex ante value of 1.07 for all areas.

2.145 453D, 454D, and 455D

Project Summary

Through a project represented by sample ID 453, 454, and 455, a program participant received Small Business Direct Install incentives from Ameren for retrofitting existing lighting with more efficient LED fixtures in a retail building.

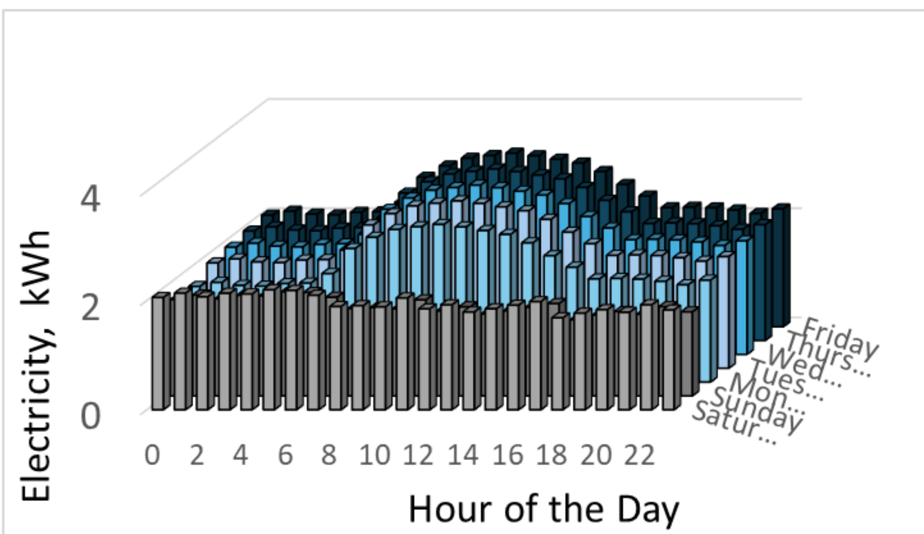
The ex post gross energy savings are 6,671 kWh with ex post gross coincident reductions of 1.27kW. The energy savings gross realization rate is 105 %.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation, sourced additional lighting fixture characteristics from manufacturer specification sheets. The installed fixture/lamp quantities were verified during the site visit, along with determining the lighting operation by usage area. Lighting fixtures/lamps were assigned to the specific usage area schedule. Holiday schedules were assigned to the company observed annual holidays. The reduced heat load was considered by applying the area specific waste heat factor for DX cooling and gas heating, to the energy savings.

The interval billing data and weather data model determined by *Equation 3*, reduced to exclude heating and cooling energy usage is summarized in the following figure, by both day of the week and hour of the day. The model was referenced during the site visit, to inform the characterization of lighting usage areas, primarily those fully lit during operating hours.

Facility Energy Usage, non-weather dependent



The variables for the energy savings calculation (*Equation 1*) are summarized in the following table along with the realized energy savings.

Lighting Measure Key Parameters and Energy Savings

Measure	Quantity		Wattage		Annual Hours	Waste Heat Factor	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
	Base	Efficient	Base	Efficient					
T12 4ft 4L to LED Type B	3	3	164	38	2,250	1.04	841	885	105%
T12 8 ft 2L to LED Retrofit Kit	1	1	138	42	2,250	1.04	214	225	105%
T5HO4ft6L to LED HB Fixture	11	11	360	165	2,250	1.04	4,774	5,019	105%
T8 4ft 4L to LED Retrofit Kit	8	8	114	85	2,250	1.04	517	543	105%
Total							**6,346**	**6,671**	**105%**

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	6,346	6,671	105%	1.21	1.27	105%
Total	**6,346**	**6,671**	**105%**	**1.21**	**1.27**	**105%**

The ex-post energy savings amounted to 6,671kWh, with a gross energy savings realization rate of 105 %. The peak demand ex-post savings of 1.27kW was greater than the ex-ante savings of 1.21kW. The primary difference in the expected and realized savings is due to the hours of use. The ex-post confirmed hours (2,250) are greater than the ex-ante hours (2,080).

2.146 456D

Project Summary

Through a project represented by sample ID 456, a program participant received Small Business Direct Install incentives from Ameren for replacing existing PSC electric motors with ECM motors for the evaporator fans in a walk-in refrigerator at a restaurant building. The ex post gross energy savings are 4,227 kWh with ex post gross coincident reductions of 0.574 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

The evaluation team gathered the project documentation, manufacturer specification data sheets, and the program tracking data list of incentivized measures to understand the project scope and contacted the participant for verification of the installation. The baseline of savings is the existing PSC motor. The efficient case motor size was referenced from the specification sheet. The TRM provides prescribed energy savings by motor size for the measure *2.9.4 Electronically Commutated Motors (ECM) for Walk-in and Reach-in Coolers/Freezers* was referenced to estimate the savings.

$$kWh = \left[Qty\ x\ \frac{Savings}{motor}\right]$$

Refrigeration Motor Measure Key Parameters and Energy Savings

Variable	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
kWh	Savings Methodology	Retrofit isolation		Ameren MO TRM
Quantity	Quantity of ECM motors	3		Invoice
Savings/motor	1.5 HP	1,409 kWh		TRM Measure 2.9.4
End Use	End use for refrigeration motors	Motors	Refrigeration	Load profiles for CDF factors

The results of the evaluation for the ex-ante and ex-post savings are listed in the following table.

Refrigeration Measure Energy Savings

Measure	**Savings per moto**	Quantity	Ex Ante Gross kWh Savings	Ex Post Gross kWh Savings	Gross Realization Rate (kWh)
ECM Motor	1,409	3	4,227	4,227	100%
Total			**4,227**	4,227	100%

Result

Realized Gross Energy and Demand Savings

Site-Level Estimation of Ex Post Gross Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
SBDI	4,227	4,227	100%	0.583	0.574	98%
Total	4,227	4,227	**100%**	**0.583**	**0.574**	**98%**

The ex-post energy savings amounted to 4,227 kWh, with a gross energy savings realization rate of 100 %. The peak demand ex-post savings of 0.574 is 98% of the ex-ante savings due to applying the most applicable end use factor for Refrigeration, instead of the ex-ante value for the Motor end use.

2.147 500R

Project Summary

Through a project represented by sample ID 500R, a program participant received RCx incentives from Ameren for the retro-commissioning of a large office building.

The ex post gross energy savings are 1,574,582 kWh with ex post gross coincident reductions of 802.71 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff consolidated relevant project documentation within the program implementer’s database and supplemented key parameters for estimating energy savings by incorporating additional data sources. These sources included equipment submittals, mechanical drawings, AMI interval billing data, phone calls with trade ally. A review of the ex-ante savings methodology led to either adopting the original savings basis or developing an alternative methodology. Factors considered in this process included defining the appropriate baseline, evaluating the availability of site-specific historical trended data, and determining the most accurate estimate of actual energy savings.

The savings method for this sampled project is sourced from the Retro commissioning report completed at the end of the project, and the additional BAS trend data requested to indicate continuation of the implemented ECMs.

The variables for the energy savings calculation are summarized in the following table along .

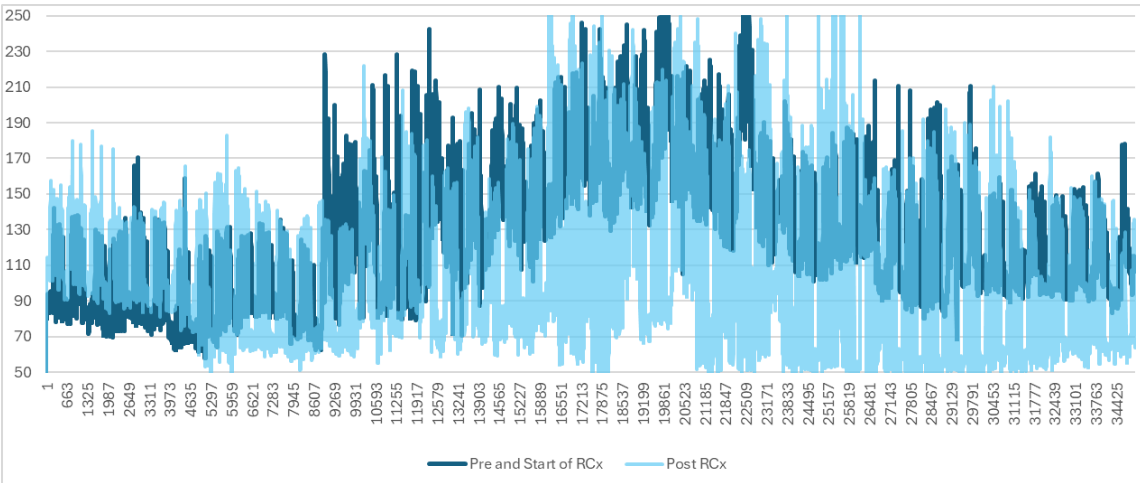
HVAC Measure Key Parameters and Energy Savings

ECM	Values		Ex Post Source
	Ex Ante	Ex Post	
Air handler static pressure resets	963,394 kWh		Report and trends
Reset of 88 thermostat setpoints	372,734 kWh		Report and trends
Floor set to permanent unoccupied mode Floor set to permanent unoccupied mode	173,867 kWh		Report and trends
Floor set to permanent unoccupied mode	30,374 kWh		Report and trends
Chilled water pumping schedule optimized	17,797 kWh		Report and trends
Floor set to permanent unoccupied mode	16,416 kWh		Report and trends
Total	1,574,582 kWh		

Some of the ECMs appeared to be less permanent than others, such as setting a floor to unoccupied mode 24/7. To verify the persistence of the basis of the saving, interval AMI data was aggregated for one year periods. The 2023 year trend (dark blue) has higher energy usage than the 2024 year trend. The chiller sequencing and idling resulted in the most significant savings.

Result

Pre RCx/Start of RCx (deep blue) kWh and Post RCx (light blue)



Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
RCx	1,574,582	1,574,582	100%	802.71	802.71	100%
Total	**1,574,582**	**1,574,582**	**100%**	**802.71**	**802.71**	**100%**

The ex post gross energy savings are 1,574,582 kWh with ex post gross coincident reductions of 802.71 kW. The energy savings gross realization rate is 100%, and the demand realization rate is 100%.

2.148 501R

Project Summary

Through a project represented by sample ID 501R, a program participant received RCx incentives from Ameren for the RCx preliminary study and subsequent retro-commissioning of a high school building.

The ex post gross energy savings are 484,908 kWh with ex post gross coincident reductions of 215.291 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff consolidated relevant project documentation within the program implementer's database and supplemented key parameters for estimating energy savings by incorporating additional data sources. These sources included equipment submittals, mechanical drawings, AMI interval billing data, participant emails, and a virtual site visit. A review of the ex ante savings methodology led to either adopting the original savings basis or developing an alternative methodology. Factors considered in this process included defining the appropriate baseline, evaluating the availability of site-specific historical trended data, and determining the most accurate estimate of actual energy savings.

A virtual site visit with the trade ally verified the persistence of the implemented ECMs through sharing of the BMS system. Trend data was requested, and later collected, which aligned with the short term equipment operation.

The variables for the energy savings calculation are summarized in the following table along .

HVAC Measure Key Parameters and Energy Savings

ECM	Values		Ex Post Source
	Ex Ante	Ex Post	
Scheduling of RTU units	22 RTU units scheduled		Report and trends
Lower RTU supply fan speed after repairing VAV boxes, % full speed	80-100 %		Report and trends
Unused floor set to permanent unoccupied mode	173,867 CFM reduction		Report and trends
Supply fan shut off for areas rarely occupied, count of fans	2 fans		Report and trends
Reset economizer setpoint for 7 RTU units	55 to 65F		Report and trends

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
RCx	484,908	484,908	100%	215.291	215.291	100%
Total	**484,908**	**484,908**	**100%**	**215.291**	**215.291**	**100%**

The ex post gross energy savings are 484,908 kWh with ex post gross coincident reductions of 215.921 kW. The energy savings gross realization rate is 100%, and the demand realization rate is 100%.

2.149 502R

Project Summary

Through a project represented by sample ID 502R, a program participant received RCx incentives from Ameren for completing an ultrasonic air leak detection and subsequently repairing 177 CFM of air leaks in a manufacturing building.

The ex-post gross energy savings are 436,914 kWh with an ex post gross peak demand reduction of 60.270 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff reviewed the project documentation provided by the participant, collected manufacturer specification sheets, CAGI air compressor sheets and verified the air leak repair log to the photographs. AMI interval billing data was modeled with weather data to determine the typical hourly base electric load profile, to validate the operating hours.

The site had completed metering of the air compressor plant for air flow and power for two weeks and referenced the data to build a flow bin model of the current operating condition. Then, the repaired air leak total was reduced in the second model, with the decreased power as the basis of the energy savings.

Modeling Inputs and Algorithm Inputs

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Basis of savings	Flow bin model from pre period metering	Flow model		Trade ally
Air Compressor Modeling				
Sequencing	Compressor sequencing	1,2,3		Trade ally flow bin model from pre period air compressor metering.
Power	Metered power, kW	Varies		
Flow	Air flow by compressor, CFM	Varies		
Hours	Annual compressed air hours	8760		Site; AMI interval data

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Compressed Air	436,914	436,914	100%	60.270	60.270	100%
Total	**436,914**	**436,914**	**100%**	**60.270**	**60.270**	**100%**

The ex-post gross energy savings are 436,914 kWh with an ex post gross peak demand reduction of 60.270 kW. The energy and demand savings gross realization rates are 100%.

2.150 503R

Project Summary

Through a project represented by sample ID 503R, a program participant received RCx incentives from Ameren for completing an ultrasonic air leak detection and subsequently repairing 114 CFM of air leaks in a manufacturing building. The trade ally also completed optimization of the air compressor scheduling controls, resulting in reduction of output pressure.

The ex-post gross energy savings are 262,861 kWh with an ex post gross peak demand reduction of 36.26 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff reviewed the project documentation provided by the participant, collected manufacturer specification sheets, CAGI air compressor sheets and verified the air leak repair log to the photographs. AMI interval billing data was modeled with weather data to determine the typical hourly base electric load profile, to validate the operating hours.

The site had completed metering of the air compressor plant for air flow and power for two weeks and referenced the data to build a flow bin model of the current operating condition. Then, the repaired air leak total was reduced in the second model, with the decreased power as the basis of the energy savings.

Modeling Inputs and Algorithm Inputs

<table>
<tr><th rowspan="2">Inputs</th><th rowspan="2">Description</th><th colspan="2">Values</th><th rowspan="2">Ex Post Source</th></tr>
<tr><th>Ex Ante</th><th>Ex Post</th></tr>
<tr><td>Basis of savings</td><td>Flow bin model from pre period metering</td><td colspan="2">Flow model</td><td>Trade ally flow bin model from pre period metering</td></tr>
<tr><td colspan="5">Air Compressor Modeling</td></tr>
<tr><td>Sequencing</td><td>Compressor sequencing</td><td colspan="2">1,2,3</td><td rowspan="3">Trade ally flow bin model from pre period air compressor metering.</td></tr>
<tr><td>Power</td><td>Metered power, kW</td><td colspan="2">Varies</td></tr>
<tr><td>Flow</td><td>Air flow by compressor, CFM</td><td colspan="2">1800</td></tr>
</table>

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Compressed Air Leak Repair	184,711	184,711	100%	25.480	25.480	100%
Compressed Air Sequencing	78,150	78,150	100%	10.78	10.78	100%
Total	**262,861**	**262,861**	**100%**	**36.26**	**36.26**	**100%**

The ex-post gross energy savings are 262,861 kWh with an ex post gross peak demand reduction of 36.26 kW. The energy and demand savings gross realization rate are 100%.

2.151 504R

Project Summary

Through a project represented by sample ID 504R, a program participant received RCx incentives from Ameren for identifying energy conservation opportunities through a RCx study and implementing the recommended measures at a school building.

The ex post gross energy savings are 90,508 kWh with ex post gross coincident reductions of 40.18 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff aggregated the applicable data within the project documentation and completed a virtual site visit with the trade ally, with access to the site's BMS system.

The weather bin modeling performed by the trade ally for the RCx measures below were reviewed. Input data for each measure was checked against mechanical sheet data for fan motor horsepower, maximum air flow capacity. The efficiency of air handlers was based on utility billing data and total air flow. The RCx results were verified with BMS trend data and BMS screenshots for one-time measurement and finally BMS operating schedules for each piece of equipment.

RCx Measure Key Parameters and Energy Savings

Inputs	Description	Values		Verification
		Ex Ante	Ex Post	
Basis of savings	Weather bin analysis	Bin	Bin	RCx trade ally
HVAC Parameters and Energy Savings				
RTU1-RTU20	Schedule revised 17 hours to 10 hours	5,054 kWh		Trend data-2 months + BMS screenprint
Gym RTU	Schedule revised 17 hours to 12 hours	1,475 kWh		Trend data-2 months + BMS screenprint
ACU1-ACU3	Schedule revised 17 hours to 12 hours	2,132 kWh		Trend data-2 months + BMS screenprint
RTU21	Schedule revised 17 hours to 10 hours; SF speed reset logic	65,676 kWh		Trend data-2 months + BMS screenprint
RTU26	Schedule revised 17 hours to 10 hours	3,788 kWh		Trend data-2 months + BMS screenprint
RTU27	Schedule revised 17 hours to 10 hours	9,946 kWh		Trend data-2 months + BMS screenprint
RTU28	Schedule revised 17 hours to 10 hours	2,437 kWh		Trend data-2 months + BMS screenprint
Total		90,508 kWh		

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Custom	90,508	90,508	100%	40.184	40.184	100%
Total	90,508	90,508	100%	40.184	40.184	100%

The ex-post energy savings amounted to 90,508 kWh, with a gross energy savings realization rate of 100%. The peak demand ex-post savings of 40.184 kW realized 100% of the savings

2.152 505R

Project Summary

Through a project represented by sample ID 505R, a program participant received RCx incentives from Ameren for completing an ultrasonic air leak detection and subsequently repairing 29CFM of air leaks in a manufacturing building.

The ex-post gross energy savings are 19,757 kWh with an ex post gross peak demand reduction of 2.75 kW. The energy savings gross realization rate is 100%.

Measurement and Verification Effort

ADM staff reviewed the project documentation provided by the participant, collected CAGI air compressor sheets and verified the air leak repair log to the photographs. AMI interval billing data was modeled with weather data to determine the typical hourly base electric load profile, to validate the operating hours.

The site had completed metering of the air compressor plant for air flow and power for two weeks and referenced the data to build a flow bin model of the current operating condition. Then, the repaired air leak total was reduced in the second model, with the decreased power as the basis of the energy savings.

Modeling Inputs and Algorithm Inputs

Inputs	Description	Values		Ex Post Source
		Ex Ante	Ex Post	
Basis of savings	Flow bin model from pre period metering	Flow model		Trade ally
Air Compressor Modeling				
Sequencing	Compressor sequencing	1		Trade ally flow bin model from pre period air compressor metering.
Power	Metered power, kW	Varies		
Flow	Air flow by compressor, CFM	Varies		
Hours	Annual compressed air hours	6540		Site; AMI interval data

Result

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex Ante	Ex Post	Realization Rate	Ex Ante	**Ex Post**	Realization Rate
Compressed Air	19,757	19,757	100%	2.725	2.725	100%
Total	**19,757**	**19,757**	**100%**	**2.725**	**2.725**	**100%**

The ex-post gross energy savings are 19,757 kWh with an ex post gross peak demand reduction of 2.725 kW. The energy and demand savings gross realization rates are 100%.

2.153 600R, 601R

Project Summary

Two projects represented by sample ID 600R and 601R participated in the Virtual Retro-commissioning (VCx) program with two buildings on a campus. The VCx team identified opportunities for reduction in base energy load, which resulted in the programming of HVAC schedules in the building management system to align with operating hours. Programming changes were implemented at this facility on March 14, 2024.

The ex-post gross energy savings are 1,606,587 kWh with an ex post-gross peak demand reduction of 713.3 kW. The realization rate for the two buildings is 97%

Measurement and Verification Effort

The evaluation team reviewed available project documents, collected site level AMI interval data, observed weather conditions during the measurement period, typical weather data, and reviewed public records for the building. A piecewise linear regression model using actual weather observations and time of week variables (Time-of-Week-Temperature) was developed using ex-ante and ex-post energy consumption for this facility from March 14, 2022 to December 30, 2024. This model was then applied to typical weather data to develop estimates of normalized counterfactual facility energy consumption and associated energy savings attributable to the VCx scheduling modifications.

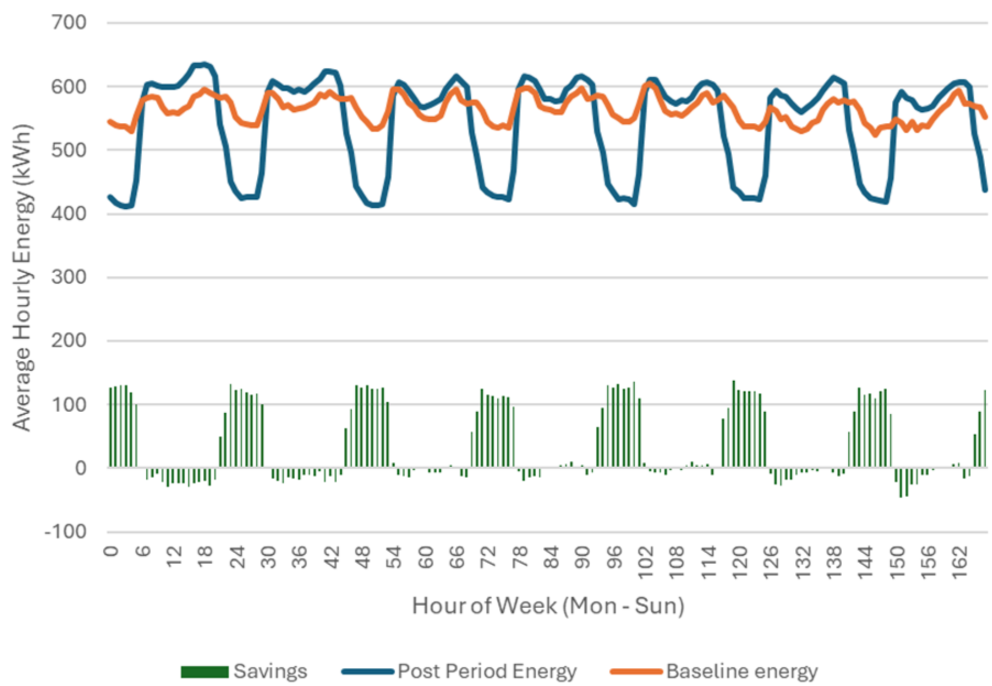
Regression Model

Metric	Building 1	Building 2
R^2	0.769	0.682
C_v RMSE	10.2%	11.3%

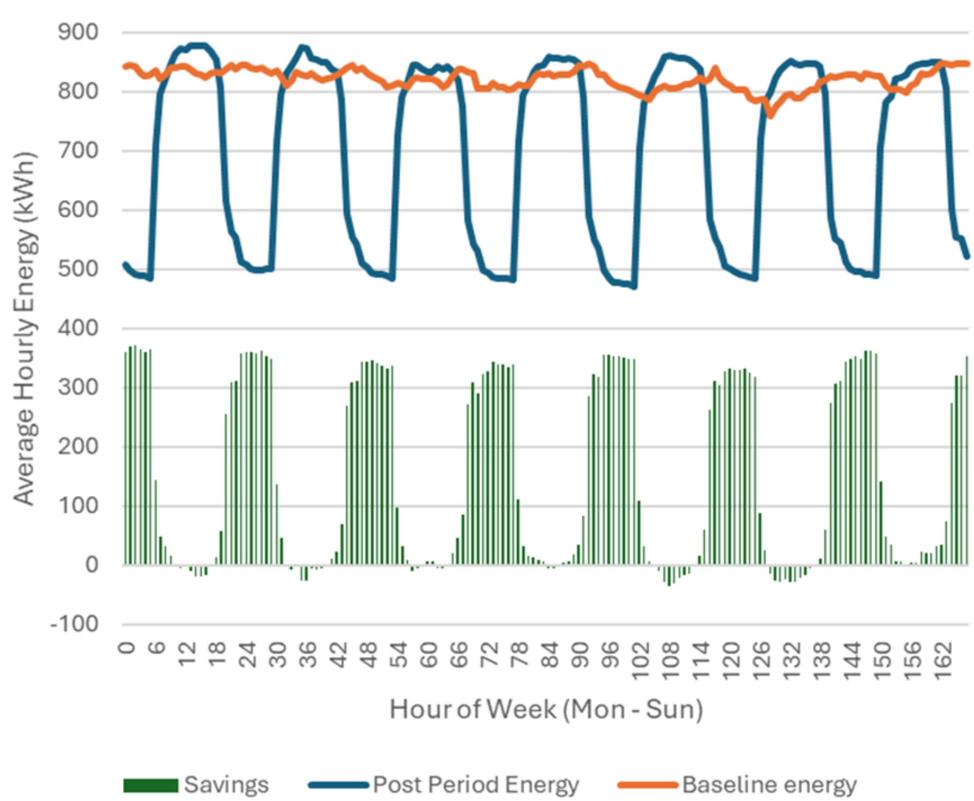
Result

All savings provided in this site report are annual estimates. Coincident peak demand savings were generated using Ameren specific Coincident Demand Factors for HVAC end-uses applied to annual energy savings. Energy savings were observed primarily during the evenings when the facility is unoccupied. The operational schedule, electric usage, and savings are consistent across all days of the week.

Building 1 Average Hourly Energy Usage by Hour of the Week



Building 2 Average Hourly Energy Usage by Hour of the Week



Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex-Ante	Ex-Post	Realization Rate	Ex-Ante	Ex-Post	Realization Rate
VCx HVAC Bldg1	1,320,692	1,295,585	98%	586.4	575.2	98%
VCx HVAC Bldg2	332,514	311,002	94%	147.6	138.1	94%
Total	1,653,206	1,606,587	97%	734.0	713.3	97%

The ex-post energy savings totaled 1,606,587 kWh, with a gross energy savings realization rate of 97%. The peak demand ex-post savings of 713.3 kW were less the ex-ante savings of 734.0 kW. The primary cause of the variance between the expected and realized savings is the use of different weather data sets for actual weather conditions and minor variations in hourly kWh consumption when 15-minute interval data was aggregated into one-hour increments.

2.154 602R

Project Summary

A project represented by sample ID 602R participated in the Virtual Retro-commissioning (VCx) program. The VCx team identified opportunities for reduction in base energy load, which resulted in the programming of HVAC schedules in the building management system to align with operating hours. Programming changes were implemented at this facility on April 21, 2024.

The ex-post gross energy savings are 356,910 kWh with an ex post-gross peak demand reduction of 158.5 kW. The realization rate for both measurements is 128%.

Measurement and Verification Effort

The evaluation team reviewed available project documents, collected site level AMI interval data, observed weather conditions during the measurement period, typical weather data, and reviewed public records for the building. A piecewise linear regression model using actual weather observations and time of week variables (Time-of-Week-Temperature) was developed using ex-ante and ex-post energy consumption for this facility from April 21, 2023, to December 30, 2024. This model was then applied to typical weather data to develop estimates of normalized counterfactual facility energy consumption and associated energy savings attributable to the VCx scheduling modifications.

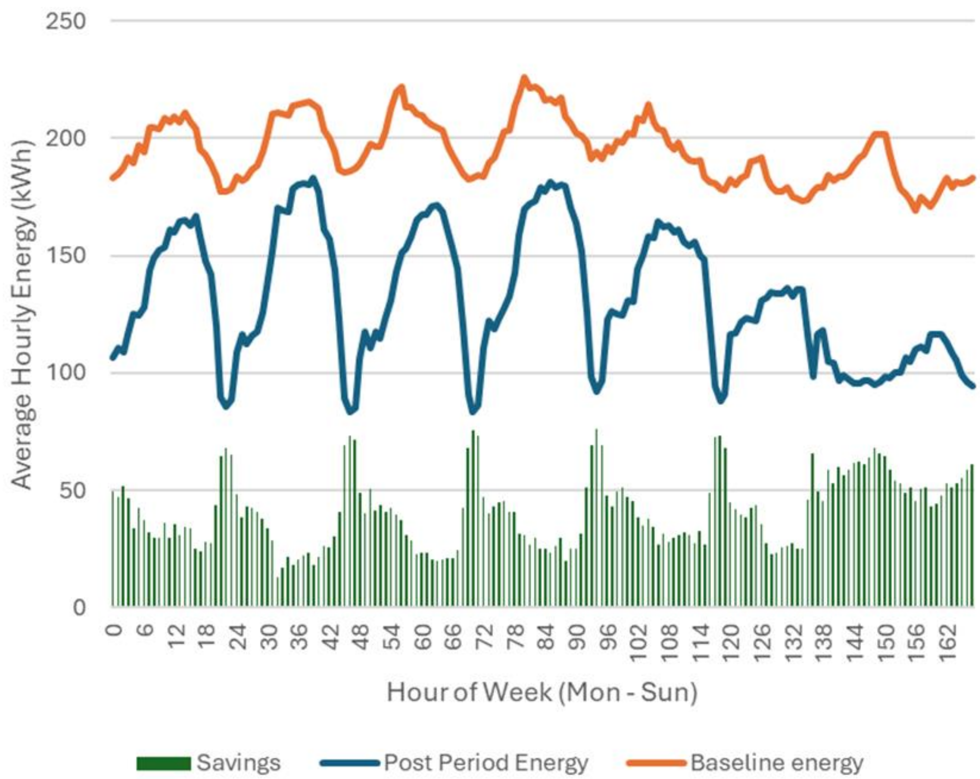
Regression Model

Metric	Result
R^2	0.817
C_v RMSE	15.9%

Result

All savings provided in this site report are annual estimates. Coincident peak demand savings were generated using Ameren specific Coincident Demand Factors for HVAC end-uses applied to annual energy savings. Energy savings were observed primarily during the weekend hours when the facility is unoccupied. The operational schedule, electric usage, and savings are consistent across all days of the week.

Average Hourly Energy Usage by Hour of the Week



Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex-Ante	Ex-Post	Realization Rate	Ex-Ante	Ex-Post	Realization Rate
VCx HVAC	279,860	356,910	128%	124.3	158.5	128%

The ex-post energy savings totaled 356,910 kWh, resulting in a gross energy savings realization rate of 128%. The peak demand ex-post savings of 158.5 kW were greater than the ex-ante savings of 124.3 kW. Three factors contributed to the variation in realized savings.

The first difference between the virtual commissioning (VCx) program contractor reported savings (391,076 kWh) and ex post results (356,910 kWh) is from the use of different weather data sets for actual weather conditions. The VCx contractor sourced actual weather data from The Weather Company, while the ex post analysis used data from the National Oceanic and Atmospheric Administration (NOAA).

The second difference arose from minor variations in hourly kWh consumption when 15-minute interval data were aggregated into one-hour increments.

The third—and most significant—difference was between the ex-ante tracked savings (279,860 kWh) and the VCx contractor's year-end reported savings (391,076 kWh). The ex-ante tracking system captured the initial savings expected at project completion, whereas the VCx contractor's updated estimate, submitted at the end of calendar year 2024, incorporated additional post-installation data used in the linear regression analysis. Similarly, the ex-post analysis included extended billing and weather data to reduce variance in the linear regression and improve model accuracy.

2.155 603R

Project Summary

A project represented by sample ID 603R participated in the Virtual Retro-commissioning (VCx) program. The VCx team identified opportunities for reduction in base energy load, which resulted in the programming of lighting schedules in the building management system to align with working hours. Programming changes were implemented at this facility on March 28, 2024.

The ex-post gross energy savings are 164,574 kWh with an ex post-gross peak demand reduction of 31.3 kW. The realization rate for both measurements is 94%.

Measurement and Verification Effort

The evaluation team reviewed available project documents, collected site level AMI interval data, observed weather conditions during the measurement period, typical weather data, and reviewed public records for the building. A piecewise linear regression model using actual weather observations and time of week variables (Time-of-Week-Temperature) was developed using ex-ante and ex-post energy consumption for this facility from March 28, 2022 to December 30, 2024. This model was then applied to typical weather data to develop estimates of normalized counterfactual facility energy consumption and associated energy savings attributable to the VCx scheduling modifications.

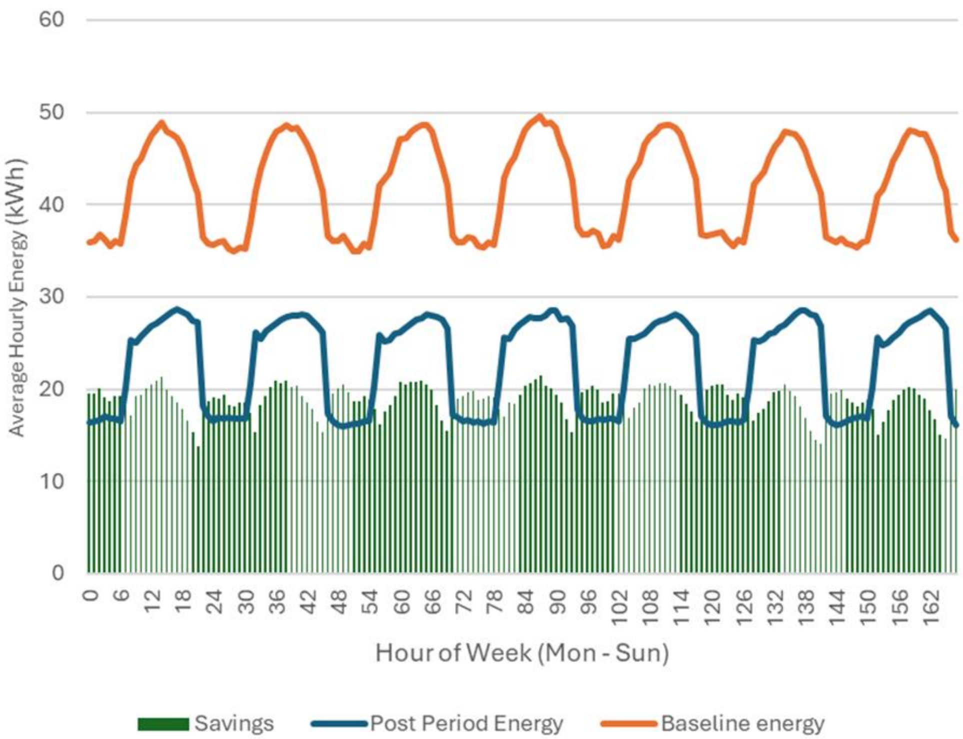
Regression Model

Metric	Result
R^2	0.767
C_v RMSE	13.6%

Result

All savings provided in this site report are annual estimates. Coincident peak demand savings were generated using Ameren specific Coincident Demand Factors for lighting end-uses applied to annual energy savings. Consistent energy savings, between 14 and 21 kWh, were observed during all hours of the weekly schedule. The operational schedule, electric usage, and savings are consistent across all days of the week.

Average Hourly Energy Usage by Hour of the Week



Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex-Ante	Ex-Post	Realization Rate	Ex-Ante	Ex-Post	Realization Rate
VCx Lighting	175,791	164,574	94%	33.4	31.3	94%

The ex-post energy savings totaled 164,574 kWh, with a gross energy savings realization rate of 94%. The peak demand ex-post savings of 31.3 kW were slightly less than the ex-ante savings of 33.4 kW and aligned with the 94% energy realization rate. The primary cause of the variance between the expected and realized savings is the use of different weather data sets for actual weather conditions and minor variations in hourly kWh consumption when 15-minute interval data was aggregated into one-hour increments.

2.156 604R

Project Summary

A project represented by sample ID 604R participated in the Virtual Retro-commissioning (VCx) program. The VCx team identified opportunities for reduction in base energy load, which resulted in the programming of lighting schedules in the building management system to align with working hours. Programming changes were implemented at this facility on March 27, 2024.

The ex-post gross energy savings are 81,111 kWh with an ex post-gross peak demand reduction of 15.4 kW. The realization rate for both measurements is 98%.

Measurement and Verification Effort

The evaluation team reviewed available project documents, collected site level AMI interval data, observed weather conditions during the measurement period, typical weather data, and reviewed public records for the building. A piecewise linear regression model using actual weather observations and time of week variables (Time-of-Week-Temperature) was developed using ex-ante and ex-post energy consumption for this facility from March 27, 2023 to December 30, 2024. This model was then applied to typical weather data to develop estimates of normalized counterfactual facility energy consumption and associated energy savings attributable to the VCx scheduling modifications.

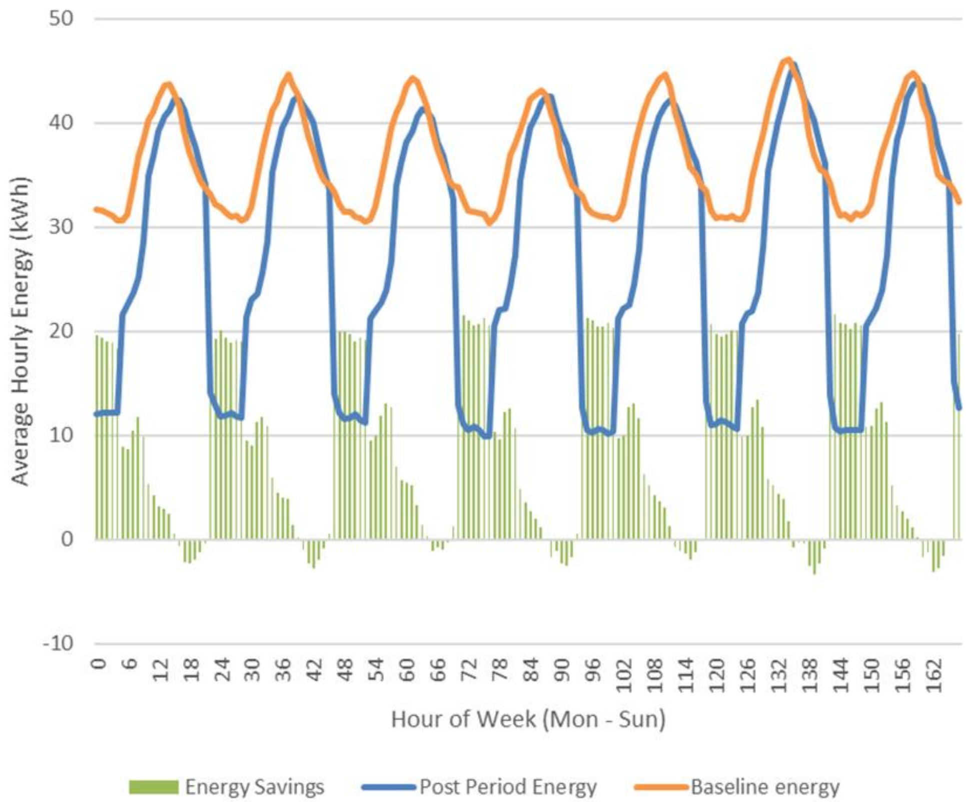
Regression Model

Metric	Result
R^2	0.885
C_v RMSE	11.0%

Result

All savings provided in this site report are annual estimates. Coincident peak demand savings were generated using Ameren specific Coincident Demand Factors for lighting end-uses applied to annual energy savings. Energy savings were observed primarily in the overnight hours when the facility is unoccupied. The operational schedule, electric usage, and savings are consistent across all days of the week.

Average Hourly Energy Usage by Hour of the Week



Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex-Ante	Ex-Post	Realization Rate	Ex-Ante	Ex-Post	Realization Rate
VCx Lighting	82,629	81,111	98%	15.7	15.4	98%

The ex-post energy savings totaled 81,111 kWh, with a gross energy savings realization rate of 98%. The peak demand ex-post savings of 15.4 kW were less than the ex-ante savings of 15.7 kW. The primary cause of the variance between the expected and realized savings is the use of different weather data sets for actual weather conditions and minor variations in hourly kWh consumption when 15-minute interval data was aggregated into one-hour increments.

2.157 606R

Project Summary

A project represented by sample ID 606R participated in the Virtual Retro-commissioning (VCx) program. The VCx team identified opportunities for reduction in base energy load, which resulted in the programming of lighting schedules in the building management system to align with working hours. Programming changes were implemented at this facility on February 27, 2024.

The ex-post gross energy savings are 65,870 kWh with an ex post-gross peak demand reduction of 12.5 kW. The realization rate for both measurements is 103%.

Measurement and Verification Effort

The evaluation team reviewed available project documents, collected site level AMI interval data, observed weather conditions during the measurement period, typical weather data, and reviewed public records for the building. A piecewise linear regression model using actual weather observations and time of week variables (Time-of-Week-Temperature) was developed using ex-ante and ex-post energy consumption for this facility from February 27, 2023, to December 30, 2024. This model was then applied to typical weather data to develop estimates of normalized counterfactual facility energy consumption and associated energy savings attributable to the VCx scheduling modifications.

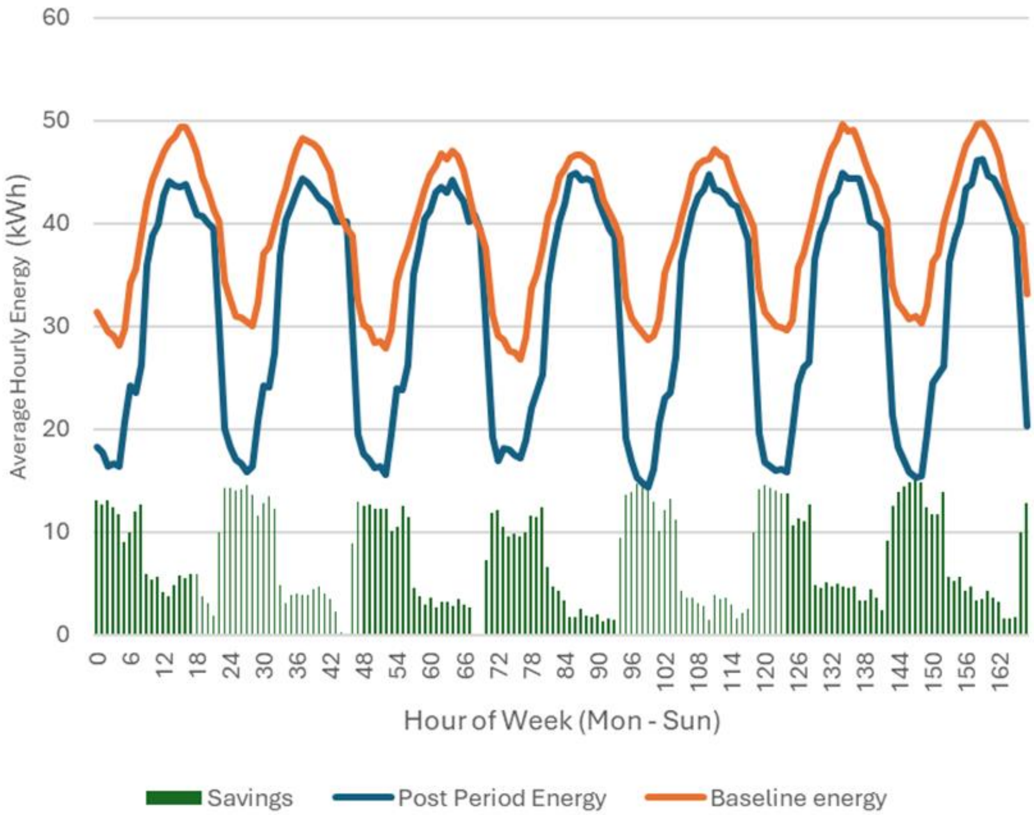
Regression Model

Metric	Result
R^2	0.827
C_v RMSE	15.5%

Result

All savings provided in this site report are annual estimates. Coincident peak demand savings were generated using Ameren specific Coincident Demand Factors for lighting end-uses applied to annual energy savings. Energy savings were observed primarily in the overnight hours when the facility is unoccupied. The operational schedule, electric usage, and savings are consistent across all days of the week.

Average Hourly Energy Usage by Hour of the Week



Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex-Ante	Ex-Post	Realization Rate	Ex-Ante	Ex-Post	Realization Rate
VCx Lighting	64,063	65,870	103%	12.2	12.5	103%

The ex-post energy savings totaled 65,870 kWh, with a gross energy savings realization rate of 103%. The peak demand ex-post savings of 12.5 kW were slightly greater than the ex-ante savings of 12.2 kW. The primary cause of the variance between the expected and realized savings is the use of different weather data sets for actual weather conditions and minor variations in hourly kWh consumption when 15-minute interval data was aggregated into one-hour increments.

2.158 607R

Project Summary

A project represented by sample ID 607R participated in the Virtual Retro-commissioning (VCx) program. The VCx team identified opportunities for reduction in base energy load, which resulted in the programming of lighting and HVAC schedules in the building management system to align with operating hours. Programming changes were implemented at this facility on March 14, 2024.

The ex-post gross energy savings are 54,604 kWh with an ex post-gross peak demand reduction of 18.1 kW. The realization rate for kWh and kW measurements is 107% and 127% respectively.

Measurement and Verification Effort

The evaluation team reviewed available project documents, collected site level AMI interval data, observed weather conditions during the measurement period, typical weather data, and reviewed public records for the building. A piecewise linear regression model using actual weather observations and time of week variables (Time-of-Week-Temperature) was developed using ex-ante and ex-post energy consumption for this facility from March 14, 2022 to December 30, 2024. This model was then applied to typical weather data to develop estimates of normalized counterfactual facility energy consumption and associated energy savings attributable to the VCx scheduling modifications.

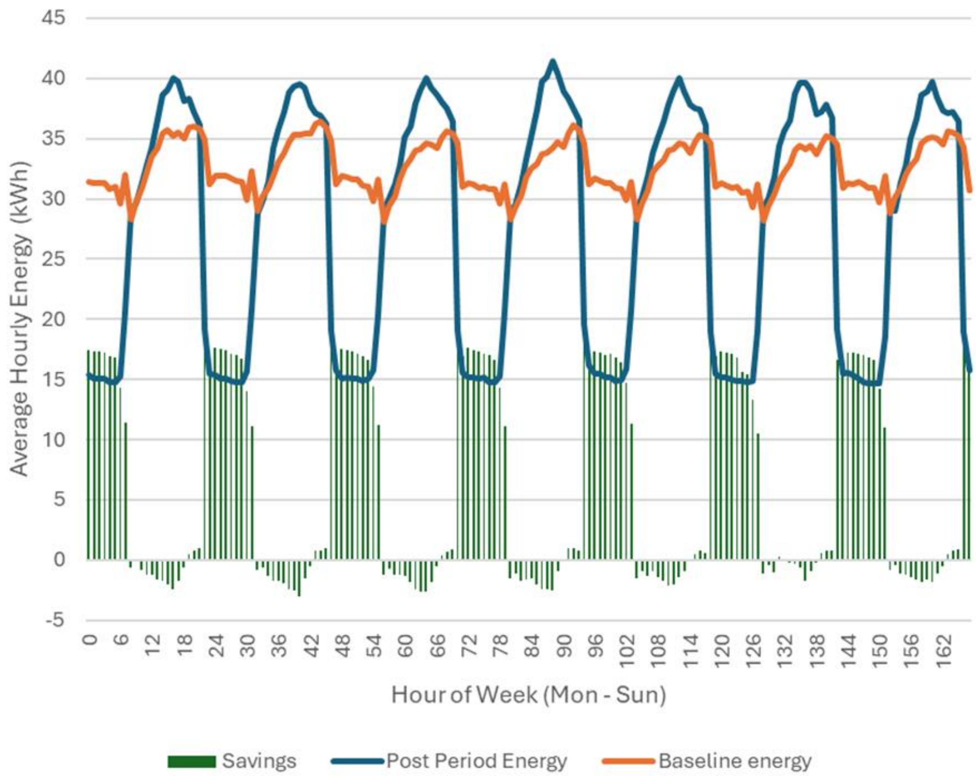
Regression Model

Metric	Result
R^2	0.838
C_v RMSE	12.6%

Result

All savings provided in this site report are annual estimates. Coincident peak demand savings were generated using Ameren specific Coincident Demand Factors for lighting and HVAC end-uses applied to annual energy savings. Energy savings were observed primarily during the evenings when the facility is unoccupied. The operational schedule, electric usage, and savings are consistent across all days of the week.

Average Hourly Energy Usage by Hour of the Week



Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex-Ante	Ex-Post	Realization Rate	Ex-Ante	Ex-Post	Realization Rate
VCx Lighting and HVAC	51,270	54,604	107%	14.3	18.1	127%

The ex-post energy savings totaled 54,604 kWh, with a gross energy savings realization rate of 107%. The peak demand ex-post savings of 18.1 kW were greater than the ex-ante savings of 14.3 kW. The primary cause of the variance between the expected and realized savings is the use of different weather data sets for actual weather conditions and minor variations in hourly kWh consumption when 15-minute interval data was aggregated into one-hour increments.

2.159 609R

Project Summary

A project represented by sample ID 609R participated in the Virtual Retro-commissioning (VCx) program. The VCx team identified opportunities for reduction in base energy load, which resulted in the programming of HVAC schedules in the building management system to align with working hours. Programming changes were implemented at this facility on November 16, 2023.

The ex-post gross energy savings are 25,645 kWh with an ex post-gross peak demand reduction of 11.4 kW. The realization rate for both measurements is 72%.

Measurement and Verification Effort

The evaluation team reviewed available project documents, collected site level AMI interval data, observed weather conditions during the measurement period, typical weather data, and reviewed public records for the building. A piecewise linear regression model using actual weather observations and time of week variables (Time-of-Week-Temperature) was developed using ex-ante and ex-post energy consumption for this facility from November 16, 2022 to November 16, 2024. This model was then applied to typical weather data to develop estimates of normalized counterfactual facility energy consumption and associated energy savings attributable to the VCx scheduling modifications.

Regression Model

Metric	Result
R^2	0.876
C_v RMSE	38.3%

Result

All savings provided in this site report are annual estimates. Coincident peak demand savings were generated using Ameren specific Coincident Demand Factors for HVAC end-uses applied to annual energy savings. Consistent energy savings, between 26 and 35 kWh, were observed during all hours of the weekly schedule. The operational schedule, electric usage, and savings are consistent across all days of the week.

Average Hourly Energy Usage by Hour of the Week

Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex-Ante	Ex-Post	Realization Rate	Ex-Ante	Ex-Post	Realization Rate
VCx HVAC	35,800	25,645	72%	15.9	11.4	72%

The ex-post energy savings totaled 25,645 kWh, resulting in a gross energy savings realization rate of 72%. The peak demand ex-post savings of 11.4 kW were less than the ex-ante savings of 15.9 kW and aligned with the energy realization rate. Three factors contributed to the variation in realized savings.

The first difference between the virtual commissioning (VCx) program contractor reported savings (26,984 kWh) and ex post results (25,645 kWh) is from the use of different weather data sets for actual weather conditions. The VCx contractor sourced actual weather data from The Weather Company, while the ex post analysis used data from the National Oceanic and Atmospheric Administration (NOAA).

The second difference arose from minor variations in hourly kWh consumption when 15-minute interval data were aggregated into one-hour increments.

The third—and most significant—difference was between the ex-ante tracked savings (35,800 kWh) and the VCx contractor's year-end reported savings (26,984 kWh). The ex-ante tracking system captured the initial savings expected at project completion, whereas the VCx contractor's updated estimate, submitted at the end of calendar year 2024, incorporated additional post-installation data used in the linear regression analysis. Similarly, the ex-post analysis included extended billing and weather data to reduce variance in the linear regression and improve model accuracy.

Site-Level Estimation of Ex Post Gross Savings

2.160 610R

Project Summary

A project represented by sample ID 610R participated in the Virtual Retro-commissioning (VCx) program. The VCx team identified opportunities for reduction in base energy load, which resulted in the programming of HVAC and lighting schedules in the building management system to align with operating hours. Programming changes were implemented at this facility on November 16, 2023.

The ex-post gross energy savings are 48,957 kWh with an ex post-gross peak demand reduction of 16.3 kW. The realization rate for kWh and kW measurements is 144% and 172% respectively.

Measurement and Verification Effort

The evaluation team reviewed available project documents, collected site level AMI interval data, observed weather conditions during the measurement period, typical weather data, and reviewed public records for the building. A piecewise linear regression model using actual weather observations and time of week variables (Time-of-Week-Temperature) was developed using ex-ante and ex-post energy consumption for this facility from November 16, 2022, to November 15, 2024. This model was then applied to typical weather data to develop estimates of normalized counterfactual facility energy consumption and associated energy savings attributable to the VCx scheduling modifications.

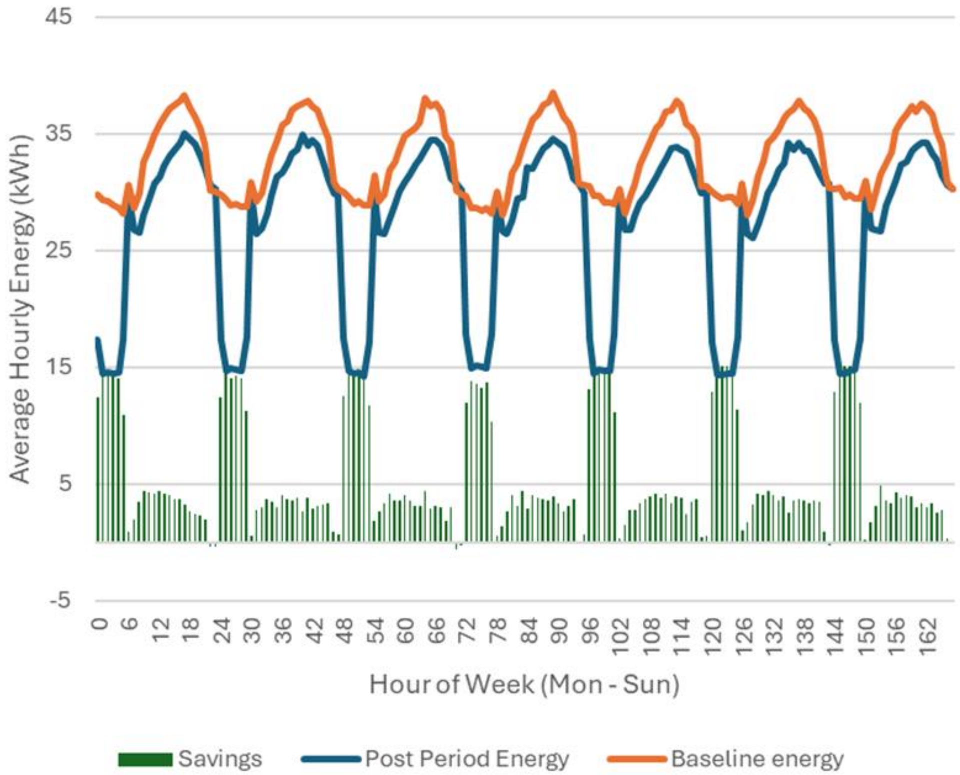
Regression Model

Metric	Result
R^2	0.843
C_v RMSE	10.9%

Result

All savings provided in this site report are annual estimates. Coincident peak demand savings were generated using Ameren specific Coincident Demand Factors for HVAC and lighting end-uses applied to annual energy savings. Energy savings were observed primarily during the nighttime hours when the facility is unoccupied. The operational schedule, electric usage, and savings are consistent across all days of the week.

Average Hourly Energy Usage by Hour of the Week



Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex-Ante	Ex-Post	Realization Rate	Ex-Ante	Ex-Post	Realization Rate
VCx HVAC; Lighting	34,003	48,957	144%	9.5	16.3	172%

The ex-post energy savings totaled 48,957 kWh, with a gross energy savings realization rate of 144%. The peak demand ex-post savings of 16.3 kW were greater than the ex-ante savings of 9.5 kW. Three factors contributed to the variation in realized savings.

The first difference between the virtual commissioning (VCx) program contractor reported savings (45,122 kWh) and ex post results (48,957 kWh) is from the use of different weather data sets for actual weather conditions. The VCx contractor sourced actual weather data from The Weather Company, while the ex post analysis used data from the National Oceanic and Atmospheric Administration (NOAA).

The second difference arose from minor variations in hourly kWh consumption when 15-minute interval data were aggregated into one-hour increments.

The third—and most significant—difference was between the ex-ante tracked savings (34,003 kWh) and the VCx contractor's year-end reported savings (45,122 kWh). The ex-ante tracking system captured the initial savings expected at project completion, whereas the VCx contractor's updated estimate, submitted at the end of calendar year 2024, incorporated additional post-installation data used in the linear regression analysis. Similarly, the ex-post analysis included extended billing and weather data to reduce variance in the linear regression and improve model accuracy.

2.161 611R

Project Summary

A project represented by sample ID 611R participated in the Virtual Retro-commissioning (VCx) program. The VCx team identified opportunities for reduction in base energy load, which resulted in the programming of HVAC schedules in the building management system to align with operating hours. Programming changes were implemented at this facility on August 22, 2024.

The ex-post gross energy savings are 129,239 kWh with an ex post-gross peak demand reduction of 57.4 kW. The realization rate for both measurements is 489%.

Measurement and Verification Effort

The evaluation team reviewed available project documents, collected site level AMI interval data, observed weather conditions during the measurement period, typical weather data, and reviewed public records for the building. A piecewise linear regression model using actual weather observations and time of week variables (Time-of-Week-Temperature) was developed using ex-ante and ex-post energy consumption for this facility from August 22, 2023, to December 30, 2024. This model was then applied to typical weather data to develop estimates of normalized counterfactual facility energy consumption and associated energy savings attributable to the VCx scheduling modifications.

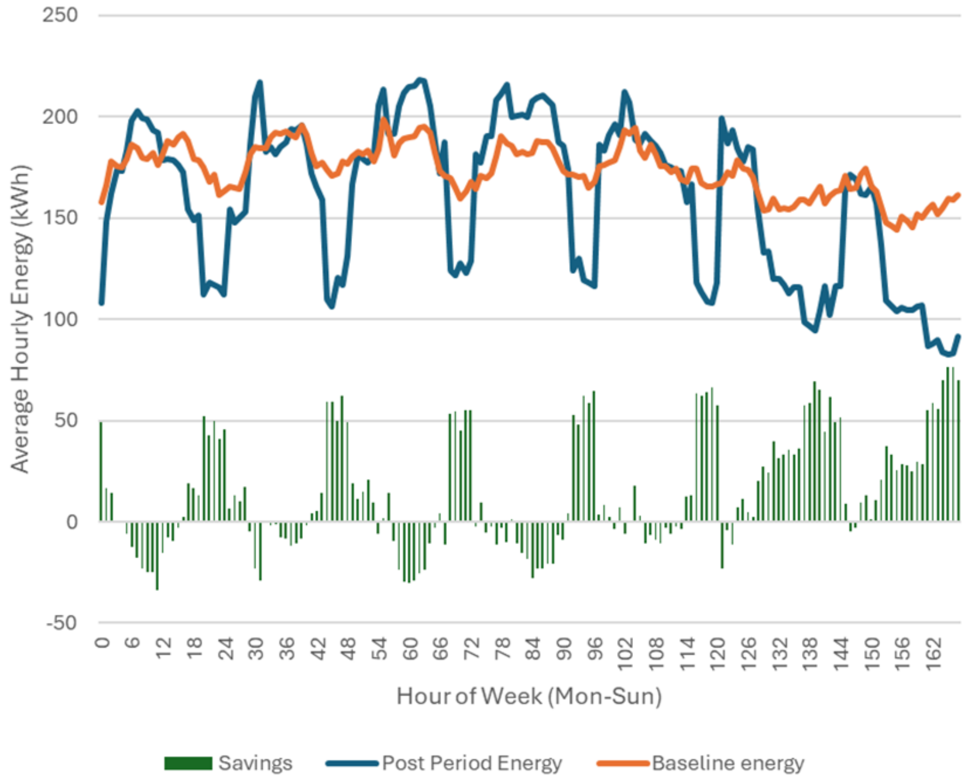
Regression Model

Metric	Result
R^2	0.616
C_v RMSE	28.3%

Result

All savings provided in this site report are annual estimates. Coincident peak demand savings were generated using Ameren specific Coincident Demand Factors for HVAC end-uses applied to annual energy savings. Energy savings were observed primarily during the weekend hours when the facility is unoccupied. This facility also has a shorter overnight period (~6 hours), where additional savings occur due to occupancy. The operational schedule, electric usage, and savings are consistent across all days of the week.

Average Hourly Energy Usage by Hour of the Week



Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex-Ante	Ex-Post	Realization Rate	Ex-Ante	Ex-Post	Realization Rate
VCx HVAC	26,437	129,239	489%	11.7	57.4	489%

The ex-post energy savings totaled 129,239 kWh, with a gross energy savings realization rate of 489%. The peak demand ex-post savings of 57.4 kW were greater than the ex-ante savings of 11.7 kW. Three factors contributed to the variation in realized savings.

The first difference between the virtual commissioning (VCx) program contractor reported savings (148,733 kWh) and ex post results (129,239 kWh) is from the use of different weather data sets for actual weather conditions. The VCx contractor sourced actual weather data from The Weather Company, while the ex post analysis used data from the National Oceanic and Atmospheric Administration (NOAA).

The second difference arose from minor variations in hourly kWh consumption when 15-minute interval data were aggregated into one-hour increments.

The third—and most significant—difference was between the ex-ante tracked savings (26,437 kWh) and the VCx contractor's year-end reported savings (148,733 kWh). The ex-ante tracking system captured the initial savings expected at project completion, whereas the VCx contractor's updated estimate, submitted at the end of calendar year 2024, incorporated additional post-installation data used in the linear regression analysis. Similarly, the ex-post analysis included extended billing and weather data to reduce variance in the linear regression and improve model accuracy.

2.162 612R

Project Summary

A project represented by sample ID 612R participated in the Virtual Retro-commissioning (VCx) program. The VCx team identified opportunities for reduction in base energy load, which resulted in the programming of lighting and HVAC schedules in the building management system to align with working hours. Programming changes were implemented at this facility on November 21, 2024.

The ex-post gross energy savings are 21,710 kWh with an ex post-gross peak demand reduction of 7.2 kW. The realization rate for kWh and kW measurements is 85% and 101% respectively.

Measurement and Verification Effort

The evaluation team reviewed available project documents, collected site level AMI interval data, observed weather conditions during the measurement period, typical weather data, and reviewed public records for the building. A piecewise linear regression model using actual weather observations and time of week variables (Time-of-Week-Temperature) was developed using ex-ante and ex-post energy consumption for this facility from November 21, 2022 to November 21, 2024. This model was then applied to typical weather data to develop estimates of normalized counterfactual facility energy consumption and associated energy savings attributable to the VCx scheduling modifications.

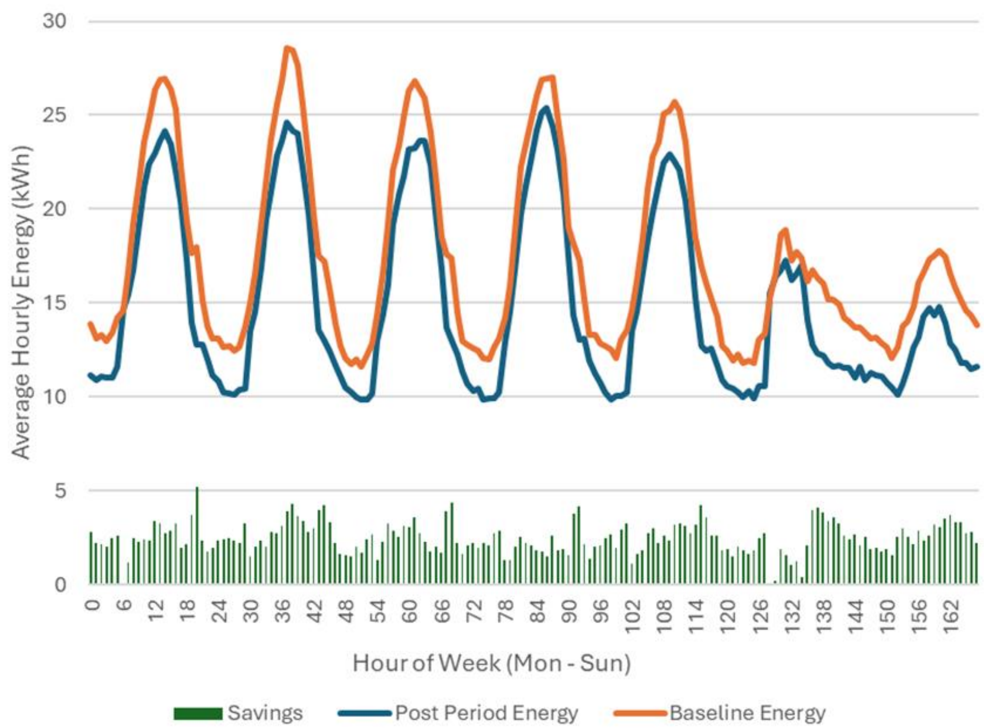
Regression Model

Metric	Result
R^2	0.813
C_v RMSE	18.6%

Result

All savings provided in this site report are annual estimates. Coincident peak demand savings were generated using Ameren specific Coincident Demand Factors for lighting and HVAC end-uses applied to annual energy savings. Consistent energy savings, between 0 and 5 kWh, were observed during all hours of the weekly schedule. The operational schedule and electric usage exhibit a weekday/weekend patters with lower use in the evenings and reduced hours on Saturday and Sunday.

Average Hourly Energy Usage by Hour of the Week



Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex-Ante	Ex-Post	Realization Rate	Ex-Ante	Ex-Post	Realization Rate
VCx Lighting and HVAC	25,562	21,710	85%	7.1	7.2	101%

The ex-post energy savings totaled 21,710 kWh, with a gross energy savings realization rate of 85%. The peak demand ex-post savings of 7.2 kW were lightly higher than the ex-ante savings of 7.1 kW. The primary cause of the variance between the expected and realized savings is the use of different weather data sets for actual weather conditions and minor variations in hourly kWh consumption when 15-minute interval data was aggregated into one-hour increments.

2.163 613R

Project Summary

A project represented by sample ID 613R participated in the Virtual Retro-commissioning (VCx) program. The VCx team identified opportunities for reduction in base energy load, which resulted in the programming of lighting schedules in the building management system to align with working hours. Programming changes were implemented at this facility on February 14, 2024.

The ex-post gross energy savings are 16,474 kWh with an ex post-gross peak demand reduction of 3.1 kW. The realization rate for both measurements is 86%.

Measurement and Verification Effort

The evaluation team reviewed available project documents, collected site level AMI interval data, observed weather conditions during the measurement period, typical weather data, and reviewed public records for the building. A piecewise linear regression model using actual weather observations and time of week variables (Time-of-Week-Temperature) was developed using ex-ante and ex-post energy consumption for this facility from February 14, 2023, to December 30, 2024. This model was then applied to typical weather data to develop estimates of normalized counterfactual facility energy consumption and associated energy savings attributable to the VCx scheduling modifications.

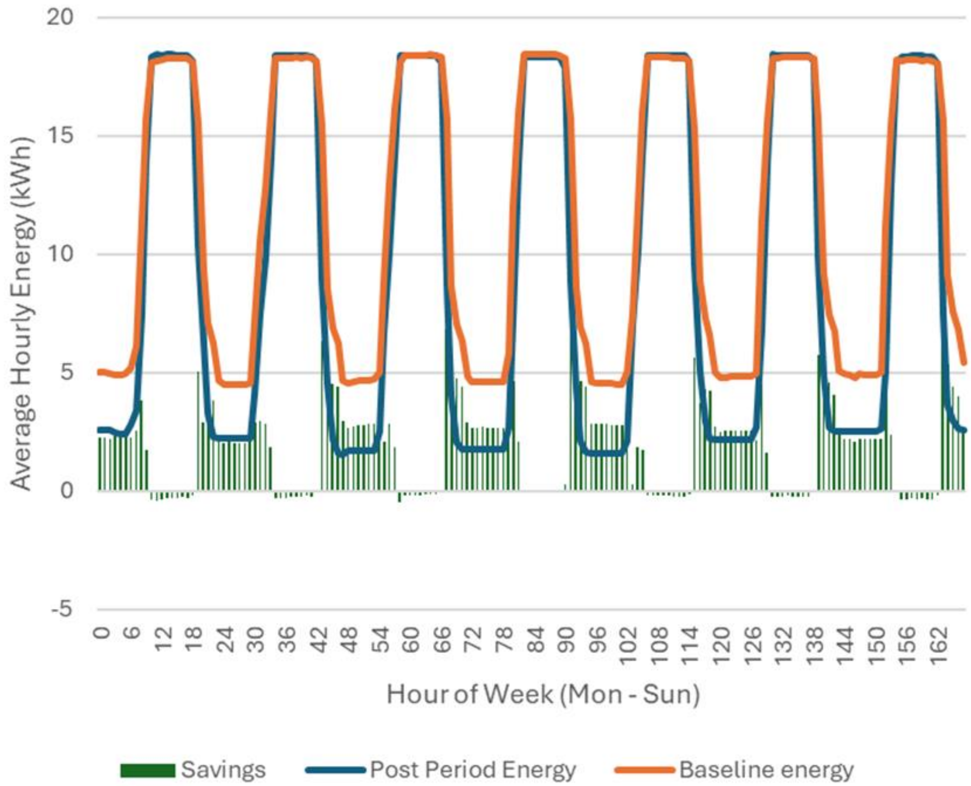
Regression Model

Metric	Result
R^2	0.854
C_v RMSE	24.5%

Result

All savings provided in this site report are annual estimates. Coincident peak demand savings were generated using Ameren specific Coincident Demand Factors for lighting end-uses applied to annual energy savings. Energy savings were observed primarily in the overnight hours when the facility is unoccupied. The operational schedule, electric usage, and savings are consistent across all days of the week.

Average Hourly Energy Usage by Hour of the Week



Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex-Ante	Ex-Post	Realization Rate	Ex-Ante	Ex-Post	Realization Rate
VCx Lighting	19,079	16,474	86%	3.6	3.1	86%

The ex-post energy savings totaled 16,474 kWh, with a gross energy savings realization rate of 86%. The peak demand ex-post savings of 3.1 kW were less than the ex-ante demand savings of 3.6 kW. The primary cause of the variance between the expected and realized savings is the use of different weather data sets for actual weather conditions and minor variations in hourly kWh consumption when 15-minute interval data was aggregated into one-hour increments.

The larger difference between the project reported ex ante savings (19,079 kWh) and the ex post savings (16,474 kWh) is within the tracking data between the Vcx program contractor and the program implementer. The program implementer reported the expected savings upon project completion (19,079 kWh), and the VCx contractor reported revised savings (16,635 kWh) at the end of the 2024 calendar year, which includes additional months within the linear regressions. The ex post savings also included the additional months of billing data and weather data to improve the fit of the linear regression modeling

Site-Level Estimation of Ex Post Gross Savings

The ex-post energy savings totaled 16,474 kWh, with a gross energy savings realization rate of 86%. The peak demand ex-post savings of 3.1 kW were less than the ex-ante demand savings of 3.6 kW. Three factors contributed to the variation in realized savings.

The first difference between the virtual commissioning (VCx) program contractor reported savings (16,635 kWh) and ex post results (16,474 kWh) is from the use of different weather data sets for actual weather conditions. The VCx contractor sourced actual weather data from The Weather Company, while the ex post analysis used data from the National Oceanic and Atmospheric Administration (NOAA).

The second difference arose from minor variations in hourly kWh consumption when 15-minute interval data were aggregated into one-hour increments.

The third—and most significant—difference was between the ex-ante tracked savings (19,079 kWh) and the VCx contractor's year-end reported savings (16,635 kWh). The ex-ante tracking system captured the initial savings expected at project completion, whereas the VCx contractor's updated estimate, submitted at the end of calendar year 2024, incorporated additional post-installation data used in the linear regression analysis. Similarly, the ex-post analysis included extended billing and weather data to reduce variance in the linear regression and improve model accuracy.

2.164 614R

Project Summary

A project represented by sample ID 614R participated in the Virtual Retro-commissioning (VCx) program. The VCx team identified opportunities for reduction in base energy load, which resulted in the programming of lighting schedules in the building management system to align with working hours. Programming changes were implemented at this facility on February 23, 2024.

The ex-post gross energy savings are 7,442 kWh with an ex post-gross peak demand reduction of 1.4 kW. The realization rate for both measurements is 90%.

Measurement and Verification Effort

The evaluation team reviewed available project documents, collected site level AMI interval data, observed weather conditions during the measurement period, typical weather data, and reviewed public records for the building. A piecewise linear regression model using actual weather observations and time of week variables (Time-of-Week-Temperature) was developed using ex-ante and ex-post energy consumption for this facility from February 23, 2023, to December 30, 2024. This model was then applied to typical weather data to develop estimates of normalized counterfactual facility energy consumption and associated energy savings attributable to the VCx scheduling modifications.

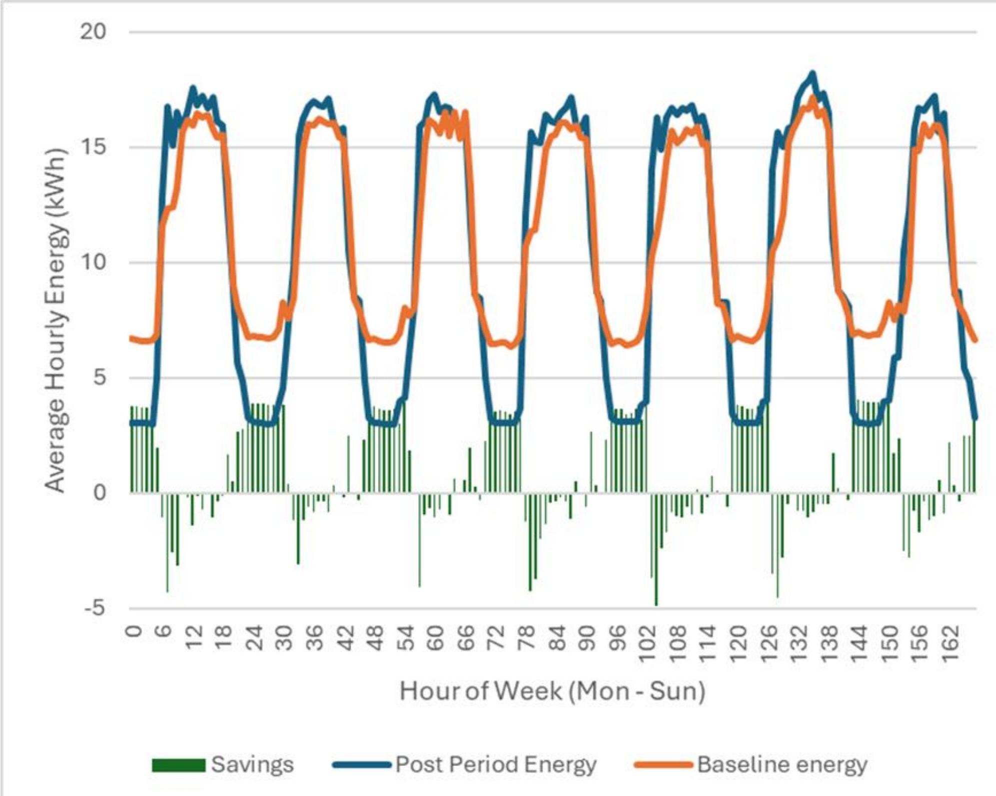
Regression Model

Metric	Result
R^2	0.790
C_v RMSE	23.5%

Result

All savings provided in this site report are annual estimates. Coincident peak demand savings were generated using Ameren specific Coincident Demand Factors for lighting end-uses applied to annual energy savings. Energy savings were observed primarily in the overnight hours when the facility is unoccupied. The operational schedule, electric usage, and savings are consistent across all days of the week.

Average Hourly Energy Usage by Hour of the Week



Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex-Ante	Ex-Post	Realization Rate	Ex-Ante	Ex-Post	Realization Rate
VCx Lighting	8,226	7,442	90%	1.6	1.4	90%

The ex-post energy savings totaled 7,442 kWh, with a gross energy savings realization rate of 90%. The peak demand ex-post savings of 1.4 kW were slightly less than the ex-ante savings of 1.6 kW. The primary cause of the variance between the expected (6,664 kWh) and realized savings (7,442 kWh) is the use of different weather data sets for actual weather conditions and minor variations in hourly kWh consumption when 15-minute interval data was aggregated into one-hour increments.

2.165 616R

Project Summary

A project represented by sample ID 616R participated in the Virtual Retro-commissioning (VCx) program. The VCx team identified opportunities for reduction in base energy load, which resulted in the programming of lighting schedules in the building management system to align with working hours. Programming changes were implemented at this facility on January 2, 2024.

The ex-post gross energy savings are 5,538 kWh with an ex post-gross peak demand reduction of 1.1 kW. The realization rate for kWh and kW measurements is 162% and 188% respectively.

Measurement and Verification Effort

The evaluation team reviewed available project documents, collected site level AMI interval data, observed weather conditions during the measurement period, typical weather data, and reviewed public records for the building. A piecewise linear regression model using actual weather observations and time of week variables (Time-of-Week-Temperature) was developed using ex-ante and ex-post energy consumption for this facility from January 2, 2023, to January 2, 2025. This model was then applied to typical weather data to develop estimates of normalized counterfactual facility energy consumption and associated energy savings attributable to the VCx scheduling modifications.

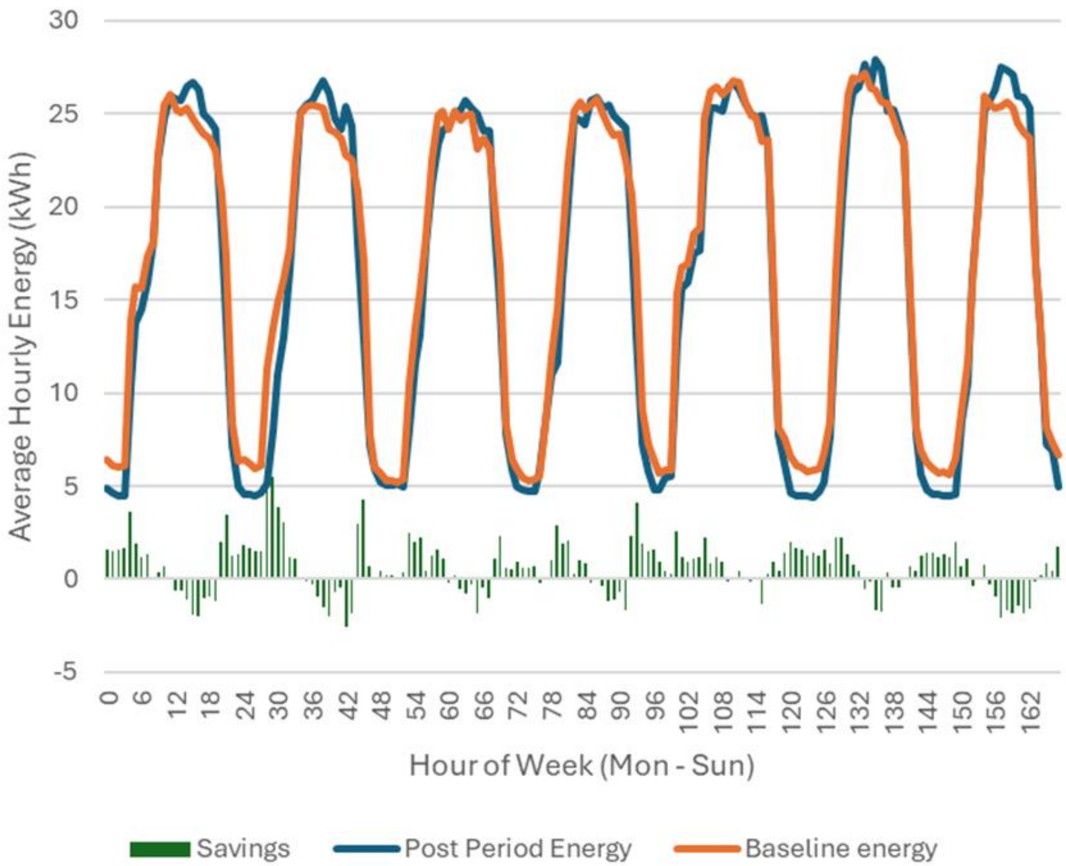
Regression Model

Metric	Result
R^2	0.864
C_v RMSE	21.4%

Result

All savings provided in this site report are annual estimates. Coincident peak demand savings were generated using Ameren specific Coincident Demand Factors for lighting end-uses applied to annual energy savings. Energy savings were observed primarily in the overnight hours when the facility is unoccupied. The operational schedule, electric usage, and savings are consistent across all days of the week.

Average Hourly Energy Usage by Hour of the Week



Realized Gross Energy and Demand Savings

Measure Category	Gross Energy Savings (kWh)			Coincident Peak Demand Savings (kW)		
	Ex-Ante	Ex-Post	Realization Rate	Ex-Ante	Ex-Post	Realization Rate
VCx Lighting	3,427	5,538	162%	0.7	1.1	188%

The ex-post energy savings totaled 5,538 kWh, with a gross energy savings realization rate of 162%. The peak demand ex-post savings of 1.1 kW were greater than the ex-ante savings of 0.7 kW. The primary cause of the variance between the expected and realized savings is the use of different weather data sets for actual weather conditions and minor variations in hourly kWh consumption when 15-minute interval data was aggregated into one-hour increments.

3 M&V Sample Site-Level and Measure-Level Gross Savings

3.1 Standard Program

Table 3-1 Summary of Sampled Site Ex Ante and Ex Post Savings – Standard Program

Stratum	Project Number	Ex Ante kWh Savings	Gross Ex Post kWh Savings	Project Gross Realization Rate
1	102S	224,943	222,652	99%
1	114S	360,397	360,397	100%
1	120S	329,025	325,950	99%
1	129S	232,418	192,893	83%
1	139S	206,591	212,275	103%
1	144S	200,589	213,712	107%
1	150S	172,343	178,785	104%
1	153S	167,842	169,415	101%
1	156S	157,811	81,881	52%
2	123S	71,909	66,670	93%
2	130S	109,783	113,884	104%
2	151S	92,469	89,879	97%
2	157S	123,182	124,969	101%
2	176S	57,814	57,274	99%
2	178S	60,025	59,463	99%
2	196S	36,166	37,518	104%
2	200S	31,522	17,083	54%
3	118S	21,895	21,552	98%
3	122S	22,793	22,793	100%
3	134S	19,140	17,739	93%
3	149S	15,430	14,095	91%
3	155S	24,944	25,176	101%
3	168S	1,060	10,109	954%
3	189S	89	66	74%
3	191S	1,303	1,230	94%
3	198S	29,995	29,153	97%
4	103S	375,897	335,190	89%
5	108S	201,224	181,102	90%
5	117S	277,758	273,402	98%
5	131S	142,884	149,764	105%
5	140S	124,607	103,313	83%
5	146S	77,811	77,168	99%

Stratum	Project Number	Ex Ante kWh Savings	Gross Ex Post kWh Savings	Project Gross Realization Rate
5	148S	162,320	163,077	100%
5	163S	125,362	125,529	100%
5	169S	74,809	76,233	102%
5	172S	64,126	62,328	97%
5	173S	62,490	46,178	74%
6	121S	259	259	100%
6	125S	428	347	81%
6	126S	2,488	2,488	100%
6	132S	18,278	20,742	113%
6	136S	428	347	81%
6	159S	2,554	3,043	119%
6	161S	1,353	1,598	118%
6	180S	25,976	23,977	92%
6	182S	16,736	14,150	85%
6	185S	2,244	2,327	104%
6	187S	14,081	20,902	148%
6	192S	584	640	110%
6	199S	1,679	1,631	97%
6	206S	1,425	1,425	100%
7	100S	338,415	312,622	92%
7	105S	614,920	576,433	94%
7	106S	551,144	545,993	99%
7	107S	544,395	510,323	94%
7	110S	431,855	428,481	99%
7	111S	370,630	347,889	94%
7	112S	369,689	370,968	100%
7	113S	350,962	350,961	100%
7	115S	347,671	325,911	94%
7	119S	332,470	279,428	84%
7	124S	212,087	196,282	93%
7	127S	281,299	239,367	85%
7	128S	274,926	267,218	97%
7	135S	224,264	184,156	82%
7	137S	241,763	234,866	97%
7	138S	210,400	230,256	109%
7	147S	177,828	177,828	100%
8	101S	60,108	60,108	100%
8	109S	132,013	212,622	161%
8	116S	44,355	43,659	98%

Stratum	Project Number	Ex Ante kWh Savings	Gross Ex Post kWh Savings	Project Gross Realization Rate
8	133S	99,626	111,527	112%
8	141S	81,954	67,408	82%
8	145S	103,954	138,411	133%
8	152S	77,481	75,308	97%
8	154S	134,127	135,430	101%
8	158S	150,118	110,674	74%
8	160S	135,525	176,740	130%
8	164S	105,200	119,039	113%
8	165S	103,341	98,128	95%
8	166S	103,278	103,278	100%
8	171S	71,925	71,744	100%
8	175S	61,245	36,095	59%
8	179S	30,177	27,321	91%
8	181S	38,163	48,720	128%
8	183S	54,850	52,425	96%
8	184S	50,450	50,263	100%
8	186S	49,189	48,886	99%
8	188S	33,349	35,398	106%
8	190S	44,452	46,025	104%
8	193S	46,229	39,862	86%
8	194S	40,907	40,245	98%
8	195S	40,072	40,032	100%
8	197S	32,240	48,674	151%
9	104S	6,602	6,417	97%
9	162S	8,431	8,701	103%
9	167S	931	1,685	181%
9	170S	1,528	1,481	97%
9	174S	618	457	74%
9	177S	2,924	2,897	99%
9	201S	21,335	22,133	104%
9	203S	10,870	10,558	97%
9	204S	10,794	10,860	101%
9	205S	9,160	9,159	100%
9	207S	9,059	9,390	104%
All Non-Sample Projects		25,793,576	26,535,996	103%
Total		38,224,153	38,590,514	101%

3.2 Custom Program

Table 3-2 Summary of Sampled Site Ex Ante and Ex Post Savings – Custom Program

Stratum	Project Number	Ex Ante kWh Savings	Gross Ex Post kWh Savings	Project Gross Realization Rate
1	203C	2,801,399	2,801,399	100%
1	206C	2,377,322	2,377,322	100%
1	210C	1,717,325	1,717,325	100%
1	214C	1,150,209	950,214	83%
2	217C	591,189	591,189	100%
2	222C	686,200	686,200	100%
2	223C	664,437	664,437	100%
2	226C	185,574	164,893	89%
2	227C	466,205	466,205	100%
2	237C	281,188	297,489	106%
2	244C	154,300	154,300	100%
3	200C	81,637	68,041	83%
3	234C	58,142	57,783	99%
3	242C	132,430	123,373	93%
3	246C	47,840	36,118	75%
3	247C	67,835	122,581	181%
4	201C	6,186,259	4,639,693	75%
4	208C	1,168,166	1,168,166	100%
4	211C	1,579,010	1,523,880	97%
4	212C	1,372,051	1,427,234	104%
4	215C	963,315	963,315	100%
4	221C	720,901	722,110	100%
4	224C	655,370	661,565	101%
5	204C	372,200	-	0%
5	219C	473,760	60,831	13%
5	228C	349,150	349,150	100%
5	235C	234,583	229,877	98%
5	238C	264,563	238,502	90%
6	225C	34,773	33,798	97%
6	231C	15,190	15,369	101%
6	232C	1,513	1,489	98%
6	236C	11,149	10,318	93%
6	239C	31,044	28,242	91%
6	240C	128,665	128,665	100%
6	241C	77,030	77,030	100%
6	243C	31,617	33,686	107%

Stratum	Project Number	Ex Ante kWh Savings	Gross Ex Post kWh Savings	Project Gross Realization Rate
6	245C	37,949	37,718	99%
7	202C	2,785,912	2,785,912	100%
7	205C	2,603,034	2,603,034	100%
7	207C	812,174	812,174	100%
7	213C	1,358,162	1,358,161	100%
7	216C	341,819	341,819	100%
7	218C	827,645	827,645	100%
7	220C	788,925	788,925	100%
7	230C	434,344	318,816	73%
7	233C	344,700	323,244	94%
8	209C	30,274	30,134	100%
8	229C	103,913	103,913	100%
8	248C	6,603	6,628	100%
8	249C	6,397	6,422	100%
9	208S	7,247	7,512	104%
All Non-Sample Projects		17,014,217	15,860,866	93%
Total		53,636,856	49,804,713	93%

3.3 Retro-Commissioning Program

Table 3-3 Summary of Sampled Site Ex Ante and Ex Post Savings – Retro-Commissioning Program

Stratum	Project Number	Ex Ante kWh Savings	Gross Ex Post kWh Savings	Project Gross Realization Rate
1	500R	1,574,582	1,574,582	100%
1	501R	484,908	484,908	100%
1	502R	436,914	436,914	100%
1	503R	262,861	262,861	100%
2	504R	90,508	90,508	100%
2	505R	19,757	19,757	100%
3	600R	1,320,692	311,002	24%
3	601R	332,514	1,295,585	390%
3	602R	279,860	356,910	128%
3	603R	175,791	164,574	94%
3	604R	82,629	81,111	98%
3	605R	69,628	-	0%
3	606R	64,063	65,870	103%
3	607R	51,270	54,604	107%

M&V Sample Site-Level and Measure-Level Gross Savings

Stratum	Project Number	Ex Ante kWh Savings	Gross Ex Post kWh Savings	Project Gross Realization Rate
3	608R	36,781	-	0%
3	609R	35,800	25,645	72%
3	610R	34,003	48,957	144%
3	611R	26,437	129,239	489%
3	612R	25,562	21,710	85%
3	613R	19,079	16,474	86%
3	614R	8,226	7,442	90%
3	615R	3,795	-	0%
3	616R	3,427	5,538	162%
All Non-Sample Projects		255,043	255,043	100%
Total		5,694,130	5,709,233	100%

3.4 Small Business Direct Install

Table 3-4 Summary of Sampled Site Ex Ante and Ex Post Savings – Small Business Direct Install

Stratum	Project Number	Ex Ante kWh Savings	Gross Ex Post kWh Savings	Project Gross Realization Rate
1	405D	115,676	120,000	104%
1	408D	107,790	97,560	91%
1	414D	87,536	77,187	88%
1	418D	74,570	69,009	93%
1	419D	64,285	66,667	104%
1	421D	63,932	61,093	96%
1	423D	65,317	65,927	101%
2	403D	35,130	34,145	97%
2	413D	20,762	20,180	97%
2	428D	52,747	51,268	97%
2	429D	40,934	38,976	95%
2	431D	36,922	24,623	67%
2	434D	15,714	12,765	81%
2	436D	30,567	31,134	102%
2	441D	26,093	24,021	92%
2	442D	23,537	20,672	88%
2	443D	23,537	20,672	88%
3	402D	9,615	9,345	97%
3	424D	14,137	14,434	102%
3	438D	8,727	8,417	96%
3	444D	6,484	6,545	101%

Stratum	Project Number	Ex Ante kWh Savings	Gross Ex Post kWh Savings	Project Gross Realization Rate
3	446D	13,174	7,892	60%
3	448D	13,567	13,441	99%
4	417D	4,454	4,329	97%
4	426D	124	125	101%
4	450D	2,985	3,085	103%
4	453D	5,615	5,904	105%
4	456D	4,227	4,227	100%
5	401D	81,457	79,173	97%
5	404D	102,592	99,715	97%
5	416D	86,289	83,855	97%
5	427D	55,899	56,421	101%
6	406D	13,354	13,853	104%
6	425D	42,372	41,184	97%
6	439D	22,339	21,546	96%
7	410D	7,553	7,553	100%
7	412D	3,558	3,458	97%
7	422D	3,491	4,880	140%
7	432D	6,934	6,998	101%
7	445D	8,433	8,511	101%
7	451D	4,712	4,580	97%
7	455D	517	543	105%
8	400D	152,286	149,404	98%
8	411D	85,071	82,570	97%
9	435D	21,204	18,503	87%
10	407D	2,440	2,531	104%
10	409D	7,208	6,504	90%
10	415D	10,056	8,740	87%
10	420D	7,048	7,306	104%
10	430D	6,961	6,648	96%
10	433D	3,565	3,830	107%
10	437D	1,869	-	0%
10	440D	648	674	104%
10	447D	1,387	831	60%
10	449D	777	657	85%
10	452D	796	810	102%
10	454D	214	225	105%
All Non-Sample Projects		4,613,425	4,320,197	94%
Total		6,322,613	5,955,341	94%

M&V Sample Site-Level and Measure-Level Gross Savings

3.5 Business Social Services Program

Table 3-5 Summary of Sampled Site Ex Ante and Ex Post Savings – Business Social Services Program

Stratum	Project Number	Ex Ante kWh Savings	Gross Ex Post kWh Savings	Project Gross Realization Rate
1	300B	724,891	773,227	107%
1	302B	328,199	351,580	107%
1	304B	334,260	357,705	107%
1	305B	241,616	257,075	106%
1	309B	214,062	228,145	107%
1	310B	202,095	281,268	139%
1	311B	192,694	194,434	101%
2	307B	166,884	169,726	102%
2	312B	156,346	158,703	102%
2	313B	114,340	116,240	102%
2	317B	104,422	105,827	101%
3	316B	48,615	49,366	102%
3	318B	54,232	54,782	101%
3	321B	37,114	40,467	109%
4	324B	12,348	12,463	101%
4	326B	266	337	127%
5	301B	69,105	73,626	107%
5	306B	64,758	65,260	101%
5	308B	223,970	321,593	144%
5	315B	87,710	88,802	101%
5	320B	47,973	48,420	101%
6	303B	9,563	10,188	107%
6	314B	30,768	30,968	101%
6	319B	30,388	30,672	101%
6	322B	9,395	9,080	97%
6	323B	14,306	14,440	101%
6	325B	18,575	17,148	92%
6	327B	11,230	10,740	96%
6	328B	6,343	6,426	101%
All Non-Sample Projects		2,149,528	2,197,661	102%
Total		5,705,996	6,076,369	106%

4 Business Participant Survey Instrument

Variable Name	Variable Definition
Organization	Name of organization
Address	Location of project
Year	Program year
Standard	1 = if standard, else 0
Custom	1 = if custom, else 0
SBDI	1 = if SBDI, else 0
RCX	1 = if retro-commissioning, else 0
Lighting_Only	1 if only installed lighting measures, else 0
Efficient_Measure	Description of the efficiency measure installed including the
Energy_Using	A flag that is equal to 1 if the Efficient_Measure uses energy and the baseline is a less efficient version, else 0.
Install	Verb to describe action that is appropriate to the measure type. For example, install, complete, implement.
Installed	Verb to describe action that is appropriate to the measure type. For example, install, complete, implement.
Installing	Verb to describe action that is appropriate to the measure type. For example, install, complete, implement.
Measure_Type_Count	Number of the types of measures installed

Research Topic	Survey Questions
Awareness	Q4 - Q6
Contractor Selection	Q7 - Q10
Cross-Program Awareness	Q11 - Q18

Program Delivery Efficiency	Q19 - Q33
Free Ridership	Q34 - Q51
Spillover	Q52 - Q134
Customer Satisfaction	Q135 - Q139
Firmographics	Q140 - Q145

4.1 Screening and Background Information

1. Our records indicate you were the main contact for the energy efficient project(s) completed at [Address] through Ameren Missouri's BizSavers Program. 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) **[Terminate]**
   3. No, I was not involved in the project(s) **[Terminate]**
   4. No, I do not work for [Organization] but provided services for the project(s) **[Terminate]**

   88. Don't know **[Terminate]**

2. 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)

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

[Multiselect]

   1. A full time energy manager or other person or persons responsible for monitoring or managing energy usage
   2. A person who has secondary responsibilities for monitoring or managing energy use
   3. Defined energy savings goals
   4. A specific policy requiring that energy efficiency is a criterion in the procurement of equipment

5. Carbon reduction goals
6. A policy to complete periodic energy audits of the facility
7. Employee training that focuses on ways to save energy
8. Other (Specify)
9. None of the above **[Exclusive]**
98. Don't know **[Exclusive]**

4.2 Awareness

4. Had you applied for Ameren Missouri incentives for any equipment replacements or building upgrades before the one(s) you did in [Year]?
    1. Yes
    2. No
    98. Don't know

[Display if Q4 = 2 or 98]

5. How did you learn about Ameren Missouri's incentives for efficient equipment or upgrades? Select all that apply.

[Multiselect, randomize 1-14]

1. From the contractor, equipment vendor, or energy consultant who completed the energy efficient project(s) that you obtained incentives for
2. From some other contractor, equipment vendor, or energy consultant
3. From an Ameren Missouri Account Representative
4. From a BizSavers Program representative
5. From social media such as Facebook or LinkedIn
6. From a YouTube advertisement
7. From an internet search
8. At an event/trade show
9. Received an Ameren Missouri email blast or electronic newsletter
10. Received an informational brochure
11. From a program sponsored webinar
12. From Ameren Missouri's website
13. Friends or colleagues
14. Through past experience with the program
15. Other (please explain)
98. Don't know

[Display if Q4 = 1]

6. When you first applied for Ameren Missouri incentives for efficient equipment or upgrades, how did you learn about those incentives? Select all that apply.

[Multiselect, randomize 1-14]

1. From the contractor, equipment vendor, or energy consultant who did the energy efficient project(s) that you got incentives for
2. From some other contractor, equipment vendor, or energy consultant

3. From an Ameren Missouri Account Representative
4. From a BizSavers Program representative
5. From social media such as Facebook or LinkedIn
6. From a YouTube advertisement
7. From an internet search
8. At an event/trade show
9. Received an Ameren Missouri email blast or electronic newsletter
10. Received an informational brochure
11. From a program sponsored webinar
12. From Ameren Missouri's website
13. Friends or colleagues
14. Through past experience with the program
15. Other (please explain)
98. Don't recall

4.3 Contractor Selection

[Display if SBDI = 0 and RCx = 0]

7. Did your organization work with a contractor or service provider to install the efficiency improvements that you received Ameren Missouri incentives for?
   1. Yes
   2. No
   98. Don't know

[Display if Q7 = 1 or SBDI = 1 or RCx = 1]

8. Did your organization seek multiple bids for the project that you received Ameren Missouri incentives for?
   1. Yes
   2. No
   98. Don't know

[Display if Q7 = 1]

9. What factors influenced your decision to choose the contractor or service provider you worked with? Please select all that apply.

[Multiselect. Randomize 1-6]

1. Listed on Ameren Missouri's website
2. Cost/budget considerations
3. Qualifications/expertise with equipment type
4. Availability to complete project within a specific timeline
5. Recommendation
6. Quality of work/brand recognition
7. Other considerations (Please specify)

98. Don’t know

[Display if Q7 = 1 and Q9 =1 is not selected]

10. Did you or your organization obtain information about the contractor or service provider from the Ameren Missouri website during the selection process?
    1. Yes
    2. No
    98. Don’t know

4.4 Cross-Program Awareness

[Display if (Standard = 1 or SBDI = 1) and Custom = 0]

11. In addition to the incentives for specific standard equipment upgrades you received, did you know you could qualify for incentives by proposing a custom energy-upgrade project that fits your specific facility needs?
    1. Yes
    2. No
    98. Don’t know

[Display if SBDI = 0 and Lighting_Only = 1]

12. In addition to the lighting incentives you received, did you know you could qualify for incentives for other types of energy efficient equipment, such as heating, cooling, hot water, and refrigeration?
    1. Yes
    2. No
    98. Don’t know

[Dispaly if SBDI = 1 and Lighting_Only = 1]

13. In addition to the discounted lighting equipment you received, did you know you could qualify for incentives for other types of energy efficient equipment, such as heating, cooling, hot water, and refrigeration?
    1. Yes
    2. No
    98. Don’t know

[Display if Lighting_Only = 1]

14. If the space heating, cooling, or refrigeration equipment at [Address] needed repair or replacement, who would be financially responsible for the repair or replacement?

1. Our firm/organization
2. The building owner (not our firm/organization)
3. A property management or energy management firm
4. Other (please explain)
98. Don't know

[Display if Q14 = 1]

15. Using the scale provided below, if the space heating, cooling, or refrigeration equipment at [Address] needed repair or replacement, how interested would you be in using Ameren Missouri incentives to replace your equipment with new, energy efficient equipment?

[Response scale: 1 = Not at all interested to 5 = Extremely interested, 98 = "Don't know"]

[Display if RCX = 1]

16. You recently received incentives for a retro-commissioning project. Which of these other Ameren Missouri program incentives are you aware of?
    1. New Construction and major building renovation incentives
    2. Standard incentives for specific measures such as lighting, HVAC, refrigeration, and water heating equipment
    3. Custom incentives for non-standard measures
    4. None of the above

[Display if RCX = 1]

17. How well did the Retro-commissioning program's range of incentive options fit your needs?

[Response scale: 1 = "Not at all" AND 5 = "Completely", 98 = "Don't know"]

[Display if Q17 < 4]

18. In what way did the range of incentive options offered fail to meet your needs completely?

4.5 Program Delivery Efficiency

4.5.1 Application Process

19. Which of the following people worked on completing your application for program incentives (including gathering required documentation)? (Select all that apply)

[Multiselect]

1. Yourself
2. Another member of your company
3. A contractor or program service provider
4. An equipment vendor
5. A designer or architect
6. Someone else – please specify
98. Don't know

[Display if Q19 = 1 and SBDI = 0]

20. Using the scale provided below, thinking back to the application process, please rate the clarity of information on how to complete the application…

[Response scale: 1 = "Not at all clear" AND 5 = "Completely clear", 98 = "Don't know"]

[Display if Q20 < 4]

21. What information, including instructions on forms, needs to be further clarified?

[Display if Q19 = 1 and SBDI = 0]

22. Using a 5-point scale, where 1 = "completely unacceptable" and 5 = "completely acceptable," how would you rate. . .

[Response scale: 1 = Not at all acceptable to 5 = Completely acceptable, 98 = "Don't know", 99 = "Not applicable"]

a. …the ease of finding forms on Ameren Missouri's website
b. …the ease of using the electronic application worksheets
c. …the time it took to approve the application
d. …the effort required to provide required invoices or other supporting documentation
e. …the overall application process

[Display if SBDI = 0]

23. Did you have a clear sense of whom you could go to for assistance with the application process?
    1. Yes
    2. No
    98. Don't know

[Display if Custom = 1 and RCX = 0]

24. After initial submission, were you (or anyone acting on your behalf) required to resubmit or provide additional documentation before your application was approved?
    1. Yes
    2. No
    98. Don't know

[Display if Q24 = 1]

25. Which of the following were reasons that you had to resubmit your application? (Please select all that apply)
    1. Issues related to how energy savings were calculated
    2. Other issues related to the audit
    3. Issues related to additional supporting documentation such as invoices
    4. Other issues (Specify)
    98. Don't know

[Display if RCX =1]

26. After initial submission, were you (or anyone acting on your behalf) required to resubmit or provide additional documentation before the following were approved?

[Scale: 1 = Yes, 2 = No, 98 = Don't know]

a. The initial application with the estimate of the retro-commissioning study cost
b. The revised application once the study was completed
c. The documentation for the completed project to receive incentives

[Display if any in Q26 = 1]

27. Which of the following were reasons that you had to resubmit your application or provide additional documentation? (Please select all that apply)
    1. Issues related to how energy savings were calculated
    2. Other issues related to the study
    3. Issues related to additional supporting documentation such as invoices
    4. Other issues (Specify)
    98. Don't know

[Display if SBDI = 0]

28. How did the incentive amount compare to what you expected?
    1. It was much less
    2. It was somewhat less
    3. It was about the amount expected
    4. It was somewhat more
    5. It was much more
    98. Don't know

[Display if SBDI = 1 and Standard = 0, Custom = 0, RCX = 0]

29. How did the project cost compare to what you expected?
    1. It was much less
    2. It was somewhat less
    3. It was about the amount expected
    4. It was somewhat more
    5. It was much more
    98. Don't know

4.5.2 Equipment Selection

30. How did each of the following affect your decision to complete the energy efficiency project?

[Response scale: 1 = No interaction with this type of person or they provided no input, 2 = Input had no effect on decision, 3 = Small effect, 3 = Moderate to large effect, 5 = Critical effect, 98 = Don't know/Not applicable]

a. **[If Standard = 1 or Custom = 1]** Vendor (retailer)
b. **[If Standard = 1 or Custom = 1]** Contractor (installer)
c. **[If Standard = 1 or Custom = 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]** Your RCx service provider
h. Someone else, please specify

[Display if Q30h= 3 – 5]

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

4.5.3 Measurement and Verification

32. After your project was completed, did a program representative other than the contractor inspect the work done through the program?
    1. Yes
    2. No
    88. Don’t know

[Display if Q32 = 1]

33. Using the scale provided below, please rate your agreement with the following statements:

[Response scale: 1 = Completely disagree to 5 = Completely agree, 98 = Don’t know, 99 = “Not applicable”]

a. The inspector was courteous
b. The inspector was efficient

4.6 Free-Ridership

34. Had you purchased and installed any energy efficient equipment for the property at [Address] before you knew about the Ameren Missouri BizSavers Program?
    1. Yes
    2. No
    98.Don’t know
35. 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?
    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.
    4. Don't know
36. Before participating in the Ameren Missouri BizSavers Program, had you [Installed] any equipment or measure similar to [Efficient measure] at the [Address] location?
    1. Yes
    2. No
    98.Don’t know
37. Did you have plans to [Install] the [Efficient_Measure] at the [Address] location before participating in the Ameren Missouri BizSavers Program?
    1. Yes
    2. No
    98.Don’t know
38. Would you have completed the [Efficient_Measure] project even if you had not participated in the program?

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

39. How important was previous experience with the Ameren Missouri BizSavers Program in making your decision to [Install] the [Efficient_Measure] at the [Address] location?
    1. Did not have previous experience with program
    2. Very important
    3. Somewhat important
    4. Only slightly important
    5. Not at all important
    98.Don't know

[Display if SBDI = 1]

40. If the Service Provider that completed the onsite energy assessment had not recommended [installing] the [Efficient_Measure], 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
    98.Don't know
41. Did a Ameren Missouri BizSavers Program or other Ameren Missouri representative recommend that you [install] the [Efficient_Measure] at the [Address] location?
    1. Yes
    2. No
    98.Don't know

[Display if Q41 = 1]

42. If the Ameren Missouri BizSavers Program representative had not recommended [installing] the [Efficient_Measure], 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
    98.Don't know
43. Would your organization have been financially able to [install] the [Efficient_Measure] at the [Address] location without the financial incentive from the Ameren Missouri BizSavers Program?
    1. Yes
    2. No
    98.Don't know

[Display if Q43 = 2]

44. To confirm, your organization would NOT have allocated the funds to complete a similar energy saving project if the program was not available. Is that correct?
    1. Yes
    2. No

98. Don’t know

45. If the financial incentive from the Ameren Missouri BizSavers Program had not been available, how likely is it that you would have [Installed] the [Efficient_Measure] anyway?
    1. Definitely would have installed
    2. Probably would have installed
    3. Probably would not have installed
    4. Definitely would not have installed
    98.Don’t know

[Display if Q43 = 2 and Q44 = 1 and Q37 = 1 and Q38 = 1]

46. Previously you said that your organization had plans to complete the project and would have completed it if you had not participated in the program. You also said that your organization would not have been financially able to install the equipment without the program.

    In your own words, can you explain the role that the financial incentive played in your decision to complete this project?

47. Did you purchase and [install] more [Efficient_Measure] than you otherwise would have without the program?
    1. Yes
    2. No, program did not affect quantity purchased and [Installed].
    98.Don’t know

[Display if Energy_Using = 1]

48. 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.
    98.Don’t know

[Display if Q48= 1]

49. Which of the following best describes what efficiency level of equipment you would have installed if the program was not available?
    1. Installed the exact same equipment
    2. Installed efficient equipment, but that wasn’t as efficient as what you installed
    3. Installed the least efficient equipment available
    4. Not installed any equipment
50. Did you [Install] the [Efficient_Measure] earlier than you otherwise would have without the program?
    1. Yes
    2. No, program did not affect did not affect timing of the installation
    98.Don’t know

[Display if Q50 = 1]

51. 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
98.Don't know

[Repeat for second measure type if Measure_Type_Count > 1]

4.7 Spillover

52. Since you completed the incentive project, have you installed any energy efficient equipment at a facility that receives electrical service from Ameren Missouri and that you DID NOT get an incentive from Ameren Missouri?
    1. Yes
    2. No
    98. Don't know

[Display Q53 if Q52 = 1]

53. What additional energy efficient equipment have you installed?

[Multiselect]

1. Lighting including lighting controls, occupancy sensors and exit signs
2. Unitary or split air conditioning system or chiller
3. Compressed air improvements
4. Efficient motors
5. Refrigeration equipment (including LED case lighting)
6. Kitchen equipment
7. Something else (Please describe)
96. Didn't implement any measures **[Skip to Customer satisfaction]**
98. Don't know

[Display Q54 if Q53 = 7]

54. What additional energy efficient equipment have you installed?

[Display Q55 if any of 1-7 in Q53 selected. Loop through for each selected]

55. Why didn't you receive incentives for the [Q53 response]?

[Multiselect, randomize 1 - 7]

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. We did receive an incentive
8. Other (Please specify)

98. Don’t know

[Display Q56 if any in Q53 selected]

56. Did you work with a contractor to install that efficient equipment or did your company’s staff install the equipment?

1. Worked with a contractor
2. Company self-installed the equipment
3. Both

98. Don’t know

4.7.1 Lighting

[Display Q57 if Q53 = 1]

57. What type(s) of lighting equipment did you install? Please mark all that you installed in the past year.

[Multiselect]

LED linear tubes, LED strip kits

1. LED mogul base, 80W or less
2. LED mogul base, more than 80W
3. LED 4’ linear tube
4. LED 2’ linear tubes, 3’ linear tubes, or U-tube
5. LED strip kits replacing 4’ tubes
6. LED strip kits replacing 2’ or 3’ tubes, or U-tube

LED luminaires/fixtures

7. LED linear troffer fixtures, replacing 2 to 3 lamp fixtures
8. LED linear troffer fixtures, replacing 4 lamp fixtures
9. LED high bay fixtures
10. LED low bay fixtures and garage fixtures
11. LED parking lot exterior pole fixtures
12. LED exit signs
13. LED ceiling downlight fixtures

Lighting Controls

14. Daylighting controls
15. Ceiling-mounted occupancy sensors
16. Wall-mounted occupancy sensors
17. Networked lighting controls

18. None of these types of equipment [Make exclusive]

98. Don’t know

[Display Q58 IF Q57 = 17]

58. What other type of lighting equipment did you install?

[REPEAT Q59 FOR EACH TYPE SELECTED IN Q57]

59. How many [Q57 RESPONSE] did you install?

[Repeat for each selected in Q57]

60. What type of building did you install the [Q57 RESPONSE] in?
    1. Large Office
    2. Medium Office
    3. Small Office
    4. Warehouse
    5. Stand-alone Retail
    6. Strip Mall
    7. Primary School
    8. Secondary School
    9. Supermarket
    10. Quick Service Restaurant
    11. Full Service Restaurant
    12. Hospital
    13. Outpatient Health Care
    14. Small Hotel - Building
    15. Large Hotel - Building
    16. Midrise Apartment - Building
    17. Other (Please specify)
    98. Don't know

[Display Q61 if Q53 =1]

61. How important was your experience with the program in your decision to install this lighting equipment?

[SCALE 0 "Not at all important" - 10 "Very important"]

98. Don't know

[Display Q62 if Q53 =1]

62. If you had NOT participated in the program, how likely is it that your organization would still have installed this lighting equipment?

[SCALE 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

98. Don't know

[Display Q63 if [Q61=0,1,2,3 AND Q62=0,1,2,3]

OR IF [Q61=8,9,10 AND Q62=8,9,10]

63. You scored the importance of your program experience to your decision to implement additional lighting measures with [Q61 RESPONSE] out of 10 possible points. You ALSO scored

the likelihood of implementing additional lighting measures if your organization had not participated in the program with [Q62 RESPONSE] out of 10 possible points.

64. Can you please explain the role the program made in your decision to implement this measure?

4.7.2 HVAC Measures

[Display Q65 IF Q53 = 2]

65. What types of energy efficient equipment did you install as part of the HVAC project? [MULTI SELECT]
    1. Split air conditioning system (An A/C system that has an evaporator indoors and the compressor and condenser outdoors.)
    2. Packaged air conditioning system (A type of central air conditioning that contains both the air handler fan, compressor and condenser in a single unit. These are typically mounted on the roof.)
    3. Heat pump (An electric heating and cooling system)
    4. Air cooled chiller (A system that produces cold liquid sent around to individual spaces used for cooling air usually found in larger facilities)
    5. Water cooled chiller (A system that produces cold liquid sent around to individual spaces used for cooling air usually found in larger facilities)
    6. Another type
    98. Don't know

[Display Q66 IF Q65 = 6]

66. What other type of HVAC equipment did you install?

[REPEAT Q67 – Q70 for each selected in Q65]

67. We would like to know more about the rated efficiency and number of units of the [Q65 RESPONSE](s) that you installed.
68. For each level of efficiency of the equipment you installed, please provide the rated efficiency and the number of units.
69. What type of building did you install the heating/cooling equipment in?
    1. Large Office
    2. Medium Office
    3. Small Office
    4. Warehouse
    5. Stand-alone Retail
    6. Strip Mall
    7. Primary School
    8. Secondary School
    9. Supermarket
    10. Quick Service Restaurant
    11. Full Service Restaurant
    12. Hospital
    13. Outpatient Health Care
    14. Small Hotel - Building
    15. Large Hotel - Building

16. Midrise Apartment - Building
17. Other (Please specify)
98. Don't know

70. What city is the building where you installed the heating/cooling equipment located in?

[Display Q71 IF Q65 = 1-6]

71. How important was your experience with the program in your decision to install the energy efficient HVAC equipment?

[SCALE 0 "Not at all important" - 10 "Very important"]

98. Don't know

[Display Q72 IF Q65 = 1-6]

72. If you had NOT participated in the program, how likely is it that your organization would still have installed the energy efficient HVAC equipment?

[SCALE 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

98. Don't know

[Display Q73 if [Q71=0,1,2,3 AND Q72=0,1,2,3] OR [Q71=8,9,10 AND Q72=8,9,10]]

73. You scored the importance of your program experience to your decision to implement energy efficient HVAC equipment with [Q71 RESPONSE] out of 10 possible points. You ALSO scored the likelihood of implementing the energy efficient HVAC equipment if your organization had not participated in the program with [Q72 RESPONSE] out of 10 possible points. Can you please explain the role the program made in your decision to implement this measure?

[Display Q74 IF Q53 = 2]

74. How many ENERGY STAR room air conditioners did you install?

[Display Q75 IF Q53 = 2]

75. What type of building did you install the room air conditioners in?
    1. Large Office
    2. Medium Office
    3. Small Office
    4. Warehouse
    5. Stand-alone Retail
    6. Strip Mall
    7. Primary School
    8. Secondary School
    9. Supermarket
    10. Quick Service Restaurant
    11. Full Service Restaurant
    12. Hospital
    13. Outpatient Health Care
    14. Small Hotel - Building
    15. Large Hotel - Building
    16. Midrise Apartment - Building

17. Other (Please specify)
98. Don't know

4.7.3 Compressed Air

[Display if Q53 =]

76. What type of compressed air improvements did you make? Please select all that apply.

1. No loss condensate drain(s)
2. Compressed air leak repair
3. Compressed air nozzles
4. VSD air compressor

[Display if Q76 = 1]

77. What type of compressor control operates on the system that the no loss condensate drain(s) were installed on? Please select all that apply.

1. Reciprocating - On/off Control
2. Reciprocating - Load/Unload
3. Screw - Load/Unload
4. Screw - Inlet Modulation
5. Screw - Inlet Modulation w/ Unloading
6. Screw - Variable Displacement
7. Screw - VFD

[Loop for each selected in Q77]

78. How many no loss condensate drains were installed on the system with the [Q37] compressor control?

[Display if Q76 = 1]

79. How many shifts operate at the facility where the no loss condensate drains were installed?

1. Single shift
2. Two shifts
3. Three shifts
4. Four shifts (24/7 schedule)

[Display if Q76 = 2]

80. How many CFM in air was leaking from the system?

[Display if Q76 = 2]

81. What type of compressor control operates on the compressed air system that had an air leak repaired? Select all that apply.

1. Reciprocating - On/off Control

2. Reciprocating - Load/Unload
3. Screw - Load/Unload
4. Screw - Inlet Modulation
5. Screw - Inlet Modulation w/ Unloading
6. Screw - Variable Displacement
7. Screw - VFD

[Display if Q76 = 2]

82. How many shifts operate at the facility where the air leak was repaired?

    1. Single shift
    2. Two shifts
    3. Three shifts
    4. Four shifts (24/7 schedule)

[Display if Q76 = 3]

83. How many compressed air nozzles did you install?

    1. 1
    2. 2
    3. 3
    4. 4
    5. 5 or more

[Display if Q83= 1-5]

84. For each of the compressed air nozzles you installed, please select the size of the compressed air nozzle size and the air compressed air system control type.

[Program as side by side question with drop-down option. Scale for nozzle size: 1/8", ¼", 5/16" ½" Scale for air compressor type: Reciprocating - On/off Control, Reciprocating - Load/Unload, Screw - Load/Unload, Screw - Inlet Modulation, Screw - Inlet Modulation w/ Unloading, Screw - Variable Displacement, Screw - VFD]

[Display if Q76 =3]

85. How many shifts operate at the facility where the nozzles were installed?

    1. Single shift
    2. Two shifts
    3. Three shifts
    4. Four shifts (24/7 schedule)

[Display if Q76 =4]

86. How many VSD air compressors of each size did you install?

a. 5-40 HP
b. More than 40 HP to less than 50 HP
c. 50 HP to 200 HP

87. How important was your experience with the program in your decision to make the compressed air improvements?

[SCALE 0 "Not at all important" - 10 "Very important"]

98. Don't know

[Display Q88 IF Q53 = 2]

88. If you had NOT participated in the program, how likely is it that your organization would still have made the compressed air improvements?

[SCALE 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

98. Don't know

[Display Q89 if [Q87=0,1,2,3 AND Q88=0,1,2,3] OR [Q87=8,9,10 AND Q88=8,9,10]]

89. You scored the importance of your program experience to your decision to make the compressed air improvements with [Q87 RESPONSE] out of 10 possible points. You ALSO scored the likelihood of installing the compressed air improvements if your organization had not participated in the program with [Q88 RESPONSE] out of 10 possible points. Can you please explain the role the program made in your decision to implement this measure?

4.7.4 Efficient Motors

[Display Q90 IF Q53 = 4]

90. How many efficient motors did you install?

[Display Q91 IF Q53 = 4]

91. What is the approximate average horsepower of the new motors? That is, what is the average across all of the motors you installed without an incentive?
[TEXT BOX]

[Display Q92 IF Q53 = 4]

92. What is the approximate average efficiency of the new motors? That is, what is the average efficiency across all of the new motors?
[TEXT BOX] Rated efficiency (%)

[Display Q93 IF Q53 = 4]

93. On average, how many hours per day do the motors operate? That is, what the average number of hours the motors you installed operate?
[TEXT BOX] hours per day

[Display Q94 IF Q53 = 4]

94. How important was your experience with the program in your decision to install efficient motors?

[SCALE 0 “Not at all important” - 10 “Very important”]

98. Don’t know

[Display Q95 IF Q53 = 4]

95. If you had NOT participated in the program, how likely is it that your organization would still have installed the efficient motors?

[SCALE 0 “Definitely would not have installed” - 10 “Definitely would have installed”]

98. Don’t know

[Display Q96 if [Q94=0,1,2,3 AND Q95=0,1,2,3] OR [Q94=8,9,10 AND Q95=8,9,10]]

96. You scored the importance of your program experience to your decision to implement efficient motors with [Q94 RESPONSE] out of 10 possible points. You ALSO scored the likelihood of implementing the efficient motors if your organization had not participated in the program with [Q95 RESPONSE] out of 10 possible points. Can you please explain the role the program made in your decision to implement this measure?

4.7.5 Commercial Refrigeration Equipment

[Display Q97 IF Q53 = 5]

97. What types of energy efficient refrigeration equipment did you install?
    1. ENERGY STAR Commercial freezer
    2. ENERGY STAR Commercial refrigerator
    3. Anti-sweat heater controls
    4. LED refrigerated case lighting
    5. Refrigerated case covers
    6. Some other type of refrigeration equipment
    98. Don’t know

[Display Q98 IF Q97 = 5]

98. What other type of energy efficient refrigeration equipment did you install?

[Display Q99 IF Q97 = 1]

99. How many ENERGY STAR commercial freezers did you install?

[Display Q100 IF Q99 = 1, REPEAT FOR EACH UP TO THREE TIMES]

100. What is the volume in cubic feet of the first freezer?

[Display Q101 IF Q99 = 1, REPEAT FOR EACH UP TO THREE TIMES]

101. Does this freezer have a solid door or a glass door?
    1. Solid door
    2. Glass door
    98. Don’t know

[Display Q102 IF Q99 = 1, REPEAT FOR EACH UP TO THREE TIMES]

102. Is this a vertical freezer or a chest type freezer?

1. Vertical
2. Chest
98. Don't know

[Display Q103 IF Q97 = 2]

103. How many ENERGY STAR commercial refrigerators did you install?

[TEXT BOX] refrigerators

[Display Q104 IF Q103 = 2, REPEAT FOR EACH UP TO THREE TIMES]

104. What is the volume in cubic feet of the first refrigerator?

[TEXT BOX] cubic feet

[Display Q105 IF Q103 = 2, REPEAT FOR EACH UP TO THREE TIMES]

105. Does this refrigerator have a solid door or a glass door?

1. Solid door
2. Glass door
98. Don't know

[Display Q106 IF Q103 = 2, REPEAT FOR EACH UP TO THREE TIMES]

106. Is this a vertical refrigerator or a chest type refrigerator?

1. Vertical
2. Chest
98. Don't know

[Display Q107 IF Q97 = 3]

107. Did you install humidity-based controls or conductivity-based controls, or both types?

1. Humidity-based controls
2. Conductivity-based controls
3. Both types
98. Don't know

[Display Q108 IF Q107= 1 OR 3]

108. How many humidity-based controls did you install?

[Display Q109 IF Q107= 1 OR 3]

109. What is the total number of freezer or refrigerator doors controlled by the humidity-based controls?

[Display Q110 IF Q107= 2 OR 3]

110. How many conductivity-based controls did you install?

[Display Q111 IF Q107= 2 OR 3]

111. What is the total number of freezer or refrigerator doors controlled by the conductivity-based controls?

[Display Q112 IF Q107 = 98]

112. How many anti-sweat heater controls did you install?

[Display Q113 IF Q107 = 98]

113. What is the total number of freezer or refrigerator doors controlled by the anti-sweat heater controls?

[Display Q114 IF Q97 = 4]

114. How many linear feet in total of LED case lighting did you install?

[Display Q115 IF Q97 = 5]

115. How many linear feet of refrigerated case covers did you install?

[Display Q116 if Q53=5]

116. How important was your experience with the program in your decision to install the energy efficient refrigeration equipment?

[SCALE 0 “Not at all important” - 10 “Very important”]

98. Don’t know

[Display Q117 if Q53=5]

117. If you had NOT participated in the program, how likely is it that your organization would still have installed this energy efficient refrigeration equipment?

[SCALE 0 “Definitely would not have installed” - 10 “Definitely would have installed”]

98. Don’t know

[Display Q118 if [Q116=0,1,2,3 AND Q117=0,1,2,3] AND [Q116=8,9,10 AND Q117=8,9,10]]

118. You scored the importance of your program experience to your decision to implement energy efficient refrigeration equipment with [Q116 RESPONSE] out of 10 possible points. You ALSO scored the likelihood of implementing energy efficient refrigeration equipment if your organization had not participated in the program with [Q117 RESPONSE] out of 10 possible points. Can you please explain the role the program made in your decision to implement this measure?

4.7.6 Commercial Kitchen Equipment

[Display Q119 IF Q53 = 6]

119. What type of kitchen equipment did you install?

1. Low flow pre-rinse spray valves
2. ENERGY STAR Commercial fryers
3. ENERGY STAR Commercial steam cookers
4. ENERGY STAR hot food holding cabinets
5. ENERGY STAR commercial griddles
6. ENERGY STAR commercial convection ovens
7. ENERGY STAR commercial combination ovens

8. Some other type of kitchen equipment
98. Don't know

[Display Q120 IF Q119 = 8]

120. What other type of kitchen equipment did you install?

[Display Q121 IF Q119 = 1]

121. Is the flow rate for any of the spray valves you installed equal to or less than 1.6 gallons per minute?
    1. Yes
    2. No
    98. Don't know

[Display Q122 IF Q119 = 1]

122. How many pre-rinse spray valves with a flow rate equal to or less than 1.6 gallons per minute did you install?

[Display Q123 IF Q119 = 1]

123. Did you install the pre-rinse spray valves at the [Address] location?
    1. Yes
    2. No
    98. Don't know

[Display Q124 IF Q123= 2]

124. In what city is the building where you installed the pre-rinse spray valves located in?

[Display Q125 IF Q119 = 2]

125. How many ENERGY STAR commercial fryers did you install?

[Display Q126 IF Q119 = 3]

126. How many ENERGY STAR commercial steam cookers did you install?
    1. Number of 3 pan steam cookers [NUMERIC]
    2. Number of 4 pan steam cookers [NUMERIC]
    3. Number of 5 pan steam cookers [NUMERIC]
    4. Number of 6 pan steam cookers [NUMERIC]
    98. Don't know

[Display Q127 IF Q119 = 4]

127. How many ENERGY STAR hot food holding cabinets did you install?

[Display Q128 IF Q119 = 5]

128. How many ENERGY STAR commercial griddles did you install?

[Display Q129 IF Q119 = 6]

129. How many ENERGY STAR commercial convection ovens did you install?

[Display Q130 IF Q119 = 7]

130. How many ENERGY STAR commercial combination ovens did you install?

[Display Q131 if Q53= 6 and Q119=1-8]

131. How important was your experience with the program in your decision to install this kitchen equipment?

[SCALE 0 "Not at all important" - 10 "Very important"]

98. Don't know

[Display Q132 if Q53= 6 and Q119=1-8]

132. If you had NOT participated in the program, how likely is it that your organization would still have installed this kitchen equipment?

[SCALE 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

98. Don't know

[Display Q133 if [Q131=0,1,2,3 AND Q132=0,1,2,3] OR [Q131=8,9,10 AND Q132=8,9,10]]

133. You scored the importance of your program experience to your decision to implement energy efficient kitchen equipment with [Q131 RESPONSE] out of 10 possible points. You ALSO scored the likelihood of implementing energy efficient kitchen equipment if your organization had not participated in the program with [Q132 RESPONSE] out of 10 possible points.

134. Can you please explain the role the program made in your decision to implement this measure?

4.8 Customer Satisfaction

135. In the course of doing this project did you have any interactions with program staff? Program staff DO NOT include anyone hired by you to install the equipment, conduct an audit or design your system.

1. Yes
2. No
98. Not sure

[Display if Q135 = 1]

136. Using the scale provided below, please indicate how knowledgeable were program staff about the issues you discussed with them?

[Response scale: 1 = Not at all knowledgeable to 5 = Very knowledgeable, 98 = "Don't know"]

[Display if Q135 = 1]

137. Using the scale provided below, please indicate how satisfied you are with the following:

[Response scale: 1 = Very dissatisfied to 5 = Very satisfied]

a. how long it took program staff to Address your questions or concerns

b. how thoroughly they Addressed your question or concern

138. On the scale of 1-5 where 1 means not at all satisfied and 5 means very satisfied, please indicate how satisfied you are with the following:

[Response scale: 1 = Very dissatisfied to 5 = Very satisfied]

a. the steps you had to take to get through the program
b. **[IF RCX=0]** the equipment that was installed
c. **[IF RCX=0]** the quality of the installation
d. **[IF RCX=0]** the amount of time it took to deliver and install the equipment
e. **[IF SBDI=0]** the amount of time it took to get your rebate or incentive
f. **[IF SBDI=0 and RCX=0]** the range of equipment that qualifies for incentives
g. **[IF SBDI=1]** how well the SBDI Service Provider explained the program rules and processes
h. **[IF SBDI=1]** how well the SBDI Service Provider explained the equipment recommendations
i. **[IF SBDI=1]** how well the SBDI Service Provider explained how much the incentives would cover
j. **[IF SBDI=1]** the walk-through assessment you received
k. **[IF SBDI=1]** the cost of the new equipment
l. **[IF SBDI=1]** the time it took to get your new lighting or other equipment
m. the program, overall

[Display if any in Q138 < 3]

139. Please describe the ways in which you were not satisfied with the aspects of the program mentioned above?

4.9 Firmographics

140. Which of the following best describes the type of work that your firm or organization does at [Address]?

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: ____
98. Not sure

141. 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
98. Don’t know

142. 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)

143. 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.

144. How many square feet (indoor space) is the part of the property at [Address] 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
98. Not sure

145. How can the BizSavers Program implementation team provide you with better service?

5 Business Nonparticipant Survey Instrument

Variable Name	Variable Definition
Address	Address for site
total_usage_2023	2023 kWh usage
rate_class	Customer rate class: 2M, 3M, 4M, or 11M
area_type	Urban or rural/small town classification
region	St. Louis, St.Louis suburbs, other.
stratum	Stratum grouping of sites.

Research Topic	Survey Questions
Program Awareness	Q8 – Q11
Challenges to Participation	Q12 – Q15
Spillover	Q16 – Q93
Interest in SBDI	Q94 – Q100
Organization Description	Q101 – Q106

5.1 Introduction

1. According to our records, Ameren Missouri provides electricity service to the facility located at [Address]. Is that correct?
   1. Yes
   2. No **[Terminate]**
   98. Don't know **[Terminate]**
2. To the best of your knowledge, has your company or organization replaced or upgraded equipment that requires electricity to operate in the past three years? This could have been for lighting, motors, refrigeration, or HVAC equipment, for example.
   1. Yes
   2. No

[DISPLAY Q3 IF Q2 = 1]

3. Did you receive an incentive from Ameren Missouri for any of that equipment? Your best guess is fine.
   1. Yes **[Terminate]**
   2. No
4. Has your company or organization completed any other electricity saving projects in the last three years for which you did get an Ameren Missouri incentive?

1. Yes **[Terminate]**
2. No

5. When it comes to purchasing energy-using equipment for your facilities/sites, do you…?
   1. Make those decisions
   2. Provide input to others who make those decisions
   3. Have no involvement with those decisions **[Terminate]**

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

[Multiselect]

1. A full time energy manager or other person or persons responsible for monitoring or managing energy usage
2. A person who has secondary responsibilities for monitoring or managing energy use
3. Defined energy savings goals
4. A specific policy requiring that energy efficiency is a criterion in the procurement of equipment
5. Carbon reduction goals
6. A policy to complete periodic energy audits of the facility
7. Employee training that focuses on ways to save energy
8. Other (Specify)
9. None of the above **[Exclusive]**

98. Don't know

7. Which types of equipment does your organization make equipment maintenance or replacement decisions about? Please select all that apply.

[Multiselect]

1. Lighting
2. Heating
3. Cooling
4. Water heating
5. Refrigeration
6. Motors
7. Commercial cooking and food preparation equipment
8. Other (Specify)

98. Don't know **[Exclusive]**

5.2 Program Awareness and Sources of Awareness

8. Before we contacted you, were you aware that Ameren Missouri provides cash incentives for energy efficient equipment purchases and upgrades for existing and new buildings?
   1. Yes

2. No
98. Don't know

[Display if Q8 = 1]

9. Which of the following types of incentives were you aware of? Please select all that apply.

[Multiselect]

1. Incentives to replace inefficient equipment, including lighting, in existing buildings
2. Incentives to incorporate energy efficiency into new construction designs
3. Incentives for retro-commissioning projects, which improve how building equipment and systems function together
4. **[Display if Rate_Class = 2M]** Incentives specifically for small business customers that are provided for upgrades made by an approved program service provider

[Display if Q8 = 1]

10. In the past year, from what sources have you gotten information about the energy efficiency incentives from Ameren Missouri? Please select all that apply.

[Multiselect; Randomize]

1. From some other contractor, equipment vendor, or energy consultant
2. From an Ameren Missouri Account Representative
3. From a BizSavers Program representative
4. From social media such as Facebook or LinkedIn
5. From a YouTube advertisement
6. From an internet search
7. At an event/trade show
8. Received an Ameren Missouri email blast or electronic newsletter
9. Received an informational brochure
10. From a program sponsored webinar
11. From Ameren Missouri's website
12. Friends or colleagues
13. None
14. Other (please explain)
98. Don't know

[Display if Q8 = 1 (aware of BizSavers) and Q2 = 1 (completed a project)]

11. Based on your responses above, you may have been aware of Ameren's program to provide incentives for energy saving projects and you completed a project without using Ameren incentives. Why did you complete a project without Ameren incentives?

[MULTIPLE RESPONSE]

1. The project did not qualify for Ameren incentives
2. Forgot about Ameren program
3. Contractor recommended not using the Ameren program

4. The amount of money we would have received did not justify participating.
5. Other, please specify:
6. Don’t know [EXCLUSIVE]

5.3 Challenges to Participation

12. What are the primary challenges that prevent your company from implementing energy efficiency improvements? Please select up to three.

[Multiselect] [Randomize order of 1 – 9] [Limit to 3 options]

1. High upfront costs of implementing energy-efficient technologies.
2. Lack of information about available energy efficiency technologies and practices.
3. Uncertainty about the financial payback or return on investment.
4. Difficulty in finding vendors or contractors.
5. Disruption of business operations during implementation.
6. Lack of internal expertise or resources to manage energy efficiency projects.
7. Insufficient incentives or financial support from government or utilities.
8. Regulatory or compliance barriers.
9. Limited availability of energy-efficient technologies suitable for our specific needs.

98. Not sure **[Exclusive]**

13. Are there other barriers or challenges that prevent your company from implementing energy efficiency improvements?

14. What do you think are the most trustworthy sources of information on how to save energy in your organization? Please select up to 3.

[Multiselect] [Randomize order] [Limit to 3 options]

1. Contractors that provide installation services
2. Local government
3. State government
4. National energy government agencies
5. Ameren Missouri
6. Professional organization
7. Trade organizations relevant to your industry
8. Peer companies in industry
9. Other community or neighborhood organization
10. Other utilities/other utility websites
11. Retailers and vendors who sell efficient products
12. Online forums, blogs, or other websites

15. Are there other sources of information on how to save energy in your organization that you trust?

5.4 Spillover Assessment

16. In the past year has your organization installed any energy efficient equipment at a facility that receives electrical service from Ameren Missouri and that you DID NOT get an incentive for from Ameren Missouri?
    1. Yes
    2. No
    98. Don’t know

[Display if Q16 = 1]

17. What additional energy efficient equipment have you installed?

[Multiselect]

1. Lighting including lighting controls, occupancy sensors and exit signs
2. Unitary or split air conditioning system or chiller
3. Compressed air improvements
4. Efficient motors
5. Refrigeration equipment (including LED case lighting)
6. Kitchen equipment
7. Something else
96. Didn’t implement any measures **[Skip to next section]**
98. Don’t know

[Display if Q17= 1 -7. Loop through for each selected.]

18. Why didn’t you receive incentives for the [Q17 response]?

[Multi select, randomize 1 - 6]

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. We did receive an incentive **[Skip to next section]**
8. Other (Please specify)
98. Don’t know

[Display if Q17= 1 -7. Loop through for each selected.]

19. Did you work with a contractor to install the [Q17 response] or did your company’s staff install the equipment?
    1. Worked with a contractor
    2. Company self-installed the equipment
    3. Both
    98. Don’t know

5.4.1 Lighting

[Display if Q17 = 1]

20. What type(s) of lighting equipment did you install? Please mark all that you installed in the past year.

[Multiselect]

LED linear tubes, LED strip kits

1. LED mogul base, 80W or less
2. LED mogul base, more than 80W
3. LED 4' linear tube
4. LED 2' linear tubes, 3' linear tubes, or U-tube (total across all three)
5. LED strip kits replacing 4' tubes
6. LED strip kits replacing 2' or 3' tubes, or U-tube (total across all three)

LED luminaires/fixtures

7. LED linear troffer fixtures, 4'
8. LED linear troffer fixtures, 2' or 3' or U-tube (total across all three)
9. LED high bay fixtures
10. LED low bay fixtures and garage fixtures
11. LED parking lot exterior pole fixtures
12. LED exit signs
13. LED ceiling downlight fixtures

Lighting Controls

14. Daylighting controls
15. Ceiling-mounted occupancy sensors
16. Wall-mounted occupancy sensors
17. Network lighting controls

18. None of these types of equipment [Make exclusive]
98. Don't know

[Display if Q20 = 18]

21. What other type of lighting equipment did you install?

[Repeat for each selected in Q20]

22. How many [Q20 RESPONSE] did you install?

[Repeat for each selected in Q20]

23. What type of building did you install the [Q20 RESPONSE] in?
    1. Large Office
    2. Medium Office
    3. Small Office

4. Warehouse
5. Stand-alone Retail
6. Strip Mall
7. Primary School
8. Secondary School
9. Supermarket
10. Quick Service Restaurant
11. Full Service Restaurant
12. Hospital
13. Outpatient Health Care
14. Small Hotel - Building
15. Large Hotel - Building
16. Midrise Apartment - Building
17. Other (Please specify)
98. Don't know

5.4.1.1 Lighting Attribution

[Display if Q17 =1]

24. When you were deciding to install the lighting equipment, did you consider any of the following sources of information?

[Scale: 1 = Yes, 2 = No]

a) Emails from Ameren Missouri about saving energy
b) Information on Ameren Missouri's website
c) Bill inserts or other mailings from Ameren Missouri
d) Information from Ameren Missouri social media sources
e) Information from an Ameren Missouri account representative
f) Information from people who received a rebate from Ameren Missouri for installing energy-efficient equipment

[Display if any in Q24 =1]

25. How important was that information in your decision to install this lighting equipment?

[Scale 0 "Not at all important" - 10 "Very important"]

98. Don't know

[Display if any in Q24 =1]

26. How likely would you have been to install the lighting equipment if you had not received that information from Ameren Missouri?

[Scale 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

98. Don't know

5.4.2 HVAC Measures

[Display if Q17 = 2]

27. What types of energy efficient equipment did you install as part of the HVAC project?
[Multiselect]

1. Split air conditioning system (An A/C system that has an evaporator indoors and the compressor and condenser outdoors.)
2. Packaged air conditioning system (A type of central air conditioning that contains both the air handler fan, compressor and condenser in a single unit. These are typically mounted on the roof.)
3. Heat pump (An electric heating and cooling system)
4. Air cooled chiller (A system that produces cold liquid sent around to individual spaces used for cooling air usually found in larger facilities)
5. Water cooled chiller (A system that produces cold liquid sent around to individual spaces used for cooling air usually found in larger facilities)
6. Another type
98. Don't know

[Display if Q27 = 6]

28. What other type of HVAC equipment did you install?
[Repeat Q29 – Q32 for each selected in Q27]

29. We would like to know more about the rated efficiency and number of units of the [Q65 RESPONSE](s) that you installed.
30. For each level of efficiency of the equipment you installed, please provide the rated efficiency and the number of units.
31. What type of building did you install the heating/cooling equipment in?
    1. Large Office
    2. Medium Office
    3. Small Office
    4. Warehouse
    5. Stand-alone Retail
    6. Strip Mall
    7. Primary School
    8. Secondary School
    9. Supermarket
    10. Quick Service Restaurant
    11. Full Service Restaurant
    12. Hospital
    13. Outpatient Health Care
    14. Small Hotel - Building
    15. Large Hotel - Building
    16. Midrise Apartment - Building
    17. Other (Please specify)
    98. Don't know
32. What city is the building where you installed the heating/cooling equipment located in?

5.4.2.1 HVAC Attribution

[Display if Q27 = 1-6]

33. When you were deciding to install the HVAC equipment, did you consider any of the following sources of information?

[Scale: 1 = Yes, 2 = No]

a) Emails from Ameren Missouri about saving energy
b) Information on Ameren Missouri's website
c) Bill inserts or other mailings from Ameren Missouri
d) Information from Ameren Missouri social media sources
e) Information from an Ameren Missouri account representative
f) Information from people who received a rebate from Ameren Missouri for installing energy-efficient equipment

[Display if any in Q33 = 1]

34. How important was that information in your decision to install the HVAC equipment?

[Scale 0 "Not at all important" - 10 "Very important"]

98. Don't know

[Display if any in Q33 = 1]

35. How likely would you have been to install the HVAC equipment if you had not received that information from Ameren Missouri?

[Scale 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

98. Don't know

5.4.3 Compressed Air

[Display if Q17 = 3]

36. What type of compressed air improvements did you make? Please select all that apply.

1. No loss condensate drain(s)
2. Compressed air leak repair
3. Compressed air nozzles
4. VSD air compressor

[Display if Q36 = 1]

37. What type of compressor control operates on the system that the no loss condensate drain(s) were installed on? Please select all that apply.

1. Reciprocating - On/off Control
2. Reciprocating - Load/Unload
3. Screw - Load/Unload
4. Screw - Inlet Modulation

5. Screw - Inlet Modulation w/ Unloading
6. Screw - Variable Displacement
7. Screw - VFD

[Loop for each selected in Q37]

38. How many no loss condensate drains were installed on the system with the [Q37] compressor control?

[Display if Q36 = 1]

39. How many shifts operate at the facility where the no loss condensate drains were installed?

    1. Single shift
    2. Two shifts
    3. Three shifts
    4. Four shifts (24/7 schedule)

[Display if Q36 = 2]

40. How many CFM in air was leaking from the system?

[Display if Q36 = 2]

41. What type of compressor control operates on the system that the no loss condensate drain(s) were installed on? Select all that apply.

    1. Reciprocating - On/off Control
    2. Reciprocating - Load/Unload
    3. Screw - Load/Unload
    4. Screw - Inlet Modulation
    5. Screw - Inlet Modulation w/ Unloading
    6. Screw - Variable Displacement
    7. Screw - VFD

[Display if Q36 = 2]

42. How many shifts operate at the facility where the no loss condensate drains were installed?

    1. Single shift
    2. Two shifts
    3. Three shifts
    4. Four shifts (24/7 schedule)

[Display if Q36 = 3]

43. How many compressed air nozzles did you install?

    1. 1

2. 2
3. 3
4. 4
5. 5 or more

[Display if Q43= 1-5]

44. For each of the compressed air nozzles you installed, please select the size of the compressed air nozzle size and the air compressed air system control type.

[Program as side by side question with drop-down option. Scale for nozzle size: 1/8”, ¼”, 5/16” ½” Scale for air compressor type: Reciprocating - On/off Control, Reciprocating - Load/Unload, Screw - Load/Unload, Screw - Inlet Modulation, Screw - Inlet Modulation w/ Unloading, Screw - Variable Displacement, Screw - VFD]

[Display if Q36 =3]

45. How many shifts operate at the facility where the nozzles were installed?

1. Single shift
2. Two shifts
3. Three shifts
4. Four shifts (24/7 schedule)

[Display if Q36 =4]

46. How many VSD air compressors of each size did you install?

d. 5-40 HP
e. More than 40 HP to less than 50 HP
f. 50 HP to 200 HP

5.4.3.1 Compressed Air Attribution

[Display IF Q17 = 3]

47. When you were deciding to make the compressed air improvements, did you consider any of the following sources of information?

[Scale: 1 = Yes, 2 = No]

a) Emails from Ameren Missouri about saving energy
b) Information on Ameren Missouri’s website
c) Bill inserts or other mailings from Ameren Missouri
d) Information from Ameren Missouri social media sources
e) Information from an Ameren Missouri account representative
f) Information from people who received a rebate from Ameren Missouri for installing energy-efficient equipment

[Display if any in Q47 = 1]

48. How important was that information in your decision to implement the compressed air improvements?

[Scale 0 “Not at all important” - 10 “Very important”]

98. Don’t know

[Display if any in Q47 = 1]

49. How likely would you have been to implement the compressed air improvements if you had not received that information from Ameren Missouri?

[Scale 0 “Definitely would not have installed” - 10 “Definitely would have installed”]

98. Don’t know

5.4.4 Efficient Motors

[Display if Q17 = 4]

50. How many efficient motors did you install?

[Display Q17 = 4]

51. What is the approximate average horsepower of the new motors? That is, what is the average across all of the motors you installed without an incentive?

[Display Q17 = 4]

52. What is the approximate average efficiency of the new motors? That is, what is the average efficiency across all of the new motors?
    [TEXT BOX] Rated efficiency (%)

[Display Q17 = 4]

53. On average, how many hours per day do the motors operate? That is, what the average number of hours the motors you installed operate?
    [TEXT BOX] hours per day

5.4.4.1 Efficient Motors Attribution

[Display if Q17 = 4]

54. When you were deciding to install the efficient motors, did you consider any of the following sources of information?

[Scale: 1 = Yes, 2 = No]

a) Emails from Ameren Missouri about saving energy
b) Information on Ameren Missouri’s website
c) Bill inserts or other mailings from Ameren Missouri
d) Information from Ameren Missouri social media sources
e) Information from an Ameren Missouri account representative
f) Information from people who received a rebate from Ameren Missouri for installing energy-efficient equipment

[Display if any in Q54 = 1]

55. How important was that information in your decision to install the efficient motors?
[Scale 0 "Not at all important" - 10 "Very important"]

98. Don't know

[Display if any in Q54 = 1]

56. How likely would you have been to install the efficient motors if you had not received that information from Ameren Missouri?
[Scale 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

5.4.5 Commercial Refrigeration Equipment

[Display Q17 = 5]

57. What types of energy efficient refrigeration equipment did you install?
    1. ENERGY STAR Commercial freezer
    2. ENERGY STAR Commercial refrigerator
    3. Anti-sweat heater controls
    4. LED refrigerated case lighting
    5. Refrigerated case covers
    6. Some other type of refrigeration equipment
    98. Don't know

[Display Q17 = 5]

58. What other type of energy efficient refrigeration equipment did you install?

[Display if Q57 = 1]

59. How many ENERGY STAR commercial freezers did you install?

[Display if Q57 = 1, Repeat FOR EACH UP TO THREE TIMES]

60. What is the volume in cubic feet of the first freezer?

[Display if Q57 = 1, Repeat FOR EACH UP TO THREE TIMES]

61. Does this freezer have a solid door or a glass door?
    1. Solid door
    2. Glass door
    98. Don't know

[Display if Q57 = 1, Repeat FOR EACH UP TO THREE TIMES]

62. Is this a vertical freezer or a chest type freezer?
    1. Vertical
    2. Chest
    98. Don't know

[Display if Q57 = 2]

63. How many ENERGY STAR commercial refrigerators did you install?
    [TEXT BOX] refrigerators

[Display if Q57 = 2, Repeat for each up to three times]

64. What is the volume in cubic feet of the first refrigerator?
    [TEXT BOX] cubic feet

[Display if Q57 = 2, Repeat for each up to three times]

65. Does this refrigerator have a solid door or a glass door?
    1. Solid door
    2. Glass door
    98. Don't know

[Display if Q57 = 2, Repeat for each up to three times]

66. Is this a vertical refrigerator or a chest type refrigerator?
    1. Vertical
    2. Chest
    98. Don't know

[Display if Q57 = 3]

67. Did you install humidity-based controls or conductivity-based controls, or both types?
    1. Humidity-based controls
    2. Conductivity-based controls
    3. Both types
    98. Don't know

[Display if Q57 = 1 OR 3]

68. How many humidity-based controls did you install?

[Display if Q57 = 1 OR 3]

69. What is the total number of freezer or refrigerator doors controlled by the humidity-based controls?

[Display if Q57 = 2 OR 3]

70. How many conductivity-based controls did you install?

[Display if Q57 = 2 OR 3]

71. What is the total number of freezer or refrigerator doors controlled by the conductivity-based controls?

[Display if Q57 = 98]

72. How many anti-sweat heater controls did you install?

[Display if Q57 = 98]

73. What is the total number of freezer or refrigerator doors controlled by the anti-sweat heater controls?

[Display if Q57 = 4]

74. How many linear feet in total of LED case lighting bulbs did you install?

[Display if Q57 = 5]

75. How many linear feet of refrigerated case covers did you install?

5.4.5.1 Commercial Refrigeration Attribution

[Display if Q17 = 5]

76. When you were deciding to install the refrigeration equipment, did you consider any of the following sources of information?

[Scale: 1 = Yes, 2 = No]

a) Emails from Ameren Missouri about saving energy
b) Information on Ameren Missouri's website
c) Bill inserts or other mailings from Ameren Missouri
d) Information from Ameren Missouri social media sources
e) Information from an Ameren Missouri account representative
f) Information from people who received a rebate from Ameren Missouri for installing energy-efficient equipment

[Display if any in Q76 = 1]

77. How important was that information in your decision to install the refrigeration equipment?

[Scale 0 "Not at all important" - 10 "Very important"]

98. Don't know

[Display if any in Q76 = 1]

78. How likely would you have been to install the refrigeration equipment if you had not received that information from Ameren Missouri?

[Scale 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

5.4.6 Commercial Kitchen Equipment

[Display if Q17 = 6]

79. What type of kitchen equipment did you install?
    1. Low flow pre-rinse spray valves
    2. ENERGY STAR Commercial fryers
    3. ENERGY STAR Commercial steam cookers
    4. ENERGY STAR hot food holding cabinets
    5. ENERGY STAR commercial griddles
    6. ENERGY STAR commercial convection ovens
    7. ENERGY STAR commercial combination ovens

8. Some other type of kitchen equipment
98. Don't know

[Display if Q79 =8]

80. What other type of kitchen equipment did you install?

[Display if Q79 = 1]

81. Is the flow rate for any of the spray valves you installed equal to or less than 1.6 gallons per minute?
    1. Yes
    2. No
    98. Don't know

[Display if Q79 = 1]

82. How many pre-rinse spray valves with a flow rate equal to or less than 1.6 gallons per minute did you install?

[Display if Q79 = 1]

83. Did you install the pre-rinse spray valves at the [Address] location?
    1. Yes
    2. No
    98. Don't know

[Display Q83 = 2]

84. In what city is the building where you installed the pre-rinse spray valves located in?

[Display if Q79 = 2]

85. How many ENERGY STAR commercial fryers did you install?

[Display if Q79 = 3]

86. How many ENERGY STAR commercial steam cookers did you install?
    1. Number of 3 pan steam cookers [NUMERIC]
    2. Number of 4 pan steam cookers [NUMERIC]
    3. Number of 5 pan steam cookers [NUMERIC]
    4. Number of 6 pan steam cookers [NUMERIC]
    98. Don't know

[Display if Q79 = 4]

87. How many ENERGY STAR hot food holding cabinets did you install?

[Display if Q79 = 5]

88. How many ENERGY STAR commercial griddles did you install?

[Display if Q79 = 6]

89. How many ENERGY STAR commercial convection ovens did you install?

[Display if Q79 = 7]

90. How many ENERGY STAR commercial combination ovens did you install?

5.4.6.1 Commercial Kitchen Attribution

[Display if Q17 = 6]

91. When you were deciding to install the commercial kitchen equipment, did you consider any of the following sources of information?

[Scale: 1 = Yes, 2 = No]

a) Emails from Ameren Missouri about saving energy
b) Information on Ameren Missouri's website
c) Bill inserts or other mailings from Ameren Missouri
d) Information from Ameren Missouri social media sources
e) Information from an Ameren Missouri account representative
f) Information from people who received a rebate from Ameren Missouri for installing energy-efficient equipment

[Display if any in Q91 = 1]

92. How important was that information in your decision to install the commercial kitchen equipment?

[Scale 0 "Not at all important" - 10 "Very important"]

98. Don't know

[Display if any in Q91 = 1]

93. How likely would you have been to install the commercial kitchen equipment if you had not received that information from Ameren Missouri?

[Scale 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

5.5 Interest in SBDI

[Display if Rate_Class = 2M]

94. Is your organization responsible for purchasing the lighting at your location?

1. Yes
2. No
98. Don't know
99. Refused

[Display if Rate_Class = 2M and Q94= 1]

95. Thinking about all of the lighting at your work location, about what proportion does LED lighting make up? Would you say…

1. None or very little

2. More than very little, but less than half
3. About half
4. More than half, but not nearly all
5. All or nearly all
98. Don't know

[Display if Rate_Class = 2M and Q94= 1]

96. About what percentage of your organization’s total monthly operating costs do your electricity bills make up?
    1. ______
    98. Don’t know

[Display if Rate_Class = 2M]

97. How likely would you be to replace your organization’s lighting if you could reduce monthly electric bills by 10% to 20%?

[Scale: 1 (Not at all likely) – 5 (Very likely)]

[Display if Rate_Class = 2M]

98. How likely would you be to replace your organization’s lighting if you could reduce monthly electric bills by more than 20%?

[Scale: 1 (Not at all likely) – 5 (Very likely)]

[Display if Rate_Class = 2M and Q94= 1 and total_usage_2023 >= 4000]

99. The Ameren Missouri Small Business Direct Install, or SBDI, program provides free walk-through energy assessments and cash incentives that typically cover at least half the cost of new, efficient lighting equipment. Several designated Service Providers provide the walk-through assessments and completely handle the application process.

    If an SBDI Service Provider contacted your organization, how likely is it that your organization would schedule a free walk-through energy assessment? Please use a 1 to 5 scale where 1 means “not at all likely” and 10 means “very likely”.

[Response scale: 1 = Not at all likely to 5 = Very likely]

[Display if Rate_Class = 2M and Q94 = 1 and Q99 <>5 and total_usage_2023 >=4000]

100. What might keep your organization from scheduling a free walk-through energy assessment with an Ameren Missouri Small Business Direct Install Service Provider?

5.6 Organization Description

101. We are almost finished. I’d like to ask you just a few final questions about you and your organization.

102. What is your job title?
    1. Accounting/Finance (accountant, treasurer, bookkeeper)
    2. Administrative (secretary, receptionist, office specialist)
    3. President or Vice President

4. CEO/CFO/Officer Position
5. Director
6. Proprietor/Owner/Partner
7. Manager
8. Controller
9. Maintenance/Facilities Management
10. Pastor
11. Other (Specify) ____
98. Don't know
99. Refused

103. What is your organization's primary business or activity?

1. Professional services (office)
2. Transportation (trucking, boating, air)
3. Construction and related trades (e.g., contractors)
4. Retail
5. Restaurant
6. Grocery/convenience store
7. Government
8. Warehouse
9. Healthcare
10. Auto Service (garage, gas, towing, rental)
11. Industrial/manufacturing
12. State-certified K-12 school (public or private)
13. Other school type
14. Entertainment
15. Lodging
16. Agriculture
17. Religious
18. Not applicable
19. Service or non-profit
20. Related to real estate/property management
21. Other, please describe _________
98. Don't know
99. Refused

[Display if Usage >= 4000]

104. Including all the properties, how many separate work locations does your organization own or lease space in, in Ameren Missouri territory?

[Show statement below in small print]

A work location may consist of multiple buildings in close proximity to each other, such as a university campus.

[Require numeric]

1. [OPEN-END RESPONSE]
98. Don't know

105. What is the approximate total square footage of your workplace located at [Address]? Please provide a number and your best guess is fine.

[Require numeric]

1. [OPEN-END RESPONSE]
98. Don’t know

106. Thinking about your work location, does your organization…

1. Own and occupy the entire building
2. Own the building and occupy part of it while leasing parts to others
3. Lease the space
4. Other – specify: _______________
98. Don’t know

6 Trade Ally Survey Instrument

Variable Name	Variable Definition
Business	Name of business/trade ally
Project_Count	Number of projects completed in past 12 months

Research Question	Survey Questions
Background	Q1 – Q8
Program Effectiveness	Q9 – Q13
Training and Communication	Q14 – Q19
Satisfaction and Program Feedback	Q20 – Q22

6.1 Background

1. Which of the following best describes your position at your organization?
    1. Owner
    2. Executive or decision maker
    3. Manager
    4. Sales role
    5. Installer or service technician
    6. Customer service representative
    96. Other (Please specify)
2. How long have you been an active trade ally (or builder) with Ameren Missouri's BizSavers® Program?
    1. Number of years **[Numeric]**
    98. Don't know
3. What are your primary reasons for your company's involvement with the Ameren Missouri BizSavers Program? Please select all that apply.

[Multiselect]

1. Make more money or increase profit: Participate to increase business and profitability.
2. Market Differentiation: To differentiate our services from competitors by leveraging the program's recognition.

3. Customer Demand: Responding to customer demand for more sustainable and energy-efficient solutions.
4. Technical Support: Access to technical support and resources provided by the program.
5. Training Opportunities: Opportunities for staff training and development in energy efficiency practices.
6. Marketing and Visibility: Increased marketing and visibility provided by the program.
7. Environmental Impact: Commitment to reducing our environmental impact.
8. For some other reason (Please describe)

4. What type of work does your company specialize in? Please select all that apply.

[Multiselect]

1. Building Automation Systems/Controls
2. HVAC
3. Lighting
4. Lighting Controls
5. General Contractor
6. Refrigeration/Commercial Kitchens
7. PC Power Management
8. Compressed Air Systems
9. Chillers
96. Other (Please specify) **[OPEN-END]**

5. What areas of Ameren Missouri's service area do you provide services to? Please select all that apply.

[Multiselect]

1. St Louis Metro
2. Outer St Louis suburbs
3. North or Central Missouri
4. Southeastern Missouri

6. Does your business participate in any of these utility electricity energy efficiency programs? Please select all that apply.

[Multiselect]

1. Evergy Missouri Programs
2. Empire District Electric Company/Liberty Utilities
3. Ameren Illinois Efficiency Programs
4. Other programs outside of Missouri

7. About what share of the projects you work on for commercial and industrial organizations include Ameren Missouri incentives? Your best guess is fine.
1. 0-10%
2. 11% - 35%
3. 36% to 65%

4. 65% - 90%
5. 91% - 100%

8. Thinking about all the projects you work on for commercial and industrial organizations, including those outside of Ameren Missouri's service area, what share of the projects that you work include utility incentives? Your best guess is fine.
   1. 0-10%
   2. 11% - 35%
   3. 36% to 65%
   4. 65% - 90%
   5. 91% - 100%
   6. Do not do work outside of Ameren Missouri's service area

6.2 Program Effectiveness

9. How effectively do the Ameren Missouri Programs meet the specific needs of each type of customer listed below?

[Scale: 1 (Not Effective) to 5 (Highly Effective), 98 = Don't know / No experience with customer type]

a. Small Businesses
b. Midsized Commercial Organizations
c. Large Commercial Organizations
d. Large Industrial Organizations
e. Nonprofit Organizations
f. Government Entities
g. Franchises
h. Rural Businesses
i. Urban Businesses
j. Technology and Start-Up Companies
k. Manufacturing Plants (Light and Heavy)
l. Hospitality
m. Schools
n. Restaurants / Food services
o. Retailers

[Repeat for each in Q10 rated less than 3]

10. Why do you say that the Ameren Missouri programs and incentives are not very effective for [Q10 item]? Please select all that apply.

[Multiselect]

1. Not enough interest in energy efficiency
2. Incentives are too low
3. Limited financial benefits for saving energy
4. Few opportunities improve energy efficiency
5. Too much disruption to business
6. Program equipment is not a good fit for the business
7. Language or cultural barriers for typical business owners/decision makers
8. Lack of internal resources to plan and manage projects

11. Are there energy efficient equipment or services that would help business customers save energy that are not currently incentivized in the Ameren Missouri Programs?
    1. Yes
    2. No
    98. Not sure

[Display if Q11 =1]

12. What types of equipment and services are there that are not included in the program. Please be as specific as possible.

[Display if Q11=1]

13. Are there other utility programs that provide incentives for those measures? Which ones?

6.3 Training and Communication

14. Did you participate in any Ameren Missouri BizSavers training in the last 12 months?
    1. Yes
    2. No
    98. Don't know

[Display if Q14 = 1]

15. How useful do you think that training was?

[Scale: 1 (Not at all useful) – 5 (Very useful)]

[Display if Q15 < 4]

16. What would have made the training more useful?

17. Do you think additional training opportunities should be provided to trade allies?
    1. Yes, please provide examples
    2. No

18. Do you have any suggestions for improving the training?

19. Which form of communication is most effective for providing information to you about program changes/updates?
    1. Email
    2. Phone calls from program representatives
    3. Presentations at events or conferences
    4. Website updates
    5. In person visits
    6. Other (Please Specify)

6.4 Satisfaction and Program Feedback

20. How would you rate the following factors?

[Response scale: 1 = “Not at all satisfied” to 5 = “Extremely satisfied”, with 98 = “Don’t know”]

1. Communication with Ameren Missouri or TRC BizSavers program staff
2. Required paperwork for projects
3. The incentive amounts
4. The range of program-qualifying equipment
5. Project turnaround time
6. The BizSavers® Program, overall

[Display if any in Q20 < 3]

21. What are the reasons for your dissatisfaction with those aspects of the program?

22. Do you have any suggestions for improving the BizSavers® Program that have not yet been mentioned?

7 Business Participant Survey Responses

QID1 - Our records indicate you were the main contact for the energy efficient project(s) completed at [Field-Address] through Ameren Missouri's BizSavers Program. 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)?

#	Answer	%	Count
1	Yes, I was involved in the decision to complete the project(s)	87.0%	20
2	No, I was involved in the project(s) but not the decision to complete the project(s)	8.7%	2
3	No, I was not involved in the project(s)	0.0%	0
4	No, I do not work for ${e://Field/Organization} but provided services for the project(s)	4.3%	1
98	Don't know	0.0%	0
	Total	100%	23

QID126 - What is your job title or role?

#	Answer	%	Count
1	Facilities Manager	20.0%	4
2	Energy Manager	5.0%	1
3	Other facilities management/maintenance position	15.0%	3
4	Chief Financial Officer	0.0%	0
5	Other financial/administrative position	0.0%	0
6	Proprietor/Owner	20.0%	4
7	President/CEO	0.0%	0
8	Manager	15.0%	3

9	Other (Specify)	25.0%	5
	Total	100%	20

QID127 - Which of the following, if any, does your company have in place at [Field-Address]? Select all that apply.

#	Answer	%	Count
1	A full time energy manager or other person or persons responsible for monitoring or managing energy usage	0.0%	0
2	A person who has secondary responsibilities for monitoring or managing energy use	35.0%	7
3	Defined energy savings goals	0.0%	0
4	A specific policy requiring that energy efficiency is a criterion in the procurement of equipment	10.0%	2
5	Carbon reduction goals	0.0%	0
6	A policy to complete periodic energy audits of the facility	5.0%	1
7	Employee training that focuses on ways to save energy	15.0%	3
8	Other (Specify)	0.0%	0
9	None of the above	35.0%	7
98	Don’t know	10.0%	2
	Total	100%	20

QID2 - Had you applied for Ameren Missouri incentives for any equipment replacements or building upgrades before the one(s) you did in [Field-Year]?

#	Answer	%	Count
1	Yes	25.0%	5
2	No	65.0%	13
98	Don't know	10.0%	2
	Total	100%	20

QID128 - How did you learn about Ameren Missouri's incentives for efficient equipment or upgrades? Select all that apply.

#	Answer	%	Count
1	From the contractor, equipment vendor, or energy consultant who completed the energy efficient project(s) that you obtained incentives for	40.0%	6
2	From some other contractor, equipment vendor, or energy consultant	6.7%	1
3	From an Ameren Missouri Account Representative	6.7%	1
4	From a BizSavers Program representative	0.0%	0
5	From social media such as Facebook or LinkedIn	0.0%	0
6	From a YouTube advertisement	0.0%	0
7	From an internet search	0.0%	0
8	At an event/trade show	0.0%	0
9	Received an Ameren Missouri email blast or electronic newsletter	13.3%	2
10	Received an informational brochure	0.0%	0
11	From a program sponsored webinar	0.0%	0
12	From Ameren Missouri's website	20.0%	3
13	Friends or colleagues	0.0%	0
14	Through past experience with the program	13.3%	2
15	Other (please explain)	6.7%	1
98	Don't know	0.0%	0
	Total	100%	15

QID129 - When you first applied for Ameren Missouri incentives for efficient equipment or upgrades, how did you learn about those incentives? Select all that apply.

#	Answer	%	Count
1	From the contractor, equipment vendor, or energy consultant who did the energy efficient project(s) that you got incentives for	60.0%	3
2	From some other contractor, equipment vendor, or energy consultant	20.0%	1
3	From an Ameren Missouri Account Representative	20.0%	1
4	From a BizSavers Program representative	20.0%	1
5	From social media such as Facebook or LinkedIn	0.0%	0
6	From a YouTube advertisement	0.0%	0
7	From an internet search	0.0%	0
8	At an event/trade show	0.0%	0
9	Received an Ameren Missouri email blast or electronic newsletter	20.0%	1
10	Received an informational brochure	20.0%	1
11	From a program sponsored webinar	0.0%	0
12	From Ameren Missouri's website	20.0%	1
13	Friends or colleagues	20.0%	1
14	Through past experience with the program	60.0%	3
15	Other (please explain)	0.0%	0
98	Don't recall	0.0%	0
	Total	100%	5

QID3 - Did your organization work with a contractor or service provider to install the efficiency improvements that you received Ameren Missouri incentives for?

#	Answer	%	Count
1	Yes	62.5%	10
2	No	37.5%	6
98	Don't know	0.0%	0
	Total	100%	16

QID130 - Did your organization seek multiple bids for the project that you received Ameren Missouri incentives for?

#	Answer	%	Count
1	Yes	57.1%	8
2	No	42.9%	6
98	Don't know	0.0%	0
	Total	100%	14

QID131 - What factors influenced your decision to choose the contractor or service provider you worked with? Please select all that apply.

#	Answer	%	Count
1	Listed on Ameren Missouri's website	10.0%	1
2	Cost/budget considerations	50.0%	5
3	Qualifications/expertise with equipment type	30.0%	3
4	Availability to complete project within a specific timeline	40.0%	4

5	Recommendation	20.0%	2
6	Quality of work/brand recognition	70.0%	7
7	Other considerations (Please specify)	10.0%	1
98	Don’t know	0.0%	0
	Total	100%	10

QID132 - Did you or your organization obtain information about the contractor or service provider from the Ameren Missouri website during the selection process?

#	Answer	%	Count
1	Yes	11.1%	1
2	No	88.9%	8
98	Don't know	0.0%	0
	Total	100%	9

QID4 - In addition to the incentives for specific standard equipment upgrades you received, did you know you could qualify for incentives by proposing a custom energy-upgrade project that fits your specific facility needs?

#	Answer	%	Count
1	Yes	21.1%	4
2	No	73.7%	14
98	Don't know	5.3%	1
	Total	100%	19

QID133 - In addition to the lighting incentives you received, did you know you could qualify for incentives for other types of energy efficient equipment, such as heating, cooling, hot water, and refrigeration?

#	Answer	%	Count
1	Yes	50.0%	5
2	No	50.0%	5
98	Don't know	0.0%	0
	Total	100%	10

QID135 - In addition to the discounted lighting equipment you received, did you know you could qualify for incentives for other types of energy efficient equipment, such as heating, cooling, hot water, and refrigeration?

#	Answer	%	Count
1	Yes	50.0%	2
2	No	50.0%	2
98	Don't know	0.0%	0
	Total	100%	4

QID134 - If the space heating, cooling, or refrigeration equipment at [Field-Address] needed repair or replacement, who would be financially responsible for the repair or replacement?

#	Answer	%	Count
1	Our firm/organization	92.9%	13
2	The building owner (not our firm/organization)	0.0%	0
3	A property management or energy management firm	0.0%	0

4	Other (please explain)	7.1%	1
98	Don’t know	0.0%	0
	Total	100%	14

QID136 - Using the scale provided below, if the space heating, cooling, or refrigeration equipment at [Field-Address] needed repair or replacement, how interested would you be in using Ameren Missouri incentives to replace your equipment with new, energy efficient equipment?

#	Answer	%	Count
1	1 (Not at all interested)	0.0%	0
2	2	0.0%	0
3	3	15.4%	2
4	4	23.1%	3
5	5(Extremely interested)	61.5%	8
98	Don't know	0.0%	0
	Total	100%	13

QID137 - You recently received incentives for a retro-commissioning project. Which of these other Ameren Missouri program incentives are you aware of?

#	Answer	%	Count
1	New Construction and major building renovation incentives	0.0%	0
2	Standard incentives for specific measures such as lighting, HVAC, refrigeration, and water heating equipment	0.0%	0
3	Custom incentives for non-standard measures	0.0%	0
4	None of the above	0.0%	0

	Total		0

QID138 - How well did the Retro-commissioning program's range of incentive options fit your needs?

#	Answer	%	Count
1	1(Not at all)	0.0%	0
2	2	0.0%	0
3	3	0.0%	0
4	4	0.0%	0
5	5(Completely)	0.0%	0
98	Don't know	0.0%	0
	Total		0

QID5 - Which of the following people worked on completing your application for program incentives (including gathering required documentation)? (Select all that apply)

#	Answer	%	Count
1	Yourself	75.0%	15
2	Another member of your company	15.0%	3
3	A contractor or program service provider	45.0%	9
4	An equipment vendor	15.0%	3
5	A designer or architect	5.0%	1
6	Someone else – please specify	0.0%	0
98	Don't know	0.0%	0
	Total	100%	20

QID140 - Using the scale provided below, thinking back to the application process, please rate the clarity of information on how to complete the application...

#	Answer	%	Count
1	1(Not at all clear)	0.0%	0
2	2	0.0%	0
3	3	8.3%	1
4	4	25.0%	3
5	5(Completely clear)	66.7%	8
98	Don't know	0.0%	0
	Total	100%	12

QID142 - Using a 5-point scale, where 1 = "completely unacceptable" and 5 = "completely acceptable," how would you rate. . .

#	Question	1(Not at all acceptable)		2		3		4		5(Completely acceptable)		Don't know		Not applicable		Total
1	the ease of finding forms on Ameren Missouri's website	0.0%	0	0.0%	0	8.3%	1	0.0%	0	66.7%	8	8.3%	1	16.7%	2	12
2	the ease of using the electronic application worksheets	0.0%	0	0.0%	0	0.0%	0	8.3%	1	83.3%	10	8.3%	1	0.0%	0	12
3	the time it took to approve	0.0%	0	0.0%	0	0.0%	0	16.7%	2	83.3%	10	0.0%	0	0.0%	0	12

	the application															
4	the effort required to provide required invoices or other supporting documentation	0.0%	0	0.0%	0	8.3%	1	25.0%	3	66.7%	8	0.0%	0	0.0%	0	12
5	the overall application process	0.0%	0	0.0%	0	0.0%	0	16.7%	2	83.3%	10	0.0%	0	0.0%	0	12

QID143 - Did you have a clear sense of whom you could go to for assistance with the application process?

#	Answer	%	Count
1	Yes	100.0%	16
2	No	0.0%	0
98	Don't know	0.0%	0
	Total	100%	16

QID144 - After initial submission, were you (or anyone acting on your behalf) required to resubmit or provide additional documentation before your application was approved?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	100.0%	1

98	Don't know	0.0%	0
	Total	100%	1

QID145 - Which of the following were reasons that you had to resubmit your application? (Please select all that apply)

#	Answer	%	Count
1	Issues related to how energy savings were calculated	0.0%	0
2	Other issues related to the audit	0.0%	0
3	Issues related to additional supporting documentation such as invoices	0.0%	0
4	Other issues (Specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

QID146 - After initial submission, were you (or anyone acting on your behalf) required to resubmit or provide additional documentation before the following were approved?

#	Question	Yes		No		Don't know		Total
1	The initial application with the estimate of the retro-commissioning study cost	0.0%	0	0.0%	0	0.0%	0	0
2	The revised application once the study was completed	0.0%	0	0.0%	0	0.0%	0	0
3	The documentation for the completed project to receive incentives	0.0%	0	0.0%	0	0.0%	0	0

QID147 - Which of the following were reasons that you had to resubmit your application or provide additional documentation? Please select all that apply

#	Answer	%	Count
1	Issues related to how energy savings were calculated	0.0%	0
2	Other issues related to the study	0.0%	0
3	Issues related to additional supporting documentation such as invoices	0.0%	0
4	Other issues (Specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

QID148 - How did the incentive amount compare to what you expected?

#	Answer	%	Count
1	It was much less	0.0%	0
2	It was somewhat less	25.0%	4
3	It was about the amount expected	56.3%	9
4	It was somewhat more	12.5%	2
5	It was much more	6.3%	1
98	Don’t know	0.0%	0
	Total	100%	16

QID149 - How did the project cost compare to what you expected?

#	Answer	%	Count
1	It was much less	25.0%	1

2	It was somewhat less	25.0%	1
3	It was about the amount expected	25.0%	1
4	It was somewhat more	0.0%	0
5	It was much more	0.0%	0
98	Don’t know	25.0%	1
	Total	100%	4

QID6 - How did each of the following affect your decision to complete the energy efficiency project?

#	Question	No interaction with this type of person or they provided no input		Input had no effect on decision		Small effect		Moderate to large effect		Critical effect		Don’t know/Not applicable		Total
1	Vendor (retailer)	25.0%	4	18.8%	3	0.0 %	0	18.8%	3	25.0 %	4	12.5%	2	16
2	Contractor (installer)	6.3%	1	18.8%	3	6.3 %	1	25.0%	4	31.3 %	5	12.5%	2	16
3	Designer or architect	40.0%	6	6.7%	1	6.7 %	1	6.7%	1	13.3 %	2	26.7%	4	15
4	SBDI Service Provider (contractor)	0.0%	0	0.0%	0	0.0 %	0	75.0%	3	25.0 %	1	0.0%	0	4
5	Ameren Missouri staff member, such as an account representative	20.0%	4	0.0%	0	15.0 %	3	15.0%	3	30.0 %	6	20.0%	4	20

6	BizSavers program representative	20.0%	4	5.0%	1	5.0%	1	10.0%	2	55.0%	11	5.0%	1	20
7	Your RCx service provider	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	undefined
8	Someone else	22.2%	4	5.6%	1	11.1%	2	5.6%	1	11.1%	2	44.4%	8	18

QID150 - Who was the someone else that affected your decision to install the efficient equipment?

Who was the someone else that affected your decision to install the efficient equipment?
Library director or the Cape Girardeau area library's.
Previous employees of our company and current employees concerned about the old lighting
Kelly
Myself, and the contractor

QID7 - After your project was completed, did a program representative other than the contractor inspect the work done through the program?

#	Answer	%	Count
1	Yes	30.0%	6
2	No	40.0%	8
98	Don't know	30.0%	6
	Total	100%	20

QID151 - Using the scale provided below, please rate your agreement with the following statements:

#	Question	1 (Completely disagree)		2		3		4		5 (Completely agree)		Don't know		Not applicable		Total
1	The inspector was courteous	0.0%	0	0.0%	0	0.0%	0	0.0%	0	100.0%	6	0.0%	0	0.0%	0	6
2	The inspector was efficient	0.0%	0	0.0%	0	0.0%	0	0.0%	0	100.0%	6	0.0%	0	0.0%	0	6

QID8 - Had you purchased and installed any energy efficient equipment for the property at [Field-Address] before you knew about the Ameren Missouri BizSavers Program?

#	Answer	%	Count
1	Yes	25.0%	5
2	No	60.0%	12
98	Don't know	15.0%	3
	Total	100%	20

QID9 - 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?

#	Answer	%	Count
1	Yes. Our organization purchased energy efficient equipment but did not apply for incentive.	25.0%	5
2	No. Our organization purchased significant energy efficient equipment and applied for an incentive.	15.0%	3
3	No significant energy efficient equipment was purchased by our organization.	45.0%	9
98	Don't know	15.0%	3
	Total	100%	20

QID10 - Before participating in the Ameren Missouri BizSavers Program, had you [Field-Installed_1] any equipment or measure similar to [Field-Efficient_Measure_1] at the [Field-Address] location?

#	Answer	%	Count
1	Yes	10.0%	2
2	No	65.0%	13
98	Don't know	25.0%	5
	Total	100%	20

QID11 - Did you have plans to [Field-Install_1] the [Field-Efficient_Measure_1] at the [Field-Address] location before participating in the Ameren Missouri BizSavers Program?

#	Answer	%	Count
1	Yes	78.9%	15
2	No	21.1%	4
98	Don't know	0.0%	0
	Total	100%	19

QID12 - Would you have completed the [Field-Efficient_Measure_1] project even if you had not participated in the program?

#	Answer	%	Count
1	Yes	55.0%	11
2	No	20.0%	4
98	Don't know	25.0%	5
	Total	100%	20

QID13 - How important was previous experience with the Ameren Missouri BizSavers Program in making your decision to [Field-Install_1] the [Field-Efficient_Measure_1] at the [Field-Address] location?

#	Answer	%	Count
1	Did not have previous experience with program	30.0%	6
2	Very important	50.0%	10
3	Somewhat important	15.0%	3
4	Only slightly important	0.0%	0

5	Not at all important	0.0%	0
98	Don’t know	5.0%	1
	Total	100%	20

QID14 - If the Service Provider that completed the onsite energy assessment had not recommended [Field-Installing_1] the [Field-Efficient_Measure_1], how likely is it that you would have [Field-Installed_1] it anyway?

#	Answer	%	Count
1	Definitely would have installed	25.0%	1
2	Probably would have installed	25.0%	1
3	Probably would not have installed	25.0%	1
4	Definitely would not have installed	25.0%	1
98	Don’t know	0.0%	0
	Total	100%	4

QID15 - Did an Ameren Missouri BizSavers Program or other Ameren Missouri representative recommend that you [Field-Install_1] the [Field-Efficient_Measure_1] at the [Field-Address] location?

#	Answer	%	Count
1	Yes	30.0%	6
2	No	60.0%	12
98	Don't know	10.0%	2
	Total	100%	20

QID16 - If the Ameren Missouri BizSavers Program representative had not recommended [Field-Installing_1] the [Field-Efficient_Measure_1], how likely is it that you would have [Field-Installed_1] it anyway?

#	Answer	%	Count
1	Definitely would have installed	0.0%	0
2	Probably would have installed	50.0%	3
3	Probably would not have installed	33.3%	2
4	Definitely would not have installed	16.7%	1
98	Don’t know	0.0%	0
	Total	100%	6

QID17 - Would your organization have been financially able to [Field-Install_1] the [Field-Efficient_Measure_1] at the [Field-Address] location without the financial incentive from the Ameren Missouri BizSavers Program?

#	Answer	%	Count
1	Yes	55.0%	11
2	No	25.0%	5
98	Don't know	20.0%	4
	Total	100%	20

QID18 - To confirm, your organization would NOT have allocated the funds to complete a similar energy saving project if the program was not available. Is that correct?

#	Answer	%	Count
1	Yes	80.0%	4

2	No	0.0%	0
98	Don't know	20.0%	1
	Total	100%	5

QID19 - If the financial incentive from the Ameren Missouri BizSavers Program had not been available, how likely is it that you would have [Field-Installed_1] the [Field-Efficient_Measure_1] anyway?

#	Answer	%	Count
1	Definitely would have installed	30.0%	6
2	Probably would have installed	45.0%	9
3	Probably would not have installed	10.0%	2
4	Definitely would not have installed	5.0%	1
98	Don’t know	10.0%	2
	Total	100%	20

QID21 - Did you purchase and [Field-Install_1] more [Field-Efficient_Measure_1] than you otherwise would have without the program?

#	Answer	%	Count
1	Yes	35.0%	7
2	No, program did not affect quantity purchased and ${e://Field/Installed_1}.	55.0%	11
98	Don’t know	10.0%	2
	Total	100%	20

QID22 - Did you choose equipment that was more energy efficient than you would have chosen because of the program?

#	Answer	%	Count
1	Yes	45.0%	9
2	No, program did not affect level of efficiency chosen for equipment.	40.0%	8
98	Don’t know	15.0%	3
	Total	100%	20

QID23 - Which of the following best describes what efficiency level of equipment you would have installed if the program was not available?

#	Answer	%	Count
1	Installed the exact same equipment	22.2%	2
2	Installed efficient equipment, but that wasn’t as efficient as what you installed	55.6%	5
3	Installed the least efficient equipment available	11.1%	1
4	Not installed any equipment	11.1%	1
	Total	100%	9

QID24 - Did you [Field-Install_1] the [Field-Efficient_Measure_1] earlier than you otherwise would have without the program?

#	Answer	%	Count
1	Yes	55.0%	11
2	No, program did not affect did not affect timing of the installation	40.0%	8
98	Don’t know	5.0%	1
	Total	100%	20

QID25 - When would you otherwise have [Field-Installed_1] the equipment?

#	Answer	%	Count
1	Less than 6 months later	0.0%	0
2	6-12 months later	36.4%	4
3	1-2 years later	27.3%	3
4	3-5 years later	9.1%	1
5	More than 5 years later	18.2%	2
98	Don’t know	9.1%	1
	Total	100%	11

QID110 - Before participating in the Ameren Missouri BizSavers Program, had you [Field-Installed_2] any equipment or measure similar to [Field-Efficient_Measure_2] at the [Field-Address] location?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	100.0%	1
98	Don't know	0.0%	0
	Total	100%	1

QID111 - Did you have plans to [Field-Install_2] the [Field-Efficient_Measure_2] at the [Field-Address] location before participating in the Ameren Missouri BizSavers Program?

#	Answer	%	Count
1	Yes	100.0%	1
2	No	0.0%	0
98	Don't know	0.0%	0
	Total	100%	1

QID112 - Would you have completed the [Field-Efficient_Measure_2] project even if you had not participated in the program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
98	Don't know	100.0%	1
	Total	100%	1

QID113 - How important was previous experience with the Ameren Missouri BizSavers Program in making your decision to [Field-Install_2] the [Field-Efficient_Measure_2] at the [Field-Address] location?

#	Answer	%	Count
1	Did not have previous experience with program	0.0%	0
2	Very important	100.0%	1
3	Somewhat important	0.0%	0
4	Only slightly important	0.0%	0

5	Not at all important	0.0%	0
98	Don’t know	0.0%	0
	Total	100%	1

QID114 - If the Service Provider that completed the onsite energy assessment had not recommended [Field-Installing_2] the [Field-Efficient_Measure_2], how likely is it that you would have [Field-Installed_2] it anyway?

#	Answer	%	Count
1	Definitely would have installed	0.0%	0
2	Probably would have installed	0.0%	0
3	Probably would not have installed	0.0%	0
4	Definitely would not have installed	0.0%	0
98	Don’t know	0.0%	0
	Total		0

QID115 - Did an Ameren Missouri BizSavers Program or other Ameren Missouri representative recommend that you [Field-Install_2] the [Field-Efficient_Measure_2] at the [Field-Address] location?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	100.0%	1
98	Don't know	0.0%	0
	Total	100%	1

QID116 - If the Ameren Missouri BizSavers Program representative had not recommended [Field-Installing_2] the [Field-Efficient_Measure_2], how likely is it that you would have [Field-Installed_2] it anyway?

#	Answer	%	Count
1	Definitely would have installed	0.0%	0
2	Probably would have installed	0.0%	0
3	Probably would not have installed	0.0%	0
4	Definitely would not have installed	0.0%	0
98	Don’t know	0.0%	0
	Total		0

QID117 - Would your organization have been financially able to [Field-Install_2] the [Field-Efficient_Measure_2] at the [Field-Address] location without the financial incentive from the Ameren Missouri BizSavers Program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
98	Don't know	0.0%	0
	Total		0

QID118 - To confirm, your organization would NOT have allocated the funds to complete a similar energy saving project if the program was not available. Is that correct?

#	Answer	%	Count
1	Yes	0.0%	0

2	No	0.0%	0
98	Don't know	0.0%	0
	Total		0

QID119 - If the financial incentive from the Ameren Missouri BizSavers Program had not been available, how likely is it that you would have [Field-Installed_2] the [Field-Efficient_Measure_2] anyway?

#	Answer	%	Count
1	Definitely would have installed	0.0%	0
2	Probably would have installed	0.0%	0
3	Probably would not have installed	0.0%	0
4	Definitely would not have installed	0.0%	0
98	Don’t know	0.0%	0
	Total		0

QID121 - Did you purchase and [Field-Install_2] more [Field-Efficient_Measure_2] than you otherwise would have without the program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No, program did not affect quantity purchased and ${e://Field/Installed_2}.	0.0%	0
98	Don’t know	0.0%	0
	Total		0

QID122 - Did you choose equipment that was more energy efficient than you would have chosen because of the program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No, program did not affect level of efficiency chosen for equipment.	0.0%	0
98	Don’t know	0.0%	0
	Total		0

QID123 - Which of the following best describes what efficiency level of equipment you would have installed if the program was not available?

#	Answer	%	Count
1	Installed the exact same equipment	0.0%	0
2	Installed efficient equipment, but that wasn’t as efficient as what you installed	0.0%	0
3	Installed the least efficient equipment available	0.0%	0
4	Not installed any equipment	0.0%	0
	Total		0

QID124 - Did you [Field-Install_2] the [Field-Efficient_Measure_2] earlier than you otherwise would have without the program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No, program did not affect did not affect timing of the installation	0.0%	0
98	Don’t know	0.0%	0
	Total		0

QID125 - When would you otherwise have [Field-Installed_2] the equipment?

#	Answer	%	Count
1	Less than 6 months later	0.0%	0
2	6-12 months later	0.0%	0
3	1-2 years later	0.0%	0
4	3-5 years later	0.0%	0
5	More than 5 years later	0.0%	0
98	Don’t know	0.0%	0
	Total		0

QID26 - Since you completed the incentive project, have you installed any energy efficient equipment at a facility that receives electrical service from Ameren Missouri and that you DID NOT get an incentive for from Ameren Missouri?

#	Answer	%	Count
1	Yes	15.8%	3
2	No	73.7%	14
98	Don’t know	10.5%	2
	Total	100%	19

QID27 - What additional energy efficient equipment have you installed?

#	Answer	%	Count
1	Lighting including lighting controls, occupancy sensors and exit signs	33.3%	1

2	Unitary or split air conditioning system or chiller	33.3%	1
3	Compressed air improvements	0.0%	0
4	Efficient motors	33.3%	1
5	Refrigeration equipment (including LED case lighting)	0.0%	0
6	Kitchen equipment	0.0%	0
7	Something else	33.3%	1
8	Didn’t implement any measures	0.0%	0
98	Don’t know	0.0%	0
	Total	100%	3

1_QID36 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	100.0%	1
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0

16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total	100%	1

2_QID36 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

3_QID36 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

4_QID36 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

5_QID36 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

6_QID36 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

7_QID36 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

8_QID36 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

9_QID36 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

10_QID36 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

11_QID36 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

12_QID36 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	100.0%	1
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total	100%	1

13_QID36 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

14_QID36 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

15_QID36 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

16_QID36 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	100.0%	1
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total	100%	1

17_QID36 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

18_QID36 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

19_QID36 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

QID37 - How important was your experience with the program in your decision to install this lighting equipment?

#	Answer	%	Count
0	0 (Not at all important)	100.0%	1
1	1	0.0%	0
2	2	0.0%	0
3	3	0.0%	0
4	4	0.0%	0
5	5	0.0%	0
6	6	0.0%	0
7	7	0.0%	0
8	8	0.0%	0
9	9	0.0%	0
10	10 (Extremely important)	0.0%	0
98	Don't know	0.0%	0
	Total	100%	1

QID38 - If you had NOT participated in the program, how likely is it that your organization would still have installed this lighting equipment?

#	Answer	%	Count
0	0 (Definitely would not have installed)	0.0%	0
1	1	0.0%	0
2	2	0.0%	0
3	3	0.0%	0
4	4	0.0%	0

5	5	0.0%	0
6	6	0.0%	0
7	7	0.0%	0
8	8	0.0%	0
9	9	0.0%	0
10	10 (Definitely would have installed)	100.0%	1
98	Don't know	0.0%	0
	Total	100%	1

QID40 - What types of energy efficient equipment did you install as part of the HVAC project?

#	Answer	%	Count
1	Split air conditioning system (An A/C system that has an evaporator indoors and the compressor and condenser outdoors.)	0.0%	0
2	Packaged air conditioning system (A type of central air conditioning that contains both the air handler fan, compressor and condenser in a single unit. These are typically mounted on the roof.)	100.0%	1
3	Heat pump (An electric heating and cooling system)	0.0%	0
4	Air cooled chiller (A system that produces cold liquid sent around to individual spaces used for cooling air usually found in larger facilities)	0.0%	0
5	Water cooled chiller (A system that produces cold liquid sent around to individual spaces used for cooling air usually found in larger facilities)	0.0%	0
6	Another type	0.0%	0
98	Don’t know	0.0%	0
	Total	100%	1

1_QID43 - What type of building did you install the heating/cooling equipment in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

2_QID43 - What type of building did you install the heating/cooling equipment in?

#	Answer	%	Count
1	Large Office	100.0%	1
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total	100%	1

3_QID43 - What type of building did you install the heating/cooling equipment in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

4_QID43 - What type of building did you install the heating/cooling equipment in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

5_QID43 - What type of building did you install the heating/cooling equipment in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

6_QID43 - What type of building did you install the heating/cooling equipment in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

7_QID43 - What type of building did you install the heating/cooling equipment in?

#	Answer	%	Count
1	Large Office	0.0%	0
2	Medium Office	0.0%	0
3	Small Office	0.0%	0
4	Warehouse	0.0%	0
5	Stand-alone Retail	0.0%	0
6	Strip Mall	0.0%	0
7	Primary School	0.0%	0
8	Secondary School	0.0%	0
9	Supermarket	0.0%	0
10	Quick Service Restaurant	0.0%	0
11	Full Service Restaurant	0.0%	0
12	Hospital	0.0%	0
13	Outpatient Health Care	0.0%	0
14	Small Hotel - Building	0.0%	0
15	Large Hotel - Building	0.0%	0
16	Midrise Apartment - Building	0.0%	0
17	Other (Please specify)	0.0%	0
98	Don’t know	0.0%	0
	Total		0

QID45 - How important was your experience with the program in your decision to install the energy efficient HVAC equipment?

#	Answer	%	Count
0	0 (Not at all important)	0.0%	0
1	1	0.0%	0
2	2	0.0%	0
3	3	0.0%	0
4	4	0.0%	0
5	5	0.0%	0
6	6	0.0%	0
7	7	0.0%	0
8	8	0.0%	0
9	9	0.0%	0
10	10 (Extremely important)	0.0%	0
98	Don't know	100.0%	1
	Total	100%	1

QID46 - If you had NOT participated in the program, how likely is it that your organization would still have installed the energy efficient HVAC equipment?

#	Answer	%	Count
0	0 (Definitely would not have installed)	0.0%	0
1	1	0.0%	0
2	2	0.0%	0
3	3	0.0%	0
4	4	0.0%	0
5	5	0.0%	0

6	6	0.0%	0
7	7	0.0%	0
8	8	0.0%	0
9	9	0.0%	0
10	10 (Definitely would have installed)	100.0%	1
98	Don't know	0.0%	0
	Total	100%	1

QID48 - What type of compressed air improvements did you make? Please select all that apply.

#	Answer	%	Count
1	No loss condensate drain(s)	0.0%	0
2	Compressed air leak repair	0.0%	0
3	Compressed air nozzles	0.0%	0
4	VSD air compressor	0.0%	0
	Total		0

QID49 - What type of compressor control operates on the system that the no loss condensate drain(s) were installed on? Please select all that apply.

#	Answer	%	Count
1	Reciprocating - On/off Control	0.0%	0
2	Reciprocating - Load/Unload	0.0%	0
3	Screw - Load/Unload	0.0%	0
4	Screw - Inlet Modulation	0.0%	0
5	Screw - Inlet Modulation w/ Unloading	0.0%	0
6	Screw - Variable Displacement	0.0%	0

7	Screw - VFD	0.0%	0
	Total		0

QID156 - How many shifts operate at the facility where the no loss condensate drains were installed?

#	Answer	%	Count
1	Single shift	0.0%	0
2	Two shifts	0.0%	0
3	Three shifts	0.0%	0
4	Four shifts (24/7 schedule)	0.0%	0
	Total		0

QID158 - What type of compressor control operates on the compressed air system that had an air leak repaired? Select all that apply.

#	Answer	%	Count
1	Reciprocating - On/off Control	0.0%	0
2	Reciprocating - Load/Unload	0.0%	0
3	Screw - Load/Unload	0.0%	0
4	Screw - Inlet Modulation	0.0%	0
5	Screw - Inlet Modulation w/ Unloading	0.0%	0
6	Screw - Variable Displacement	0.0%	0
7	Screw - VFD	0.0%	0
	Total		0

QID159 - How many shifts operate at the facility where the air leak was repaired?

#	Answer	%	Count
1	Single shift	0.0%	0
2	Two shifts	0.0%	0
3	Three shifts	0.0%	0
4	Four shifts (24/7 schedule)	0.0%	0
	Total		0

QID160 - How many compressed air nozzles did you install?

#	Answer	%	Count
1	1	0.0%	0
2	2	0.0%	0
3	3	0.0%	0
4	4	0.0%	0
5	5 or more	0.0%	0
	Total		0

Q96#1 - For each of the compressed air nozzles you installed, please select the size of the compressed ai... - Nozzle size

#	Question	1/8""		1/4""		5/16"		1/2"		Total
1	Nozzle 1	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0
2	Nozzle 2	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0
3	Nozzle 3	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0

4	Nozzle 4	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0
5	Nozzle 5	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0

Q96#2 - For each of the compressed air nozzles you installed, please select the size of the compressed ai... - Air compressor type

#	Question	Reciprocating - On/off Control		Reciprocating - Load/Unload		Screw - Load/Unload		Screw - Inlet Modulation		Screw - Inlet Modulation w/ Unloading		Screw - Variable Displacement		Screw - VFD		Total
1	Nozzle 1	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0
2	Nozzle 2	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0
3	Nozzle 3	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0
4	Nozzle 4	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0
5	Nozzle 5	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0

QID162 - How many shifts operate at the facility where the nozzles were installed?

#	Answer	%	Count
1	Single shift	0.0%	0
2	Two shifts	0.0%	0
3	Three shifts	0.0%	0
4	Four shifts (24/7 schedule)	0.0%	0
	Total		0

QID51 - How important was your experience with the program in your decision to make the compressed air improvements?

#	Answer	%	Count
0	0 (Not at all important)	0.0%	0
1	1	0.0%	0
2	2	0.0%	0
3	3	0.0%	0
4	4	0.0%	0
5	5	0.0%	0
6	6	0.0%	0
7	7	0.0%	0
8	8	0.0%	0
9	9	0.0%	0
10	10 (Extremely important)	0.0%	0
98	Don't know	0.0%	0
	Total		0

QID52 - If you had NOT participated in the program, how likely is it that your organization would still have made the compressed air improvements?

#	Answer	%	Count
0	0 (Definitely would not have installed)	0.0%	0
1	1	0.0%	0
2	2	0.0%	0
3	3	0.0%	0
4	4	0.0%	0
5	5	0.0%	0

6	6	0.0%	0
7	7	0.0%	0
8	8	0.0%	0
9	9	0.0%	0
10	10 (Definitely would have installed)	0.0%	0
98	Don't know	0.0%	0
	Total		0

QID59 - How important was your experience with the program in your decision to install efficient motors?

#	Answer	%	Count
0	0 (Not at all important)	0.0%	0
1	1	0.0%	0
2	2	0.0%	0
3	3	100.0%	1
4	4	0.0%	0
5	5	0.0%	0
6	6	0.0%	0
7	7	0.0%	0
8	8	0.0%	0
9	9	0.0%	0
10	10 (Extremely important)	0.0%	0
98	Don't know	0.0%	0
	Total	100%	1

QID60 - If you had NOT participated in the program, how likely is it that your organization would still have installed efficient motors?

#	Answer	%	Count
0	0 (Definitely would not have installed)	0.0%	0
1	1	0.0%	0
2	2	0.0%	0
3	3	0.0%	0
4	4	0.0%	0
5	5	0.0%	0
6	6	0.0%	0
7	7	0.0%	0
8	8	0.0%	0
9	9	0.0%	0
10	10 (Definitely would have installed)	100.0%	1
98	Don't know	0.0%	0
	Total	100%	1

QID62 - What types of energy efficient refrigeration equipment did you install?

#	Answer	%	Count
1	ENERGY STAR Commercial freezer	0.0%	0
2	ENERGY STAR Commercial refrigerator	0.0%	0
3	Anti-sweat heater controls	0.0%	0
4	LED refrigerated case lighting	0.0%	0
5	Refrigerated case covers	0.0%	0
6	Some other type of refrigeration equipment	0.0%	0

98	Don’t know	0.0%	0
	Total		0

1_QID66 - Does this freezer have a solid door or a glass door?

#	Answer	%	Count
1	Solid door	0.0%	0
2	Glass door	0.0%	0
98	Don’t know	0.0%	0
	Total		0

1_QID67 - Is this a vertical freezer or a chest type freezer?

#	Answer	%	Count
1	Vertical	0.0%	0
2	Chest	0.0%	0
98	Don’t know	0.0%	0
	Total		0

2_QID66 - Does this freezer have a solid door or a glass door?

#	Answer	%	Count
1	Solid door	0.0%	0
2	Glass door	0.0%	0
98	Don’t know	0.0%	0
	Total		0

2_QID67 - Is this a vertical freezer or a chest type freezer?

#	Answer	%	Count
1	Vertical	0.0%	0
2	Chest	0.0%	0
98	Don’t know	0.0%	0
	Total		0

3_QID66 - Does this freezer have a solid door or a glass door?

#	Answer	%	Count
1	Solid door	0.0%	0
2	Glass door	0.0%	0
98	Don’t know	0.0%	0
	Total		0

3_QID67 - Is this a vertical freezer or a chest type freezer?

#	Answer	%	Count
1	Vertical	0.0%	0
2	Chest	0.0%	0
98	Don’t know	0.0%	0
	Total		0

1_QID70 - Does this refrigerator have a solid door or a glass door?

#	Answer	%	Count
1	Solid door	0.0%	0
2	Glass door	0.0%	0
98	Don’t know	0.0%	0
	Total		0

1_QID71 - Is this a vertical refrigerator or a chest type refrigerator?

#	Answer	%	Count
1	Vertical	0.0%	0
2	Chest	0.0%	0
98	Don’t know	0.0%	0
	Total		0

2_QID70 - Does this refrigerator have a solid door or a glass door?

#	Answer	%	Count
1	Solid door	0.0%	0
2	Glass door	0.0%	0
98	Don’t know	0.0%	0
	Total		0

2_QID71 - Is this a vertical refrigerator or a chest type refrigerator?

#	Answer	%	Count
1	Vertical	0.0%	0
2	Chest	0.0%	0
98	Don’t know	0.0%	0
	Total		0

3_QID70 - Does this refrigerator have a solid door or a glass door?

#	Answer	%	Count
1	Solid door	0.0%	0
2	Glass door	0.0%	0
98	Don’t know	0.0%	0
	Total		0

3_QID71 - Is this a vertical refrigerator or a chest type refrigerator?

#	Answer	%	Count
1	Vertical	0.0%	0
2	Chest	0.0%	0
98	Don’t know	0.0%	0
	Total		0

QID72 - Did you install humidity-based controls or conductivity-based controls, or both types?

#	Answer	%	Count
1	Humidity-based controls	0.0%	0
2	Conductivity-based controls	0.0%	0
3	Both types	0.0%	0
98	Don’t know	0.0%	0
	Total		0

QID81 - How important was your experience with the program in your decision to install the energy efficient refrigeration equipment?

#	Answer	%	Count
0	0 (Not at all important)	0.0%	0
1	1	0.0%	0
2	2	0.0%	0
3	3	0.0%	0
4	4	0.0%	0
5	5	0.0%	0
6	6	0.0%	0
7	7	0.0%	0
8	8	0.0%	0
9	9	0.0%	0
10	10 (Extremely important)	0.0%	0
98	Don't know	0.0%	0
	Total		0

QID82 - If you had NOT participated in the program, how likely is it that your organization would still have installed this energy efficient refrigeration equipment?

#	Answer	%	Count
0	0 (Definitely would not have installed)	0.0%	0
1	1	0.0%	0
2	2	0.0%	0
3	3	0.0%	0
4	4	0.0%	0
5	5	0.0%	0
6	6	0.0%	0
7	7	0.0%	0
8	8	0.0%	0
9	9	0.0%	0
10	10 (Definitely would have installed)	0.0%	0
98	Don't know	0.0%	0
	Total		0

QID85 - What type of kitchen equipment did you install?

#	Answer	%	Count
1	Low flow pre-rinse spray valves	0.0%	0
2	ENERGY STAR Commercial fryers	0.0%	0
3	ENERGY STAR Commercial steam cookers	0.0%	0
4	ENERGY STAR hot food holding cabinets	0.0%	0
5	ENERGY STAR commercial griddles	0.0%	0

6	ENERGY STAR commercial convection ovens	0.0%	0
7	ENERGY STAR commercial combination ovens	0.0%	0
8	Some other type of kitchen equipment	0.0%	0
98	Don’t know	0.0%	0
	Total		0

QID87 - Is the flow rate for any of the spray valves you installed equal to or less than 1.6 gallons per minute?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
98	Don't know	0.0%	0
	Total		0

QID89 - Did you install the pre-rinse spray valves at the [Field-Address] location?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
98	Don't know	0.0%	0
	Total		0

QID98 - How important was your experience with the program in your decision to install this kitchen equipment?

#	Answer	%	Count
0	0 (Not at all important)	0.0%	0
1	1	0.0%	0
2	2	0.0%	0
3	3	0.0%	0
4	4	0.0%	0
5	5	0.0%	0
6	6	0.0%	0
7	7	0.0%	0
8	8	0.0%	0
9	9	0.0%	0
10	10 (Very important)	0.0%	0
98	Don't Know	0.0%	0
	Total		0

QID99 - If you had NOT participated in the program, how likely is it that your organization would still have installed this kitchen equipment?

#	Answer	%	Count
0	0 (Definitely would not have installed)	0.0%	0
1	1	0.0%	0
2	2	0.0%	0
3	3	0.0%	0
4	4	0.0%	0

5	5	0.0%	0
6	6	0.0%	0
7	7	0.0%	0
8	8	0.0%	0
9	9	0.0%	0
10	10 (Definitely would have installed)	0.0%	0
98	Don't Know	0.0%	0
	Total		0

QID170 - How important was your experience with the program in your decision to install the other equipment?

#	Answer	%	Count
0	0 (Not at all important)	100.0%	1
1	1	0.0%	0
2	2	0.0%	0
3	3	0.0%	0
4	4	0.0%	0
5	5	0.0%	0
6	6	0.0%	0
7	7	0.0%	0
8	8	0.0%	0
9	9	0.0%	0
10	10 (Very important)	0.0%	0
98	Don't Know	0.0%	0
	Total	100%	1

QID171 - If you had NOT participated in the program, how likely is it that your organization would still have installed the other equipment?

#	Answer	%	Count
0	0 (Definitely would not have installed)	0.0%	0
1	1	0.0%	0
2	2	0.0%	0
3	3	0.0%	0
4	4	0.0%	0
5	5	0.0%	0
6	6	0.0%	0
7	7	0.0%	0
8	8	0.0%	0
9	9	0.0%	0
10	10 (Definitely would have installed)	100.0%	1
98	Don't Know	0.0%	0
	Total	100%	1

QID107 - In the course of doing this project did you have any interactions with program staff? Program staff DO NOT include anyone hired by you to install the equipment, conduct an audit or design your system.

#	Answer	%	Count
1	Yes	59.1%	13
2	No	27.3%	6
98	Not sure	13.6%	3
	Total	100%	22

QID152 - Using the scale provided below, please indicate how knowledgeable were program staff about the issues you discussed with them?

#	Answer	%	Count
1	1(Not knowledgeable at all)	0.0%	0
2	2	0.0%	0
3	3	0.0%	0
4	4	7.7%	1
5	5 (Very knowledgeable)	92.3%	12
98	Don't know	0.0%	0
	Total	100%	13

QID153 - Using the scale provided below, please indicate how satisfied you are with the following:

#	Question	1 (Very dissatisfied)		2		3		4		5 (Very satisfied)		Total
1	How long it took program staff to address your questions or concerns	0.0%	0	0.0%	0	0.0%	0	15.4%	2	84.6%	11	13
2	How thoroughly they addressed your question or concern	0.0%	0	0.0%	0	0.0%	0	15.4%	2	84.6%	11	13

QID154 - Using the scale provided below, please indicate how satisfied you are with the following:

#	Question	1 (Very dissatisfied)		2		3		4		5 (Very satisfied)		Total
1	the steps you had to take to get	5.3%	1	0.0%	0	5.3%	1	10.5%	2	78.9%	15	19

	through the program											
2	the equipment that was installed	5.0%	1	0.0%	0	0.0%	0	15.0%	3	80.0%	16	20
3	the quality of the installation	5.3%	1	0.0%	0	0.0%	0	15.8%	3	78.9%	15	19
4	the amount of time it took to deliver and install the equipment	5.0%	1	0.0%	0	0.0%	0	5.0%	1	90.0%	18	20
5	the amount of time it took to get your rebate or incentive	6.3%	1	0.0%	0	0.0%	0	18.8%	3	75.0%	12	16
6	the range of equipment that qualifies for incentives	6.3%	1	6.3%	1	6.3%	1	12.5%	2	68.8%	11	16
7	how well the SBDI Service Provider explained the program rules and processes	0.0%	0	0.0%	0	0.0%	0	25.0%	1	75.0%	3	4
8	how well the SBDI Service Provider explained the equipment recommendations	0.0%	0	0.0%	0	0.0%	0	25.0%	1	75.0%	3	4
9	how well the SBDI Service Provider explained how much the incentives would cover	0.0%	0	25.0%	1	0.0%	0	0.0%	0	75.0%	3	4
10	the walk-through assessment you received	0.0%	0	33.3%	1	0.0%	0	0.0%	0	66.7%	2	3
11	the cost of the new equipment	0.0%	0	0.0%	0	0.0%	0	0.0%	0	100.0%	4	4
12	the time it took to get your new lighting or other equipment	0.0%	0	0.0%	0	0.0%	0	0.0%	0	100.0%	4	4
13	the program, overall	5.0%	1	0.0%	0	10.0%	2	10.0%	2	75.0%	15	20

QID101 - Which of the following best describes the type of work that your firm or organization does at [Field-Address]?

#	Answer	%	Count
1	Industrial	11.1%	2
2	Restaurant (not fast food)	0.0%	0
3	Fast food restaurant	0.0%	0
4	Retail	16.7%	3
5	Office	5.6%	1
6	Grocery and convenience	0.0%	0
7	School	11.1%	2
8	Lodging	0.0%	0
9	Warehouse	11.1%	2
10	Other – specify:	44.4%	8
98	Not sure	0.0%	0
	Total	100%	18

QID102 - Does your organization rent, own and occupy, or own and rent the facility to someone else at this location?

#	Answer	%	Count
1	Own	33.3%	6
2	Own and occupy	55.6%	10
3	Own and rent to someone else	0.0%	0
98	Don’t know	11.1%	2
	Total	100%	18

QID105 - How many square feet (indoor space) is the part of the property at [Field-Address] that your firm or organization occupies? (If your firm or organization occupies the entire property, indicate the total size of that property.)

#	Answer	%	Count
1	Less than 5,000	16.7%	3
2	5,001 to 10,000	27.8%	5
3	10,001 to 20,000	5.6%	1
4	20,001 to 50,000	11.1%	2
5	50,001 to 75,000	11.1%	2
6	75,001 to 100,000	0.0%	0
7	100,001 to 250,000	0.0%	0
8	250,001 to 500,000	5.6%	1
9	500,001 to 1,000,000	0.0%	0
10	More than 1,000,000	0.0%	0
98	Not sure	22.2%	4
	Total	100%	18

8 Business Nonparticipant Survey Responses

QID1 - According to our records, Ameren Missouri provides electricity service to the facility located at [Field-Address]. Is that correct?

#	Answer	%	Count
1	Yes	100.0%	69
	Total	100%	69

QID82 - To the best of your knowledge, has your company or organization replaced or upgraded equipment that requires electricity to operate in the past three years? This could have been for lighting, motors, refrigeration, or HVAC equipment, for example.

#	Answer	%	Count
1	Yes	55.9%	41.2
2	No	44.1%	32.5
	Total	100%	73.7

QID83 - Did you receive an incentive from Ameren Missouri for any of that equipment? Your best guess is fine.

#	Answer	%	Count
2	No	100.0%	41.2
	Total	100%	41.2

QID84 - Has your company or organization completed any other electricity saving projects in the last three years for which you did get an Ameren Missouri incentive?

#	Answer	%	Count
2	No	100.0%	73.7
	Total	100%	73.7

QID85 - When it comes to purchasing energy-using equipment for your facilities/sites, do you…?

#	Answer	%	Count
1	Make those decisions	76.1%	56.1
2	Provide input to others who make those decisions	23.9%	17.6
	Total	100%	73.7

QID86 - Which of the following, if any, does your company have in place at [Address]? Select all that apply.

#	Answer	%	Count
1	A full-time energy manager or other person or persons responsible for monitoring or managing energy usage	2.4%	1.8
2	A person who has secondary responsibilities for monitoring or managing energy use	11.7%	8.6
3	Defined energy savings goals	3.4%	2.5
4	A specific policy requiring that energy efficiency is a criterion in the procurement of equipment	5.1%	3.7
5	Carbon reduction goals	0.0%	0.0
6	A policy to complete periodic energy audits of the facility	5.8%	4.3
7	Employee training that focuses on ways to save energy	3.4%	2.5

8	Other (Specify)	4.1%	3.0
9	None of the above	71.0%	52.3
98	Don’t know	4.9%	3.6
	Total	100%	73.7

QID87 - Which types of equipment does your organization make equipment maintenance or replacement decisions about? Please select all that apply.

#	Answer	%	Count
1	Lighting	89.5%	66.0
2	Heating	84.7%	62.4
3	Cooling	87.8%	64.7
4	Water heating	68.2%	50.2
5	Refrigeration	48.7%	35.9
6	Motors	33.1%	24.4
7	Commercial cooking and food preparation equipment	18.2%	13.4
8	Other (Specify)	6.4%	4.7
98	Don’t know	2.3%	1.7
	Total	100%	73.7

QID2 - Before we contacted you, were you aware that Ameren Missouri provides cash incentives for energy efficient equipment purchases and upgrades for existing and new buildings?

#	Answer	%	Count
1	Yes	37.2%	27.4

2	No	55.4%	40.8
98	Don’t know	7.4%	5.4
	Total	100%	73.7

QID88 - Which of the following types of incentives were you aware of? Please select all that apply.

#	Answer	%	Count
1	Incentives to replace inefficient equipment, including lighting, in existing buildings	93.5%	25.6
2	Incentives to incorporate energy efficiency into new construction designs	44.5%	12.2
3	Incentives for retro-commissioning projects, which improve how building equipment and systems function together	24.3%	6.7
4	Incentives specifically for small business customers that are provided for upgrades made by an approved program service provider	35.8%	9.8
	Total	100%	27.4

QID89 - In the past year, from what sources have you gotten information about the energy efficiency incentives from Ameren Missouri? Please select all that apply.

#	Answer	%	Count
1	From some other contractor, equipment vendor, or energy consultant	24.3%	6.7
2	From an Ameren Missouri Account Representative	8.7%	2.4
3	From a BizSavers Program representative	0.0%	0.0
4	From social media such as Facebook or LinkedIn	6.5%	1.8
5	From a YouTube advertisement	0.0%	0.0
6	From an internet search	22.7%	6.2
7	At an event/trade show	0.0%	0.0
8	Received an Ameren Missouri email blast or electronic newsletter	47.0%	12.9

9	Received an informational brochure	26.7%	7.3
10	From a program sponsored webinar	0.0%	0.0
11	From Ameren Missouri's website	51.5%	14.1
12	Friends or colleagues	22.7%	6.2
13	Other (please explain)	0.0%	0.0
14	None	9.1%	2.5
98	Don't know	4.0%	1.1
	Total	100%	27.4

QID90 - Based on your responses above, you may have been aware of Ameren's program to provide incentives for energy saving projects and you completed a project without using Ameren incentives. Why did you complete a project without Ameren incentives?

#	Answer	%	Count
1	The project did not qualify for Ameren incentives	36.3%	3.5
2	Forgot about Ameren program	13.0%	1.2
3	Contractor recommended not using the Ameren program	0.0%	0.0
4	The amount of money we would have received did not justify participating.	18.7%	1.8
5	Other, please specify:	0.0%	0.0
98	Don't know	37.8%	3.6
	Total	100%	9.6

QID91 - What are the primary challenges that prevent your company from implementing energy efficiency improvements? Please select up to three.

#	Answer	%	Count
1	High upfront costs of implementing energy-efficient technologies.	46.5%	34.3
2	Lack of information about available energy efficiency technologies and practices.	22.4%	16.5
3	Uncertainty about the financial payback or return on investment.	36.6%	27.0
4	Difficulty in finding vendors or contractors.	4.1%	3.0
5	Disruption of business operations during implementation.	9.9%	7.3
6	Lack of internal expertise or resources to manage energy efficiency projects.	13.4%	9.8
7	Insufficient incentives or financial support from government or utilities.	27.3%	20.1
8	Regulatory or compliance barriers.	0.0%	0.0
9	Limited availability of energy-efficient technologies suitable for our specific needs.	4.0%	2.9
98	Not sure	27.9%	20.5
	Total	100%	73.7

QID93 - What do you think are the most trustworthy sources of information on how to save energy in your organization? Please select up to 3.

#	Answer	%	Count
1	Contractors that provide installation services	27.1%	18.1
2	Local government	5.6%	3.7
3	State government	5.4%	3.6
4	National energy government agencies	16.5%	11.1
5	Ameren Missouri	75.2%	50.4
6	Professional organization	5.4%	3.6
7	Trade organizations relevant to your industry	20.0%	13.4

8	Peer companies in industry	12.8%	8.6
9	Other community or neighborhood organization	8.1%	5.4
10	Other utilities/other utility websites	6.4%	4.3
11	Retailers and vendors who sell efficient products	18.2%	12.2
12	Online forums, blogs, or other websites	14.6%	9.8
	Total	100%	67.0

QID94 - Are there other sources of information on how to save energy in your organization that you trust?

QID3 - In the past year has your organization installed any energy efficient equipment at a facility that receives electrical service from Ameren Missouri and that you DID NOT get an incentive for from Ameren Missouri?

#	Answer	%	Count
1	Yes	24.8%	18.3
2	No	57.3%	42.2
98	Don’t know	17.9%	13.2
	Total	100%	73.7

QID4 - What additional energy efficient equipment have you installed?

#	Answer	%	Count
1	Lighting including lighting controls, occupancy sensors and exit signs	64.3%	11.8
2	Unitary or split air conditioning system or chiller	16.6%	3.0
3	Compressed air improvements	13.6%	2.5
4	Efficient motors	6.2%	1.1
5	Refrigeration equipment (including LED case lighting)	20.4%	3.7

6	Kitchen equipment	6.8%	1.2
7	Something else	31.9%	5.8
8	Didn’t implement any measures	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	18.3

QID6 - Why didn’t you receive incentives for the lighting equipment?

#	Answer	%	Count
1	Didn't know whether equipment qualified for financial incentives	47.1%	5.5
2	Equipment did not qualify for financial incentives	0.0%	0.0
3	Too much paperwork for the financial incentive application	21.2%	2.5
4	Financial incentive was insufficient	0.0%	0.0
5	Didn't have time to complete paperwork for financial incentive application	10.6%	1.2
6	Didn't know about financial incentives until after equipment was purchased	74.1%	8.7
7	We did receive an incentive	0.0%	0.0
8	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	11.8

QID116 - Why didn’t you receive incentives for the HVAC equipment?

#	Answer	%	Count
1	Didn't know whether equipment qualified for financial incentives	59.1%	1.8
2	Equipment did not qualify for financial incentives	0.0%	0.0
3	Too much paperwork for the financial incentive application	40.9%	1.2
4	Financial incentive was insufficient	40.9%	1.2

5	Didn't have time to complete paperwork for financial incentive application	0.0%	0.0
6	Didn't know about financial incentives until after equipment was purchased	81.8%	2.5
7	We did receive an incentive	0.0%	0.0
8	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	3.0

QID115 - Why didn’t you receive incentives for the compressed air improvements?

#	Answer	%	Count
1	Didn't know whether equipment qualified for financial incentives	50.0%	1.2
2	Equipment did not qualify for financial incentives	0.0%	0.0
3	Too much paperwork for the financial incentive application	0.0%	0.0
4	Financial incentive was insufficient	0.0%	0.0
5	Didn't have time to complete paperwork for financial incentive application	0.0%	0.0
6	Didn't know about financial incentives until after equipment was purchased	100.0%	2.5
7	We did receive an incentive	0.0%	0.0
8	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	2.5

QID114 - Why didn’t you receive incentives for the efficient motors?

#	Answer	%	Count
1	Didn't know whether equipment qualified for financial incentives	100.0%	1.1

2	Equipment did not qualify for financial incentives	100.0%	1.1
3	Too much paperwork for the financial incentive application	0.0%	0.0
4	Financial incentive was insufficient	0.0%	0.0
5	Didn't have time to complete paperwork for financial incentive application	0.0%	0.0
6	Didn't know about financial incentives until after equipment was purchased	100.0%	1.1
7	We did receive an incentive	0.0%	0.0
8	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	1.1

QID113 - Why didn’t you receive incentives for the refrigeration equipment?

#	Answer	%	Count
1	Didn't know whether equipment qualified for financial incentives	33.3%	1.2
2	Equipment did not qualify for financial incentives	33.3%	1.2
3	Too much paperwork for the financial incentive application	0.0%	0.0
4	Financial incentive was insufficient	0.0%	0.0
5	Didn't have time to complete paperwork for financial incentive application	0.0%	0.0
6	Didn't know about financial incentives until after equipment was purchased	33.3%	1.2
7	We did receive an incentive	0.0%	0.0
8	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	3.7

QID112 - Why didn’t you receive incentives for the kitchen equipment?

#	Answer	%	Count
1	Didn't know whether equipment qualified for financial incentives	0.0%	0.0
2	Equipment did not qualify for financial incentives	100.0%	1.2
3	Too much paperwork for the financial incentive application	0.0%	0.0
4	Financial incentive was insufficient	0.0%	0.0
5	Didn't have time to complete paperwork for financial incentive application	0.0%	0.0
6	Didn't know about financial incentives until after equipment was purchased	0.0%	0.0
7	We did receive an incentive	0.0%	0.0
8	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	1.2

QID111 - Why didn’t you receive incentives for the other equipment?

#	Answer	%	Count
1	Didn't know whether equipment qualified for financial incentives	59.8%	3.5
2	Equipment did not qualify for financial incentives	19.5%	1.1
3	Too much paperwork for the financial incentive application	0.0%	0.0
4	Financial incentive was insufficient	0.0%	0.0
5	Didn't have time to complete paperwork for financial incentive application	0.0%	0.0
6	Didn't know about financial incentives until after equipment was purchased	29.0%	1.7
7	We did receive an incentive	0.0%	0.0
8	Other (Please specify)	9.5%	0.6
98	Don’t know	30.8%	1.8

	Total	100%	5.8

QID7 - Did you work with a contractor to install that efficient equipment or did your company's staff install the equipment?

#	Answer	%	Count
1	Worked with a contractor	36.3%	6.6
2	Company self-installed the equipment	56.9%	10.4
3	Both	6.8%	1.2
98	Don't know	0.0%	0.0
	Total	100%	18.3

QID8 - What type(s) of lighting equipment did you install? Please mark all that you installed in the past year.

#	Answer	%	Count
1	LED mogul base, 80W or less	15.3%	1.8
2	LED mogul base, more than 80W	0.0%	0.0
3	LED 4' linear tube	47.1%	5.5
4	LED 2' linear tubes, 3' linear tubes, or U-tube	0.0%	0.0
5	LED strip kits replacing 4' tubes	0.0%	0.0
6	LED strip kits replacing 2' or 3' tubes, or U-tube	0.0%	0.0
7	LED linear troffer fixtures, replacing 2 to 3 lamp fixtures	0.0%	0.0
8	LED linear troffer fixtures, replacing 4 lamp fixtures	0.0%	0.0
9	LED high bay fixtures	21.2%	2.5
10	LED low bay fixtures and garage fixtures	10.6%	1.2
11	LED parking lot exterior poll fixture	0.0%	0.0
12	LED exit signs	10.6%	1.2

13	LED ceiling downlight fixtures	4.7%	0.6
14	Daylighting controls	0.0%	0.0
15	Ceiling-mounted occupancy sensors	0.0%	0.0
16	Wall-mounted occupancy sensors	10.6%	1.2
17	Network lighting controls	0.0%	0.0
18	None of these types of equipment	10.6%	1.2
98	Don’t know	21.2%	2.5
	Total	100%	11.8

19_QID11 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0

17	Other (Please specify)	69.3%	1.2
98	Don’t know	30.7%	0.6
	Total	100%	1.8

20_QID11 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

21_QID11 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	29.0%	1.2
2	Medium Office	29.0%	1.2
3	Small Office	12.9%	0.6
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	29.0%	1.2
98	Don’t know	0.0%	0.0
	Total	100%	4.3

22_QID11 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

23_QID11 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

24_QID11 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

25_QID11 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

26_QID11 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don't know	0.0%	0.0
	Total	100%	0.0

27_QID11 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	100.0%	2.5
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	2.5

28_QID11 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	100.0%	1.2
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	1.2

29_QID11 – What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel – Building	0.0%	0.0
15	Large Hotel – Building	0.0%	0.0
16	Midrise Apartment – Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don't know	0.0%	0.0
	Total	100%	0.0

30_QID11 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	100.0%	1.2
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	1.2

31_QID11 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	100.0%	0.6
98	Don’t know	0.0%	0.0
	Total	100%	0.6

32_QID11 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

33_QID11 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

34_QID11 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	100.0%	1.2
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	1.2

35_QID11 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

36_QID11 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	100.0%	1.2
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	1.2

37_QID11 - What type of building did you install the [Field-2] in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

QID15 - When you were deciding to install the lighting equipment, did you consider any of the following sources of information?

#	Question	Yes		No		Total
1	Emails from Ameren Missouri about saving energy	0.0%	0	100.0%	8.0	8.0
2	Information on Ameren Missouri's website	0.0%	0	100.0%	8.0	8.0
3	Bill inserts or other mailings from Ameren Missouri	0.0%	0	100.0%	8.0	8.0
4	Information from Ameren Missouri social media sources	0.0%	0	100.0%	8.0	8.0
5	Information from an Ameren Missouri account representative	0.0%	0	100.0%	8.0	8.0
6	Information from people who received a rebate from Ameren Missouri for installing energy-efficient equipment	15.5%	1.2	84.5%	6.8	8.0

QID12 - How important was that information in your decision to install this lighting equipment?

#	Answer	%	Count
0	0 (Not at all important)	0.0%	0.0
1	1	100.0%	1.2
2	2	0.0%	0.0
3	3	0.0%	0.0
4	4	0.0%	0.0
5	5	0.0%	0.0
6	6	0.0%	0.0
7	7	0.0%	0.0
8	8	0.0%	0.0
9	9	0.0%	0.0
10	10 (Extremely important)	0.0%	0.0
98	Don't know	0.0%	0.0

	Total	100%	1.2

QID13 - How likely would you have been to install the lighting equipment if you had not received that information from Ameren Missouri?

#	Answer	%	Count
0	0 (Definitely would not have installed)	0.0%	0.0
1	1	100.0%	1.2
2	2	0.0%	0.0
3	3	0.0%	0.0
4	4	0.0%	0.0
5	5	0.0%	0.0
6	6	0.0%	0.0
7	7	0.0%	0.0
8	8	0.0%	0.0
9	9	0.0%	0.0
10	10 (Definitely would have installed)	0.0%	0.0
98	Don't know	0.0%	0.0
	Total	100%	1.2

QID16 - What types of energy efficient equipment did you install as part of the HVAC project?

#	Answer	%	Count
1	Split air conditioning system (An A/C system that has an evaporator indoors and the compressor and condenser outdoors.)	100.0%	3.0
2	Packaged air conditioning system (A type of central air conditioning that contains both the air handler fan, compressor and condenser in a single unit. These are typically mounted on the roof.)	0.0%	0.0

3	Heat pump (An electric heating and cooling system)	59.1%	1.8
4	Air cooled chiller (A system that produces cold liquid sent around to individual spaces used for cooling air usually found in larger facilities)	0.0%	0.0
5	Water cooled chiller (A system that produces cold liquid sent around to individual spaces used for cooling air usually found in larger facilities)	0.0%	0.0
6	Another type	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	3.0

1_QID19 - What type of building did you install the heating/cooling equipment in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	40.9%	1.2
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0

17	Other (Please specify)	59.1%	1.8
98	Don’t know	0.0%	0.0
	Total	100%	3.0

2_QID19 - What type of building did you install the heating/cooling equipment in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

3_QID19 - What type of building did you install the heating/cooling equipment in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	100.0%	1.8
98	Don’t know	0.0%	0.0
	Total	100%	1.8

4_QID19 - What type of building did you install the heating/cooling equipment in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

5_QID19 - What type of building did you install the heating/cooling equipment in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

6_QID19 - What type of building did you install the heating/cooling equipment in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

7_QID19 - What type of building did you install the heating/cooling equipment in?

#	Answer	%	Count
1	Large Office	0.0%	0.0
2	Medium Office	0.0%	0.0
3	Small Office	0.0%	0.0
4	Warehouse	0.0%	0.0
5	Stand-alone Retail	0.0%	0.0
6	Strip Mall	0.0%	0.0
7	Primary School	0.0%	0.0
8	Secondary School	0.0%	0.0
9	Supermarket	0.0%	0.0
10	Quick Service Restaurant	0.0%	0.0
11	Full Service Restaurant	0.0%	0.0
12	Hospital	0.0%	0.0
13	Outpatient Health Care	0.0%	0.0
14	Small Hotel - Building	0.0%	0.0
15	Large Hotel - Building	0.0%	0.0
16	Midrise Apartment - Building	0.0%	0.0
17	Other (Please specify)	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

QID23 - When you were deciding to install the HVAC equipment, did you consider any of the following sources of information?

#	Question	Yes		No		Total
1	Emails from Ameren Missouri about saving energy	0.0%	0	100.0%	3.0	3.0
2	Information on Ameren Missouri’s website	0.0%	0	100.0%	3.0	3.0
3	Bill inserts or other mailings from Ameren Missouri	0.0%	0	100.0%	3.0	3.0
4	Information from Ameren Missouri social media sources	0.0%	0	100.0%	3.0	3.0
5	Information from an Ameren Missouri account representative	0.0%	0	100.0%	3.0	3.0
6	Information from people who received a rebate from Ameren Missouri for installing energy-efficient equipment	0.0%	0	100.0%	3.0	3.0

QID21 - How important was that information in your decision to install the HVAC equipment?

#	Answer	%	Count
0	0 (Not at all important)	0.0%	0.0
1	1	0.0%	0.0
2	2	0.0%	0.0
3	3	0.0%	0.0
4	4	0.0%	0.0
5	5	0.0%	0.0
6	6	0.0%	0.0
7	7	0.0%	0.0
8	8	0.0%	0.0
9	9	0.0%	0.0
10	10 (Extremely important)	0.0%	0.0
98	Don't know	0.0%	0.0

	Total	100%	0.0

QID22 - How likely would you have been to install the HVAC equipment if you had not received that information from Ameren Missouri?

#	Answer	%	Count
0	0 (Definitely would not have installed)	0.0%	0.0
1	1	0.0%	0.0
2	2	0.0%	0.0
3	3	0.0%	0.0
4	4	0.0%	0.0
5	5	0.0%	0.0
6	6	0.0%	0.0
7	7	0.0%	0.0
8	8	0.0%	0.0
9	9	0.0%	0.0
10	10 (Definitely would have installed)	0.0%	0.0
98	Don't know	0.0%	0.0
	Total	100%	0.0

QID24 - What type of compressed air improvements did you make? Please select all that apply.

#	Answer	%	Count
1	No loss condensate drain(s)	100.0%	2.5
2	Compressed air leak repair	50.0%	1.2
3	Compressed air nozzles	50.0%	1.2
4	VSD air compressor	0.0%	0.0

	Total	100%	2.5

QID25 - What type of compressor control operates on the system that the no loss condensate drain(s) were installed on? Please select all that apply.

#	Answer	%	Count
1	Reciprocating - On/off Control	100.0%	1.2
2	Reciprocating - Load/Unload	0.0%	0.0
3	Screw - Load/Unload	0.0%	0.0
4	Screw - Inlet Modulation	0.0%	0.0
5	Screw - Inlet Modulation w/ Unloading	0.0%	0.0
6	Screw - Variable Displacement	0.0%	0.0
7	Screw - VFD	0.0%	0.0
	Total	100%	1.2

QID101 - How many shifts operate at the facility where the no loss condensate drains were installed?

#	Answer	%	Count
1	Single shift	100.0%	1.2
2	Two shifts	0.0%	0.0
3	Three shifts	0.0%	0.0
4	Four shifts (24/7 schedule)	0.0%	0.0
	Total	100%	1.2

QID103 - What type of compressor control operates on the compressed air system that had an air leak repaired?

#	Answer	%	Count
1	Reciprocating - On/off Control	100.0%	1.2
2	Reciprocating - Load/Unload	0.0%	0.0
3	Screw - Load/Unload	0.0%	0.0
4	Screw - Inlet Modulation	0.0%	0.0
5	Screw - Inlet Modulation w/ Unloading	0.0%	0.0
6	Screw - Variable Displacement	0.0%	0.0
7	Screw - VFD	0.0%	0.0
	Total	100%	1.2

QID104 - How many shifts operate at the facility where the air leak was repaired?

#	Answer	%	Count
1	Single shift	100.0%	1.2
2	Two shifts	0.0%	0.0
3	Three shifts	0.0%	0.0
4	Four shifts (24/7 schedule)	0.0%	0.0
	Total	100%	1.2

QID105 - How many compressed air nozzles did you install?

#	Answer	%	Count
1	1	0.0%	0.0

2	2	100.0%	1.2
3	3	0.0%	0.0
4	4	0.0%	0.0
5	5 or more	0.0%	0.0
	Total	100%	1.2

Q43#1 - For each of the compressed air nozzles you installed, please select the size of the compressed ai... - Nozzle size

#	Question	1/8""		1/4""		5/16"		1/2"		Total
1	Nozzle 1	0.0%	0	100.0%	1.2	0.0%	0	0.0%	0	1.2
2	Nozzle 2	0.0%	0	100.0%	1.2	0.0%	0	0.0%	0	1.2
3	Nozzle 3	0.0%	0	0.0%	0	0.0%	0	0.0%	0	NaN
4	Nozzle 4	0.0%	0	0.0%	0	0.0%	0	0.0%	0	NaN
5	Nozzle 5	0.0%	0	0.0%	0	0.0%	0	0.0%	0	NaN

Q43#2 - For each of the compressed air nozzles you installed, please select the size of the compressed ai... - Air compressor type

#	Question	Reciprocating - On/off Control		Reciprocating - Load/Unload		Screw - Load/Unload		Screw - Inlet Modulation		Screw - Inlet Modulation w/ Unloading		Screw - Variable Displacement		Screw - VFD		Total
1	Nozzle 1	100.0%	1.2	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	1.2
2	Nozzle 2	100.0%	1.2	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	1.2
3	Nozzle 3	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	NaN

4	Nozzle 4	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	NaN
5	Nozzle 5	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	NaN

QID106 - How many shifts operate at the facility where the nozzles were installed?

#	Answer	%	Count
1	Single shift	100.0%	1.2
2	Two shifts	0.0%	0.0
3	Three shifts	0.0%	0.0
4	Four shifts (24/7 schedule)	0.0%	0.0
	Total	100%	1.2

QID29 - When you were deciding to make the compressed air improvements, did you consider any of the following sources of information?

#	Question	Yes		No		Total
1	Emails from Ameren Missouri about saving energy	0.0%	0	100.0%	1.2	1.2
2	Information on Ameren Missouri’s website	0.0%	0	100.0%	1.2	1.2
3	Bill inserts or other mailings from Ameren Missouri	0.0%	0	100.0%	1.2	1.2
4	Information from Ameren Missouri social media sources	0.0%	0	100.0%	1.2	1.2
5	Information from an Ameren Missouri account representative	0.0%	0	100.0%	1.2	1.2
6	Information from people who received a rebate from Ameren Missouri for installing energy-efficient equipment	0.0%	0	100.0%	1.2	1.2

QID27 - How important was that information in your decision to implement the compressed air improvements?

#	Answer	%	Count
0	0 (Not at all important)	0.0%	0.0
1	1	0.0%	0.0
2	2	0.0%	0.0
3	3	0.0%	0.0
4	4	0.0%	0.0
5	5	0.0%	0.0
6	6	0.0%	0.0
7	7	0.0%	0.0
8	8	0.0%	0.0
9	9	0.0%	0.0
10	10 (Extremely important)	0.0%	0.0
98	Don't know	0.0%	0.0
	Total	100%	0.0

QID28 - How likely would you have been to implement the compressed air improvements if you had not received that information from Ameren Missouri?

#	Answer	%	Count
0	0 (Definitely would not have installed)	0.0%	0.0
1	1	0.0%	0.0
2	2	0.0%	0.0
3	3	0.0%	0.0
4	4	0.0%	0.0

5	5	0.0%	0.0
6	6	0.0%	0.0
7	7	0.0%	0.0
8	8	0.0%	0.0
9	9	0.0%	0.0
10	10 (Definitely would have installed)	0.0%	0.0
98	Don't know	0.0%	0.0
	Total	100%	0.0

QID36 - When you were deciding to install the efficient motors, did you consider any of the following sources of information?

#	Question	Yes		No		Total
1	Emails from Ameren Missouri about saving energy	0.0%	0	100.0%	1.1	1.1
2	Information on Ameren Missouri's website	0.0%	0	100.0%	1.1	1.1
3	Bill inserts or other mailings from Ameren Missouri	0.0%	0	100.0%	1.1	1.1
4	Information from Ameren Missouri social media sources	0.0%	0	100.0%	1.1	1.1
5	Information from an Ameren Missouri account representative	0.0%	0	100.0%	1.1	1.1
6	Information from people who received a rebate from Ameren Missouri for installing energy-efficient equipment	0.0%	0	100.0%	1.1	1.1

QID34 - How important was your experience with the program in your decision to install efficient motors?

#	Answer	%	Count
0	0 (Not at all important)	0.0%	0.0
1	1	0.0%	0.0
2	2	0.0%	0.0

3	3	0.0%	0.0
4	4	0.0%	0.0
5	5	0.0%	0.0
6	6	0.0%	0.0
7	7	0.0%	0.0
8	8	0.0%	0.0
9	9	0.0%	0.0
10	10 (Extremely important)	0.0%	0.0
98	Don't know	0.0%	0.0
	Total	100%	0.0

QID35 - How likely would you have been to install the efficient motors if you had not received that information from Ameren Missouri?

#	Answer	%	Count
0	0 (Definitely would not have installed)	0.0%	0.0
1	1	0.0%	0.0
2	2	0.0%	0.0
3	3	0.0%	0.0
4	4	0.0%	0.0
5	5	0.0%	0.0
6	6	0.0%	0.0
7	7	0.0%	0.0
8	8	0.0%	0.0
9	9	0.0%	0.0
10	10 (Definitely would have installed)	0.0%	0.0
98	Don't know	0.0%	0.0
	Total	100%	0.0

QID37 - What types of energy efficient refrigeration equipment did you install?

#	Answer	%	Count
1	ENERGY STAR Commercial freezer	0.0%	0.0
2	ENERGY STAR Commercial refrigerator	50.0%	1.2
3	Anti-sweat heater controls	0.0%	0.0
4	LED refrigerated case lighting	0.0%	0.0
5	Refrigerated case covers	0.0%	0.0
6	Some other type of refrigeration equipment	0.0%	0.0
98	Don’t know	50.0%	1.2
	Total	100%	2.5

1_QID42 - Does this freezer have a solid door or a glass door?

#	Answer	%	Count
1	Solid door	0.0%	0.0
2	Glass door	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

1_QID43 - Is this a vertical freezer or a chest type freezer?

#	Answer	%	Count
1	Vertical	0.0%	0.0
2	Chest	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

2_QID42 - Does this freezer have a solid door or a glass door?

#	Answer	%	Count
1	Solid door	0.0%	0.0
2	Glass door	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

2_QID43 - Is this a vertical freezer or a chest type freezer?

#	Answer	%	Count
1	Vertical	0.0%	0.0
2	Chest	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

3_QID42 - Does this freezer have a solid door or a glass door?

#	Answer	%	Count
1	Solid door	0.0%	0.0
2	Glass door	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

3_QID43 - Is this a vertical freezer or a chest type freezer?

#	Answer	%	Count
1	Vertical	0.0%	0.0
2	Chest	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

1_QID57 - Does this refrigerator have a solid door or a glass door?

#	Answer	%	Count
1	Solid door	100.0%	1.2
2	Glass door	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	1.2

1_QID45 - Is this a vertical refrigerator or a chest type refrigerator?

#	Answer	%	Count
1	Vertical	100.0%	1.2
2	Chest	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	1.2

2_QID57 - Does this refrigerator have a solid door or a glass door?

#	Answer	%	Count
1	Solid door	100.0%	1.2
2	Glass door	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	1.2

2_QID45 - Is this a vertical refrigerator or a chest type refrigerator?

#	Answer	%	Count
1	Vertical	100.0%	1.2
2	Chest	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	1.2

3_QID57 - Does this refrigerator have a solid door or a glass door?

#	Answer	%	Count
1	Solid door	100.0%	1.2
2	Glass door	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	1.2

3_QID45 - Is this a vertical refrigerator or a chest type refrigerator?

#	Answer	%	Count
1	Vertical	100.0%	1.2
2	Chest	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	1.2

4_QID57 - Does this refrigerator have a solid door or a glass door?

#	Answer	%	Count
1	Solid door	0.0%	0.0
2	Glass door	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

4_QID45 - Is this a vertical refrigerator or a chest type refrigerator?

#	Answer	%	Count
1	Vertical	0.0%	0.0
2	Chest	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

5_QID57 - Does this refrigerator have a solid door or a glass door?

#	Answer	%	Count
1	Solid door	0.0%	0.0
2	Glass door	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

5_QID45 - Is this a vertical refrigerator or a chest type refrigerator?

#	Answer	%	Count
1	Vertical	0.0%	0.0
2	Chest	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

QID46 - Did you install humidity-based controls or conductivity-based controls, or both types?

#	Answer	%	Count
1	Humidity-based controls	0.0%	0.0
2	Conductivity-based controls	0.0%	0.0
3	Both types	0.0%	0.0
98	Don’t know	0.0%	0.0
	Total	100%	0.0

QID58 - When you were deciding to install the refrigeration equipment, did you consider any of the following sources of information?

#	Question	Yes		No		Total
1	Emails from Ameren Missouri about saving energy	0.0%	0	100.0%	2.5	2.5
2	Information on Ameren Missouri’s website	0.0%	0	100.0%	2.5	2.5
3	Bill inserts or other mailings from Ameren Missouri	0.0%	0	100.0%	2.5	2.5
4	Information from Ameren Missouri social media sources	0.0%	0	100.0%	2.5	2.5
5	Information from an Ameren Missouri account representative	0.0%	0	100.0%	2.5	2.5
6	Information from people who received a rebate from Ameren Missouri for installing energy-efficient equipment	50.0%	1.2	50.0%	1.2	2.5

QID55 - How important was that information in your decision to install the refrigeration equipment?

#	Answer	%	Count
0	0 (Not at all important)	0.0%	0.0
1	1	0.0%	0.0
2	2	0.0%	0.0
3	3	0.0%	0.0
4	4	0.0%	0.0
5	5	100.0%	1.2
6	6	0.0%	0.0
7	7	0.0%	0.0
8	8	0.0%	0.0
9	9	0.0%	0.0
10	10 (Extremely important)	0.0%	0.0
98	Don't know	0.0%	0.0

	Total	100%	1.2

QID56 - How likely would you have been to install the refrigeration equipment if you had not received that information from Ameren Missouri?

#	Answer	%	Count
0	0 (Definitely would not have installed)	0.0%	0.0
1	1	0.0%	0.0
2	2	0.0%	0.0
3	3	0.0%	0.0
4	4	0.0%	0.0
5	5	0.0%	0.0
6	6	0.0%	0.0
7	7	0.0%	0.0
8	8	0.0%	0.0
9	9	100.0%	1.2
10	10 (Definitely would have installed)	0.0%	0.0
98	Don't know	0.0%	0.0
	Total	100%	1.2

QID59 - What type of kitchen equipment did you install?

#	Answer	%	Count
1	Low flow pre-rinse spray valves	0.0%	0.0
2	ENERGY STAR Commercial fryers	0.0%	0.0
3	ENERGY STAR Commercial steam cookers	0.0%	0.0
4	ENERGY STAR hot food holding cabinets	0.0%	0.0

5	ENERGY STAR commercial griddles	0.0%	0.0
6	ENERGY STAR commercial convection ovens	0.0%	0.0
7	ENERGY STAR commercial combination ovens	0.0%	0.0
8	Some other type of kitchen equipment	0.0%	0.0
98	Don’t know	100.0%	1.2
	Total	100%	1.2

QID61 - Is the flow rate for any of the spray valves you installed equal to or less than 1.6 gallons per minute?

#	Answer	%	Count
1	Yes	0.0%	0.0
2	No	0.0%	0.0
98	Don't know	0.0%	0.0
	Total	100%	0.0

QID63 - Did you install the pre-rinse spray valves at the [Field-Address] location?

#	Answer	%	Count
1	Yes	0.0%	0.0
2	No	0.0%	0.0
98	Don't know	0.0%	0.0
	Total	100%	0.0

QID74 - When you were deciding to install the commercial kitchen equipment, did you consider any of the following sources of information?

#	Question	Yes		No		Total
1	Emails from Ameren Missouri about saving energy	0.0%	0	100.0%	1.2	1.2
2	Information on Ameren Missouri’s website	0.0%	0	100.0%	1.2	1.2
3	Bill inserts or other mailings from Ameren Missouri	0.0%	0	100.0%	1.2	1.2
4	Information from Ameren Missouri social media sources	0.0%	0	100.0%	1.2	1.2
5	Information from an Ameren Missouri account representative	0.0%	0	100.0%	1.2	1.2
6	Information from people who received a rebate from Ameren Missouri for installing energy-efficient equipment	0.0%	0	100.0%	1.2	1.2

QID72 - How important was that information in your decision to install the commercial kitchen equipment?

#	Answer	%	Count
0	0 (Not at all important)	0.0%	0.0
1	1	0.0%	0.0
2	2	0.0%	0.0
3	3	0.0%	0.0
4	4	0.0%	0.0
5	5	0.0%	0.0
6	6	0.0%	0.0
7	7	0.0%	0.0
8	8	0.0%	0.0
9	9	0.0%	0.0
10	10 (Very important)	0.0%	0.0
98	Don't Know	0.0%	0.0

	Total	100%	0.0

QID73 - How likely would you have been to install the commercial kitchen equipment if you had not received that information from Ameren Missouri?

#	Answer	%	Count
0	0 (Definitely would not have installed)	0.0%	0.0
1	1	0.0%	0.0
2	2	0.0%	0.0
3	3	0.0%	0.0
4	4	0.0%	0.0
5	5	0.0%	0.0
6	6	0.0%	0.0
7	7	0.0%	0.0
8	8	0.0%	0.0
9	9	0.0%	0.0
10	10 (Definitely would have installed)	0.0%	0.0
98	Don't Know	0.0%	0.0
	Total	100%	0.0

QID117 - When you were deciding to install the other equipment you mentioned, did you consider any of the following sources of information?

#	Question	Yes		No		Total
1	Emails from Ameren Missouri about saving energy	9.5%	0.6	90.5%	5.3	5.8
2	Information on Ameren Missouri’s website	0.0%	0	100.0%	5.8	5.8
3	Bill inserts or other mailings from Ameren Missouri	9.5%	0.6	90.5%	5.3	5.8
4	Information from Ameren Missouri social media sources	0.0%	0	100.0%	5.8	5.8

5	Information from an Ameren Missouri account representative	0.0%	0	100.0%	5.8	5.8
6	Information from people who received a rebate from Ameren Missouri for installing energy-efficient equipment	0.0%	0	100.0%	5.8	5.8

QID118 - How important was that information in your decision to install the other equipment?

#	Answer	%	Count
0	0 (Not at all important)	0.0%	0.0
1	1	0.0%	0.0
2	2	0.0%	0.0
3	3	0.0%	0.0
4	4	0.0%	0.0
5	5	0.0%	0.0
6	6	0.0%	0.0
7	7	0.0%	0.0
8	8	0.0%	0.0
9	9	0.0%	0.0
10	10 (Very important)	0.0%	0.0
98	Don't Know	100.0%	0.6
	Total	100%	0.6

QID119 - How likely would you have been to install the other equipment if you had not received that information from Ameren Missouri?

#	Answer	%	Count
0	0 (Definitely would not have installed)	100.0%	0.6
1	1	0.0%	0.0

2	2	0.0%	0.0
3	3	0.0%	0.0
4	4	0.0%	0.0
5	5	0.0%	0.0
6	6	0.0%	0.0
7	7	0.0%	0.0
8	8	0.0%	0.0
9	9	0.0%	0.0
10	10 (Definitely would have installed)	0.0%	0.0
98	Don't Know	0.0%	0.0
	Total	100%	0.6

QID75 - Is your organization responsible for purchasing the lighting at your location?

#	Answer	%	Count
1	Yes	92.9%	61.9
2	No	3.5%	2.3
98	Don’t know	3.5%	2.3
99	Refused	0.0%	0.0
	Total	100%	66.6

QID95 - Thinking about all of the lighting at your work location, about what proportion does LED lighting make up? Would you say…

#	Answer	%	Count
1	None or very little	22.8%	14.1
2	More than very little, but less than half	10.9%	6.8

3	About half	8.9%	5.5
4	More than half, but not nearly all	8.9%	5.5
5	All or nearly all	44.4%	27.5
98	Don't know	4.0%	2.5
	Total	100%	61.9

QID96 - About what percentage of your organization's total monthly operating costs do your electricity bills make up?

#	Answer	%	Count
1	Percentage:	61.4%	38.0
98	Don't know	38.6%	23.9
	Total	100%	61.9

QID97 - How likely would you be to replace your organization's lighting if you could reduce monthly electric bills by 10% to 20%?

#	Answer	%	Count
1	1 (Not at all likely)	13.5%	9.0
2	2	14.9%	10.0
3	3	27.6%	18.4
4	4	14.7%	9.8
5	5 (Very likely)	29.3%	19.5
	Total	100%	66.6

QID99 - How likely would you be to replace your organization's lighting if you could reduce monthly electric bills by more than 20%?

#	Answer	%	Count
1	1 (Not at all likely)	10.2%	6.6
2	2	11.5%	7.5
3	3	19.6%	12.7
4	4	15.1%	9.8
5	5 (Very likely)	43.5%	28.2
	Total	100%	64.8

QID98 - The Ameren Missouri Small Business Direct Install, or SBDI, program provides free walk-through energy assessments and cash incentives that typically cover at least half the cost of new, efficient lighting equipment. Several designated Service Providers provide the walk-through assessments and completely handle the application process. If an SBDI Service Provider contacted your organization, how likely is it that your organization would schedule a free walk-through energy assessment? Please use a 1 to 5 scale where 1 means "not at all likely" and 5 means "extremely likely".

#	Answer	%	Count
1	1 (Not at all likely)	22.3%	10.9
2	2	20.0%	9.8
3	3	23.9%	11.8
4	4	12.7%	6.2
5	5 (Very likely)	21.1%	10.4
	Total	100%	49.1

QID81 - Thinking about your work location, does your organization…

	Answer	%	Count
1	Own and occupy the entire building	41.4%	28.2
2	Own the building and occupy part of it while leasing parts to others	8.8%	6.0
3	Lease the space	43.8%	29.8
4	Other – specify:	6.1%	4.1
	Total	100%	68.1

9 Trade Ally Survey Responses

Q1 - Which of the following best describes your position at your organization?

#	Answer	%	Count
1	Owner	14.3%	3
2	Executive or decision maker	19.0%	4
3	Manager	4.8%	1
4	Sales role	38.1%	8
5	Installer or service technician	4.8%	1
6	Customer service representative	0.0%	0
7	Office/Administrative role	9.5%	2
8	Other (Please specify)	9.5%	2
	Total	100%	21

Q2 - How long have you been an active trade ally (or builder) with Ameren Missouri's BizSavers® Program?

#	Answer	%	Count
1	Number of years:	76.2%	16
98	Don't know	23.8%	5
	Total	100%	21

#	Answer	%	Count
1	1	6.7%	1

2	2	13.3%	2
3	3	13.3%	2
5	5	13.3%	2
7	7	6.7%	1
8	8	6.7%	1
9	9	6.7%	1
10	10	13.3%	2
12	12	6.7%	1
14	14	6.7%	1
15	15	6.7%	1
	Total	100%	15

Q3 - What are your primary reasons for your company's involvement with the Ameren Missouri BizSavers Program? Please select all that apply.

#	Answer	%	Count
1	Make more money or increase profit: Participate to increase business and profitability.	65.0%	13
2	Market Differentiation: To differentiate our services from competitors by leveraging the program's recognition.	65.0%	13
3	Customer Demand: Responding to customer demand for more sustainable and energy-efficient solutions.	70.0%	14
4	Technical Support: Access to technical support and resources provided by the program.	25.0%	5
5	Training Opportunities: Opportunities for staff training and development in energy efficiency practices.	25.0%	5
6	Marketing and Visibility: Increased marketing and visibility provided by the program.	45.0%	9
7	Environmental Impact: Commitment to reducing our environmental impact.	60.0%	12
8	For some other reason (Please describe)	5.0%	1
	Total	100%	20

Q4 - What type of work does your company specialize in? Please select all that apply.

#	Answer	%	Count
1	Building Automation Systems/Controls	57.1%	12
2	HVAC	61.9%	13
3	Lighting	85.7%	18
4	Lighting Controls	85.7%	18
5	General Contractor	23.8%	5
6	Refrigeration/Commercial Kitchens	14.3%	3
7	PC Power Management	19.0%	4
8	Compressed Air Systems	23.8%	5
9	Chillers	38.1%	8
10	Other (Please specify)	14.3%	3
	Total	100%	21

Q5 - What areas of Ameren Missouri's service area do you provide services to? Please select all that apply.

#	Answer	%	Count
1	St Louis Metro	90.5%	19
2	Outer St Louis suburbs	81.0%	17
3	North or Central Missouri	71.4%	15
4	Southeastern Missouri	81.0%	17
	Total	100%	21

Q6 - Does your business participate in any of these utility electricity energy efficiency programs? Please select all that apply.

#	Answer	%	Count
1	Evergy Missouri Programs	68.4%	13
2	Empire District Electric Company/Liberty Utilities	31.6%	6
3	Ameren Illinois Efficiency Programs	100.0%	19
4	Other programs outside of Missouri	47.4%	9
	Total	100%	19

Q7 - About what share of the projects you work on for commercial and industrial organizations include Ameren Missouri incentives? Your best guess is fine.

#	Answer	%	Count
1	0 - 10%	28.6%	6
2	11% - 35%	33.3%	7
3	36% - 65%	14.3%	3
4	65% - 90%	19.0%	4
5	91% - 100%	4.8%	1
	Total	100%	21

Q8 - Thinking about all the projects you work on for commercial and industrial organizations, including those outside of Ameren Missouri's service area, what share of the projects that you work include utility incentives? Your best guess is fine.

#	Answer	%	Count
1	0 - 10%	9.5%	2
2	11% - 35%	28.6%	6
3	36% - 65%	19.0%	4
4	65% - 90%	28.6%	6
5	91% - 100%	14.3%	3
6	Do not do work outside of Ameren Missouri's service area	0.0%	0
	Total	100%	21

Q9 - How effectively do the Ameren Missouri Programs meet the specific needs of each type of customer listed below?

#	Question	1 (Not effective)		2		3		4		5 (Highly effective)		Don't know / No experience with customer type		Total
1	Small Businesses	0.0%	0	10.5%	2	15.8%	3	26.3%	5	36.8%	7	10.5%	2	19
2	Midsized Commercial Organizations	0.0%	0	0.0%	0	5.3%	1	42.1%	8	47.4%	9	5.3%	1	19
3	Large Commercial Organizations	0.0%	0	5.3%	1	0.0%	0	52.6%	10	31.6%	6	10.5%	2	19
4	Large Industrial	0.0%	0	5.6%	1	11.1%	2	38.9%	7	33.3%	6	11.1%	2	18

	Organizations													
5	Nonprofit Organizations	0.0%	0	11.8%	2	17.6%	3	29.4%	5	35.3%	6	5.9%	1	17
6	Government Entities	6.3%	1	6.3%	1	25.0%	4	18.8%	3	18.8%	3	25.0%	4	16
7	Franchises	0.0%	0	12.5%	2	6.3%	1	12.5%	2	18.8%	3	50.0%	8	16
8	Rural Businesses	6.3%	1	18.8%	3	12.5%	2	6.3%	1	31.3%	5	25.0%	4	16
9	Urban Businesses	0.0%	0	0.0%	0	23.5%	4	23.5%	4	41.2%	7	11.8%	2	17
10	Technology and Start-Up Companies	5.9%	1	5.9%	1	11.8%	2	11.8%	2	17.6%	3	47.1%	8	17
11	Manufacturing Plants (Light and Heavy)	0.0%	0	11.1%	2	5.6%	1	22.2%	4	44.4%	8	16.7%	3	18
12	Hospitality	0.0%	0	16.7%	3	5.6%	1	38.9%	7	27.8%	5	11.1%	2	18
13	Schools	0.0%	0	0.0%	0	27.8%	5	16.7%	3	44.4%	8	11.1%	2	18
14	Restaurants / Food services	5.9%	1	5.9%	1	17.6%	3	35.3%	6	23.5%	4	11.8%	2	17
15	Retailers	0.0%	0	5.6%	1	22.2%	4	33.3%	6	27.8%	5	11.1%	2	18

1_Q10 - Why do you say that the Ameren Missouri programs and incentives are not very effective for [Field-2]? Please select all that apply.

#	Answer	%	Count
1	Not enough interest in energy efficiency	50.0%	2
2	Incentives are too low	100.0%	4
3	Limited financial benefits for saving energy	50.0%	2
4	Few opportunities improve energy efficiency	0.0%	0
5	Too much disruption to business	0.0%	0

6	Program equipment is not a good fit for the business	0.0%	0
7	Language or cultural barriers for typical business owners/decision makers	0.0%	0
8	Lack of internal resources to plan and manage projects	25.0%	1
	Total	100%	4

2_Q10 - Why do you say that the Ameren Missouri programs and incentives are not very effective for [Field-2]? Please select all that apply.

#	Answer	%	Count
1	Not enough interest in energy efficiency	0.0%	0
2	Incentives are too low	100.0%	3
3	Limited financial benefits for saving energy	66.7%	2
4	Few opportunities improve energy efficiency	0.0%	0
5	Too much disruption to business	0.0%	0
6	Program equipment is not a good fit for the business	0.0%	0
7	Language or cultural barriers for typical business owners/decision makers	0.0%	0
8	Lack of internal resources to plan and manage projects	0.0%	0
	Total	100%	3

3_Q10 - Why do you say that the Ameren Missouri programs and incentives are not very effective for [Field-2]? Please select all that apply.

#	Answer	%	Count
1	Not enough interest in energy efficiency	33.3%	1
2	Incentives are too low	0.0%	0
3	Limited financial benefits for saving energy	0.0%	0
4	Few opportunities improve energy efficiency	33.3%	1
5	Too much disruption to business	0.0%	0

6	Program equipment is not a good fit for the business	33.3%	1
7	Language or cultural barriers for typical business owners/decision makers	0.0%	0
8	Lack of internal resources to plan and manage projects	33.3%	1
	Total	100%	3

4_Q10 - Why do you say that the Ameren Missouri programs and incentives are not very effective for [Field-2]? Please select all that apply.

#	Answer	%	Count
1	Not enough interest in energy efficiency	0.0%	0
2	Incentives are too low	33.3%	1
3	Limited financial benefits for saving energy	0.0%	0
4	Few opportunities improve energy efficiency	66.7%	2
5	Too much disruption to business	33.3%	1
6	Program equipment is not a good fit for the business	33.3%	1
7	Language or cultural barriers for typical business owners/decision makers	0.0%	0
8	Lack of internal resources to plan and manage projects	33.3%	1
	Total	100%	3

7_Q10 - Why do you say that the Ameren Missouri programs and incentives are not very effective for [Field-2]? Please select all that apply.

#	Answer	%	Count
1	Not enough interest in energy efficiency	0.0%	0
2	Incentives are too low	33.3%	1
3	Limited financial benefits for saving energy	33.3%	1
4	Few opportunities improve energy efficiency	0.0%	0
5	Too much disruption to business	33.3%	1

6	Program equipment is not a good fit for the business	0.0%	0
7	Language or cultural barriers for typical business owners/decision makers	0.0%	0
8	Lack of internal resources to plan and manage projects	33.3%	1
	Total	100%	3

8_Q10 - Why do you say that the Ameren Missouri programs and incentives are not very effective for [Field-2]? Please select all that apply.

#	Answer	%	Count
1	Not enough interest in energy efficiency	33.3%	1
2	Incentives are too low	33.3%	1
3	Limited financial benefits for saving energy	33.3%	1
4	Few opportunities improve energy efficiency	33.3%	1
5	Too much disruption to business	0.0%	0
6	Program equipment is not a good fit for the business	0.0%	0
7	Language or cultural barriers for typical business owners/decision makers	0.0%	0
8	Lack of internal resources to plan and manage projects	33.3%	1
	Total	100%	3

9_Q10 - Why do you say that the Ameren Missouri programs and incentives are not very effective for [Field-2]? Please select all that apply.

#	Answer	%	Count
1	Not enough interest in energy efficiency	0.0%	0
2	Incentives are too low	50.0%	1
3	Limited financial benefits for saving energy	50.0%	1
4	Few opportunities improve energy efficiency	0.0%	0
5	Too much disruption to business	0.0%	0

6	Program equipment is not a good fit for the business	0.0%	0
7	Language or cultural barriers for typical business owners/decision makers	0.0%	0
8	Lack of internal resources to plan and manage projects	50.0%	1
	Total	100%	2

10_Q10 - Why do you say that the Ameren Missouri programs and incentives are not very effective for [Field-2]? Please select all that apply.

#	Answer	%	Count
1	Not enough interest in energy efficiency	50.0%	1
2	Incentives are too low	0.0%	0
3	Limited financial benefits for saving energy	0.0%	0
4	Few opportunities improve energy efficiency	50.0%	1
5	Too much disruption to business	0.0%	0
6	Program equipment is not a good fit for the business	0.0%	0
7	Language or cultural barriers for typical business owners/decision makers	0.0%	0
8	Lack of internal resources to plan and manage projects	50.0%	1
	Total	100%	2

11_Q10 - Why do you say that the Ameren Missouri programs and incentives are not very effective for [Field-2]? Please select all that apply.

#	Answer	%	Count
1	Not enough interest in energy efficiency	50.0%	1
2	Incentives are too low	50.0%	1
3	Limited financial benefits for saving energy	0.0%	0
4	Few opportunities improve energy efficiency	0.0%	0
5	Too much disruption to business	50.0%	1

6	Program equipment is not a good fit for the business	50.0%	1
7	Language or cultural barriers for typical business owners/decision makers	0.0%	0
8	Lack of internal resources to plan and manage projects	50.0%	1
	Total	100%	2

12_Q10 - Why do you say that the Ameren Missouri programs and incentives are not very effective for [Field-2]? Please select all that apply.

#	Answer	%	Count
1	Not enough interest in energy efficiency	50.0%	1
2	Incentives are too low	50.0%	1
3	Limited financial benefits for saving energy	50.0%	1
4	Few opportunities improve energy efficiency	0.0%	0
5	Too much disruption to business	50.0%	1
6	Program equipment is not a good fit for the business	0.0%	0
7	Language or cultural barriers for typical business owners/decision makers	0.0%	0
8	Lack of internal resources to plan and manage projects	0.0%	0
	Total	100%	2

13_Q10 - Why do you say that the Ameren Missouri programs and incentives are not very effective for [Field-2]? Please select all that apply.

#	Answer	%	Count
1	Not enough interest in energy efficiency	50.0%	1
2	Incentives are too low	50.0%	1
3	Limited financial benefits for saving energy	0.0%	0
4	Few opportunities improve energy efficiency	0.0%	0
5	Too much disruption to business	0.0%	0

6	Program equipment is not a good fit for the business	0.0%	0
7	Language or cultural barriers for typical business owners/decision makers	0.0%	0
8	Lack of internal resources to plan and manage projects	50.0%	1
	Total	100%	2

14_Q10 - Why do you say that the Ameren Missouri programs and incentives are not very effective for [Field-2]? Please select all that apply.

#	Answer	%	Count
1	Not enough interest in energy efficiency	0.0%	0
2	Incentives are too low	50.0%	1
3	Limited financial benefits for saving energy	0.0%	0
4	Few opportunities improve energy efficiency	0.0%	0
5	Too much disruption to business	0.0%	0
6	Program equipment is not a good fit for the business	50.0%	1
7	Language or cultural barriers for typical business owners/decision makers	0.0%	0
8	Lack of internal resources to plan and manage projects	50.0%	1
	Total	100%	2

15_Q10 - Why do you say that the Ameren Missouri programs and incentives are not very effective for [Field-2]? Please select all that apply.

#	Answer	%	Count
1	Not enough interest in energy efficiency	0.0%	0
2	Incentives are too low	50.0%	1
3	Limited financial benefits for saving energy	0.0%	0
4	Few opportunities improve energy efficiency	50.0%	1
5	Too much disruption to business	0.0%	0

6	Program equipment is not a good fit for the business	50.0%	1
7	Language or cultural barriers for typical business owners/decision makers	0.0%	0
8	Lack of internal resources to plan and manage projects	50.0%	1
	Total	100%	2

16_Q10 - Why do you say that the Ameren Missouri programs and incentives are not very effective for [Field-2]? Please select all that apply.

#	Answer	%	Count
1	Not enough interest in energy efficiency	50.0%	1
2	Incentives are too low	0.0%	0
3	Limited financial benefits for saving energy	50.0%	1
4	Few opportunities improve energy efficiency	0.0%	0
5	Too much disruption to business	0.0%	0
6	Program equipment is not a good fit for the business	0.0%	0
7	Language or cultural barriers for typical business owners/decision makers	0.0%	0
8	Lack of internal resources to plan and manage projects	0.0%	0
	Total	100%	2

17_Q10 - Why do you say that the Ameren Missouri programs and incentives are not very effective for [Field-2]? Please select all that apply.

#	Answer	%	Count
1	Not enough interest in energy efficiency	33.3%	1
2	Incentives are too low	33.3%	1
3	Limited financial benefits for saving energy	33.3%	1
4	Few opportunities improve energy efficiency	0.0%	0
5	Too much disruption to business	0.0%	0

6	Program equipment is not a good fit for the business	0.0%	0
7	Language or cultural barriers for typical business owners/decision makers	0.0%	0
8	Lack of internal resources to plan and manage projects	33.3%	1
	Total	100%	3

Q11 - Are there energy efficient equipment or services that would help business customers save energy that are not currently incentivized in the Ameren Missouri Programs?

#	Answer	%	Count
1	Yes	38.9%	7
2	No	11.1%	2
98	Not sure	50.0%	9
	Total	100%	18

Q14 - Did you participate in any Ameren Missouri BizSavers training in the last 12 months?

#	Answer	%	Count
1	Yes	61.1%	11
2	No	27.8%	5
98	Don't know	11.1%	2
	Total	100%	18

Q15 - How useful do you think that training was?

#	Answer	%	Count
1	1 (Not at all useful)	0.0%	0
2	2	0.0%	0
3	3	10.0%	1
4	4	50.0%	5
5	5 (Very useful)	40.0%	4
	Total	100%	10

Q17 - Do you think additional training opportunities should be provided to trade allies?

#	Answer	%	Count
1	Yes, please provide examples:	31.3%	5
2	No	68.8%	11
	Total	100%	16

Q19 - Which form of communication is most effective for providing information to you about program changes/updates?

#	Answer	%	Count
1	Email	83.3%	15
2	Phone calls from program representatives	5.6%	1
3	Presentations at events or conferences	5.6%	1
4	Website updates	5.6%	1

5	In person visits	0.0%	0
6	Other (Please Specify)	0.0%	0
	Total	100%	18

Q20 - How would you rate the following factors?

#	Question	1 (Not at all satisfied)		2		3		4		5 (Extremely satisfied)		Don't know		Total
1	Communication with Ameren Missouri or TRC BizSavers program staff	0.0%	0	0.0%	0	0.0%	0	27.8%	5	72.2%	13	0.0%	0	18
2	Required paperwork for projects	0.0%	0	11.1%	2	11.1%	2	38.9%	7	38.9%	7	0.0%	0	18
3	The incentive amounts	0.0%	0	11.1%	2	33.3%	6	22.2%	4	33.3%	6	0.0%	0	18
4	The range of program-qualifying equipment	5.6%	1	16.7%	3	22.2%	4	27.8%	5	27.8%	5	0.0%	0	18
5	Project turnaround time	0.0%	0	0.0%	0	11.1%	2	38.9%	7	50.0%	9	0.0%	0	18
6	The BizSavers® Program, overall	0.0%	0	0.0%	0	11.1%	2	44.4%	8	44.4%	8	0.0%	0	18