

BizSavers Program Evaluation Report

Volume II of II

March 2016 - February 2017

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Ameren Missouri

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1. Introduction

This report is divided into two volumes providing information on the impact, process, and cost effectiveness evaluation of the BizSavers portfolio of programs for the period March 2016 through February 2017. Volume II contains appendices presenting detailed information regarding evaluation methodologies, data collection instruments, and evaluation results. Volume II is organized as follows:

- Appendix 2 presents site-level gross impact evaluation reports for each site in which measurement and verification of energy savings was performed.
- Appendix 3 presents detailed information regarding the results of the gross impact evaluation, including a discussion of high impact measures (HIM).
- Appendix 4 contains the staff and implementer interview guide.
- Appendix 5 contains the online participant survey instrument.
- Appendix 6 presents the New Construction Program participant interview guide.
- Appendix 7 presents the SBDI participant interview guide.
- Appendix 8 contains the Standard and Custom Program near participant interview guide.
- Appendix 9 presents the non-participant survey instrument.
- Appendix 10 presents the trade ally process interview guide.
- Appendix 11 provides the service provider interview guide.
- Appendix 12 provides detailed information regarding the non-participant spillover evaluation methodology.
- Appendix 13 presents the heating and cooling interaction factors used in assessment of ex post energy savings of lighting measures in conditioned spaces.
- Appendix 14 presents detailed information pertaining to the cost effectiveness evaluation.
- Appendix 15 contains a glossary of terms used in the evaluation report.

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

2. Site-Level Estimation of Ex Post Gross Savings

Site ID 1200

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and post-retrofit connected loads, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 8/3/16 and 8/22/16.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014125-100208-Lighting-Non Linear LED Fixture Replacing Metal Halide Fixture	1169	Lighting	Custom	290	290	461	146	4,463	1.02	427,518	414,567	97%
Total										427,518	414,567	97%

The annual lighting hours of operation verified during the M&V site visit (4,463) are less than the annual hours of operation used to calculate ex ante savings (4,680).

A heating and cooling interactive factor of 1.02, applicable to a gas heated, air conditioned light manufacturing facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 97%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	427,518	414,567	97%	78.75
Total		427,518	414,567	97%	78.75

¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing

Data Collection

The participant received Standard refrigeration incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, nameplate information, and operating characteristics of an installed True self-contained commercial glass door freezer.

Analysis Results

Freezer Savings Calculations

<i>Measure</i>	<i>Quantity</i>	<i>Cabinet Volume (ft³)</i>	<i>Baseline Daily Energy Usage (kWh/Day)</i>	<i>Efficient Daily Energy Usage (kWh/Day)</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
Self-contained Glass Door Freezer	1	49	40.85	25.75	3,869	5,515	143%
Total					3,869	5,515	143%

The ex ante analysis references deemed estimates from the 2016 Ameren Missouri TRM for a freezer volume of 40 ft³, and accounts for 365 days annually. The ex post analysis references the actual freezer volume of 49 ft³, and accounts for 365.25 days annually to include leap year. A table showing calculation algorithms for baseline and efficient energy consumption is shown below.

Freezer Daily Energy Consumption

<i>Type</i>	<i>kWh/Day</i>
Glass Door Freezer - Baseline ²	0.75 * V + 4.10
Glass Door Freezer - Efficient ³	0.250 * V + 13.500

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 143%.

² Department of Energy. Electronic Code Of Federal Regulations. <http://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=d4f708bf8f0bc88702b59230eba89ad6&mc=true&n=pt10.3.431&r=PART&ty=HTML#se10.3.431_166>

³ ENERGY STAR Program Requirements for Commercial Refrigerators and Freezers Partner Commitments Version 2.0, U.S. Environmental Protection Agency. <http://www.energystar.gov/ia/partners/product_specs/program_reqs/commer_refrig_glass_prog_req.pdf>

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Refrigeration	3,869	5,515	143%	0.75
Total		3,869	5,515	143%	0.75

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and post-retrofit connected loads, and determined the lighting operating schedule.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
014195-100208-Lighting-Non Linear LED Fixture Replacing Metal Halide Fixture	1169	Exterior	Custom	50	50	210	52	4,311	1.00	34,602	34,053	98%
		Miscellaneous		55	55	210	52	8,760	1.00	76,124	76,124	100%
Total										110,726	110,177	100%

The annual lighting hours of operation verified during the M&V site visit range between 4,311 and 8,760. The annual lighting hours of operation for the first line item in the table above (4,311) are less than the hours of operation used to calculate ex ante savings (4,380), photo cells were used with this measure. The second line item in the above table operated 24/7.

The ex ante savings estimate claimed 'lighting' as the end use category for the first line item in the above table. The installation was in a covered garage with non-daylighting hours.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 100%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Exterior	36,602	34,053	98%	0.19
	Miscellaneous	76,124	76,124	100%	10.50
Total		110,726	110,177	100%	10.69

⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and post-retrofit connected load, and determined the lighting operating schedule. Annual lighting operating hours were verified through collaboration with facility personnel.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014156-100208-Lighting-Non Linear LED Fixture Replacing Metal Halide Fixture	1169	Lighting	Custom	715	757	403	200	6,019	1.10	822,795	902,137	110%
Total										822,795	902,137	110%

The annual lighting hours of operation verified during the M&V site visit (6,019) was greater than the annual lighting hours of operation used to calculate ex ante savings (6,017).

A heating and cooling interactive factor of 1.10, applicable to a gas heated, air conditioned large one story retail facility in Jefferson City, was applied to the ex post lighting energy savings. No heating and cooling factor was applied to 90 fixtures, which were located within two locations that were not air conditioned. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 110%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	822,795	902,137	110%	171.37
Total		822,795	902,137	110%	171.37

⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and post-retrofit connected load, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 8/17/16 and 9/14/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014124-100104-Lighting-Linear Tube LED Fixture Replacing T8 Fixture	1169	Lighting	Custom	249	249	62	30	4,348	1.11	35,059	38,540	110%
				1,049	1,049	72	38	4,348	1.11	156,930	172,510	110%
				9	9	112	60	4,767	1.11	2,059	2,482	121%
				69	69	85	45	4,767	1.11	12,144	14,635	121%
				701	701	62	30	4,767	1.11	98,701	118,947	121%
				113	113	30	15	4,767	1.11	7,458	8,988	121%
				177	177	46	26	4,767	1.11	15,576	18,771	121%
				17	17	72	38	4,767	1.11	2,543	3,065	121%
Total									330,470	377,938	114%	

The annual lighting hours of operation verified during the M&V site visit range between 4,348 and 4,767. The average annual lighting hours of operation (averaged by reduction in connected load) are greater than the hours of operation used to calculate ex ante savings (4,400).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned large 3-story retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 114%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Custom	Lighting	330,470	377,938	114%	71.79
Total		330,470	377,938	114%	71.79

⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and post-retrofit connected load, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014447-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp	3007	Lighting	Standard	180	180	65	9	3,724	1.12	24,664	41,967	170%
014447-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			40	40	29	7	3,724	1.12	3,228	3,747	116%
014447-201212-Lighting-LED 12-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			10	10	72	16	3,724	1.12	2,027	2,331	115%
Total										29,919	48,045	161%

The annual lighting hours of operation verified during the M&V site visit (3,724) are less than the annual hours of operation used to calculate ex ante savings (3,754). The ex ante annual hours of operation did not account for the 5 observed holidays.

The ex post savings analysis for the first line item in the above table used the application stated wattage of 65 W. The ex ante baseline wattage of 45.5 W was computed by factoring 70% of a 65W incandescent lamp, however, a BR lamp is exempt from wattage adjustment.

An adjusted wattage for the second and third line items in the table above, 29W and 72W, respectively, was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 40W and 100W incandescent lamp. The ex ante wattage of 28W and 70W was computed within the application by factoring 70% of a 40W and 100W incandescent lamp.

A heating and cooling interactive factor of 1.12, applicable to a gas heated, electric air conditioned full service restaurant in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 161%.

⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	29,919	48,045	161%	9.13
Total		29,919	48,045	161%	9.13

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and post-retrofit connected load, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014424-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025	Lighting	Standard	1,240	1,240	32	18	5,010	1.11	106,868	96,573	90%
Total										106,868	96,573	90%

The annual lighting hours of operation verified during the M&V site visit (5,010) are less than the annual hours of operation used to calculate ex ante savings (6,156). The ex ante annual hours of operation are the average hours of operation for all stores across the country. Ex post annual hours of operation are defined as store hours with an additional 15 minutes for opening and closing. The facility is closed for 3 holidays annually.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned large one story retail facility in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 90%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	106,868	96,573	90%	18.35
Total		106,868	96,573	90%	18.35

⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and post-retrofit connected load, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014426-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025	Lighting	Standard	1,331	1,331	32	18	5,089	1.10	118,072	104,658	89%
Total										118,072	104,658	89%

The annual lighting hours of operation verified during the M&V site visit (5,089) are less than the annual hours of operation used to perform the ex ante savings estimate (6,156). The ex ante hours of operation provided in the application are the average hours of operation for all stores across the country. Ex post annual hours of operation are defined as store hours with an additional 15 minutes for opening and closing. The facility is closed for 3 holidays annually.

The quantity of lamps found during the M&V site visit (1,331) was lower than the quantity used in the ex ante savings estimate (1,370).

A heating and cooling interactive factor of 1.10, applicable to a gas heated, air conditioned large one story retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 89%.

⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	118,072	104,658	89%	19.88
Total		118,072	104,658	89%	19.88

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and post-retrofit connected load, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014208-100208-Lighting-Non Linear LED Fixture Replacing Metal Halide Fixture_2016228-17811	1169	Lighting	Custom	61	45	461	221	4,812	1.00	96,814	87,456	90%
Total										96,814	87,456	90%

The annual lighting hours of operation verified during the M&V site visit (4,811) are less than the annual hours of operation used to calculate ex ante savings (5,200).

The M&V site visit discovered 45 new fixtures installed, where ex ante savings referenced 43 fixtures.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁰

A table showing the energy savings achieved by measures evaluated for this site is shown below. The overall realization rate is 90%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	96,814	87,456	90%	16.61
Total		96,814	87,456	90%	16.61

¹⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and post-retrofit connected load, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 10/7/16 and 10/25/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014338-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025	Lighting	Standard	3,400	3,400	32	14	6,097	1.00	458,266	373,146	81%
400				400	32	14	3,650	1.11	31,536	29,066	92%	
014604-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp				84	84	32	12	3,957	1.10	14,717	7,352	50%
Total										504,519	409,563	81%

The annual lighting hours of operation verified during the M&V site visit, ranging between 3,650 and 6,097, are less than the hours of operation used to calculate ex ante savings, ranging between 4,380 and 8,760.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned office in St. Louis, was applied to the office and hallway ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹¹

A table showing the energy savings achieved by measures evaluated for this site is shown below. The overall realization rate is 81%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	504,519	409,563	81%	77.8
Total		504,519	409,563	81%	77.8

¹¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015420-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	70	70	53	8	2,641	1.03	8,772	8,505	97%
				11	11	65	8	-	1.03	1,584	-	0%
015420-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			5	5	35	9	3,139	1.03	366	422	115%
Total										10,722	8,927	83%

The annual lighting hours of operation verified during the M&V site visit range between 250 and 3,390. The average annual lighting hours of operation for the first and second line items in the table above (2,641 and 0, respectively) are less than the hours of operation used to calculate ex ante savings (2,816). The facility personnel stated that they never use the lighting fixtures where the second line item above was installed. The installation was close to a band stage and they do not want those lights on. The average annual lighting hours of operation for the third line item above (3,139) are greater than the hours of operation used to calculate the ex ante savings (2,816).

The ex ante savings estimate used an adjusted base wattage for the second line item in the table above of 45.5W by multiplying the provided wattage by 70%. The base lamps for this measure (BR reflector) are exempt from an adjusted wattage calculation.

The quantity of the second line item in the table above (11) verified during the M&V site visit is less than the ex ante savings quantity (15).

A heating and cooling interactive factor of 1.03, applicable to an electric heated, air conditioned full service restaurant in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The measure name for the first measure is not accurate. The baseline lamps were Incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 83%.

¹² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	10,722	8,927	83%	1.70
Total		10,722	8,927	83%	1.70

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015442-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	1151	Lighting	SBDI	52	52	53	8	4,563	1.11	9,291	11,693	126%
Total										9,291	11,693	126%

The annual lighting hours of operation verified during the M&V site visit (4,563) are greater than the annual hours of operation used to calculate ex ante savings (4,015).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 126%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	9,291	11,693	126%	2.22
Total		9,291	11,693	126%	2.22

¹³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site ID(s)

1180, 1182, 1183, 1184, & 1185

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visits, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewed facility personnel at each location regarding lighting operating hours and installed four photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 10/14/16 and 11/08/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014809-305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture	3005-1	Lighting	Standard	15	15	461	150	3,645	1.00	17,512	18,472	105%
014935-305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture				10	10	400	150	3,882	1.00	11,262	9,705	86%
014994-305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture				31	21	400	150	3,645	1.00	18,770	33,720	180%
015017-305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture				16	16	400	150	3,623	1.00	15,016	14,494	97%
015055-305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture				14	14	400	150	3,431	1.00	13,139	12,007	91%
Total										75,699	88,397	117%

The annual lighting hours of operation verified during the M&V site visit at four locations (ranging from 3,431 to 3,645) are less than the annual hours of operation used to calculate ex ante savings (3,754).

The annual lighting hours of operation verified during the M&V site visit for the remaining location (3,882) are greater than the annual hours of operation used to calculate ex ante savings (3,754). However, this location had an installed base and efficient quantity (10) that was less than the ex ante quantity (12).

The M&V site visit determined the first location listed in the above table removed 6 4LT8 fixtures and installed 3 additional of the efficient LED fixtures. While at the third location the base quantity was 31 instead of 20 and the efficient quantity 21 instead of 20.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁴

A table showing the energy savings achieved by the measures evaluated for these sites are shown below. The overall realization rate is 117%.

¹⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	75,699	88,397	117%	16.79
Total		75,699	88,397	117%	16.79

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015603-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	11	11	65	9	4,131	1.11	1,486	2,844	191%
				4	4	46	8	4,131	1.11	555	695	125%
015603-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			11	0	39	39	4,131	1.11	1,184	-	0%
Total										3,225	3,539	110%

The annual lighting hours of operation verified during the M&V site visit (4,131) are greater than the annual hours of operation used to calculate ex ante savings (3,650).

The ex ante savings estimate used an adjusted base wattage of 45.5W for the first line item in the table above by multiplying the provided wattage by 70%. The base lamps for this measure (BR reflector) is exempt from an adjusted wattage calculation.

The customer removed the third line item in the above table LED lamps and replaced with their original base lamps. The efficient lamps were not bright enough for the client.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The measure name for the first line item above is not accurate. The baseline lamps were Incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 110%.

¹⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	3,225	3,539	110%	0.67

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and post-retrofit connected load, and installed four photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 9/16/16 and 9/28/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014516-200101-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T12 <=40 Watt Lamp	3026	Lighting	Standard	406	406	40	17	7,870	1.01	27,192	74,273	273%
014516-201212-Lighting-LED 12-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			14	14	60	13	1,924	1.03	1,998	1,305	65%
Total										29,190	75,578	259%

The annual lighting hours of operation verified during the M&V site visit for the first line item in the table above (7,870) are greater than the annual hours of operation used to calculate ex ante savings (2,912). The ex ante hours of operation provided in the application closely represent office hours. The annual lighting hours of operation verified during the M&V site visit for the second measure (1,924) are less than the annual hours of operation used to calculate ex ante savings (2,912). These fixtures were installed in restroom locations where hours of use are lower.

The second line item in the table above efficient wattage (13) was found to be greater than the ex ante savings efficient wattage (11).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned office in St. Louis, was applied to the ex post lighting energy savings for the measures installed within the Public Works Office Building. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 259%.

¹⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	29,190	75,578	259%	14.36
Total		29,190	75,578	259%	14.36

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and post-retrofit connected load, and installed six photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 9/28/16 and 10/26/16.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014474-200707-Lighting-LED 111-130 Watt Lamp Replacing Interior HID 301-400 Watt Lamp	3005-1	Lighting	Standard	103	103	400	111	8,760	1.11	165,684	288,808	174%
014474-200101-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T12 <=40 Watt Lamp	3026			260	260	40	18	6,871	1.11	31,231	43,777	140%
Total										196,915	332,585	169%

The annual lighting hours of operation verified during the M&V site visit, ranging between 6,870 and 8,760, are greater than the annual hours of operation used to calculate ex ante savings (5,460). The majority of lamps operate 24/7 and do not follow the posted store hours, which was the basis for ex ante annual hours of operation.

The quantity of lamps found during the M&V site visit for the first line item in the above table (103) was less than the quantity used in ex ante savings (105).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 169%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	196,915	332,585	169%	63.18
Total		196,915	332,585	169%	63.18

¹⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015553-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008	Lighting	SBDI	37	37	50	8	2,308	1.11	3,601	3,972	110%
Total										3,601	3,972	110%

The annual lighting hours of operation verified during the M&V site visit (2,308) are less than the annual hours of operation used to calculate ex ante savings (2,317).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 110%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	3,601	3,972	110%	0.75
Total		3,601	3,972	110%	0.75

¹⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015435-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	5	5	53	9	1,782	1.05	501	413	82%
015435-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			12	12	50	7	2,227	1.11	774	1,272	164%
015435-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			6	6	32	17	2,227	1.11	207	222	107%
				8	8	32	17	300	1.11	36	40	111%
Total										1,518	1,947	128%

Lighting Controls Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	QTY	Controlled Wattage	Baseline Hours	Efficient Hours	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate	
015435-201518-Lighting-Single Technology Occupancy Sensor Controlling Lighting Circuit >50 and <=120 Watts	3080	Lighting	SBDI	2	18	1,844	1,291	1	250	21	8%	
Total										250	21	8%

The annual lighting hours of operation verified during the M&V site visit for the first three line items in the first table above (ranging from 1,782 to 2,227) are less than the annual hours of operation used to calculate ex ante savings (2,304).

The ex ante savings estimate used an adjusted base wattage of 35W for the second line item in the first table by multiplying the provided wattage by 70%. The base lamp for this measure (MR16) are exempt from an adjusted wattage calculation.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The lighting controls ex ante savings estimate assumes a greater impact on the lighting hours than calculated by the ex post energy savings analysis. These were installed in the restrooms where the owner would make sure the lights were off when the building was unoccupied.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 137%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	1,768	1,968	111%	0.42
Total		1,768	1,968	111%	0.42

¹⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015678-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026	Lighting	SBDI	40	40	34	15	2,537	1.09	2,035	2,109	104%
				32	32	34	15	2,537	1.09	1,628	1,687	104%
				50	100	96	22	2,537	1.09	6,960	7,216	104%
015678-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	SBDI	14	14	32	22	2,537	1.09	374	389	104%
				76	76	32	22	2,537	1.09	2,035	2,109	104%
Total										13,032	13,510	104%

The annual lighting hours of operation verified during the M&V site visit (2,537) are less than the annual hours of operation used to calculate ex ante savings (2,677).

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned light manufacturing in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 104%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
SBDI	Lighting	13,032	13,510	104%	2.57
Total		13,032	13,510	104%	2.57

²⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015498-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	37	37	60	9	4,572	1.11	6,470	9,461	146%
015498-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			6	6	65	9	3,390	1.11	729	1,273	175%
Total										7,199	10,734	149%

The annual lighting hours of operation verified during the M&V site visit (ranging from 3,390 to 4,572) are greater than the annual hours of operation used to calculate ex ante savings (3,285).

The ex ante savings estimate used an adjusted base wattage of 45.5W for the second line item in the table above by multiplying the provided wattage by 70%. The base lamps for this measures (BR reflector) are exempt from an adjusted wattage calculation.

The quantity of the first line item in the table above (37) verified during the M&V site visit is less than the ex ante savings quantity (39).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The measure name for the first line item above is not accurate. The baseline lamps were Incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 149%.

²¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	7,199	10,734	149%	2.04
Total		7,199	10,734	149%	2.04

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015506-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008	Lighting	SBDI	18	18	50	13	319	1.11	597	237	40%
				8	8	50	12	319	1.11	304	107	35%
015506-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			3	3	63	12	319	1.11	64	54	85%
Total										965	399	41%

The annual lighting hours of operation verified during the M&V site visit (319) are less than the annual hours of operation used to calculate ex ante savings (800).

The quantity of the first and second line items in the above table (18 and 8, respectively) verified during the M&V site visit is less than the ex ante savings quantity (20 and 10, respectively). The lamps were at the facility but not installed on either visit.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 41%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
SBDI	Lighting	965	399	41%	0.08
Total		965	399	41%	0.08

²² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 9/27/16 and 11/08/16.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015281-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008	Lighting	SBDI	66	66	53	13	1,887	1.11	5,726	5,585	98%
015281-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			19	19	50	7	1,887	1.11	1,772	1,707	96%
015281-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			4	4	43	10	1,887	1.11	282	280	99%
015281-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			6	6	53	13	8,760	1.11	2,102	2,358	112%
Total										9,882	9,930	100%

The annual lighting hours of operation verified during the M&V site visit for the first three line items in the above table (1,887) are less than the annual hours of operation used to calculate ex ante savings (2,169).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding End Use kW factor to the kWh savings.²³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 100%.

²³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	9,882	9,930	100%	1.89
Total		9,882	9,930	100%	1.89

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014104-100211-Lighting-Non Linear LED Fixture Replacing High Pressure Sodium Fixture	1169	Miscellaneous	Custom	320	320	119	57	8,760	1.00	173,798	173,798	100%
				913	913	119	57	8,760	1.00	495,869	495,869	100%
				660	660	119	57	8,760	1.00	358,459	358,459	100%
Total										1,028,126	1,028,126	100%

The realization rate indicates a highly accurate ex ante savings estimate. All lighting was confirmed to operate 24 hours per day.

The ex ante claimed the end use category for the first line item in the table above table as 'lighting'. The correct end use is 'miscellaneous'.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁴

A table showing the energy savings achieved by the measures evaluated for these sites are shown below. The gross realization rate is 100%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Custom	Miscellaneous	1,028,126	1,028,126	100%	141.82
Total		1,028,126	1,028,126	100%	141.82

²⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015558-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	11	11	65	9	3,896	1.11	1,528	2,682	176%
015558-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			13	13	35	35	3,896	1.11	1,269	-	0%
				4	4	35	5	3,896	1.11	450	518	115%
Total										3,247	3,200	99%

The annual lighting hours of operation verified during the M&V site visit (3,896) are greater than the annual hours of operation used to calculate ex ante savings (3,754).

The ex ante savings estimate used an adjusted base wattage of 45.5W for the first line item in the above table by multiplying the provided wattage by 70%. The base lamps for this measure (BR reflector) is exempt from an adjusted wattage calculation.

The customer had removed the efficient lamps for the second line item in the table above and reinstalled the base lamps in the fixtures. The implementer was informed that the customer had repeatedly tried to contact the trade ally for a solution for the area with no responses.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The measure name for the second and third line items above are not accurate. The baseline lamps were Incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 99%.

²⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	3,247	3,200	99%	0.61
Total		3,247	3,200	99%	0.61

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and post-retrofit connected load, and installed four photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 9/9/16 and 9/28/16.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014440-100208-Lighting-Non Linear LED Fixture Replacing Metal Halide Fixture	1169	Lighting	Custom	35	24	455	150	2909	1.00	51272	35847	70%
				155	44	455	150	2354	1.00	210953	150492	71%
				4	4	455	150	8,760	1.00	10,687	10,687	100%
Total									272,912	197,026	72%	

The annual lighting hours of operation verified during the M&V site visit, ranging between 2,354 and 2,909, are less than the annual hours of operation used to calculate ex ante savings, ranging between 3,300 and 4,160. The ex ante hours of operation provided in the application reflected 14 to 16 hour work days instead of 10 to 11 hour work days.

No adjustments were made to savings estimates regarding heating and cooling interactive effects due to no space heating or electric space cooling.

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 72%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	272,912	197,026	72%	37.43
Total		272,912	197,026	72%	37.43

Data Collection

The participant received Custom and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014417-100208- Lighting-Non Linear LED Fixture Replacing Metal Halide Fixture	1169	Misc.	Custom	28	14	455	213	8,760	1.00	85,480	85,480	100%
				568	568	215	45	8,760	1.00	845,865	845,866	100%
				6	6	295	108	8,760	1.00	9,829	9,829	100%
				168	168	455	79	8,760	1.00	553,352	553,352	100%
				61	61	295	39	8,760	1.00	136,796	136,796	100%
014683-201111- Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	12	12	29	7	8,760	1.14	2,208	2,631	119%
				12	12	43	10	8,760	1.14	3,364	3,946	117%
				24	24	43	10	8,760	1.14	6,728	7,892	117%
014683-201212- Lighting-LED 12-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			12	12	72	18	8,760	1.14	5,466	6,457	118%
				12	12	72	18	8,760	1.14	5,466	6,457	118%
				12	12	72	18	8,760	1.14	5,466	6,457	118%
014683-200808- Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			20	20	50	8	8,760	1.14	4,730	8,370	177%
				20	20	50	8	8,760	1.14	4,730	8,370	177%
				12	12	50	8	8,760	1.14	2,891	5,082	176%
014683-201010- Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008			40	40	75	13	8,760	1.14	21,900	24,911	114%
014683-200808- Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012	24	24	50	7	8,760	1.14	9,040	10,283	114%		
		24	24	50	7	8,760	1.14	9,040	10,283	114%		
Total										1,717,816	1,738,919	101%

The realization rate for the Custom incentives indicates a highly accurate ex ante savings estimate.

An adjusted base wattage of 29W, 43W, and 72W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 40W, 60W, and 100W incandescent lamp. The ex ante base wattages of 28W, 42W, and 70W was computed within the application by factoring 70% of the original incandescent wattage.

The ex ante savings estimate used an adjusted base wattage of 35W for the thirteenth through fifteenth measures by multiplying the provided wattage by 70%. The base lamps for these measures (MR16) are exempt from an adjusted wattage calculation.

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned assembly in St. Louis, was applied to the ex post lighting energy savings for the Standard incentives. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 101%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Miscellaneous	1,631,322	1,631,322	100%	225.03
Standard	Lighting	86,495	107,597	124%	20.44
Total		1,717,816	1,738,919	101%	245.47

²⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015293-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	SBDI	6	6	42	10	3,529	1.11	763	762	100%
015293-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			8	8	50	7	3,529	1.11	1,345	1,345	100%
Total										2,108	2,107	100%

The annual lighting hours of operation verified during the M&V site visit (3,529) are less than the annual hours of operation used to calculate ex ante savings (3,911).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 100%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	2,108	2,107	100%	0.40
Total		2,108	2,107	100%	0.40

²⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 9/02/16 and 9/28/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014126-100209-Lighting-Non Linear LED Fixture Replacing Pulse Start Metal Halide Fixture	1169	Lighting	Custom	690	697	402	200	6,194	1.10	903,152	943,004	112%
		Exterior		15	15	402	200	4,311	1.00		13,064	
		Miscellaneous		45	45	402	200	6,008	1.00		54,611	
Total										903,152	1,010,679	112%

The annual lighting hours of operation verified during the M&V site visit for 697 interior fixtures (6,194) are greater than the hours of operation used to calculate ex ante savings (6,017). The M&V site visit revealed that 60 fixtures are installed outside, where 15 are installed with photo-cells. The annual lighting hours of operation for exterior lighting fixtures without photo-cells (6,008) are less than those used to calculate ex ante savings. Fixtures installed with photo-cells operate during non-daylight hours²⁸ (4,311).

The application listed all of the line items above as one item. The ex post disaggregated into three line items due to the multiple end use installations. The first line item in the table above was an interior installation, the second line item was an exterior installation with non-daylight hours, and the third line item was a miscellaneous installation.

A heating and cooling interactive factor of 1.10, applicable to a gas heated, air conditioned large one story retail in Cape Girardeau, was applied to the ex post lighting energy savings for the first line item above. Exterior lighting and the ex ante savings estimate did not account for heating and cooling interactive effects.

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 112%.

²⁸ Sun or Moon Rise/Set Table for One Year. U.S. Naval Observatory. <http://aa.usno.navy.mil/data/docs/RS_OneYear.php>

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	903,152	943,003	112%	179.14
	Exterior		13,064		0.07
	Miscellaneous		54,611		7.53
Total		903,152	1,010,679	112%	186.74

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/09/16 and 12/26/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015214-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	31	31	72	7	1,964	1.11	4,429	4,384	99%
015214-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			8	8	53	9	1,964	1.11	661	757	115%
				15	15	53	7	1,964	1.11	1,297	1,485	115%
015214-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			3	3	53	11	1,964	1.11	237	271	115%
Total										6,624	6,897	104%

The annual lighting hours of operation verified during the M&V site visit range between 1,938 and 1,991. The average annual lighting hours of operation (1,964) are greater than the hours of operation used to calculate ex ante savings (1,900).

An adjusted base wattage of 72W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 100W incandescent lamp. The ex ante base wattage of 70W was computed within the application by factoring 70% of a 100W incandescent lamp.

The quantity of the first line item in the table above (31) verified during the M&V site visit is less than the ex ante savings quantity (37).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The measure name for the first measure is not accurate. The baseline lamps were Incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 104%.

²⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	6,624	6,897	104%	1.31
Total		6,624	6,897	104%	1.31

Data Collection

The participant received New Construction lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected load, and determined the lighting operating schedule. Annual lighting operating hours were verified through collaboration with facility personnel.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
008828-406123-Lighting- New Construction Lighting Power Density (LPD)	3000	Lighting	New Construction	79	79	126	82	1,727	1.09	8,993	6,499	72%
				197	197	87	57	2,365	1.09	15,588	15,430	99%
				8	8	167	109	1,727	1.09	1,210	875	72%
				16	16	35	23	2,337	1.09	503	491	98%
				8	8	89	58	1,727	1.09	644	466	72%
				35	35	46	30	2,057	1.09	1,458	1,254	86%
Total										28,395	25,015	88%

The annual lighting hours of operation verified during the M&V site visit (ranging from 1,727 – 2,365) are less than the annual hours of operation used to calculate ex ante savings (2,607). The ex ante hours did not include school holidays nor the fact that half of the building is closed for two months during the summer.

A heating and cooling interactive factor of 1.17, applicable to a gas heated, air conditioned primary school facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 88%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
New Construction	Lighting	28,395	25,015	88%	4.75
Total		28,395	25,015	88%	4.75

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014401-100207-Lighting-Non Linear LED Fixture Replacing T5 HO Fixture	1169	Lighting	Custom	1	1	117	44	4,380	1.10	639	353	55%
				8	8	114	88	4,380	1.10	2,278	1,005	44%
				4	4	117	44	8,760	1.10	2,558	2,822	110%
				3	3	59	17	8,760	1.15	1,840	1,269	69%
				9	9	117	44	8,760	1.10	5,755	6,350	110%
				1	1	114	44	8,760	1.10	613	677	110%
				8	8	42	21	5,475	1.10	1,472	1,015	69%
				2	2	117	44	8,760	1.10	1,279	1,411	110%
				3	3	114	44	8,760	1.10	1,840	2,030	110%
				14	14	117	44	8,760	1.10	8,953	9,878	110%
				67	67	114	44	8,760	1.10	41,084	45,329	110%
				19	19	56	35	8,760	1.10	3,495	3,856	110%
				20	20	88	44	8,760	1.10	7,709	8,505	110%
				2	2	59	17	8,760	1.15	736	846	115%
2	2	114	44	8,760	1.10	1,226	1,353	110%				
Total										81,477	86,699	106%

The annual lighting hours of operation verified during the M&V site visit range between 4,380 and 8,760. The average annual lighting hours of operation for the first, second, and seventh line items in the table above (4,380, 4,380, and 5,475, respectively) are less than the hours of operation used to calculate ex ante savings (8,760).

The quantity of the second and fourth line items above (8 and 3, respectively) verified during the M&V site visit are less than the ex ante savings quantities (10 and 5, respectively).

A heating and cooling interactive factor of 1.10, applicable to a gas heated, air conditioned large retail in Cape Girardeau, was applied to the ex post lighting energy savings for thirteen measures. An applicable factor of 1.15 was applied for freezer space regarding the fourth and fourteenth line items above. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.³⁰

³⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 106%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	81,478	86,699	106%	16.47
Total		81,478	86,699	106%	16.47

Executive Summary

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and post-retrofit connected load, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 9/21/16 and 10/5/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014427-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025	Lighting	Standard	1,412	1,412	32	18	4,961	1.1	121,692	108,234	89%
Total										121,692	108,234	89%

The annual lighting hours of operation verified during the M&V site visit (4,961) are less than the annual hours of operation used to calculate ex ante savings (6,156). The ex ante hours of operation provided in the application are the average hours of operation for all the stores across the country.

A heating and cooling interactive factor of 1.1, applicable to a gas heated, air conditioned large one story retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.³¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 89%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	121,692	108,234	89%	20.56
Total		121,692	108,234	89%	20.56

³¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015507-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012	Lighting	SBDI	14	14	50	7	2,057	1.11	1,241	1,176	95%
015507-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			2	2	43	10	51	1.11	134	4	3%
				1	1	43	10	51	1.11	66	2	3%
Total										1,441	1,181	82%

The annual lighting hours of operation verified during the M&V site visit (ranging between 51 and 2,057) are less than the annual hours of operation used to calculate ex ante savings (2,062). The second and third line items in the table above are used a maximum of 15 minutes per month.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The measure name for the second and third line items above is not accurate. The baseline lamps were Incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.³²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 82%.

³² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	1,441	1,181	82%	0.22
Total		1,441	1,181	82%	0.22

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed one photo-sensor logger to monitor lighting operation. The photo-sensor loggers collected data between 12/09/16 and 12/26/16.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015283-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	15	15	53	9	1,902	1.11	1,488	1,375	92%
015283-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			3	3	50	5	51	1.00	171	7	4%
Total										1,659	1,382	83%

The annual lighting hours of operation verified during the M&V site visit range between 51 and 1,902. The ex ante savings estimate hours of operation for the first line item in the table above are highly accurate. For the second line item, the annual hours of operation (51) are less than the hours of operation used to calculate the ex ante savings (1,900). The installed location (attic) has a maximum usage of one hour per week.

The ex ante savings estimate used an adjusted base wattage of 35W for the second measure by multiplying the provided wattage by 70%. The base lamps for this measure (MR16) are exempt from an adjusted wattage calculation.

The quantity of the first line item above (15) verified during the M&V site visit is less than the ex ante savings quantity (18).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings for the first measure. The ex ante savings estimate did not account for heating and cooling interactive effects.

The measure name for the first line item above is not accurate. The baseline lamps were Incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.³³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 83%.

³³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	1,659	1,382	83%	0.26
Total		1,659	1,382	83%	0.26

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015620-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	14	14	53	8	3,581	1.01	2,316	2,295	99%
015620-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			9	9	49	7	3,581	1.01	1,405	1,393	99%
015620-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp or Fixture	3012			3	3	50	4	3,581	1.01	346	508	147%
Total										4,067	4,197	103%

The annual lighting hours of operation verified during the M&V site visit (3,633) are less than the annual hours of operation used to calculate ex ante savings (3,718).

The ex ante savings estimate used an adjusted base wattage of 35W for the third line item above by multiplying the provided wattage by 70%. The base lamps for this measure (MR16) are exempt from an adjusted wattage calculation.

A heating and cooling interactive factor of 1.01, applicable to an electric heated, air conditioned small retail in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.³⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 103%.

³⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	4,067	4,197	103%	0.80
Total		4,067	4,197	103%	0.80

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and post-retrofit connected load, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 9/2/16 and 9/28/16.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014437-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp	3007	Lighting	Standard	260	260	65	9	2,860	1.11	43,884	46,123	105%
Total										43,884	46,123	105%

The annual lighting hours of operation verified during the M&V site visit (2,860) are less than the annual hours of operation used to calculate ex ante savings (3,014).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail facility in Cape Girardeau, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.³⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 105%.

Verified Gross Savings/Realization Rates By Measure

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	43,884	46,123	105%	8.76
Total		43,884	46,123	105%	8.76

³⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015325-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008	Lighting	SBDI	113	113	53	12	2,062	1.01	11,441	9,568	84%
Total										11,441	9,568	84%

The annual lighting hours of operation verified during the M&V site visit (2,062) are less than the annual hours of operation used to calculate ex ante savings (2,500). It was discovered that 40-60 lamps may only be used a maximum of 50% each day.

A heating and cooling interactive factor of 1.01, applicable to an electric heated, air conditioned small retail in St. Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.³⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 84%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
SBDI	Lighting	11,441	9,568	84%	1.82
Total		11,441	9,568	84%	1.82

³⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015556-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	30	30	53	9	2,785	1.11	3,854	4,071	106%
015556-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			1	1	35	9	2,785	1.11	76	80	106%
Total										3,930	4,152	106%

The annual lighting hours of operation verified during the M&V site visit (2,785) are less than the annual hours of operation used to calculate ex ante savings (2,920).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The measure name for the second line item above is not accurate. The baseline lamps were Incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.³⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 106%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
SBDI	Lighting	3,930	4,152	106%	0.79
Total		3,930	4,152	106%	0.79

Site ID

2497

³⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015280-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	40	40	53	9	1,633	1.01	3,132	2,858	91%
015280-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			4	4	45	8	1,633	1.01	270	246	91%
				10	10	53	8	1,633	1.01	881	731	83%
Total										4,283	3,835	90%

The annual lighting hours of operation verified during the M&V site visit (1,633) are less than the annual hours of operation used to calculate ex ante savings (1,800).

The quantity of the third measure (10) verified during the M&V site visit is less than the ex ante savings quantity (11).

A heating and cooling interactive factor of 1.01, applicable to an electric heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.³⁸

The measure name for the first line item above is not accurate. The baseline lamps were Incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 90%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
SBDI	Lighting	4,283	3,835	90%	0.73
Total		4,283	3,835	90%	0.73

Site ID 2517

³⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015642-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	SBDI	16	16	43	10	642	1.11	1,097	381	35%
015642-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			117	117	65	9	2,425	1.11	9,011	17,601	195%
				7	7	65	12	1,949	1.11	495	801	162%
				7	7	45	6	1,949	1.11	576	589	102%
015642-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			2	2	50	7	8,760	1.11	118	834	706%
Total										11,297	20,206	179%

The annual lighting hours of operation verified during the M&V site visit range between 206 and 8,760. The annual lighting hours of operation for the first, third, and fourth line items in the table above (642, 1,949, and 1,949 respectively) are less than the hours of operation used to calculate ex ante savings (2,110). The annual hours of operation for the second and fifth line items (2,425 and 8,760, respectively) are greater than the hours of operation used to calculate ex ante savings (2,110).

The ex ante savings estimate used an adjusted base wattage of 42W, 45.5W and 35W for the first, second, third, and fifth line items above respectively by multiplying the provided wattage by 70%. For the first line item an adjusted base wattage of 43W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W incandescent lamp. For the remaining measures the base lamps (BR reflector and MR16) are exempt from an adjusted wattage calculation.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The measure name for the first line item in the above table is not accurate. The baseline lamps were Incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.³⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 179%.

³⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	11,297	20,206	179%	3.84
Total		11,297	20,206	179%	3.84

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015640-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008	Lighting	SBDI	16	16	90	17	2,595	1.07	3,644	3,249	89%
015640-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			35	35	50	7	2,595	1.07	4,696	4,187	89%
015640-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			43	42	65	9	2,595	1.07	4,897	6,724	137%
015640-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			13	13	50	7	2,595	1.07	1,136	1,555	137%
Total										14,373	15,715	109%

The annual lighting hours of operation verified during the M&V site visit (2,595) are less than the annual hours of operation used to calculate ex ante savings (3,120).

The ex ante savings estimate used an adjusted base wattage of 45.5W and 35W for the third and fourth line items in the table above respectively by multiplying the provided wattage by 70%. The base lamps for these measures (BR reflector and MR16) are exempt from an adjusted wattage calculation.

A heating and cooling interactive factor of 1.07, applicable to a gas heated, air conditioned medical facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.⁴⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 109%.

⁴⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	14,373	15,715	109%	2.99
Total		14,373	15,715	109%	2.99

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules. Also, baseline equipment was verified to the application by both interview questions and observing existing fixtures and spare lighting stock.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015684-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026	Lighting	SBDI	32	64	96	15	2,729	1.01	6,336	5,798	92%
015684-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			50	50	32	15	2,598	1.00	2,550	2,221	87%
015684-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			2	2	40	15	2,807	1.00	150	141	94%
015684-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			76	76	32	15	2,807	1.00	3,876	3,648	94%
015684-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			16	16	34	15	2,700	1.00	912	826	91%
015684-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			1	1	42	10	2,389	1.00	96	77	80%
Total										13,920	12,711	91%

The annual lighting hours of operation verified during the M&V site visit (ranging between 2,389 and 2,807) are less than the hours of operation used to calculate ex ante savings (3,000).

A heating and cooling interactive factor of 1.01, applicable to an electric heated, small retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.⁴¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 91%.

⁴¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	13,920	12,711	91%	2.41
Total		13,920	12,711	91%	2.41

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015584-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	81	81	53	9	3,828	1.11	10,289	14,938	145%
015584-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			10	8	53	13	1,824	1.11	1,153	850	74%
Total										11,442	15,788	138%

The annual lighting hours of operation verified during the M&V site visit for the first line item in the table above (3,828) are greater than the hours of operation used to calculate ex ante savings (2,920), while the hours of operation for the second line item above (1,824) are less.

The installed quantity of the second line item in the above table (8) verified during the M&V site visit is less than the ex ante savings quantity (10). The customer removed (2) lamps due to over brightness in the location.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The measure name for the second line item in the above table is not accurate. The baseline lamps were Incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.⁴²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 138%.

⁴² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	11,442	15,788	138%	3.00
Total		11,442	15,788	138%	3.00

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed six photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 11/30/16 and 12/21/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015114-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026	Lighting	Standard	104	104	40	22	4,403	1.11	8,297	9,130	110%
				20	20	40	22	3,640		1,596	1,451	91%
				40	40	40	22	4,402		3,191	3,510	110%
				56	56	40	22	8,760		8,830	9,780	111%
				6	6	40	22	4,407		479	527	110%
				2	2	40	22	1,239		54	49	91%
Total									22,447	24,447	109%	

The annual lighting hours of operation verified during the M&V site visit for the fourth line in the table above (8,760) equals the ex ante estimate for annual operating hours. The hours of operation for the remaining line items above (ranging from 1,239 to 4,407) are less than the hours of operation used to calculate ex ante savings (ranging from 1,512 to 4,432).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁴³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 109%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	22,447	24,447	109%	4.64
Total		22,447	24,447	109%	4.64

⁴³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers monitored lighting operation between 12/8/16 and 12/27/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015724-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	SBDI	4	4	43	10	2,391	1.11	280	355	127%
015724-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			18	18	65	9	2,393		1,415	2,671	189%
015724-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			3	3	63	14	2,391		317	389	123%
Total										2,012	3,415	170%

The annual lighting hours of operation verified during the M&V site visit range between 2,352 and 2,834. The average annual lighting hours of operation (2,392) are greater than the hours of operation used to calculate ex ante savings (2,154).

The ex ante savings estimate used LM adjusted base wattages of 42W, 45.5W, and 63W by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W and 63W for the first and third line items in the table above respectively to meet EISA 2007 requirements for a 60W and 90W incandescent lamp. The base lamps for the second line item above (65W BR30) is exempt from an adjusted wattage calculation.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁴⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 170%.

⁴⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	2,012	3,415	170%	0.65
Total		2,012	3,415	170%	0.65

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/6/17 and 2/3/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014196-100101-Lighting-Linear Tube LED Fixture Replacing T12 Fixture	1169	Lighting	Custom	250	250	82	49	3,493	1.01	41,250	29,154	71%
014517-200505-Lighting-LED <=80 Watt Lamp Replacing Interior HID 100-175 Watt Lamp	3006-1		Standard	66	66	90	12	8,760	1.01	45,096	45,628	101%
				33	33	110	27	8,760	1.01	23,994	24,277	101%
Total										110,340	99,059	90%

The annual lighting hours of operation verified during the M&V site visit range between 3,493 and 8,760. The annual lighting hours of operation for the first line item in the table above (3,493) are less than the hours of operation used to calculate ex ante savings (5,000), while line items two and three equal the ex ante savings (8,760) hours.

A heating and cooling interactive factor of 1.01, applicable to an electrically heated, air conditioned office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁴⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 90%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	41,250	29,154	71%	5.54
Standard		69,090	69,905	101%	13.28
Total		110,340	99,059	90%	18.82

⁴⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/19/17 and 2/8/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014975-100101-Lighting-Linear Tube LED Fixture Replacing T12 Fixture	1169	Lighting	Custom	88	88	164	36	3,174	0.98	41,114	35,120	85%
Total										41,114	35,120	85%

The annual lighting hours of operation verified during the M&V site visit (3,174) are less than the hours of operation used to calculate ex ante savings (3,650).

A heating and cooling interactive factor of 0.98, applicable to an electrically heated, air conditioned education facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁴⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 85%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Custom	Lighting	41,114	35,120	85%	6.67
Total		41,114	35,120	85%	6.67

⁴⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/3/17 and 1/23/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015763-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	103	103	49	8	4,593	1.12	9,404	21,949	233%
015763-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			3	3	53	9	4,593	1.12	287	678	236%
015763-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			26	26	53	7	4,593	1.12	2,603	6,141	236%
				6	6	63	11	4,593	1.12	693	1,618	233%
015765-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			42	42	49	8	4,593	1.12	3,835	8,950	233%
015765-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			96	94	40	18	4,910	1.12	4,726	11,791	250%
015765-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			18	18	32	18	5,301	1.12	554	1,493	269%
Total										22,102	52,620	238%

The annual lighting hours of operation verified during the M&V site visit (ranging between 4,593 and 5,549) are significantly greater than the hours of operation used to calculate ex ante savings (2,200).

The ex ante savings estimate used LM adjusted base wattages of 49W, 52.5W, and 63W for the first through fifth line items in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 53W for the second and third line item to meet EISA 2007 requirements for a 75W incandescent lamp.

The measure name for the second line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.12, applicable to a gas heated, air conditioned restaurant facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁴⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 238%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	22,102	52,620	238%	10.00
Total		22,102	52,620	238%	10.00

⁴⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/7/17 and 2/23/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
016103-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	7	7	53	9	4,314	1.12	1,143	1,485	130%
016103-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			24	24	45	8	4,314	1.12	3,316	4,259	128%
Total										4,459	5,744	129%

The annual lighting hours of operation verified during the M&V site visit (4,314) are greater than the annual hours of operation used to calculate ex ante savings (3,754). The posted restaurant hours are daily from 11 a.m. to 9 p.m. The site contact stated they arrive 1 ½ hours prior to opening to start the day and stay ½ hour after closing to clean. The ex ante hours do not represent the posted store hours.

The ex ante savings estimate used an adjusted base wattage of 52.5W and 44.8W by multiplying the provided wattage by 70%. An adjusted base wattage of 53W for the first line item in the above table was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 75W incandescent lamp.

The measure name for the first measure is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.12, applicable to a gas heated, air conditioned restaurant in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.⁴⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 109%.

⁴⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	4,459	5,744	129%	1.09
Total		4,459	5,744	129%	1.09

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers monitored lighting operation between 11/17/16 and 12/5/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015458-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	30	30	53	8	2,161	1.04	3,888	3,043	78%
				3	3	53	8	3,465	1.04	393	493	125%
015458-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			13	13	53	9	2,813	1.04	1,647	1,678	102%
Total										5,928	5,214	88%

The annual lighting hours of operation verified during the M&V site visit for the first and third line items in the table above (2,161 and 2,813, respectively) are less than the hours of operation used to calculate ex ante savings (2,912), while the third line item has hours (3,465) greater.

The ex ante savings estimate used an LM adjusted base wattage of 52.5W for all measures by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 53W to meet EISA 2007 requirements for a 75W incandescent lamp.

The measure name for the third line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.04, applicable to an electrically heated, air conditioned restaurant facility in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁴⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 88%.

⁴⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	5,928	5,214	88%	0.99
Total		5,928	5,214	88%	0.99

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff visually inspected newly-installed equipment to verify equipment installation. Baseline and post-retrofit connected loads were obtained through review of project documentation. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015426-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	SBDI	4	4	29	5	1,007	1.11	241	107	45%
015426-201316-Lighting-LED or Electroluminescent Replacing Incandescent Exit Sign	793			1	1	30	1	8,760	1.11	254	281	111%
015426-305501-Lighting-Linear ft T8 25 Watt (<=7 Watts/ft) Replacing T12 <=40 Watt Linear ft	3021			4	4	40	28	2,240	1.11	125	119	95%
015426-305501-Lighting-Linear ft T8 25 Watt (<=7 Watts/ft) Replacing T12 <=40 Watt Linear ft	3021			68	64	40	28	2,240	1.11	2,422	2,299	95%
Total										3,042	2,806	92%

The annual lighting hours of operation verified during the M&V site visit range between 1,007 and 8,760. The average annual lighting hours of operation (2,312) are less than the hours of operation used to calculate ex ante savings (2,773).

The ex ante savings estimate used an LM adjusted base wattage of 28W for first line item of the table above by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 29W to meet EISA 2007 requirements for a 40W incandescent lamp.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁵⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 92%.

⁵⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	3,042	2,806	92%	0.53
Total		3,042	2,806	92%	0.53

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed four photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/15/17 and 3/6/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014649-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	50	50	43	9	6,297	1.13	9,636	12,109	126%
014649-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp	3007			30	30	65	10	2,978	1.13	6,307	5,609	89%
Total										15,943	17,718	111%

The annual lighting hours of operation verified during the M&V site visit for the first line in the above table (6,297) are greater than the hours of operation used to calculate the ex ante savings (5,804). The second line in the above table has lower hours of operation (2,978) than the ex ante.

The ex ante savings estimate used an LM adjusted base wattage of 42W for the first line item in the table above and 45.5W for the second line item in by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W for the first line item to meet EISA 2007 requirements for a 60W incandescent lamp. The base lamps for the second line item (65W BR reflector) are exempt from an adjusted wattage calculation.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.13, applicable to a gas heated, air conditioned assisted living facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁵¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 111%.

⁵¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	15,943	17,718	111%	3.37
Total		15,943	17,718	111%	3.37

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 11/18/16 and 12/13/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014974-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	294	294	43	9.5	1,145	1.14	22,030	12,808	58%
015157-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			30	30	43	10.2	6,766	1.14	4,316	7,589	176%
				11	11	43	9.2	6,023	1.14	3,968	2,543	64%
015157-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			106	106	53	10	8,760	1.14	39,464	45,347	115%
015157-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			58	58	46	10.2	5,413	1.14	18,037	12,587	70%
Total										87,815	80,874	92%

The annual lighting hours of operation verified during the M&V site visit for the first and fourth line items in the table above (1,145⁵² and 8,760, respectively) are equal to the hours of operation used to calculate ex ante saving. The second and third line items above have annual hours of operation (6,766 and 6,023 respectively) which are greater than the hours used to calculate ex ante savings (4360). The fifth line item hours of operation (5,413) are less than the ex ante hours (8,760). This measure was installed in the dining area where only one lamp was on 24/7

The ex ante savings estimate used an LM adjusted base wattage of 42W for the first three line items, 52.5W for the fourth line item, and 45.5W for the fifth line item in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W for the first three line items, and 53W for the fourth line item to meet EISA 2007 requirements for a 60W and 75W incandescent lamp.

During the M&V site visit, ADM staff visually verified a count of 294 and 11 lamps for the first and third line items in the table above while the ex ante savings estimate used a count of 592 and 28 lamps. The site contact agreed with our counts for installed lamps.

⁵² The ex post savings analysis cites the DEER 2005 guest room lighting operation estimate (1,145). This average value has been corroborated through ADM’s extensive fixture-level and circuit-level monitoring of guest room lighting operation.

The measure names for the first four line items in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned nursing home facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁵³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 92%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	87,815	80,874	92%	15.36
Total		87,815	80,874	92%	15.36

⁵³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff visually inspected newly-installed equipment to verify equipment installation. Baseline and post-retrofit connected loads were obtained through review of project documentation. Annual lighting operating hours were verified by interviewing facility personnel regarding facility operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015339-305401- Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026	Lighting	SBDI	1	1	40	18	5,814	1.11	129	142	110%
				1	1	40	18	5,814	1.11	129	142	110%
				32	16	40	18	4,305	1.00	5,793	4,271	74%
				24	48	90	18	5,814	1.11	7,567	8,345	110%
015340-100201- Lighting-Non Linear LED Fixture Replacing T12 Fixture_20161027-145554_146-100201	1169		Custom	90	65	164	49	5,814	1.11	67,598	74,535	110%
				12	12	98	22	5,814	1.15	5,326	6,098	114%
				6	6	82	40	5,814	1.11	1,472	1,623	110%
				19	19	98	22	5,814	1.29	8,433	10,830	128%
Total										96,447	105,985	110%

The annual lighting hours of operation verified during the M&V site visit for the third line item above (4,305⁵⁴) are less than the annual hours of operation used to calculate ex ante savings (5,840). This measure was an exterior installation with non-daylight hours of use. The remaining line items had annual hours of operation (5,814) also less than the ex ante savings estimate (5,840).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail facility in St. Louis, was applied to the ex post lighting energy savings for line items one, two, four, five, and seven in the table above. For line items six and eight in the above table a heating a cooling interactive factor of 1.15 and 1.29, applicable to a freezer and cooler installation. The ex ante savings estimate did not account for heating and cooling interactive effects. The third line item above received a heating and cooling interactive factor of 1.00 which matches the ex ante estimate.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁵⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 110%.

⁵⁴ This calculation was performed by the non-daylighting calculator for the current year in conjunction with the US Naval Observatory SunRise/SunSet table.

⁵⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	13,618	12,900	95%	1.64
Custom		82,829	93,085	112%	17.68
Total		96,447	105,985	110%	19.32

Data Collection

The participant received Standard & Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed eight photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 10/12/16 and 11/23/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014642-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025	Lighting	Standard	20	20	32	12	204	1.15	104	94	90%
				28	28	32	12	2,524		1,456	1,622	111%
014642-200104-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 25 Watt Lamp	3023			9	9	25	12	204		91	27	30%
014642-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025			4	4	32	12	204		21	19	90%
				30	30	32	12	2,524		1,716	1,738	101%
				6	6	32	12	204		31	28	90%
				168	168	32	12	2,524		9,610	9,735	101%
				141	141	32	12	3,455		9,532	11,183	117%
				340	340	32	12	3,455		21,216	26,966	127%
				318	318	32	12	3,455		22,324	25,221	113%
				6	6	32	12	3,455		468	476	102%
				39	39	32	12	3,455		3,042	3,093	102%
			39	39	32	12	4,343	3,650		3,889	107%	
24	24	32	12	8,760	4,205	4,827	115%					
014642-100208-Lighting-Non Linear LED Fixture Replacing Metal Halide Fixture	1169	Custom	26	26	455	145	2,656	25,148	24,576	98%		
014642-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025	Standard	117	117	32	12	8,760	20,498	23,530	115%		
015092-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009		-	-	-	-	-	1,498	-	0%		
015092-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025		14	14	32	12	8,760	2,453	2,816	115%		
			612	612	32	12	3,455	38,189	48,539	127%		
			6	6	32	12	204	31	28	90%		
			15	15	32	12	2,524	780	869	111%		
			17	17	25	8	204	76	68	89%		
			17	17	25	8	3,455	902	1,146	127%		
Total										167,040	190,488	114%

The annual lighting hours of operation verified during the M&V site visit for line items one, three, four, six, twenty, and twenty-two in the above table (204) are less than the annual hours of operation used to calculate ex ante savings (ranging from 260 to 780). These lamps were installed in storage, supply,

and mechanical closets. The annual lighting hours of operation for line items two, five, seven, ten through thirteen, fifteen, and twenty-one (ranging from 2,524 to 4,343) are less than the annual hours of operation used to calculate ex ante (ranging from 2,600 to 4,680). For line item eight, nine, nineteen, and twenty-three the annual lighting hours of operation (3,455) are greater than the annual hours of operation used to calculate ex ante (ranging from 3,120 to 3,380). The ex post annual hours of operation for line items fourteen, sixteen, and eighteen (8,760) align with the ex ante annual hours.

During the M&V site visit, the baseline behavior for controlling lighting was determined by survey questions per usage area. The survey indicated some efficient behavior with turning off lighting during the workday and the end of the workday.

The quantity of the seventeenth line item in the above table (0) verified during the M&V site visit is less than the ex ante savings quantity (3). The client had no knowledge of any lamps in the exterior to be replaced. Surveying the site exterior found no LED Aline lamps installed as well as no exterior lighting with annual lighting hours of 8,760.

A heating and cooling interactive factor of 1.15, applicable to an electrically heated, air conditioned large office in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.⁵⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 114%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	141,892	165,912	117%	31.52
Custom		25,148	24,576	98%	4.67
Total		167,040	190,488	114%	36.19

⁵⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/6/17 and 2/3/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015789-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	58	58	44.8	10.5	2,681	1.11	5,897	5,907	100%
015789-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			6	6	53	9	2,609	1.11	721	763	106%
015789-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			9	9	47.6	15	2,681	1.11	786	871	111%
Total										7,404	7,541	102%

The annual lighting hours of operation verified during the M&V site visit (ranging between 2,609 and 2,681) are less than the hours of operation used to calculate ex ante savings (2,763).

The ex ante savings estimate used LM adjusted base wattages of 44.8W, 52.5W, and 47.6W for the first through third line items in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 53W for the second line item to meet EISA 2007 requirements for a 75W incandescent lamp.

During the M&V visit, ADM staff visually verified efficient wattages of 10.5W and 15W for the first and third line items in the table above, where ex ante savings referred to efficient wattages of 8W and 16W respectively.

The measure name for the second line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁵⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 102%.

⁵⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	7,404	7,541	102%	1.43
Total		7,404	7,541	102%	1.43

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/26/17 and 2/16/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015494-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	Standard	83	83	65	9	4,206	1.11	13,269	21,622	163%
015494-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			30	30	43	10	1,119	1.11	4,271	1,244	29%
Total										17,540	22,866	130%

The annual lighting hours of operation verified during the M&V site visit (ranging between 1,119 and 4,206) which are less than the hours of operation used to calculate ex ante savings (4,380).

The ex ante savings estimate used LM adjusted base wattages of 45.5W and 42W for the first and second line item in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W for the second line item to meet EISA 2007 requirements for a 60W incandescent lamp. The base lamps for the first line item (65W BR/R) are exempt from an adjusted wattage calculation.

The measure name for the second line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁵⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 130%.

⁵⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	17,540	22,866	130%	4.34
Total		17,540	22,866	130%	4.34

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff visually inspected newly-installed equipment to verify equipment installation. Baseline and post-retrofit connected loads were obtained through review of project documentation. ADM staff interviewed facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers monitored lighting operation between 12/9/16 and 12/26/16. These data were used to calculate energy savings.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015582-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	7	7	53	9	1,784	1.12	1,223	614	50%
				10	10	65	7	3,338	1.12	1,546	2,164	140%
015582-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			12	12	53	9	1,784	1.12	2,096	1,053	50%
Total										4,865	3,831	79%

The annual lighting hours of operation verified during the M&V site visit range between 1,784 and 3,338. The average annual lighting hours of operation (2,421) are less than the hours of operation used to calculate ex ante savings (4,015), which is the main cause for the low realization rate.

The ex ante savings estimate used LM adjusted base wattages of 52.5W, 45.5W, and 52.5W for the first, second, and third line items in the table above respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted baseline of 53W for the first and third line items to meet EISA 2007 requirements for a 75W incandescent lamp. The base lamp for the second line item (65W BR/R) is exempt from an adjusted wattage calculation.

A heating and cooling interactive factor of 1.12, applicable to a gas heated, air conditioned restaurant facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁵⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 79%.

⁵⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	4,865	3,831	79%	0.73
Total		4,865	3,831	79%	0.73

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/01/16 and 12/23/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015105-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	135	135	43	10	1,145	0.99	11,565	5,130	44%
015355-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Exterior Lighting		48	48	43	10	4,310	1.00	7,475	6,828	91%
015355-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026	Lighting		52	52	40	15	1,145	0.99	12,848	1,475	11%
Total										31,888	13,432	42%

The annual lighting hours of operation verified during the M&V site visit for the first line item in the table above (1,145⁶⁰) are less than the annual hours of operation used to calculate ex ante savings (1,280). These lamps were installed in guest rooms.

The annual lighting hours of operation for the second and third line items in the above table (4,310 and 1,145 respectively) are less than the annual hours of operation used to calculate ex ante savings (5,840). The second line item was an exterior installation using a photo cell for their operation.ⁱ The third line item above was installed within guest and storage rooms.

The ex ante savings estimate used an adjusted base wattage of 42W for the first and second line items in the above table by multiplying the provided wattage by 70%. An adjusted base wattage of 43W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W incandescent lamp.

The quantity of the first line item (135) verified during the M&V site visit is less than the ex ante savings quantity (278). The client had removed all of the table and desk lamps from all guest rooms due to guests taking the LED lamps with them upon departing the property. The lamps are now in a storage room. The quantity of the second line item (48) is greater than the ex ante savings quantity (40). These lamps were installed along the soffit of the exterior of the building. The quantity of the third line item (52) is less than the ex ante savings estimate (88). These lamps were installed in guest bathrooms, an apartment suite, and storage rooms. The extras were in a storage room.

⁶⁰ The ex post savings analysis cites the DEER 2005 guest room lighting operation estimate (1,145). This average value has been corroborated through ADM's extensive fixture-level and circuit-level monitoring of guest room lighting operation

The measure names for the first and second line items in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 0.99, applicable to an electric heated, air conditioned guest lodging in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.⁶¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 42%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	31,888	13,432	42%	1.25
Total		31,888	13,432	42%	1.25

⁶¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/26/17 and 2/16/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015705-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	140	140	56	17	4,356	1.01	17,254	24,234	140%
Total										17,254	24,234	140%

The annual lighting hours of operation verified during the M&V site visit (4,356) are greater than the hours of operation used to calculate ex ante savings (3,120).

A heating and cooling interactive factor of 1.01, applicable to an electrically heated, air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁶²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 140%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	17,254	24,234	140%	4.60
Total		17,254	24,234	140%	4.60

⁶² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/20/16 and 1/19/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015593-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	SBDI	1	41	29	10	2,328	1.01	1,887	1,839	97%
015593-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			145	145	32	15	2,421	1.01	6,303	6,052	96%
Total										8,190	7,891	96%

The annual lighting hours of operation verified during the M&V site visit (ranging from 2,328 and 2,421 are less than the hours of operation used to calculate ex ante savings (2,557).

The ex ante savings estimate used an LM adjusted base wattage of 28W by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 29W to meet EISA 2007 requirements for a 40W incandescent lamp.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.01, applicable to a gas heated, air conditioned retail facility in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁶³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 96%.

⁶³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	8,190	7,891	96%	1.50
Total		8,190	7,891	96%	1.50

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/9/17 and 2/28/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015811-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	SBDI	6	6	43	10	1,532	1.11	511	341	67%
015811-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			19	19	72	14	1,653	1.11	2,889	2,017	70%
015811-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			3	3	45	6	1,548	1.11	307	201	65%
Total										3,707	2,559	69%

The annual lighting hours of operation verified during the M&V site visit (ranging between 1,532 and 1,653) are less than the hours of operation used to calculate ex ante savings (2,622).

The ex ante savings estimate used an LM adjusted base wattage of 42W for the first line item in the above table by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W to meet EISA 2007 requirements for a 60W incandescent lamp.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁶⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 69%.

⁶⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	3,707	2,559	69%	0.49
Total		3,707	2,559	69%	0.49

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015302-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008	Lighting	Standard	48	48	75	12	3,045	1.15	9,435	10,568	112%
015302-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			-	-	32					1,123	-
Total										10,558	10,568	100%

The annual lighting hours of operation verified during the M&V site visit (3,045) are less than the annual hours of operation used to calculate ex ante savings (3,120).

During the M&V visit, ADM staff visually verified that the LED tube lighting referred to in the second line item in the table above was not yet installed. According to facility personnel, an inadequate number of lamps were purchased for the conference room which delayed installation. There was no estimated date in the future for the installation.

A heating and cooling interactive factor of 1.15, applicable to an electrically heated, air conditioned office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁶⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 100%.

⁶⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	10,558	10,568	100%	2.01
Total		10,558	10,568	100%	2.01

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed one photo-sensor logger to monitor lighting operation. The photo-sensor loggers collected data between 11/16/16 and 12/21/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015453-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	11	11	65	9	8,760	1.11	3,517	5,977	170%
015453-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			18	18	50	7	2,399	1.11	1,952	2,056	105%
Total										5,469	8,033	147%

The annual lighting hours of operation verified during the M&V site visit range between 2,399 and 8,760. The annual hours of operation for the second measure (2,399) are lower than the hours of operation used to calculate the ex ante savings (2,522).

The ex ante savings estimate used an LM adjusted base wattage of 45.5W for the first measure by multiplying the provided wattage by 70%. The base lamps for this measure (65W BR/R) are exempt from an adjusted wattage calculation.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁶⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 147%.

⁶⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	5,469	8,033	147%	1.53
Total		5,469	8,033	147%	1.53

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/17/17 and 2/7/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015040-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	30	30	43	10	406	1.14	402	460	115%
015041-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			16	16	49	9	406	1.14	266	296	111%
				16	16	49	15	406	1.14	230	255	111%
015041-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			14	14	65	9	512	1.14	215	461	214%
Total										1,113	1,472	132%

The annual lighting hours of operation verified during the M&V site visit range between 406 and 512. The annual lighting hours of operation for the first three line items in the table above are less than the hours of operation used to calculate ex ante savings while the last line item are greater (416).

The ex ante savings estimate used an LM adjusted base wattage of 42W for the first line item, 49W for the second and third line item, and 45.5W for the fourth line item in the table above by multiplying the provided wattage by 70%. The ex post savings estimate uses an adjusted base wattage of 43W for the first line item to meet EISA 2007 requirements for a 60W incandescent lamp. The base lamps for the fourth line item (65W BR/R) are exempt from an adjusted wattage calculation.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned assembly facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁶⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 132%.

⁶⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	1,113	1,472	132%	0.28
Total		1,113	1,472	132%	0.28

Data Collection

The participant received Custom and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed one photo-sensor logger to monitor lighting operation. The photo-sensor loggers collected data between 1/17/17 and 2/8/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014459-100208-Lighting-Non Linear LED Fixture Replacing Metal Halide Fixture	1169	Misc.	Custom	19	19	215	70	8,760	1.00	24,134	24,134	100%
				6	6	455	191	8,760	1.00	13,876	13,876	100%
015688-305005-Lighting-<=80 Watt Lamp or Fixture Replacing Interior HID 100-175 Watt Lamp or Fixture	3006-1	Lighting	Standard	4	4	150	54	3,735	1.14	1,382	1,632	118%
Total										39,392	39,642	101%

The annual lighting hours of operation verified during the M&V site visit range between 3,735 and 8,760. The average annual lighting hours of operation for the first two line items in the table above are equal to the hours of operation used to calculate ex ante savings (8,760) while the annual lighting hours for the third line item are greater (3,600).

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned assembly facility in St. Louis, was applied to the ex post lighting energy savings for the third line item in the table above. No heating or cooling interactive factor was referenced in the first two line items due to space being unconditioned. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁶⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 101%.

⁶⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Miscellaneous	38,010	38,010	100%	5.24
Standard	Lighting	1,382	1,632	118%	0.31
Total		39,392	39,642	101%	5.55

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed seven photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 11/16/16 and 12/09/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015219-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	7	7	43	9	1,325	1.10	1,070	349	33%
015219-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			28	28	20	8	5,517	1.10	2,184	2,048	94%
				22	22	34	8	5,517	1.10	4,004	3,487	87%
				846	846	34	16	2,905	1.10	60,912	48,874	80%
015219-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			611	611	32	16	2,244	1.10	36,406	24,241	67%
Total										104,576	79,000	76%

Lighting Controls Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Quantity	Controlled Wattage	Baseline Hours	Efficient Hours	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate	
015219-301818-Lighting-Fixture Mounted Occupancy Sensor Controlling >50 and <=200 Watts Replacing No Controls	3077	Lighting	Standard	13	96	2,244	1,125	1.10	3,900	1,543	40%	
				8	96	2,244	1,125	1.10	2,400	950	40%	
015219-201518-Lighting-Single Technology Occupancy Sensor Controlling Lighting Circuit >50 and <=120 Watts	3080			36	96	2,244	1,125	1.10	4,500	4,274	95%	
				40	96	2,244	1,125	1.10	5,000	4,749	95%	
Total										15,800	11,517	73%

The annual lighting hours of operation verified during the M&V site visit (ranging from 1,325 to 5,517) are less than the annual hours of operation used to calculate ex ante savings (ranging from 3,724 to 7,000). The facility has hours of 7 a.m. to 4 p.m. 5 days a week (2,274 annual hours) with only the stairwells constantly on.

The ex ante savings estimate used an adjusted base wattage of 42W for the first line item in the first table above by multiplying the provided wattage by 70%. An adjusted base wattage of 43W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W incandescent lamp.

A heating and cooling interactive factor of 1.10, applicable to a gas heated, air conditioned office in Cape Girardeau was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

During the M&V site visit, the baseline behavior for controlling lighting was determined by survey questions per usage area. The survey indicated no efficient behavior with turning off lighting during the workday but at the end of the workday.

The measure name for the first line item in the first table is not accurate. The baseline lamps were Incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.⁶⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 75%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	120,376	90,516	75%	18.01
Total		120,376	90,516	75%	18.01

⁶⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014284-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025	Lighting	Standard	20	20	32	17	3,385	1.09	751	1,112	148%
014284-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			60	60	29	11	2,006	1.09	2,553	2,372	93%
014287-200302-Lighting-T8 28 Watt Lamp Replacing T8 32 Watt Lamp	3020			360	360	32	28	3,385	1.09	3,604	5,336	148%
015781-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			36	36	53	16	8,760	1.09	11,511	12,775	111%
Total										18,419	21,595	117%

The annual lighting hours of operation verified during the M&V site visit range between 2,006 and 8,760. The annual lighting hours of operation for the first and third line items in the table above are greater than the hours of operation used to calculate ex ante savings (2,503), while the annual hours of operation for the second line item are fewer. The annual lighting hours of operation for the fourth line item is equal to the annual hours of operation used to calculate ex ante savings.

The ex ante savings estimate used LM adjusted base wattages of 28W and 52.5W for the second and fourth line items in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used adjusted base wattages of 29W and 53W to meet EISA 2007 requirements for a 40W and 75W incandescent lamp respectively.

The measure names for the second and fourth line items in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁷⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 117%.

⁷⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	18,419	21,595	117%	4.10
Total		18,419	21,595	117%	4.10

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed one photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/19/17 and 2/19/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014242-100113-Lighting-Linear Tube LED Fixture Replacing CFL Fixture	1169	Lighting	Custom	60	18	40	32	5,429	1.11	10,032	10,952	109%
015031-100204-Lighting-Non Linear LED Fixture Replacing T8 Fixture		Misc.		84	48	186	48	3,915	1.00	116,683	52,147	45%
Total										126,715	63,099	50%

The annual lighting hours of operation verified during the M&V site visit for the first and second line item in the table above (5,429 and 3,915) are less than the annual hours of operation used to calculate ex ante savings (5,500 and 8,760). Only 15 of the lamps referenced in line item two in the table above were verified to operate 24/7.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small office in St. Louis, was applied to the ex post lighting energy savings for the first line item above.. The ex ante savings estimate did not account for heating and cooling interactive effects. No heating and cooling interactive factor was referenced in the second line item above due to lighting being installed in an unconditioned space.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁷¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 50%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Custom	Lighting	10,032	10,952	109%	2.08
	Misc.	116,683	52,147	45%	7.19
Total		126,715	63,099	50%	9.27

⁷¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and interviewing facility personnel regarding lighting operating schedules. Annual lighting operating hours were verified by interviewing facility personnel regarding facility operating schedules. An additional fifteen minutes were added to the beginning and end of facility operating hours to account for opening and closing times.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014913-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	7	7	43	10	2,527	1.01	582	591	101%
014913-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			146	146	32	22	2,527	1.01	3,796	3,733	98%
				2	2	32	15	2,527	1.01	88	87	99%
014913-201316-Lighting-LED or Electroluminescent Replacing Incandescent Exit Sign	793			3	3	30	1	8,760	1.01	767	776	101%
				1	1	30	4	8,760	1.01	231	234	101%
014914-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			1	1	43	10	2,527	1.01	83	84	101%
014914-100104-Lighting-Linear Tube LED Fixture Replacing T8 Fixture	1169		Custom	93	186	128	22	2,527	1.01	20,311	19,975	98%
Total										25,858	25,480	99%

The annual lighting hours of operation verified during the M&V site visit for line items one through three, six and seven in the above table (2,527) are less than the hours of operation used to calculate the ex ante savings (2,673).

The ex ante savings estimate used an LM adjusted base wattage of 42W for the first and sixth line item in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W for the first and sixth line items to meet EISA 2007 requirements for a 60W incandescent lamp.

The measure names for the first and sixth line items in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.01, applicable to a electric heated, air conditioned small office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁷²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 99%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	5,547	5,506	99%	1.05
Custom		20,311	19,975	98%	3.79
Total		25,858	25,480	99%	4.84

⁷² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015123-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	628	628	43	9.5	2,358	1.16	28,288	57,780	204%
015191-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			252	252	43	9.5	1,145	1.17	11,648	11,311	104%
015398-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			288	288	53	10	1,145	1.17	30,600	16,592	54%
Total										70,536	85,614	121%

The annual lighting hours of operation verified during the M&V site visit range between 1,145⁷³ and 8,760. The annual lighting hours of operation for the first line item in the table above are greater than the hours of operation used to calculate ex ante savings (1,280) while the rest of the line items are fewer.

The ex ante savings estimate used a LM adjusted base wattage of 42W for the first and second line item in the table above, and 52.5W for the 3rd line item by multiplying the provided wattage by 70%. The ex post savings estimate used adjusted base wattages of 43W and 53W to meet EISA 2007 requirements for a 60W and 75W incandescent lamp.

During the M&V visit, ADM staff visually verified that a total of 1,196 incandescent A-line lamps were installed instead of the 1,440 found in the application. The third measure in the table had the largest discrepancy in expected installed quantities with the realization rate of 54%.

The measure names in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.17, applicable to an electrically heated, air conditioned hotel facility in St. Louis, was applied to the ex post lighting energy savings for measures implemented in guest rooms. A heating and cooling interactive factor of 1.14, applicable to an gas heated, air conditioned assembly facility in St. Louis, was applied to the ex post lighting energy savings for

⁷³ The ex post savings analysis cites the DEER 2005 guest room lighting operation estimate (1,145). This average value has been corroborated through ADM's extensive fixture-level and circuit-level monitoring of guest room lighting operation.

measures implemented in other locations. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁷⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 121%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	70,536	85,684	121%	16.3
Total		70,536	85,684	121%	16.3

⁷⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014791-100208-Lighting-Non Linear LED Fixture Replacing Metal Halide Fixture	1169	Misc.	Custom	40	40	215	50	8,760	1.00	57,816	57,816	100%
				69	69	215	50	6,935	1.00	78,955	78,955	100%
Total										136,771	136,771	100%

The annual lighting hours of operation verified during the M&V site visit range between 6,935 and 8,760 match the hours of operation used to calculate the ex ante savings.

No heating and cooling interactive factor was applied to the ex ante nor the ex post lighting energy savings due to lighting being installed in a non-conditioned space.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁷⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 100%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Custom	Miscellaneous	136,771	136,771	100%	18.87
Total		136,771	136,771	100%	18.87

⁷⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and interviewing facility personnel regarding lighting operating schedules. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules. An additional 30 minutes were added to the beginning and end of restaurant hours to account for opening and cleaning times.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014177-100213-Lighting-Non Linear LED Fixture Replacing CFL Fixture	1169	Lighting	Custom	30	30	46	15	8,760	1.02	8,147	8,281	102%
014769-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025		Standard	30	30	32	17	8,760	1.02	1,314	4,007	305%
014881-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008			12	12	50	6	4,753	1.02	1,584	2,551	161%
			6	6	55	13	4,753	1.02	765	1,232	161%	
Total										11,810	16,071	136%

The annual lighting hours of operation verified during the M&V site visit range between 4,753 and 8,760. The annual lighting hours of operation for the first line item in the table above are equal to the hours of operation used to calculate ex ante savings. The annual lighting hours for the second line item (8,760) are greater than the hours used to calculate ex ante savings (2,920). This is due to the lighting being located in the hallway outside of the office, which is operational 24/7. The annual lighting hours of operation for the third and fourth line items are greater than the hours used to calculate ex ante savings (3,000).

A heating and cooling interactive factor of 1.02, applicable to an electrically heated, air conditioned large retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁷⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 136%.

⁷⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	8,147	8,281	102%	1.57
Standard		3,663	7,790	213%	1.48
Total		11,810	16,071	136%	3.05

Data Collection

The participant received Custom and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 11/17/16 and 12/22/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate	
014510-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025	Lighting	Standard	3	3	32	18	3,951	1.29	198	214	108%	
014510-100101-Lighting-Linear Tube LED Fixture Replacing T12 Fixture	1169		Custom		67	67	138	80	3,587	1.07	18,314	14,942	82%
					1	1	138	80	3,680	1.11	273	236	87%
					6	6	138	80	3,680	1.11	1,640	1,418	86%
					2	2	138	80	3,680	1.11	547	473	86%
014510-200101-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T12 <=40 Watt Lamp	3026		Standard	71	71	40	18	3,680	1.11	7,362	6,367	86%	
Total										28,334	23,650	83%	

The annual lighting hours of operation verified during the M&V site visit (ranging from 3,397 to 3,951) are less than the annual hours of operation used to calculate ex ante savings (4,713).

A heating and cooling interactive factor of 1.07, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings.

The ex ante savings estimate did not account for heating and cooling interactive effects. The ex post savings analysis applied a heating and cooling interactive factor of 1.29 for the first line item in the above table, applicable to medium temperature refrigerated space, these lamps were located within a cooler. The second line item above had a total of 22 lamps not receive a heating and cooling interactive factor due to being installed in an area with no heat or air conditioning. The remaining items received a heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail facility in Cape Girardeau.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.⁷⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 83%.

⁷⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	20,774	17,069	82%	3.24
Standard		7,560	6,581	87%	1.25
Total		28,334	23,650	83%	4.49

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed one photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/11/17 and 2/4/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015855-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp or Fixture	3012	Lighting	SBDI	67	67	50	7	2,821	1.11	5,478	9,001	164%
015855-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			15	15	45	8	2,821	1.11	1,612	1,725	107%
015855-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			2	2	53	9	2,821	1.11	254	275	108%
Total										7,344	11,001	150%

The annual lighting hours of operation verified during the M&V site visit (2,821) are less than the annual hours of operation used to calculate ex ante savings (2,920).

The ex ante savings estimate used LM adjusted base wattages of 35W, 44.8W, and 52.5W by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 53W for the third line item in the table above to meet EISA 2007 requirements for a 75W incandescent lamp. The base lamps for the first line item (MR16) are exempt from an adjusted wattage calculation.

The measure name for the third line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁷⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 150%.

⁷⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	7,344	11,001	150%	2.09
Total		7,344	11,001	150%	2.09

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and interviewing facility personnel regarding lighting operating schedules. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014225-100108-Lighting-Linear Tube LED Fixture Replacing Metal Halide Fixture	1169	Lighting	Custom	33	25	461	170	8,760	1.10	96,014	105,414	110%
				30	24					85,389	93,749	110%
				33	33					84,093	92,326	110%
				21	21	53,514	58,753			110%		
				35	35	461	140			98,419	108,054	110%
Total									417,429	458,296	110%	

The annual lighting hours of operation verified during the M&V site visit are equal to the annual hours of operation used to calculate ex ante savings (8,760).

A heating and cooling interactive factor of 1.10, applicable to a gas heated, air conditioned light manufacturing facility in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁷⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 110%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Custom	Lighting	417,429	458,296	110%	87.06
Total		417,429	458,296	110%	87.06

⁷⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014592-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008	Lighting	Standard	7	7	55	13	8,760	1.18	1,061	3,085	291%
Total										1,061	3,085	291%

The annual lighting hours of operation verified during the M&V site visit (8,760) are greater than the annual hours of operation used to calculate ex ante savings (2,080).

A heating and cooling interactive factor of 1.18, applicable to a gas heated, air conditioned hotel facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

During the M&V visit, ADM staff verified an efficient lighting count of 7 lamps, where the ex ante savings estimate referenced a quantity of 12 lamps efficient lamps. The site contact stated that the remaining lamps were in storage.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁸⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 291%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	1,061	3,085	291%	0.59
Total		1,061	3,085	291%	0.59

⁸⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/23/16 and 1/9/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015430-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	29	29	53	9	2,170	1.11	3,025	3,066	101%
015430-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp or Fixture	3012			8	8	50	5	2,035	1.11	863	811	94%
Total										3,888	3,877	100%

The annual lighting hours of operation verified during the M&V site visit range between 1,541 and 2,529. The average annual lighting hours of operation (2,140) are less than the hours of operation used to calculate ex ante savings (2,398).

The ex ante savings estimate used an LM adjusted base wattage of 52.5W for the first line item in the above table by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 53W to meet EISA 2007 requirements for a 75W incandescent lamp.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁸¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 100%.

⁸¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	3,888	3,877	100%	0.74
Total		3,888	3,877	100%	0.74

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed four photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/22/16 and 1/20/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015459-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	12	12	72	9.5	528	1.00	1,133	396	35%
015459-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			60	60	40	15.0	2,810	1.10	3,900	4,625	119%
				58	58	96	40.0	3,037	1.10	5,067	10,822	214%
				4	4	32	15.0	3,037	1.10	106	227	214%
				2	2	32	15.0	2,247	1.10	53	84	158%
Total									10,259	16,152	157%	

The annual lighting hours of operation verified during the M&V site visit range between 528 and 3,037. The annual lighting hours of operation for the first line item in the table above are less than what was used to calculate ex ante savings (1,560). The annual lighting hours of operation for the second line item are greater than what was used to calculate ex ante savings (2,600). The remainder of the line item's annual lighting operation hours are greater than what was used to calculate ex ante savings (1,560).

The ex ante savings estimate used an LM adjusted base wattage of 70W for the first line item in the above table by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 72W to meet EISA requirements for a 100W incandescent lamp.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.10, applicable to a gas heated, air conditioned storage facility in Jefferson City, was applied to the ex post lighting energy savings for line items two through five in the table above. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁸²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 157%.

⁸² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	10,259	16,152	157%	3.07
Total		10,259	16,152	157%	3.07

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015940-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026	Lighting	SBDI	16	32	75	18	3,086	1.11	1,178	2,130	181%
				144	144	40	18	3,086		18,556	10,813	58%
				2	2	40	18	3,086		258	150	58%
				16	16	40	18	930		403	362	90%
Total									20,395	13,454	66%	

The annual lighting hours of operation verified during the M&V site visit for the first three line items in the above table (3,086) and the fourth line item (930) are greater than the annual hours of operation used to calculate ex ante savings (3,068 and 600 respectively).

The base wattage of the first line item in the above table (75W) verified during the M&V site visit is greater than the ex ante savings base wattage (60W). The base wattage for the second through fourth line items (40W) are less than the ex ante savings base wattage (60W).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned office in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.⁸³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 66%

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
SBDI	Lighting	20,395	13,454	66%	2.56
Total		20,395	13,454	66%	2.56

⁸³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/07/16 and 12/28/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015232-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	122	122	53	9	2,410	1.02	15,454	13,146	85%
015232-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			21	21	43	9	2,766	1.02	2,498	2,007	80%
015232-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			-	-	50	7	0	1.02	125	-	0%
Total										18,077	15,153	84%

The annual lighting hours of operation verified during the M&V site visit (ranging between 2,410 and 2,766) are less than the annual hours of operation used to calculate ex ante savings (2,912). The facility is diligent at keeping unoccupied areas unlit.

The ex ante savings estimate used an adjusted base wattage of 52.5W and 42W for the first and second line items in the above table by multiplying the provided wattage by 70%. An adjusted base wattage of 53W and 43W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 75W and 60W incandescent lamp.

The quantity of the second line item in the above table (21) verified during the M&V site visit is less than the ex ante savings quantity (26). The third line item above, LED replacing Halogen BR/R, was not installed at the facility resulting in a quantity of 0.

The measure name for the second line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.02, applicable to a electric heated, air conditioned small office in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.⁸⁴

⁸⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 84%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	18,077	15,153	84%	2.88
Total		18,077	15,153	84%	2.88

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/20/16 and 1/19/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015564-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026	Lighting	SBDI	12	12	36	11	2,641	1.10	780	870	112%
				33	33	40	15	2,113	1.10	2,145	1,914	89%
015564-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			15	15	32	15	2,113	1.10	663	592	89%
Total										3,588	3,376	94%

The annual lighting hours of operation verified during the M&V site visit for the first line item in the table above (2,641) are greater than the annual hours of operation used to calculate the ex ante savings (2,600) while the second and third line items (2,113) are lower.

A heating and cooling interactive factor of 1.10, applicable to a gas heated, air conditioned retail facility in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁸⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 94%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
SBDI	Lighting	3,588	3,376	94%	0.64
Total		3,588	3,376	94%	0.64

⁸⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate	
014254-100807-Lighting-T5 HO Fixture Replacing T5 HO Fixture	1169	Lighting	Custom	15	15	468	432	8,760	1.11	4,730	5,232	111%	
014254-200402-Lighting-T8 25 Watt Lamp Replacing T8 32 Watt Lamp	3020		Standard		30	30	32	25	2,740	1.11	655	636	97%
016027-305502-Lighting-Linear ft T8 25 Watt (<=7 Watts/ft) Replacing T8 32 Watt Linear ft	3020				90	90	32	25	2,740	1.11	1,688	1,909	113%
Total										7,073	7,777	110%	

The annual lighting hours of operation verified during the M&V site visit range between 2,740 and 8,760. The annual lighting hours of operation for the first line item in the table above is equal to the hours of operation used to calculate ex ante savings (8,760). The second line item hours of operation are less than the ex ante savings estimate hours (3,120) while the third line item above has hours that are greater than the ex ante estimate (2,680).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁸⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 110%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Custom	Lighting	4,730	5,232	111%	0.99
Standard		2,343	2,545	109%	0.48
Total		7,073	7,777	110%	1.48

⁸⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014969-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	Standard	24	24	53	13	4,228	1.14	4,152	4,617	111%
014969-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			480	480	43	10	4,228	1.14	68,328	77,334	113%
015240-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			132	132	50	7	4,228	1.14	16,188	27,298	169%
015240-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			50	50	43	10	4,228	1.14	7,118	8,056	113%
Total										95,786	117,304	122%

The annual lighting hours of operation verified during the M&V site visit (4,228) are less than the annual hours of operation used to calculate ex ante savings (4,380).

The ex ante savings estimate used an adjusted base wattage of 52.5W, 42W, 35W, and 42W for the first through fourth line items in the above table by multiplying the provided wattage by 70%. An adjusted base wattage of 53W (first line item) and 43W (second and fourth line items) was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 75W and 60W incandescent lamp. The third line item in the above table was a MR-16 lamp which are exempt from an adjusted wattage calculation.

The measure name for the first, second, and fourth lines in the above table are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned assembly facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.⁸⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 122%.

⁸⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	95,786	117,304	122%	22.28
Total		95,786	117,304	122%	22.28

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/9/17 and 2/27/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015662-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	Standard	31	31	65	12	4,750	1.03	5,640	8,046	143%
015662-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			74	74	40	14	5,650	1.03	10,447	11,207	107%
Total										16,087	19,253	120%

The average annual lighting hours of operation for the first line item in the table above (4,750) are less than the hours of operation used to calculate ex ante savings (5,430), while the average annual lighting hours of operation for the second line item (5,650) are greater.

The ex ante savings estimate used an LM adjusted base wattage of 45.5W first line item in the above table by multiplying the provided wattage by 70%. The base lamps for this measure (65W BR/R) are exempt from an adjusted wattage calculation.

A heating and cooling interactive factor of 1.03, applicable to an electrically heated, air conditioned assembly facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁸⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 120%.

⁸⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	16,087	19,253	120%	3.66
Total		16,087	19,253	120%	3.66

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and interviewing facility personnel regarding lighting operating schedules. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014575-100212-Lighting-Non Linear LED Fixture Replacing Incandescent/Halogen Lamp Fixture	1169	Lighting	Custom	68	68	458	153	8,760	1.00	181,682	181,682	100%
Total										181,682	181,682	100%

The annual lighting hours of operation verified during the M&V site visit are equal to the annual hours of operation used to calculate ex ante savings (8,760).

Neither the ex post nor the ex ante savings estimate accounted for heating and cooling interactive effects due to measures being implemented in an uncooled, gas heated space.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁸⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 100%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	181,682	181,682	100%	34.51
Total		181,682	181,682	100%	34.51

⁸⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed four photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/19/17 and 2/10/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015060-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	830	830	32	17	2,931	1.09	45,318	39,920	88%
				280	280	32	17	2,231	1.11	15,960	12,259	77%
Total										61,278	52,179	88%

The annual lighting hours of operation for line items one and two in the table above verified during the M&V site visit, (range between 2,931 and 2,231) are less than the hours of operation used to calculate ex ante savings (3,640 and 3,800 respectively).

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned manufacturing facility in St. Louis, was applied to the ex post lighting energy savings for the first line item. A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned office facility in St. Louis, was applied to the ex post lighting energy savings for the second line item. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁹⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 85%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	61,278	52,179	85%	9.91
Total		61,278	52,179	85%	9.91

⁹⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/22/16 and 1/20/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015604-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	2	2	72	72	6,558	1.01	1,068	0	0%
015604-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			6	6	40	15	6,677	1.01	1,314	1,016	77%
				16	32	96	15	6,438	1.01	9,251	6,895	75%
				2	4	96	15	6,677	1.01	1,156	894	77%
Total										12,789	8,805	69%

The annual lighting hours of operation verified during the M&V site visit (ranging between 6,438 and 6,677) are less than the hours of operation used to calculate ex ante savings (8,760).

During the M&V visit, ADM staff verified that the lighting in the first line item in the table above was not implemented at the time of the site visitation. This results in no ex post savings and a realization rate of zero.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.01, applicable to a electrically heated, air conditioned retail facility in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁹¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 69%.

Site-Level Energy Savings

Incentive	kWh Savings
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⁹¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

	<i>End Use Category</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	<i>Gross Ex Post kW Reduction</i>
SBDI	Lighting	12,789	8,805	69%	1.67
Total		12,789	8,805	69%	1.67

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015637-305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture	3005-1	Lighting	Standard	109	109	455	107	2,834	1.10	118,348	117,818	100%
Total										118,348	117,818	100%

The annual lighting hours of operation verified during the M&V site visit (2,834) are less than the annual hours of operation used to calculate ex ante savings (3,120).

A heating and cooling interactive factor of 1.10, applicable to a gas heated, air conditioned storage facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁹²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 100%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	118,348	117,818	100%	22.38
Total		118,348	117,818	100%	22.38

⁹² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed six photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 11/29/16 and 12/26/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015454-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	184	184	32	15	3,453	1.11	13,082	11,962	91%
015454-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			26	26	40	15	3,878	1.11	2,718	2,792	103%
				2	2	55	15	4,614	1.11	335	344	103%
				46	92	60	15	4,303	1.11	5,771	6,577	114%
				220	440	60	15	4,300	1.11	27,601	31,434	114%
				38	38	40	15	4,298	1.11	3,973	4,523	114%
				14	28	60	15	4,614	1.11	1,756	1,804	103%
				4	8	60	15	3,453	1.11	502	459	91%
				50	50	40	18	3,828	1.11	4,600	4,664	101%
Total												60,339

The annual lighting hours of operation verified during the M&V site visit range between 3,453 and 4,614. The average annual lighting hours of operation for line items three through seven are greater than the hours of operation used to calculate ex ante savings (4,182), while the rest are lower.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁹³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 107%.

⁹³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	60,339	64,559	107%	12.26
Total		60,339	64,559	107%	12.26

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 11/23/16 and 12/5/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015424-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	13	13	53	8	3,816	1.11	2,051	2,472	121%
015424-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			6	6	72	9	3,816	1.11	1,298	1,598	123%
015425-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			12	12	53	8	3,816	1.11	1,894	2,282	121%
015425-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			3	3	35	9	3,816	1.11	277	330	119%
015451-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			16	16	66.5	11	3,764	1.11	3,644	3,735	103%
015451-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			12	12	49	8	3,440	1.11	2,001	1,875	94%
015451-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			8	8	72	9	3,816	1.11	1,985	2,130	107%
Total												13,150

The annual lighting hours of operation verified during the M&V site visit range between 3,440 and 3,816. The annual lighting hours of operation for the first four line items in the table above are greater than the hours of operation used to calculate ex ante savings (3,546). The annual lighting hours of operation for the last three line items are less than the hours of operation used to calculate ex ante savings (4,067).

The ex ante savings estimate used LM adjusted base wattages of 52.5W for the first and third, 70W for the second and seventh, 35W for the fourth, 66.5W for the fifth, and 49W for the sixth line items in the above table by multiplying the provided wattage by 70%. The ex post savings estimate used adjusted base wattages of 53W and 72W to meet EISA 2007 requirements for a 75W and 100W incandescent lamp.

The measure names for the second, fourth, and seventh line items in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁹⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 110%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	13,150	14,422	110%	2.74
Total		13,150	14,422	110%	2.74

⁹⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/09/16 and 12/26/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015382-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	SBDI	8	8	43	9	1,709	1.11	860	515	60%
015382-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3007			12	12	53	8	2,726		1,392	1,630	117%
015382-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3012			40	40	72	5	2,726		4,734	8,090	171%
Total										6,986	10,235	146%

The annual lighting hours of operation verified during the M&V site visit for the first line in the above table (1,709) are less than the annual hours of operation used to calculate ex ante savings (2,607). For line items two and three the verified annual hours of operation (2,726) are greater than those used in the ex ante calculation.

The ex ante savings estimate used an adjusted base wattage of 42W and 52.5W and 50.4W for the measures respectively by multiplying the provided wattage by 70%. An adjusted base wattage of 43W and 53W for the first two line items above was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W incandescent lamp and BR/R 75W lamp. The base lamps for the third line item, MR16, is exempt from an adjusted wattage calculation.

The quantity of the first measure (8) verified during the M&V site visit is less than the ex ante savings quantity (10).

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.⁹⁵

⁹⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 146%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	6,986	10,235	146%	1.94
Total		6,986	10,235	146%	1.94

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014801-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	296	296	18	10	1,145	1.17	24,079	3,371	14%
014973-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			30	30	18	10	1,145	1.17	1,116	342	31%
				330	330	18	10	8,760	1.18	26,432	27,374	104%
Total										51,627	31,087	60%

The annual lighting hours of operation verified during the M&V site visit range between 1,145⁹⁶ and 8,760. The annual lighting hours of operation for the first line item in the table above are fewer than the hours of operation used to calculate ex ante savings (2,503), equal for the second line item, and greater for the third line item (2,503). The third line item above was installed in public areas and remain on 24 hours, 7 days a week.

The ex ante savings estimate used an LM adjusted base wattage of 42W by multiplying the provided wattage by 70%. The site contact confirmed that the base lamps were CFLs and not incandescent lamps. The ex post savings analysis used 18W for the base wattage as confirmed during the M&V site visit.

The measure names in the table above are not accurate. The baseline lamps were CFLs and were replaced with LED A19 lamps.

A heating and cooling interactive factor of 1.17, applicable to an electrically heated, air conditioned hotel facility in St. Louis, was applied to the ex post lighting energy savings for the first two line items in the table above. A heating and cooling interactive factor of 1.18, applicable to a gas heated, air conditioned hotel facility in St. Louis, was applied to the ex post lighting energy savings for the third line item in the table above. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁹⁷

⁹⁶ The ex post savings analysis cites the DEER 2005 guest room lighting operation estimate (1,145). This average value has been corroborated through ADM’s extensive fixture-level and circuit-level monitoring of guest room lighting operation.

⁹⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 60%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	51,627	31,087	60%	5.91
Total		51,627	31,087	60%	5.91

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/02/16 and 12/27/16.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015327-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	SBDI	152	152	43	9	2,969	1.11	15,048	16,995	113%
015327-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			22	22	65	8	2,969	1.11	2,475	4,124	167%
Total										17,523	21,118	121%

The annual lighting hours of operation verified during the M&V site visit (2,969) are less than the annual hours of operation used to calculate ex ante savings (3,000).

An adjusted base wattage of 43W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W incandescent lamp. The ex ante base wattage of 42W was computed within the application by factoring 70% of a 60W incandescent lamp.

The ex ante savings estimate used an adjusted base wattage of 42W and 45.5W for the measures above respectively by multiplying the provided wattage by 70%. An adjusted base wattage of 43W was used in the ex post savings analysis for the first line item in the table above to meet the EISA 2007 standard lumen equivalent for a 60W incandescent lamp. The base lamps for the second line item above (BR reflector) are exempt from an adjusted wattage calculation.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.⁹⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 121%.

⁹⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	17,523	21,118	121%	4.01
Total		17,523	21,118	121%	4.01

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and interviewing facility personnel regarding lighting operating schedules. Annual lighting operating hours were verified by interviewing facility personnel regarding facility operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015438-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	12	12	53	8	2,357	1.11	1,111	1,418	128%
015438-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			4	4	53	12	2,357	1.11	337	431	128%
Total										1,448	1,849	128%

The annual lighting hours of operation verified during the M&V site visit (2,357) are greater than the annual hours of operation used to calculate ex ante savings (2,080).

The ex ante savings estimate used an LM adjusted base wattage of 52.5W by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 53W to meet EISA 2007 requirements for a 75W incandescent lamp.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail facility in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.⁹⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 128%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
SBDI	Lighting	1,448	1,849	128%	0.35
Total		1,448	1,849	128%	0.35

⁹⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed four photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/24/17 and 2/16/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014832-201316-Lighting-LED or Electroluminescent Replacing Incandescent Exit Sign	793	Lighting	Standard	9	9	40	2	8,760	1.11	2,995	3,318	111%
014832-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			88	88	40	18	4,876	1.10	9,486	10,347	109%
				8	8	40	18	4,876	1.10	862	941	109%
				480	480	32	18	5,414	1.11	16,464	40,292	245%
014832-305502-Lighting-Linear ft T8 25 Watt (<=7 Watts/ft) Replacing T8 32 Watt Linear ft	3022			48	48	75	18	6,741	1.11	13,406	20,321	152%
014832-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			100	100	32	18	6,741	1.11	3,430	10,398	303%
Total										46,644	85,617	184%

The annual lighting hours of operation verified during the M&V site visit range between 4,876 and 8,760. The annual lighting hours of operation for the first line item in the table above is equal to the annual hours of operation used to determine ex ante savings (8,760). The annual lighting hours of operation for the second and third line items (4,876) are less than the hours of operation used to calculate ex ante savings (4,900). The annual lighting hours of operation for the fourth (5,414), fifth and sixth line items (6,741) are greater than the hours of operation used to calculate ex ante savings (2,450, 4,900, and 2,450 respectively).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings for lighting installed inside the store. A heating and cooling interactive factor of 1.10, applicable to a gas heated, air conditioned storage facility in St. Louis, was applied to the ex post lighting energy savings for lighting installed inside the store. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁰⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 184%.

¹⁰⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	46,644	85,617	184%	16.26
Total		46,644	85,617	184%	16.26

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed one photo-sensor logger to monitor lighting operation. The photo-sensor loggers collected data between 1/3/17 and 2/2/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015139-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	Standard	100	100	53	9.5	8,760	1.09	19,001	41,700	219%
015139-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			72	72	43	9.5	1,567	1.09	46,976	4,136	9%
Total										65,977	45,835	69%

The annual lighting hours of operation verified during the M&V site visit range between 1,567 and 8,760. The annual lighting hours of operation for the first line item in the table above are greater than the hours of operation used to calculate ex ante savings (4,368), and fewer for the second line item (2,190).

The ex ante savings estimate used LM adjusted base wattages of 52.5W and 42W for the first and second line items in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used adjusted base wattages of 53W and 43W to meet EISA 2007 requirements for a 75W and 60W incandescent lamp.

ADM staff verified an efficient wattage of 9.5W for all measures, where the ex ante savings estimate for the first line in the table above referenced an efficient wattage of 9W. ADM staff also verified that approximately 10 of the 250 apartments had efficient lighting installed. Lighting was also installed in a recreation area. This resulted in a lamp quantity of 72 for the second line item in the above table, where ex ante savings estimate referenced a count of 660 lamps. During the site visit a storage room with over 700 LED 9.5W lamps still in boxes was brought to the attention of the ADM staff.

The measure names in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned assisted living facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁰¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 69%.

¹⁰¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	65,977	45,835	69%	8.71
Total		65,977	45,835	69%	8.71

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed one photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/5/16 and 1/27/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014375-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp	3007	Lighting	Standard	24	24	65	12	7,115	1.18	7,043	10,712	152%
014375-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			13	13	50	10	8,760	1.18	2,847	5,392	189%
014849-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp	3007			12	12	50	8	8,760	1.18	4,415	5,226	118%
				36	36	65	9	8,760	1.18	1,511	20,904	1383%
Total										15,816	42,234	267%

The annual lighting hours of operation for the first line item in the table above (7,115) are less than the hours of operation used to calculate ex ante savings (8,760). A portion of this measure was installed over the breakfast bar which does not remain on all day. The second and third line items are accurate and match the ex ante estimate (8,760). The annual lighting hours of operation for the fourth line item (8,760) is greater than the hours of operation use to calculate ex ante savings (1,150). During the M&V visit, ADM staff visually verified that the lighting in reference to the fourth line item in the table above was installed in elevator lobby areas that operate continuously. The application states that lighting was installed in guest rooms. The site contact stated that no lighting had been updated in the guest rooms.

The ex ante savings estimate used an adjusted base wattage of 45.5W for the first and fourth line items in the table above and 35W for the second by multiplying the provided wattage by 70%. The base lamps for these measures (65W BR/R and MR16) are exempt from an adjusted wattage calculation.

A heating and cooling interactive factor of 1.18, applicable to a gas heated, air conditioned hotel facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁰²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 267%.

¹⁰² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	15,816	42,234	267%	8.02
Total		15,816	42,234	267%	8.02

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/3/17 and 1/23/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015100-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	Standard	24	24	65	9.0	6,391	1.17	3,189	10,051	315%
				82	82	65	9.0	8,760	1.17	40,226	47,071	117%
				30	30	50	8.0	8,760	1.17	11,038	12,916	117%
				18	18	50	8.0	1,512	1.17	1,572	1,338	85%
015100-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			10	10	50	6.5	8,760	1.17	2,497	4,459	179%
015100-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			30	30	43	9.5	5,705	1.17	8,541	6,709	79%
Total										67,063	82,544	123%

The annual lighting hours of operation verified during the M&V site visit range between 1,512 and 8,760. The annual lighting hours of operation for line item one are greater than the hours of operation used to calculate the ex ante savings estimate (3,640). The annual lighting hours of operation for line items four and six are less than the hours of operation used to calculate the ex ante savings estimate (2,080 and 8,760 respectively).

The ex ante savings estimate used LM adjusted base wattages of 45.5W, 35W, and 42W for the first, fifth, and sixth line items in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W for the sixth line item to meet EISA 2007 requirements for a 60W incandescent lamp. The base lamps for the first and fifth line items (65W BR/R and MR16) are exempt from an adjusted wattage calculation.

The measure name for the sixth line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.17, applicable to an electrically heated, air conditioned hotel facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁰³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 123%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	67,063	82,544	123%	15.68
Total		67,063	82,544	123%	15.68

¹⁰³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed one photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/6/16 and 12/21/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014570-100213-Lighting-Non Linear LED Fixture Replacing CFL Fixture	1169	Lighting	Custom	10	10	46	15	8,760	1.14	2,716	3,089	114%
014780-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011		Standard	30	30	43	10	1,145	1.17	1,338	1,326	99%
				-	-	29	7	-	-	44	-	0%
014789-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp	3007		40	40	50	9	3,317	1.14	4,605	6,188	134%	
Total										8,703	10,604	122%

The annual lighting hours of operation for the first line item in the table above (8,760) are equal to the hours of operation used to calculate ex ante savings. While the second (1,145¹⁰⁴) and fourth (3,317) line items above were greater (1,045 and 2,808 respectively).

The ex ante savings estimate used LM adjusted base wattages of 42W and 28W for the second and third line items in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used adjusted base wattages of 43W and 29W for the second and third line item to meet EISA 2007 requirements for a 60W and 40W incandescent lamp.

The measure names for the second and third line items in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

The ex post quantity for the second line item (30) is less than the ex ante savings quantity (40). In addition, the third line item was not installed and the site contact was unaware of this lamp.

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned assembly facility in St. Louis, was applied to the ex post lighting energy savings for measures implemented in the lobby or ballrooms. A heating and cooling interactive factor of 1.17, applicable to an electrically heated, air conditioned hotel facility in St. Louis, was applied to the ex post lighting energy savings for measures

¹⁰⁴ The ex post savings analysis cites the DEER 2005 guest room lighting operation estimate (1,145). This average value has been corroborated through ADM's extensive fixture-level and circuit-level monitoring of guest room lighting operation.

implemented in guest rooms. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁰⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 122%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	2,716	3,089	114%	0.59
Standard		5,987	7,515	126%	1.43
Total		8,703	10,604	122%	2.01

¹⁰⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/16/17 and 3/6/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014503-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008	Lighting	Standard	66	66	53	17	1,442	1.14	7,029	3,898	55%
014503-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			14	14	43	10	219	1.14	1,365	117	9%
Total										8,394	4,015	48%

The annual lighting hours of operation verified during the M&V site visit, ranging between 219 and 1,442, are fewer than the hours of operation used to calculate ex ante savings (3,000). The lighting referenced in the second line item in the table above was installed in a restroom, while the application states they were installed in clubhouse sconces.

The ex ante savings estimate used LM adjusted base wattages of 52.5W and 42W for the first and second line items in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used adjusted base wattages of 53W and 43W to meet EISA 2007 requirements for a 75W and 60W incandescent lamp.

The measure name for the second line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned assembly facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁰⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 48%.

¹⁰⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	8,394	4,015	48%	0.76
Total		8,394	4,015	48%	0.76

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/08/16 and 12/27/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015445-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	2	2	53	7	1,582	1.11	173	161	93%
015445-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			12	10	40	18	1,582	1.11	570	526	92%
015445-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			2	2	40	18	1,582	1.11	84	77	92%
015445-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			10	10	43	9	1,582	1.11	627	596	95%
015445-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			6	6	53	9	865	1.11	496	253	51%
Total										1,950	1,613	83%

The annual lighting hours of operation verified during the M&V site visit (ranging from 865 to 1,582) are less than the annual hours of operation used to calculate ex ante savings (1,900). Staff reported using ambient lighting whenever possible.

An adjusted base wattage of 43W and 53W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W and 75W incandescent lamp. The ex ante base wattage of 42W and 52.5W was computed within the application by factoring 70% of a 60W and 75W incandescent lamp respectively.

The measure name for the fourth line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁰⁷

¹⁰⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 83%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	1,950	1,613	83%	0.31
Total		1,950	1,613	83%	0.31

Data Collection

The participant received New Construction lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014174-406123-Lighting-New Construction Lighting Power Density (LPD)	3000	Lighting	New Construction	1	16	7,500	104	3,158	1.00	72,385	18,428	25%
				1	33	19,200	152	3,158	1.00	136,344	44,789	33%
Total										208,729	63,217	30%

The annual lighting hours of operation verified during the M&V site visit (3,158) are less than the annual hours of operation used to calculate ex ante savings (4,992). The site contact confirmed a maximum of 12 hours a day Monday through Friday and less than an hour on Saturday. The ex ante hours were based on 18 hour days Monday through Thursday, 10 hours on Friday, 4 hours on Saturday, and 9 plus hours on Sunday.

The ex ante baseline allowed wattage (49,493) was based on the square footage of the entire facility (60,616). However, only the addition to the existing building involved the measure listed in the above table. The square footage of the new area (33,375) has a lighting power density baseline wattage (26,700) which is lower than the ex ante savings estimate.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁰⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 30%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
New Construction	Lighting	208,729	63,217	30%	12.01
Total		208,729	63,217	30%	12.01

¹⁰⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Custom and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed five photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 11/16/16 and 12/1/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014377-100101- Lighting-Linear Tube LED Fixture Replacing T12 Fixture	1169	Lighting	Custom	120	120	82	6	4,380	1.09	79,786	43,678	82%
				120	120	41	3	4,380	1.09		21,839	
				680	450	59	35	3,695	1.09	134,035	98,604	74%
014631-305402- Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025		Standard	2,500	2,500	32	17	8,760	1.09	328,500	359,669	109%
Total										542,321	523,790	97%

The annual lighting hours of operation verified during the M&V site visit range between 1,827 and 8,760. The lighting hours of operation referenced in the third line item in the table above (3,695) is less than the lighting hours of operation used to calculate ex ante savings (5,500). The first and second line items are in reference to a single measure that is controlled with occupancy sensors. The controlled lighting is set to half power after several minutes of inactivity, and is operated continuously.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned large office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁰⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 97%.

¹⁰⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	213,821	164,121	77%	31.18
Standard		328,500	359,669	109%	68.32
Total		542,321	523,790	97%	99.50

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015559-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	25	25	46	9	4,745	1.03	4,308	4,537	105%
				21	21	53	8			3,975	4,686	118%
015559-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp or Fixture	3012			9	9	50	5			1,641	2,004	122%
015559-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			2	2	35	9			835	255	31%
Total										10,759	11,482	107%

The annual lighting hours of operation verified during the M&V site visit (4,745) are greater than the annual hours of operation used to calculate ex ante savings (4,015). Besides the posted hours of

The quantity of the first, second, and fourth line items in the table above (25, 21, and 2, respectively) verified during the M&V site visit are less than the ex ante savings quantities (29, 22, and 8 respectively).

The measure name for the fourth line item in the above table is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.03, applicable to an electric heated, air conditioned restaurant in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹¹⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 107%.

¹¹⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	10,759	11,482	107%	2.18
Total		10,759	11,482	107%	2.18

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
016007-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	78	78	53	13	4,537	1.12	12,371	15,823	128%
016007-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			23	23	53	9	4,537		4,541	5,132	113%
016007-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp or Fixture	3012			7	7	50	7	4,537		392	1,527	389%
Total										17,304	22,482	130%

The annual lighting hours of operation verified during the M&V site visit (4,537) are greater than the annual hours of operation used to calculate ex ante savings (ranging from 2,000 to 3,600).

The ex ante savings estimate used an adjusted base wattage of 52.5W for the first and second line item in the above table and 35W for the third line item by multiplying the provided wattage by 70%. An adjusted base wattage of 53W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 75W incandescent lamp. The base lamps for the third line item (MR16) are exempt from an adjusted wattage calculation.

The quantities of the first and second line items (78 and 23, respectively) verified during the M&V site visit are less than the ex ante savings quantities (87 and 29, respectively). There were a quantity (4 and 2, respectively) that had been unscrewed and verified by the client not used.

The measure name for the second line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.12, applicable to a gas heated, air conditioned restaurant in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹¹¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 130%.

¹¹¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	17,304	22,482	130%	4.27
Total		17,304	22,482	130%	4.27

Data Collection

The participant received Custom and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/05/16 and 12/23/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014704-201316-Lighting-LED or Electroluminescent Replacing Incandescent Exit Sign	793	Lighting	Standard	2	2	30	4	8,760	1.07	463	496	107%
014704-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			16	16	32	15	2,497	1.07	792	728	92%
014704-201316-Lighting-LED or Electroluminescent Replacing Incandescent Exit Sign	793			4	4	30	2	8,760	1.07	981	1,052	107%
014704-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			108	108	32	15	2,497	1.07	5,347	4,916	92%
014704-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			10	20	96	15	2,497	1.07	1,922	1,767	92%
014704-100201-Lighting-Non Linear LED Fixture Replacing T12 Fixture	1169		Custom	16	8	138	150	8,404	1.07	8,830	9,083	103%
014704-100104-Lighting-Linear Tube LED Fixture Replacing T8 Fixture				12	12	114	40	1,453	1.07	2,586	1,383	53%
014704-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011		Standard	3	3	29	10	1,453	1.07	2	89	5645%
Total										20,923	19,515	93%

The annual lighting hours of operation verified during the M&V site visit for the second, and fourth through seventh line items in the above table (ranging from 1,453 to 8,404) are less than the annual hours of operation used to calculate ex ante savings (ranging from 2,912 to 8,760). For the eighth line item above the verified hours of operation (1,453) are greater than the hours of operation used in the ex ante calculation (29.12).

An adjusted base wattage of 29W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 40W incandescent lamp. The ex ante base wattage of 28W was computed within the application by factoring 70% of a 40W incandescent lamp.

The measure name for the eighth line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.07, applicable to a gas heated, air conditioned healthcare facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹¹²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 93%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	11,416	10,466	92%	1.99
Standard		9,507	9,049	95%	1.72
Total		20,923	19,515	93%	3.71

¹¹² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/9/17 and 3/1/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014532-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	501	501	43	9	5,639	1.13	72,216	108,663	150%
Total										72,216	108,663	150%

The annual lighting hours of operation verified during the M&V site visit (5,639) are greater than the annual hours of operation used to calculate ex ante savings (4,368).

The ex ante savings estimate used an LM adjusted base wattage of 42W by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W to meet EISA 2007 requirements for 60W incandescent lamp.

The measure name in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.13, applicable to an electrically heated, air conditioned assisted living facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹¹³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 150%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	72,216	108,663	150%	20.64
Total		72,216	108,663	150%	20.64

¹¹³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014180-100213-Lighting-Non Linear LED Fixture Replacing CFL Fixture	1169	Lighting	Custom	25	25	42	15	4,745	1.11	4,188	3,542	85%
014786-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011		Standard	47	47	43	9	2,165	1.11	5,323	3,883	73%
014786-305502-Lighting-Linear ft T8 25 Watt (<=7 Watts/ft) Replacing T8 32 Watt Linear ft	3022			90	90	32	25	2,165	1.11	2,130	1,509	71%
				616	616	32	25	2,165	1.11	14,579	10,325	71%
014786-305501-Lighting-Linear ft T8 25 Watt (<=7 Watts/ft) Replacing T12 <=40 Watt Linear ft	3021			938	938	32	25	2,165	1.11	23,099	15,723	68%
				310	310	34	25	2,165	1.11	9,433	6,681	71%
015013-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			516	516	34	25	2,165	1.11	15,701	11,120	71%
				24	24	43	10	8,760	1.11	4,765	7,673	161%
Total										79,218	60,456	76%

The annual lighting hours of operation verified during the M&V site visit range between 2,165 and 8,760. For the first through seventh line items in the table above the hours of operation (4,745 and 2,165) are less than the hours of operation used to calculate ex ante savings (6,205 and 3,381). The eighth line item above has hours of operation (8,760) greater than the ex ante estimate (6,205).

The ex ante savings estimate used an LM adjusted base wattage of 42W for the second and eighth line items in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W to meet EISA 2007 requirements for a 60W incandescent lamp.

The measure names for the second and eighth line items in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

The ex post quantity for the fifth line item in the above table (938) is less than the ex ante savings estimate (976). The site contact stated that 38 were purchased as extras to have on hand.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹¹⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 76%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	4,188	3,542	85%	0.67
Standard		75,030	56,914	76%	10.81
Total		79,218	60,456	76%	11.48

¹¹⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received New Construction lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014280-406123-Lighting-New Construction Lighting Power Density (LPD)_	3000	Lighting	New Construction	20	20	656	152	2,568	1.00	31,465	25,900	82%
Total										31,465	25,900	82%

The annual lighting hours of operation verified during the M&V site visit (2,568) are less than the annual hours of operation used to calculate ex ante savings (3,120). The ex ante estimate had 11 hours a day Monday through Friday and 6 hours on Saturday. The site contact confirmed 9 hour days Monday through Friday along with 5-6 hours on Saturday.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹¹⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 82%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
New Construction	Lighting	31,465	25,900	82%	4.92
Total		31,465	25,900	82%	4.92

¹¹⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/17/17 and 2/7/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015306-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	730	730	32	17	2,959	1.09	31,317	35,442	113%
Total										31,317	35,442	113%

The annual lighting hours of operation verified during the M&V site visit (2,959) are greater than the hours of operation used to calculate ex ante savings (2,860).

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned manufacturing facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹¹⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 113%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	31,317	35,442	113%	6.73
Total		31,317	35,442	113%	6.73

¹¹⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015077-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008	Lighting	Standard	30	30	65	12	8,760	1.00	16,714	13,928	83%
Total										16,714	13,928	83%

The annual lighting hours of operation verified during the M&V site visit are equal to the annual hours of operation used to calculate ex ante savings (8,760).

The ex post lamp quantity (30) is less than the quantity in the ex ante savings estimate (36). During the M&V site visit, ADM staff visually verified 30 installed lamps and 6 spares in storage.

A heating and cooling interactive factor of 1.00, applicable to a gas heated facility in St. Louis, was applied to the ex post lighting energy savings which matches the ex ante savings estimate.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹¹⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 83%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	16,714	13,928	83%	2.65
Total		16,714	13,928	83%	2.65

¹¹⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed five photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/9/16 and 12/28/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015491-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026	Lighting	Standard	65	65	40	15	2,627	1.11	4,225	4,742	112%
				2	2	40	12	2,627	1.11	146	163	112%
015491-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			253	253	32	15	2,603	1.11	11,183	12,433	111%
015161-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			76	76	40	15	2,137	1.11	4,940	4,510	91%
				117	117	40	15	2,365	1.11	7,605	7,682	101%
				4	4	32	12	2,344	1.11	208	208	100%
				12	12	40	12	2,365	1.11	874	882	101%
015161-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			4	4	30	11	2,365	1.11	198	200	101%
				64	64	32	15	2,137	1.11	2,829	2,582	91%
				204	204	32	15	2,365	1.11	9,017	9,109	101%
Total										41,225	42,512	103%

The annual lighting hours of operation verified during the M&V site visit range between 2,106 and 2,627. The average annual lighting hours of operation for the first three line items in the table above are greater than the hours of operation used to calculate ex ante savings (2,600), while the rest of the line items are lower.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned office facility in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹¹⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 103%.

¹¹⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	41,225	42,512	103%	8.08
Total		41,225	42,512	103%	8.08

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/9/16 and 1/19/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015588-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	24	24	72	9	1,804	1.11	3,208	3,039	95%
Total										3,208	3,039	95%

The annual lighting hours of operation verified during the M&V site visit (1,804) are less than the annual hours of operation used to calculate ex ante savings (2,191).

The ex ante savings estimate used an LM adjusted base wattage of 70W by multiplying the provided wattage by 70%. The ex post savings estimated used an adjusted base wattage of 72W to meet EISA 2007 requirements for a 100W incandescent lamp.

The measure name in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail facility in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹¹⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 95%.

¹¹⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	3,208	3,039	95%	0.58
Total		3,208	3,039	95%	0.58

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014893-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp	3007	Lighting	Standard	77	77	50	9	2,878	1.01	7,902	9,141	116%
Total										7,902	9,141	116%

The annual lighting hours of operation verified during the M&V site visit (2,878) are greater than the annual hours of operation used to calculate ex ante savings (2,503).

A heating and cooling interactive factor of 1.01, applicable to an electrically heated, air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹²⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 116%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	7,902	9,141	116%	1.74
Total		7,902	9,141	116%	1.74

¹²⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed one photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/16/17 and 3/6/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015179-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	Standard	24	24	50	9	5,912	1.15	2,308	6,677	289%
015396-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			-	-	-	-	-	-	-	1,712	-
Total										4,020	6,677	166%

The annual lighting hours of operation verified during the M&V site visit for the first line item in the above table (5,912) are greater than the annual hours of operation used to calculate ex ante savings (2,346). The application claimed hours of operation to be 9 hours a day, 5 days a week. ADM staff verified the hours of operation to be closer to 16 hours a day, 7 days a week.

During the M&V visit, ADM staff verified with facility personnel that the MR-16 lighting referred to in the second line in the table above was not installed at this site.

A heating and cooling interactive factor of 1.15, applicable to an electrically heated, air conditioned office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹²¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 166%.

¹²¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	4,020	6,677	166%	1.27
Total		4,020	6,677	166%	1.27

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate	
014599-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008	Lighting	Standard	75	75	75	13	3,279	1.09	30,225	16,693	55%	
				153	153	63	15	3,279	1.09	47,736	26,365	55%	
10	10			50	7	3,279	1.09	1,820	1,544	85%			
90	90			32	15	6,482	1.09	9,945	10,859	109%			
72	72			43	7	3,279	1.09	13,860	9,305	67%			
014601-100213-Lighting-Non Linear LED Fixture Replacing CFL Fixture	1169		Custom	34	34	35	15	3,279	1.09	3,740	2,441	65%	
014602-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012		Standard	35	35	50	7	3,279	1.09	5,390	5,403	100%	
014602-100213-Lighting-Non Linear LED Fixture Replacing CFL Fixture	1169		Custom	185	185	36	15	3,279	1.09	21,367	13,947	65%	
014968-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025		Miscellaneous	Standard	112	112	32	15	8,760	1.00	16,679	16,679	100%
014968-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009		Lighting		10	10	43	9	6,055	1.09	2,145	2,254	105%
014968-100213-Lighting-Non Linear LED Fixture Replacing CFL Fixture	1169	Custom		88	88	34	15	6,055	1.09	10,868	11,085	102%	
Total										163,775	116,575	71%	

The annual lighting hours of operation verified during the M&V site visit for line items one through eight, ten and eleven in the table above (ranging from 3,279 to 6,482) are less than the annual hours of operation used to calculate ex ante savings (ranging from 5,500 to 6,500). The installations took place in several private offices common areas as well as the lobby of the building. The ex ante hours of operation represent the lobby hours. The ex post hours of operation for line item nine (8,760) were installed in the garage.

The ex ante savings estimate used an adjusted base wattage of 35W for the third and seventh line item in the above table and 42W for the fifth and tenth line item by multiplying the provided wattage by 70%. An adjusted base wattage of 43W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W incandescent lamp. The base lamps for the 35W adjustment (MR16) are exempt from an adjusted wattage calculation.

The measure names for the fifth and tenth line items in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned large office building in St. Louis, was applied to the ex post lighting energy savings for all but the ninth line item as it was a garage installation.. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹²²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 71%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	111,121	72,423	65%	14.00
Standard	Miscellaneous	16,679	16,679	100%	2.30
Custom	Lighting	35,975	27,473	76%	5.22
Total		163,775	116,575	71%	21.52

¹²² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014684-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008	Lighting	Standard	6	6	55	12	2,768	1.11	991	791	80%
				2	2	53	12	2,420	1.11	312	220	71%
014684-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp	3007			3	3	65	9	3,082	1.11	421	573	136%
014793-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			4	4	32	15	2,547	1.11	156	192	123%
014793-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			12	12	35	7	3,523	1.11	773	1,311	170%
016175-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			60	60	43	9.5	3,523	1.11	6,969	7,843	113%
016175-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			7	7	40	15	3,973	1.00	625	695	111%
				3	3	40	12	3,973	1.00	300	334	111%
Total										10,547	11,959	113%

The annual lighting hours of operation verified during the M&V site visit range between 2,420 and 3,973. The annual lighting hours of operation for the first three line items in the table above (2,768, 2,420, and 3,082, respectively) are less than the hours of operation used to calculate ex ante savings (3,840). The hours of operation for the fourth and fifth line items above (2,547, 3,523, respectively) are greater than the ex ante estimate (2,301). The hours of operation for the sixth through eighth line items (3,523, 3,973, and 3,973, respectively) are greater than the ex ante estimate (3,574).

The ex ante savings estimate used LM adjusted base wattages of 52.5W, 45.5W, and 42W for the second, third, and sixth line items in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used adjusted base wattages of 53W and 43W for the second and sixth line items to meet EISA 2007 requirements for a 75W and 60W incandescent lamp respectively. The base lamps for the third measure (65W BR/R) are exempt from an adjusted wattage calculation.

The measure name for the sixth line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings for the first through sixth line items. The ex ante savings estimate did not account for heating and cooling interactive effects. The seventh and eighth line items above were installed in an unconditioned warehouse space.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹²³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 113%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	10,547	11,959	113%	2.27
Total		10,547	11,959	113%	2.27

¹²³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed five photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/06/16 and 1/09/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015377-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	70	70	43	10	1,387	1.09	5,060	3,499	69%
015377-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			25	25	32	14	1,342		1,017	659	65%
015377-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			25	25	40	15	1,342		1,412	916	65%
015377-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			18	18	65	8	684		1,525	766	50%
016065-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			50	50	40	15	1,342		2,824	1,832	65%
016065-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			18	18	43	10	4,912		1,301	3,186	245%
Total										13,138	10,858	83%

Lighting Controls Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Quantity	Controlled Wattage	Efficient Hours	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015377-201718-Lighting-Dual Technology Occupancy Sensor Controlling Lighting Circuit >150 Watts	3016	Lighting	Standard	10	192	1,550	1.09	5,700	4,079	72%
016065-201718-Lighting-Dual Technology Occupancy Sensor Controlling Lighting Circuit >150 Watts				3	180	1,550		1,710	1,147	67%
Total								7,410	5,226	71%

The annual lighting hours of operation verified during the M&V site visit for the first five line items in the first table above (ranging from 684 to 1,342) are less than the annual hours of operation used to calculate ex ante savings (2,259). The sixth line item in the first table was installed in sconces in a public area resulting in a greater use in annual hours of operation (4,912) than used to calculate the ex ante savings.

The ex ante savings estimate used an adjusted base wattage of 42W for the first and sixth line item in the first table and 45.5W for the fourth line item by multiplying the provided wattage by 70%. An

adjusted base wattage of 43W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W incandescent lamp for the first and sixth line item. The base lamps for the fourth line item (BR reflector) are exempt from an adjusted wattage calculation.

The measure names for the first and sixth line items in the first table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned large office in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

During the M&V site visit, the baseline behavior for controlling lighting was determined by survey questions per usage area. The survey indicated some efficient behavior with turning off lighting during the workday and the end of the workday.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹²⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 78%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	20,548	16,084	78%	3.47
Total		20,548	16,084	78%	3.47

¹²⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules. Logging is not allowed within the facilities.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014522-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025	Lighting	Standard	1,400	1,400	32	18	7,957	1.01	156,800	157,145	100%
				1,500	1,500	32	18	7,957	1.01	168,000	168,246	100%
				1,750	1,750	32	18	7,957	1.01	196,000	196,431	100%
				500	500	32	18	7,957	1.01	56,000	56,123	100%
				1,500	1,500	32	18	7,957	1.01	168,000	168,151	100%
				1,500	1,500	32	18	7,957	1.01	168,000	168,246	100%
				1,500	1,500	32	18	7,957	1.01	168,000	168,151	100%
500	500	32	18	7,957	1.01	56,000	56,082	100%				
014522-100104-Lighting-Linear Tube LED Fixture Replacing T8 Fixture	1169		Custom	14,332	7,654	32	18	7,957	1.01	2,566,816	2,572,466	100%
Total										3,703,616	3,711,042	100%

The annual lighting hours of operation verified during the M&V site visit (7,957) are less than the annual hours of operation used to calculate ex ante savings (8,000).

A heating and cooling interactive factor (ranging from 1.12 to 1.15), applicable to a gas heated, air conditioned assembly was applied to the ex post lighting energy savings for the different facility locations. This factor was applied to the portion of lighting installed within offices or assembly areas for each line item in the above table. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹²⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 100%.

¹²⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	1,136,800	1,138,576	100%	216.29
Custom		2,566,816	2,572,466	100%	488.67
Total		3,703,616	3,711,042	100%	704.96

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/7/17 and 2/24/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015108-305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture	3005-1	Lighting	Standard	11	11	455	197	2,038	1.00	11,097	5,784	52%
Total										11,097	5,784	52%

The annual lighting hours of operation verified during the M&V site visit (2,038) are less than the hours of operation used to calculate ex ante savings (3,910).

The measure was installed in an unconditioned machine shop. The heating and cooling interactive factor (1.00) matches the ex ante.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹²⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 52%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	11,097	5,784	52%	1.10
Total		11,097	5,784	52%	1.10

¹²⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014613-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	85	85	43	10	1,145	1.17	4,800	3,758	78%
				85	85	43	10	1,145	1.17	3,840	3,758	98%
Total										8,640	7,516	87%

The annual lighting hours of operation verified during the M&V site visit (1,145¹²⁷) are less than the annual hours of operation used to calculate ex ante savings (ranging from 1,500 to 1,200).

The ex ante savings estimate used an LM adjusted base wattage of by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W to meet EISA 2007 requirements for a 60W incandescent lamp.

The quantity for each line in the table above (85) is less than the quantity referenced in the ex ante savings estimate (100). The site contact showed ADM staff 30 lamps in storage as extras to have on hand.

The measure names in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.17, applicable to an electrically heated and air conditioned hotel facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹²⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 87%.

¹²⁷ The ex post savings analysis cites the DEER 2005 guest room lighting operation estimate (1,145). This average value has been corroborated through ADM's extensive fixture-level and circuit-level monitoring of guest room lighting operation.

¹²⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	8,640	7,516	87%	1.43
Total		8,640	7,516	87%	1.43

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015921-305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture	3004-2	Lighting	Standard	12	12	455	100	8,760	1.09	37,318	40,858	109%
Total										37,318	40,858	109%

The annual lighting hours of operation verified during the M&V site visit are equal to the annual hours of operation used to calculate ex ante savings.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, electric air conditioned office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹²⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 109%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	37,318	40,858	109%	7.76
Total		37,318	40,858	109%	7.76

¹²⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/12/17 and 2/2/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015128-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	Standard	36	36	50	9	3,086	1.01	4,849	4,601	95%
015128-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			3	3	43	9.5	2,556	1.01	320	260	81%
015181-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			31	31	50	9	3,199	1.01	5,720	4,108	72%
015181-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			5	5	50	9	3,199	1.01	923	663	72%
015181-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			20	20	43	9.5	3,199	1.01	2,925	2,166	74%
015475-305005-Lighting-<=80 Watt Lamp or Fixture Replacing Interior HID 100-175 Watt Lamp or Fixture	3006-1			39	39	100	30	6,570	1.00	23,915	17,936	75%
Total										38,652	29,733	77%

The annual lighting hours of operation verified during the M&V site visit for the first two line items in the table above (3,066 and 2,556) are lower than the hours of operation used to calculate the ex ante savings (3,285). For line items three through five in the table above the hours of operation (3,199) are less than the ex ante savings estimate hours (4,500). The sixth line item above was installed in a parking garage with expected hours of operation of 8,760 but the site visit revealed that the lighting is on a timer and they are turned off 6 hours each day resulting in lower annual operating hours (6,570).

The ex ante savings estimate used an LM adjusted base wattage of 42W for the second and fifth line items in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W to meet EISA 2007 requirements for a 60W incandescent lamp.

The measure names for the second and fifth line items in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.01, applicable to an electrically heated and air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings. Heat is gas powered for approximately one hour in the morning, and electrically powered the rest of the day. No interactive factor was used for the last line item in the table above because lamps were installed in an unconditioned space. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹³⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 77%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	38,652	29,733	77%	5.65
Total		38,652	29,733	77%	5.65

¹³⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015605-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	SBDI	43	43	32	9	500	1.11	3,219	536	17%
				3	3	41	5			318	60	19%
Total										3,537	597	17%

The annual lighting hours of operation verified during the M&V site visit (500) are less than the annual hours of operation used to calculate ex ante savings (2,920). The site closed permanently the week of the M&V site visit. A return visit was conducted 3 months after the closing revealing the facility unoccupied with no lighting. The ex post analysis provided 10 weeks of store hour lighting from the installation of the new LEDs until the closure of the store.

The quantity of the first line in the table above (43) verified during the M&V site visit is less than the ex ante savings quantity (49).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹³¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 17%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	3,537	597	17%	0.11
Total		3,537	597	17%	0.11

¹³¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/19/17 and 2/8/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014690-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	96	96	32	14	3,701	1.10	10,801	7,058	65%
014844-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			16	16	32	14	3,688	1.10	3,863	1,172	30%
Total										14,664	8,230	56%

The annual lighting hours of operation verified during the M&V site visit, ranging between 3,701 and 3,688, are fewer than the hours of operation used to calculate ex ante savings (4,380).

During the M&V visit, ADM staff visually verified a quantity of 96 lamps for the first line item in the table above and 16 lamps for the second line item, which is fewer than what was used to determine ex ante savings (137 and 49 respectively). There were no spare lamps at the site and contact stated they had many lamps fail.

A heating and cooling interactive factor of 1.10, applicable to a gas heated, electric air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹³²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 56%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	14,664	8,230	56%	1.56
Total		14,664	8,230	56%	1.56

¹³² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed eleven photo-sensor loggers to monitor lighting operation at three locations. The photo-sensor loggers collected data between 11/23/16 and 12/5/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015381-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	60	60	53	8	2,801	1.12	10,720	8,455	79%
				49	49	65	8	4,417	1.12	11,234	13,815	123%
				49	49	53	8	3,990	1.12	8,755	9,836	112%
015384-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			4	4	35	9	4,388	1.12	418	510	122%
Total										31,127	32,616	105%

The annual lighting hours of operation verified during the M&V site visit for line items one and three in the above table (2,801 and 3,990 respectively) is less than the annual hours of operation used to calculate the ex ante savings (4,015). For line items two and four the annual hours of operation (4,417 and 4,388 respectively) are greater than the annual hours of operation used to calculate ex ante.

The ex ante savings estimate used LM adjusted base wattages of 52.5W, 65.1W, 35W, and 52.5W for the first through fourth line item in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 53W for the first and fourth line items to meet EISA 2007 requirements for a 75W incandescent lamp.

The measure name for the fourth line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.12, applicable to a gas heated, air conditioned restaurant facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹³³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 105%.

¹³³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	31,127	32,616	105%	6.20
Total		31,127	32,616	105%	6.20

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015757-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	SBDI	29	29	43	10	722	1.12	789	772	98%
015757-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			14	14	50	10	3,637	1.12	2,072	2,277	110%
015757-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			4	4	29	7	3,637	1.12	311	358	115%
				14	14	43	10	3,637	1.12	1,658	1,878	113%
Total										4,830	5,285	109%

The annual lighting hours of operation verified during the M&V site visit (ranging from 722 to 3,637) are less than the annual hours of operation used to calculate ex ante savings (ranging from 850 to 3700).

The ex ante savings estimate used an adjusted base wattage of 42W for the first and fourth line item in the above table and 28W for the third line item by multiplying the provided wattage by 70%. An adjusted base wattage of 43W and 28W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W and 40W incandescent lamp.

The measure names for the first, third, and fourth line items in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.12, applicable to a gas heated, air conditioned restaurant in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹³⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 109%.

¹³⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	4,830	5,285	109%	1.00
Total		4,830	5,285	109%	1.00

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate		
014436-200402-Lighting-T8 25 Watt Lamp Replacing T8 32 Watt Lamp	3022	Lighting	Standard	150	150	32	25	3,826	1.09	6,510	4,399	68%		
014787-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008			78	78	50	6	3,826	1.09	21,278	14,377	68%		
014787-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp	3007			102	102	50	9	3,826	1.09	25,928	17,519	68%		
014787-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008			12	12	50	6	3,826	1.09	3,274	2,212	68%		
014807-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			30	30	50	7	6,570	1.09	7,998	8,758	109%		
				30	30	50	7	6,570	1.09	7,998	8,758	109%		
014880-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008			12	12	50	6	3,826	1.09	3,274	2,212	68%		
015109-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			50	50	50	7	3,826	1.09	13,330	9,007	68%		
015109-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			4	4	65	12	3,826	1.09	1,314	888	68%		
				10	10	50	6	3,826	1.09	2,728	1,843	68%		
015109-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			50	50	55	9	3,826	1.09	14,260	9,635	68%		
015109-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			108	108	60	13	3,826	1.09	31,806	21,490	68%		
Total												139,698	101,096	72%

The annual lighting hours of operation verified during the M&V site visit for line items one through four and seven through twelve listed in the table above (3,826) are less than the annual hours of operation used to calculate ex ante savings (6,200). These measures were installed in private offices and the ex ante hours are based on public area hours of the building. The annual hours of operation for the fifth and sixth line item above (6,200) matches the hours used in the ex ante savings estimate. These measures were installed in elevators and controlled through an EMS lighting schedule.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹³⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 72%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	139,698	101,096	72%	19.20
Total		139,698	101,096	72%	19.20

¹³⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/24/17 and 2/17/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015417-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	164	164	32	14	3,048	1.01	8,289	9,103	110%
Total										8,289	9,103	110%

The annual lighting hours of operation verified during the M&V site visit (3,048) are greater than the annual hours of operation used to calculate ex ante savings (2,808).

A heating and cooling interactive factor of 1.01, applicable to an electrically heated and air conditioned office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹³⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 110%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	8,289	9,103	110%	1.73
Total		8,289	9,103	110%	1.73

¹³⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/23/16 and 1/9/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015733-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	SBDI	12	12	43	9	3,543	1.11	1,425	1,601	112%
015733-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			24	24	63	17	4,017	1.11	3,972	4,911	124%
Total										5,397	6,512	121%

The annual lighting hours of operation verified during the M&V site visit for the first line item in the table above (3,543) is less than the hours of operation used to calculate ex ante savings (3,598), while the second line item hours (4,017) are greater than the ex ante.

The ex ante savings estimate used LM adjusted base wattages of 42W and 63W for the first and second line item in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W for the first line item to meet EISA 2007 requirements for a 60W incandescent lamp.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹³⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 121%.

¹³⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	5,397	6,512	121%	1.24
Total		5,397	6,512	121%	1.24

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed five photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/2/16 and 12/27/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015135-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026	Lighting	Standard	168	168	75	33	5,536	1.09	30,482	42,768	140%
				438	438	32	15	3,424		32,167	27,912	87%
				384	384	32	15	4,978		28,201	35,577	126%
014547-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025			358	358	32	15	2,918		53,313	19,442	36%
015063-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			24	24	32	15	2,547		1,043	1,138	109%
015063-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			64	64	65	9	2,547		10,230	10,084	99%
				13	13	35	6	2,547		1,629	1,051	65%
Total										157,064	137,973	88%

The annual lighting hours of operation verified during the M&V site visit for the first and third lines in the above table (5,536 and 4,978) are greater than the hours of operation used to calculate ex ante savings (4,320). The annual hours of operation for line items two and four (3,424 and 2,918) and line items five through seven (2,547) in the table above are less than the hours of operation used to calculate the ex ante savings (4,320, 8,760, 2,557, 4,320, and 4,320 respectively).

An adjusted base wattage of 45.5 was used in the ex ante savings calculation for line item six in the above table. The base lamps for this measure (BR/R) are exempt from an adjusted wattage calculation.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned large office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹³⁸

¹³⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 88%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	157,065	137,973	88%	26.21
Total		157,065	137,973	88%	26.21

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015473-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	Standard	30	30	65	10.5	4,120	1.12	7,142	7,545	106%
015473-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3011			16	16	43	9.5	4,120	1.12	3,000	2,469	82%
Total										10,142	10,013	99%

The annual lighting hours of operation verified during the M&V site visit (4,120) are less than the annual hours of operation used to calculate ex ante savings (4,360).

The ex ante savings estimate used LM adjusted base wattages of 65.1W and 52.5W by multiplying the provided wattage by 70%. The site had the baseline lamps in storage. The first line item above was a 65W BR/R and would not have required a wattage adjustment. The baseline lamp for the second line item above was a 60W incandescent with an adjusted wattage of 43W meeting the EISA 2007 requirements.

The measure name for the second line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.12, applicable to a gas heated, air conditioned restaurant facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹³⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 99%.

¹³⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	10,142	10,013	99%	1.90
Total		10,142	10,013	99%	1.90

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/26/17 and 2/14/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015165-305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture	3005-1	Lighting	Standard	12	12	400	150	3,401	1.00	9,360	10,203	109%
015568-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			400	400	32	17	2,984	1.02	19,662	18,328	93%
				12	12	32	17	3,401	1.00	589	490	83%
Total										29,611	29,022	98%

The annual lighting hours of operation verified during the M&V site visit for the above line items (3,401, 2,984 and 3,401 respectively) are greater than the hours of operation used to calculate ex ante savings (3,120, 3,277, and 3,277 respectively).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned office facility in St. Louis, was applied to the ex post lighting energy savings for lighting installed inside the office (captured within line item two above). No heating and cooling interactive factor was used for lighting installed in the shop since the space is not cooled or electrically heated. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁴⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 98%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	29,611	29,022	98%	5.51
Total		29,611	29,022	98%	5.51

¹⁴⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
016096-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3011	Lighting	Standard	2	2	53	9.5	2,803	1.02	2,408	252	10%
016096-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			65	65	53	12	2,803	1.02	7,371	7,711	105%
Total										9,779	7,962	81%

The annual lighting hours of operation verified during the M&V site visit (2,803) are greater than the annual hours of operation used to calculate ex ante savings (2,800).

The ex ante savings estimate used an LM adjusted base wattage of 52.5W by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 53W to meet EISA 2007 requirements for a 75W incandescent lamp.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

The ex post analysis used a quantity for the first line item above (2) that is less than the quantity used to calculate the ex ante savings (20). The ADM staff along with the site contact confirmed that only 2 A19 lamps are installed. All remaining lamps are in storage.

A heating and cooling interactive factor of 1.02, applicable to an electrically heated, air conditioned restaurant facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁴¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 81%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	

¹⁴¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Standard	Lighting	9,779	7,962	81%	1.51
Total		9,779	7,962	81%	1.51

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed five photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/06/16 and 1/17/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014823-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	356	356	28	12	2,898	1.11	24,829	18,330	74%
				24	24	25	11	1,448		1,517	560	37%
				20	20	32	17	2,381		1,352	820	61%
Total									27,698	19,709	71%	

The annual lighting hours of operation verified during the M&V site visit (ranging from 1,315 to 4,198) are less than the annual hours of operation used to calculate ex ante savings (4,359).

During the M&V site visit, the baseline behavior for controlling lighting was determined by survey questions per usage area. The survey indicated some efficient behavior with turning off lighting during the workday and the end of the workday.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned office facility in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁴²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 71%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	27,698	19,709	71%	3.74
Total		27,698	19,709	71%	3.74

¹⁴² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed five photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/31/17 and 2/21/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014865-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008	Lighting	Standard	160	160	60	13	2,258	1.14	21,958	19,313	88%
				14	14	50	13	2,843	1.14	1,533	1,698	111%
014866-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008	Lighting		60	60	60	13	592	1.14	8,234	1,898	23%
016244-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			Exterior	10	10	50	9	4,305	1.00	1,433	1,765
016244-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008	7			7	60	12	4,305	1.00	978	1,447	148%
016246-305501-Lighting-Linear ft T8 25 Watt (<=7 Watts/ft) Replacing T12 <=40 Watt Linear ft	3021	Lighting		75	75	40	25	1,370	1.14	3,276	1,753	54%
Total										37,412	27,874	75%

The annual lighting hours of operation verified during the M&V site visit for line items one through three and six in the table above (ranging from 592 to 2,843) are less than the hours of operation used to calculate ex ante savings (ranging from 2,912 to 2,920). These measures were installed not only in the sanctuary but in meeting rooms and extra offices with varying use. The hours of operation for line items four and five in the table above (4,305) are greater than the hours of operation used to calculate ex ante (2,912). These two measures were installed outside using non daylighting photo cells¹⁴³.

During the M&V site visit, ADM staff verified, both visually and with facility personnel that the quantity for line item four in the table above (10) is less than the quantity used to determine ex ante savings (12). Two of the twelve lamps referenced in the application are used as spare lamps and were not installed at the time of the M&V visit.

The end use category for the fourth and fifth line items in the table above (exterior) verified during the M&V site visit are different than the end use category used in the ex ante (lighting).

¹⁴³ Non-daylighting calculator for the current year in conjunction with the US Naval Observatory SunRise/SunSet table.

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned assembly facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁴⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 75%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	35,001	24,662	70%	4.68
	Exterior	2,411	3,212	133%	0.00
Total		37,412	27,874	75%	4.68

¹⁴⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and interviewing facility personnel regarding lighting operating schedules. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules. Fifteen minutes were added to the beginning and end of facility operating hours to account for opening and closing hours.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015499-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	26	26	53	9	2,914	1.11	2,497	3,715	149%
				4	4	72	18	2,914	1.11	459	701	153%
Total										2,956	4,416	149%

The annual lighting hours of operation verified during the M&V site visit (2,914) are greater than the annual hours of operation used to calculate ex ante savings (2,208).

The ex ante savings estimate used LM adjusted base wattages of 52.5W and 70W for the second and third line items in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used adjusted base wattages of 53W and 72W to meet EISA 2007 requirements for 75W and 100W incandescent lamps.

The measure name in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail facility in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁴⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 149%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
SBDI	Lighting	2,956	4,416	149%	0.84
Total		2,956	4,416	149%	0.84

¹⁴⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/31/17 and 2/20/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015837-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026	Lighting	Standard	130	130	75	38	3,169	1.00	15,507	15,243	98%
				12	12	75	38	3,181	1.00	1,432	1,412	99%
				22	22	40	17	3,417	1.11	1,631	1,912	117%
Total										18,570	18,567	100%

The annual lighting hours of operation verified during the M&V site visit (3,169 and 3,542) for the first and second line items in the table above are less than the hours of operation used to calculate ex ante savings (3224). The annual hours of operation for the third line item (3,417) are greater than the ex ante savings estimate.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, electric air conditioned office facility in St. Louis, was applied to the ex post lighting energy savings for lighting installed in office areas, represented in the third line item above. The ex ante savings estimate did not account for heating and cooling interactive effects. No heating and cooling interactive factor was referenced for lighting installed in the shop because this location is not air conditioned and is occasionally gas heated.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁴⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 100%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	18,570	18,567	100%	3.53
Total		18,570	18,567	100%	3.53

¹⁴⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/19/17 and 2/10/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014782-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	12	12	43	9.2	367	1.01	735	151	20%
014782-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp	3007			27	27	65	8	1,929	1.01	1,891	3,004	159%
014782-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			28	28	40	15	740	1.01	1,307	524	40%
015046-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			6	6	65	8.5	1,929	1.01	415	662	160%
015046-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			3	3	49	14.5	367	1.01	193	38	20%
015046-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			15	15	43	9	367	1.01	925	189	20%
Total												5,466

The annual lighting hours of operation verified during the M&V site visit for the first, fifth, and sixth line item in the above table (367) and the third line item (740) are less than the hours of operation used to calculate the ex ante savings estimate (1,868). The hours of operation for line items two and four in the above table (1,929) are greater than the ex ante savings estimate (1,868).

The ex ante savings estimate used an LM adjusted base wattage of 42W for the first and sixth line items in the table above, 45.5W for the second and fourth line items, and 49W for the fifth line item by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W for the first and sixth line items to meet EISA 2007 requirements for a 60W incandescent lamp. The base lamps for the second and fourth line items (65W BR/R) are exempt from an adjusted wattage calculation.

The measure names for the first and sixth line items in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.01, applicable to an electrically heated/air conditioned office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁴⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 84%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	5,466	4,568	84%	0.87
Total		5,466	4,568	84%	0.87

¹⁴⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/7/16 and 12/30/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015449-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	SBDI	6	6	43	9	1,637	1.02	1,155	339	29%
015449-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			16	16	53	7	2,359	1.02	1,820	1,764	97%
				2	2	53	12	1,637	1.02	203	136	67%
015449-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			59	59	53	8	1,649	1.02	6,564	4,448	68%
015449-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			-	-	72	16	-	-	270	-	0%
Total										10,012	6,688	67%

The annual lighting hours of operation verified during the M&V site visit (ranging between 1,637 and 2,359) which are less than the hours of operation used to calculate ex ante savings (2,500).

An adjusted base wattage of 43W, 53W, and 72W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W, 75W, and 100W incandescent lamp. The ex ante base wattage of 42W, 52.5W, and 70W was computed within the application by factoring 70% of a 60W, 75W, and 100W incandescent lamp.

The quantity of the first line item in the above table (6) verified during the M&V site visit is less than the ex ante savings quantity (14). There were 8 lamps not updated within the restrooms of the facility. The fifth line in the table above, LED replacing PAR38, was not installed at the facility resulting in a quantity of 0.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.02, applicable to an electric heated, air conditioned small office in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁴⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 67%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	10,012	6,688	67%	1.27
Total		10,012	6,688	67%	1.27

¹⁴⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Custom and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/17/17 and 2/14/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015259-100101-Lighting-Linear Tube LED Fixture Replacing T12 Fixture	1169	Lighting	Custom	543	380	41	15	2,358	1.01	51,242	39,079	76%
015754-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026		Standard	324	324	40	15	3,481	1.01	25,337	28,528	113%
Total										76,579	67,607	88%

The annual lighting hours of operation verified during the M&V site visit for the first line item in the table above (2,358) is less than the hours of operation used to calculate ex ante savings (3,128). For the second line item above the hours of operation (3,481) are greater than the ex ante savings (3,128).

The measure name for the second line item is not correct. The baseline noted and verified during the M&V site visit this was a 4' 3LT12 fixture where 2 LED lamps were installed. This was not a new fixture installation. The quantity of baseline lamps (543) is greater than the quantity in the ex ante savings estimate (181) since the ex post analysis compared lamps to lamps. In addition, the ex post savings analysis wattage (41) is less than the wattage used to calculate ex ante savings (122), also to compare lamps to lamps.

A heating and cooling interactive factor of 1.01, applicable to an electrically heated, air conditioned office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁴⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 88%.

¹⁴⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	51,242	39,079	76%	7.42
Standard		25,337	28,528	113%	5.42
Total		76,579	67,607	88%	12.84

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 11/15/16 and 11/29/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014170-100104-Lighting-Linear Tube LED Fixture Replacing T8 Fixture	1169	Lighting	Custom	149	594	112	18	7,665	1.11	52,525	50,903	97%
				395	790	62	18	7,665	1.11	89,966	87,187	97%
				349	349	49	36	7,665	1.11	39,744	38,517	97%
				4	4	138	72	7,665	1.11	2,312	2,241	97%
				15	15	217	108	7,665	1.11	14,323	13,880	97%
				19	19	85	54	7,665	1.11	5,160	5,000	97%
				27	27	30	18	6,205	1.29	1,620	2,593	160%
Total									205,650	200,321	97%	

The annual lighting hours of operation verified during the M&V site visit range between 5,268 and 8,760. The average annual lighting hours of operation for the first six line items in the table above (7,665) are less than the average hours of operation used to calculate ex ante savings (8,708). The hours of operation for the seventh line item (6,205) is greater than the ex ante hours (5,000).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail facility in St. Louis, was applied to the ex post lighting energy savings. A heating and cooling interactive factor of 1.29, applicable to a medium temperature refrigerated space, was used for the last measure. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁵⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 97%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Custom	Lighting	205,650	200,321	97%	38.05
Total		205,650	200,321	97%	38.05

¹⁵⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/8/16 and 12/27/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015694-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012	Lighting	SBDI	29	29	50	7	1,850	1.11	2,630	2,554	97%
015694-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			4	4	29	7	3,305		181	329	182%
Total										2,811	2,883	103%

The annual lighting hours of operation verified during the M&V site visit for the first line item in the table above (1,850) is less than the annual hours of operation used to calculate ex ante savings (2,109). The second line item above has hours of operation greater than the ex ante hours.

The ex ante savings estimate used an LM adjusted base wattage of 28W for the second line item in the table above by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 29W to meet EISA 200 requirements for a 40W incandescent lamp.

The measure name for the second line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁵¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 103%.

¹⁵¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	2,811	2,883	103%	0.55
Total		2,811	2,883	103%	0.55

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules. Fifteen minutes were added to the beginning and end of the facility operating hours to account for opening and closing time.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014350-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008	Lighting	Standard	30	30	60	12	3,556	1.02	7,043	5,205	74%
				30	30	60	12	3,556	1.02	7,043	5,205	74%
				30	30	60	12	3,556	1.02	6,962	5,205	75%
Total										21,048	15,615	74%

The annual lighting hours of operation verified during the M&V site visit (3,556) are less than the annual hours of operation used to calculate ex ante savings (5,460).

The ex ante savings estimate used a baseline wattage of 55W for all measures, and an efficient wattage of 12.5W for the third line item in the table above. During the M&V visit, ADM staff verified that the baseline lamps were 60W through visual inspection, and that the efficient wattage of the third line item is 12W through review of project invoices. These values were used for the ex post savings estimate calculation.

A heating and cooling interactive factor of 1.02, applicable to an electrically heated, air conditioned small office facility in Cape Girardeau, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁵²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 74%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	21,048	15,615	74%	2.97
Total		21,048	15,615	74%	2.97

¹⁵² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Custom and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 11/29/16 and 12/23/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014470-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	50	50	29	7	2,838	1.12	5,281	3,569	68%
				17	17	29	4	3,762	1.00	2,240	1,599	71%
				3	3	43	10	3,762	1.12	472	416	88%
		6		6	43	10	3,762	1.12	5,031	833	90%	
		26		26	43	10	4,309	1.00		3,697		
014470-100212-Lighting-Non Linear LED Fixture Replacing Incandescent/Halogen Lamp Fixture	1169	Lighting	Custom	4	4	168	24	3,489	1.12	2,830	2,247	79%
				2	2	56	4	3,489	1.12	511	406	79%
				3	3	364	60	3,489	1.12	4,481	3,557	79%
014470-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011		Standard	14	14	29	4	3,489	1.12	1,685	1,393	83%
				6	6	43	4	3,489	1.12	1,135	924	81%
Total										23,666	18,641	79%

The annual lighting hours of operation verified during the M&V site visit (ranging from 775 to 4,309) are less than the annual hours of operation used to calculate ex ante savings (4,913).

The ex ante savings estimate used an adjusted base wattage of 28W (line items 1, 2, and 9) and 42W (line items 3, 4, and 10) by multiplying the provided wattage by 70%. The ex post savings calculation used adjusted base wattages of 29W and 43W to meet the EISA 2007 standard lumen equivalent for a 40W and 60W Incandescent lamps.

The quantity of the second line item in the above table (17) verified during the M&V site visit is less than the ex ante savings quantity (19).

The end use category for the fourth line item in the table above (exterior) verified during the M&V site visit is different than the end use category used in the ex ante (lighting). These lamps were installed in the exterior soffit of the facility with non-daylight hours of use.

The measure names for line items one through five, nine, and ten in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.12, applicable to a gas heated, air conditioned full service restaurant in St. Louis, was applied to the ex post lighting energy savings for all but the second and fourth line items in the above table (exterior installations). The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁵³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 79%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	7,821	6,210	79%	1.18
Standard	Lighting	11,756	8,734	74%	1.66
	Exterior	4,088	3,697	90%	0.00
Total		23,666	18,641	79%	2.84

¹⁵³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/02/16 and 12/27/16.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015452-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	3	3	53	9	1,766	1.11	287	258	90%
015452-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			40	40	40	18	1,766	1.11	1,936	1,719	89%
015452-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			5	5	53	9	1,766	1.11	479	430	90%
Total										2,702	2,406	89%

The annual lighting hours of operation verified during the M&V site visit (1,766) are less than the annual hours of operation used to calculate ex ante savings (2,200).

An adjusted base wattage of 53W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 75W incandescent lamp. The ex ante base wattage of 52.5W was computed within the application by factoring 70% of a 75W incandescent lamp.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small office in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁵⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 89%.

¹⁵⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	2,702	2,406	89%	0.46
Total		2,702	2,406	89%	0.46

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed one photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/10/17 and 1/30/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014408-100101-Lighting-Linear Tube LED Fixture Replacing T12 Fixture	1169	Lighting	Custom	10	10	164	36	1,688	1.11	2,816	2,389	85%
				9	6	82	36	1,688	1.11	1,149	974	85%
Total										3,965	3,363	85%

The annual lighting hours of operation verified during the M&V site visit (1,688) are less than the annual hours of operation used to calculate ex ante savings (2,200).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁵⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 85%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	3,965	3,363	85%	0.64
Total		3,965	3,363	85%	0.64

¹⁵⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/27/17 and 2/19/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
016092-305005-Lighting-<=80 Watt Lamp or Fixture Replacing Interior HID 100-175 Watt Lamp or Fixture	3006-1	Lighting	Standard	74	74	150	60	3,560	1.14	25,308	26,967	107%
Total										25,308	26,967	107%

The annual lighting hours of operation verified during the M&V site visit (3,560) are less than the annual hours of operation used to calculate ex ante savings (3,800).

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned assembly facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁵⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 107%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	25,308	26,967	107%	5.12
Total		25,308	26,967	107%	5.12

¹⁵⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/10/17 and 1/31/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014485-100108-Lighting-Linear Tube LED Fixture Replacing Metal Halide Fixture	1169	Misc.	Custom	177	177	215	40	8,760	1.00	271,341	271,341	100%
014485-100111-Lighting-Linear Tube LED Fixture Replacing High Pressure Sodium Fixture				9	9	138	40	8,760	1.00	7,726	7,726	100%
015184-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026	Lighting	Standard	140	100	40	15	4,320	1.07	13,432	18,976	141%
Total										292,499	298,043	102%

The annual lighting hours of operation for the first two line items in the table above are equal to the hours of operation used to calculate ex ante savings (8,760) since they were installed in a garage. For the third line item above the lighting hours of operation (4,320) are greater than the ex ante savings estimate (3,276).

A heating and cooling interactive factor of 1.07, applicable to an electrically heated, air conditioned medical facility in St. Louis, was applied to the ex post lighting energy savings for the third line item above. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁵⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 102%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Miscellaneous	279,067	279,067	100%	38.50
Standard	Lighting	13,432	18,976	141%	3.60
Total		292,499	298,043	102%	56.61

¹⁵⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules. Annual lighting operating hours were verified through discussion with facility personnel regarding facility hours of operation. An additional 2 hours before opening and ½ hour after closing were added to include food preparation and cleaning time.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015441-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	SBDI	52	52	43	9	4,928	1.03	6,890	9,005	131%
015441-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			22	22	53	7.5			8,040	5,098	128%
				23	23	53	9			5,154		
Total										14,930	19,257	129%

The annual lighting hours of operation verified during the M&V site visit (4,928) are greater than the annual hours of operation used to calculate ex ante savings (4,015).

The ex ante savings estimate used LM adjusted base wattages of 42W and 52.5W by multiplying the provided wattage by 70%. The ex post savings estimate used adjusted base wattages of 43W and 53W to meet EISA 2007 requirements for 60W and 75W incandescent lamps.

The second line item in the table above was determined to have (22) 7.5W and (23) 9W LEDs instead of the claimed (45) 8W LEDs.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.03, applicable to an electrically heated, air conditioned full-service restaurant facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁵⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 129%.

¹⁵⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	14,930	19,257	129%	3.66
Total		14,930	19,257	129%	3.66

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014582-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008	Lighting	Standard	50	50	90	17	7,300	1.12	17,885	29,786	167%
Total										17,885	29,786	167%

The annual lighting hours of operation verified during the M&V site visit (7,300) are greater than the annual hours of operation used to calculate ex ante savings (4,900). The lighting remains on almost the entire day and evening for members use and security.

A heating and cooling interactive factor of 1.12, applicable to a gas heated, air conditioned restaurant in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁵⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 109%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	17,885	29,786	167%	5.66
Total		17,885	29,786	167%	5.66

¹⁵⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/22/16 and 1/20/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015587-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	48	48	53	9	2,368	1.01	4,343	5,072	117%
015587-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			3	3	65	7	2,376	1.01	240	419	175%
Total										4,583	5,491	120%

The annual lighting hours of operation verified during the M&V site visit, ranging between 2,229 and 2,581, are greater than the hours of operation used to calculate ex ante savings (2,080).

The ex ante savings estimate used LM adjusted base wattages of 52.5W and 45.5W for the first and second line items in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 53W for the first line item to meet EISA 2007 requirements for a 75W incandescent lamp. The base lamps for the second line item (MR16) are exempt from an adjusted wattage calculation.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.01, applicable to an electrically heated, air conditioned retail facility in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁶⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 120%.

¹⁶⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	4,583	5,491	120%	1.04
Total		4,583	5,491	120%	1.04

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015149-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp_	3009	Lighting	SBDI	31	31	53	9	2,437	1.11	3,758	3,704	99%
015149-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			6	6	65	11	2,437	1.11	911	880	97%
				3	3	65	7	2,437	1.11	277	472	170%
015149-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			7	7	35	5	2,437	1.11	1,008	855	85%
Total										5,954	5,911	99%

The annual lighting hours of operation verified during the M&V site visit (2,437) are greater than the annual hours of operation used to calculate ex ante savings (2,400).

The ex ante savings estimate used adjusted base wattages of 52.5W, 45.5W and 35W for the measures respectively by multiplying the provided wattage by 70%. An adjusted base wattage of 43W was used in the ex post savings analysis for the first line item in the above table to meet the EISA 2007 standard lumen equivalent for a 75W incandescent lamp. The base lamps for line items two through four (BR reflectors and MR16) are exempt from an adjusted wattage calculation.

The quantities of the first, second, and fourth line items in the above table (31, 6, and 7, respectively) verified during the M&V site visit is less than the ex ante savings quantities (36, 11, and 14, respectively). The client did not like the look of the LED lamps for the fourth line item once they were installed so the trade ally went to a local store, purchased non LED MR16 lamps and replaced 7 of the 14 installed LEDs.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁶¹

¹⁶¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 99%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	5,954	5,911	99%	1.12
Total		5,954	5,911	99%	1.12

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed one photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 10/14/16 and 11/07/16.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015237-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	43	43	15	9	2,919	1.11	3,891	836	21%
015237-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			3	3	38	11	2,919		243	263	108%
Total												4,134

The annual lighting hours of operation verified during the M&V site visit (2,919) are greater than the annual hours of operation used to calculate ex ante savings (2,080).

The ex ante base wattages for the first and second line items in the above table (52.5W and 50W) are greater than the ex post base wattages (15W and 38W). The M&V site visit confirmed the wattages from extra base lamps found in storage. The site contact confirmed these were the lamps that were in use prior to the installation of the LEDs.

The measure name for the first measure is not accurate. The baseline lamps were CFLs and were replaced with LED BR/R lamps. The base lamps are stated incorrectly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned office in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁶²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 27%.

¹⁶² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	4,134	1,099	27%	0.21
Total		4,134	1,099	27%	0.21

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 11/18/16 and 12/6/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015296-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	15	15	65	9	2,159	1.01	1,139	1,839	161%
015296-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			4	4	50	8	2,169	1.01	225	370	164%
015296-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			64	64	32	18	2,169	1.01	1,864	1,971	106%
015296-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			11	11	50	9	2,169	1.01	938	992	106%
015296-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			4	4	43	9	2,164	1.01	275	298	109%
Total										4,441	5,470	123%

The annual lighting hours of operation verified during the M&V site visit (ranging between 2,159 and 2,169) are greater than the hours of operation used to calculate ex ante savings (2,080).

The ex ante savings estimate used LM adjusted base wattages of 45.5W, 35W, and 42W for the first, second, and fifth line items in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted wattage of 43W for the fifth line item to meet EISA 2007 requirements for a 60W incandescent lamp. The base lamps for the first and second line items (65W BR/R and MR16) are exempt from an adjusted wattage calculation.

The measure name for the fifth line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.01, applicable to an electrically heated, air conditioned small retail facility in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁶³

¹⁶³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 123%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	4,441	5,470	123%	1.04
Total		4,441	5,470	123%	1.04

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/19/16 and 1/20/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015641-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	65	65	65	12	729	1.15	4,355	2,895	66%
				1	1	65	9	4,499	1.15	112	290	259%
015641-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			27	27	53	9	2,452	1.15	2,349	3,356	143%
015641-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			30	30	29	6	2,560	1.15	1,320	2,035	154%
Total										8,136	8,577	105%

The annual lighting hours of operation verified during the M&V site visit range between 729 and 4,499. The annual lighting hours of operation for the first line item in the table above are less than the hours of operation used to calculate ex ante savings (2,000), while the rest of the line items are greater.

The ex ante savings estimate used LM adjusted base wattages of 45.5W, 52.5W, and 28W for the first, third, and fourth line items in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used adjusted base wattages of 53W and 29W for the third and fourth line items to meet EISA 2007 requirements for a 75W and 40W incandescent lamp. The base lamps for the first line item (65W BR/R) are exempt from an adjusted wattage calculation.

The measure names for the third and fourth line items in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.15, applicable to a gas heated, air conditioned assembly facility in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁶⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 105%.

¹⁶⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	8,136	8,577	105%	1.63
Total		8,136	8,577	105%	1.63

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed one photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 11/16/16 and 12/21/16.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015233-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	SBDI	28	28	43	10	4,124	1.11	3,837	4,284	112%
015233-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			8	8	65	9	4,124	1.11	1,231	2,046	166%
Total										5,068	6,330	125%

The annual lighting hours of operation verified during the M&V site visit (4,124) are less than the annual hours of operation used to calculate ex ante savings (4,217).

The ex ante savings estimate used adjusted base wattages of 42W and 45.5W for the first and second line item in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W for the first line item to meet EISA 2007 requirements for a 60W incandescent lamp. The base lamps for the second line item (65W BR/R) are exempt from an adjusted wattage calculation.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁶⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 125%.

¹⁶⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	5,068	6,330	125%	1.20
Total		5,068	6,330	125%	1.20

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed six photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/7/16 and 12/28/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014843-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	351	351	43	9	1,145	1.13	16,865	15,441	92%
014843-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			15	15	50	6	8,760	1.13	3,811	6,540	172%
015443-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			1,107	1,107	32	14	5,160	1.13	174,552	116,317	67%
Total										195,228	138,229	71%

The annual lighting hours of operation verified during the M&V site visit for the first line item in the table above (1,145¹⁶⁶) is less than the hours of operation used to calculate ex ante savings (1,456). The hours for the second line item (8,760) match the ex ante hours. The hours of operation for the third line item (5,160) are less than the hours of operation used to calculate ex ante savings (8,760).

The ex ante savings estimate used LM adjusted base wattages of 42W and 35W for the first and second line items in the table above respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W for the first line item to meet EISA 2007 requirements for a 60W incandescent lamp. The base lamp for the second line item (MR16) is exempt from an adjusted wattage calculation.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.13, applicable to a gas heated, air conditioned nursing home facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁶⁷

¹⁶⁶The ex post savings analysis cites the DEER 2005 guest room lighting operation estimate (1,145). This average value has been corroborated through ADM's extensive fixture-level and circuit-level monitoring of guest room lighting operation.

¹⁶⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 71%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	195,228	138,229	71%	26.27
Total		195,228	138,229	71%	26.27

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015338-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	SBDI	16	16	42	10	5,996	1.12	3,370	3,486	103%
015338-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			13	13	50	7	5,996	1.12	3,622	3,747	103%
015338-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			2	2	60	7	5,996	1.12	687	711	103%
Total										7,679	7,944	103%

The annual lighting hours of operation verified during the M&V site visit (5,996) are less than the annual hours of operation used to calculate ex ante savings (6,480).

The base wattage of 42W referenced in the first line item in the table above is an estimated average, the actual pre-existing lamps were a combination of 40W and 60W halogen A-line lamps.

A heating and cooling interactive factor of 1.12, applicable to a gas heated, air conditioned restaurant facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁶⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 103%.

¹⁶⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	7,679	7,944	103%	1.51
Total		7,679	7,944	103%	1.51

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed four photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 11/17/16 and 12/8/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015290-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	61	61	72	9	2,492	1.03	7,442	9,898	133%
015290-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			4	4	50	5	2,492	1.03	240	464	193%
015290-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			5	5	45	8	2,492	1.03	375	483	129%
015290-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			3	3	29	9	2,492	1.03	114	155	136%
Total										8,171	11,000	135%

The annual lighting hours of operation verified during the M&V site visit (2,492) are greater than the hours of operation used to calculate ex ante savings (2,000).

The ex ante savings estimate used LM adjusted base wattages of 70W, 35W, and 28W for the first, second, and fourth line items in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used adjusted wattages of 72W and 29W for the first and fourth line item respectively to meet EISA 2007 requirements for a 100W and 40W incandescent lamp. The base lamp for the second line item (MR16) is exempt from an adjusted wattage calculation.

The measure names for the first and fourth line items in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.03, applicable to an electrically heated, air conditioned restaurant facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁶⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 135%.

¹⁶⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	8,171	11,000	135%	2.09
Total		8,171	11,000	135%	2.09

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/12/17 and 2/14/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015294-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	Standard	40	40	53	12	4,864	1.11	5,832	8,835	151%
				36	36	45	8	4,833	1.11	4,860	7,227	149%
				54	54	65	8	4,864	1.11	7,290	16,582	227%
				38	38	65	8	4,984	1.11	5,130	11,957	233%
015294-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			28	28	29	8	4,833	1.11	2,066	3,223	156%
015294-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			8	8	53	11	4,864	1.11	1,210	1,832	151%
015294-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			63	63	45	6	4,861	1.11	8,845	13,229	150%
				3	3	45	5	4,984	1.11	437	671	153%
015294-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			2	2	55	9	4,861	1.11	331	495	150%
015299-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			36	36	65	8	3,890	1.11	4,860	8,841	182%
				86	86	65	8	3,890	1.11	11,610	21,120	182%
				21	21	53	12	4,411	1.11	3,062	4,207	137%
015299-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			15	15	75	16	3,890	1.11	3,186	3,813	120%
015299-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	11	11	53	11	4,411	1.11	1,643	2,257	137%		
015299-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	40	40	29	8	4,411	1.11	2,952	4,202	142%		
		18	18	43	9	3,890	1.11	2,125	2,621	123%		
015299-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012	19	19	50	6	3,890	1.11	1,984	3,602	182%		
Total										67,423	114,713	170%

The annual lighting hours of operation verified during the M&V site visit (ranging between 3,890 and 4,984) are greater than the hours of operation used to calculate ex ante savings (3,600).

The ex ante savings estimate used an LM adjusted base wattage of 52.5W for the first, sixth, twelfth, and fourteenth line items, 28W for the fifth and fifteenth line items, 45.5W for the third, fourth, tenth and eleventh line items, and 35W for the seventeenth line item in the above table by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 53W for the first, sixth, twelfth, and fourteenth line items, and 29W for the fifth and fifteenth line items to meet EISA 2007 requirements for a 75W and 40W incandescent lamp. The base lamps for the third, fourth, tenth,

eleventh, and seventeenth line items (65W BR/R and MR-16) are exempt from an adjusted wattage calculation.

The measure names for the fifth, sixth, fourteenth, and fifteenth line items in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁷⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 170%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	67,423	114,713	170%	21.79
Total		67,423	114,713	170%	21.79

¹⁷⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/9/17 and 2/27/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
016112-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	2	2	65	9	2,465	1.11	183	306	167%
016112-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			16	16	47.6	6	2,465	1.11	1,673	1,817	109%
016112-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp or Fixture	3012			6	6	50	7	2,444	1.11	422	698	165%
Total										2,278	2,821	124%

The annual lighting hours of operation verified during the M&V site visit (ranging between 2,444 and 2,465) are less than the hours of operation used to calculate ex ante savings (2,513).

The ex ante savings estimate used an LM adjusted base wattage of 45.5W for the first line item, 47.6W for the second line item, and 35W for the third line item in the table above by multiplying the provided wattage by 70%. The base lamps for the first and third line item (BR/R and MR-16 respectively) are exempt from an adjusted wattage calculation.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁷¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 124%.

¹⁷¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	2,278	2,821	124%	0.54
Total		2,278	2,821	124%	0.54

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
016014-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	35	35	65	9	1,958	1.11	3,080	4,250	138%
016014-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			3	3	43	10	1,958		235	218	93%
				6	6	43	10	1,958		470	436	93%
Total										3,785	4,903	130%

The annual lighting hours of operation verified during the M&V site visit (1,958) are less than the annual hours of operation used to calculate ex ante savings (2,411). The site contact confirmed that they follow the posted store hours (10:30 – 5 Monday through Saturday and Noon – 5 Sunday) with no additional opening or closing times.

The ex ante savings estimate used an adjusted base wattage of 45.5W for the first line item in the table above and 43W for the second and third line items by multiplying the provided wattage by 70%. The base lamps for the first measure (BR/R) are exempt from an adjusted wattage calculation. An adjusted base wattage of 43W was used in the ex post savings analysis for the second and third line items above to meet the EISA 2007 standard lumen equivalent for a 60W incandescent lamp.

The measure name for the second and third lines in the above table are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁷²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 130%.

¹⁷² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	3,785	4,903	130%	0.93
Total		3,785	4,903	130%	0.93

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed one photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/31/17 and 2/20/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014997-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	100	100	43	10	6,474	1.17	14,235	25,378	178%
014997-305502-Lighting-Linear ft T8 25 Watt (<=7 Watts/ft) Replacing T8 32 Watt Linear ft	3022			-	-	32	25	-	-	1,840	0	0%
Total										16,075	25,378	158%

The annual lighting hours of operation verified during the M&V site visit range between 4,188 and 8,760. The average annual lighting hours of operation for the first line item in the table above (6,474) are greater than the hours of operation used to calculate ex ante savings (4,380). The majority of this measure was installed in public areas that operate 24/7.

The lighting referenced in the second line item in the table above was not installed at the time of the M&V visit, resulting in a quantity (0) which is less than the quantity used to determine ex ante savings (30). The new lighting stated in this measure was not stored at the site.

The ex ante savings estimate used an LM adjusted base wattage of 42W for the first line item in the table above by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W to meet EISA 2007 requirements for a 60W incandescent lamp.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.17, applicable to an electrically heated, air conditioned hotel facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁷³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 158%.

¹⁷³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	16,075	25,378	158%	4.82
Total		16,075	25,378	158%	4.82

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/23/16 and 1/9/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015450-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	1	1	53	8	1,793	0.90	85	72	86%
				6	6	53	8	1,793	0.90	513	439	86%
015450-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			28	28	43	9	1,807	0.90	1,756	1,543	88%
Total										2,354	2,054	87%

The annual lighting hours of operation verified during the M&V site visit (ranging between 1,793 and 1,807) are less than the hours of operation used to calculate ex ante savings (1,900).

The ex ante savings estimate used LM adjusted base wattages of 52.5W and 42W for the first through third line items in the above table by multiplying the provided wattage by 70%. The ex post savings estimate used adjusted base wattages of 53W and 43W to meet EISA 2007 requirements for a 75W and 60W incandescent lamp.

The measure name for the third line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 0.90, applicable to a gas heated, non-air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁷⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 87%.

¹⁷⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	2,354	2,054	87%	0.39
Total		2,354	2,054	87%	0.39

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/23/16 and 1/9/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015333-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	39	39	53	9	1,619	1.11	3,563	3,077	86%
015333-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			1	1	53	8	1,622	1.11	95	82	86%
015333-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			1	1	40	18	1,619	1.11	46	39	85%
Total										3,704	3,198	86%

The annual lighting hours of operation verified during the M&V site visit range between 1,316 and 1,836. The average annual lighting hours of operation (1,619) are less than the hours of operation used to calculate ex ante savings (2,100).

The ex ante savings estimate used an LM adjusted base wattage of 52.5W for the first and second line item in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 53W to meet EISA 2007 requirements for a 75W incandescent lamp.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁷⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 86%.

¹⁷⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	3,704	3,198	86%	0.61
Total		3,704	3,198	86%	0.61

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction actor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate	
014166-100101-Lighting-Linear Tube LED Fixture Replacing T12 Fixture	1169	Lighting	Custom	6	4	51	23	8,760	1.09	1,875	2,053	109%	
				1	1	25	11	8,760		123	134	109%	
				2	2	82	24	8,760		1,016	1,113	109%	
014658-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011		Standard		5	5	43	11	3,520	1.00	543	617	114%
014658-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008				16	16	53	13	4,311	1.00	2,212	2,759	125%
014659-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011				7	7	43	11	2,906	1.09	651	713	109%
014659-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008				100	100	53	13	2,906		13,825	12,728	92%
014659-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011				4	4	29	7	2,906		168	280	167%
015071-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012				15	15	50	8	2,906		1,904	2,019	106%
015071-100213-Lighting-Non Linear LED Fixture Replacing CFL Fixture	1169				Custom	40	40	46	9		4,171	6,926	6,759
		6	6	36		9	2,906	1,011	515	51%			
Total										30,254	29,689	98%	

The annual lighting hours of operation verified during the M&V site visit for the second and third line item in the table above (3,520 and 4,311, respectively) are greater than the annual hours of operation used to calculate ex ante savings (3,500). The third line item was an exterior installation with a photo cell control for non-daylighting hours.ⁱⁱ Line items six through eleven in the above table have annual lighting hours of operation (ranging from 2,906 to 4,171) which are less than the annual hours of operation used to calculate ex ante savings (ranging from 3,000 to 4,680).

The ex ante savings estimate used an adjusted base wattage of 42W for the fourth and sixth line item in the above table, 52.5W for the fifth and seventh line item, and 28W for the eighth line item by multiplying the provided wattage by 70%. An adjusted base wattage of 43W, 53W and 29W was used

in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W, 75W and 40W incandescent lamp.

The quantity of the eleventh line item (6) verified during the M&V site visit is less than the ex ante savings quantity (8). The client removed two of the fixtures from the building.

The measure names for the fourth, sixth, and eighth line items in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned large office in St. Louis, was applied to the ex post lighting energy savings for all the interior installations. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁷⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 98%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	17,091	16,356	96%	3.11
	Exterior Lighting	2,212	2,759	125%	0.00
Custom	Lighting	10,951	10,574	97%	2.01
Total		30,254	29,689	98%	5.12

¹⁷⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules. Annual lighting operating hours were verified by interviewing facility personnel regarding facility operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015038-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026	Lighting	Standard	41	41	40	15	2,457	1.09	2,600	2,747	106%
				102	102	40	15			6,500	6,867	106%
				102	102	40	15			6,500	6,867	106%
				16	16	40	18			915	967	106%
015038-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	153	153	32	15	2,457	1.09	6,630	7,004	106%
				296	296	32	15			12,818	13,541	106%
				16	16	32	18			582	615	106%
Total										36,545	38,608	106%

The annual lighting hours of operation verified during the M&V site visit (2,457) are less than the annual hours of operation used to calculate ex ante savings (2,600). An additional 30 minutes were added to the end of weekday operations to account for any extra working hours.

During the M&V visit, ADM staff verified through facility personnel interviews that 727 lights were removed, which differs from the 712 given in the application. The ex post savings estimate calculation uses an adjusted lamp quantity to meet the verified total of 727 lamps replaced.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned office in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁷⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 106%.

¹⁷⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	36,545	38,608	106%	7.33
Total		36,545	38,608	106%	7.33

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed six photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 11/11/16 and 1/31/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014738-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	396	396	32	14	4,062	1.09	25,589	31,704	124%
014746-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft				6,685	6,685	32	14	4,035	1.09	431,985	531,542	123%
				500	500	32	12	3,721	1.09	35,900	40,739	113%
				100	100	32	12	4,202	1.09	7,180	9,201	128%
Total										500,654	613,185	122%

The annual lighting hours of operation verified during the M&V site visit (ranging from 3,721 to 4,202) are greater than the annual hours of operation used to calculate ex ante savings (3,590).

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned large office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁷⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 122%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	500,654	613,185	122%	116.48
Total		500,654	613,185	122%	116.48

¹⁷⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/4/17 and 1/27/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014583-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025	Lighting	Standard	135	135	32	15	2,906	1.11	5,868	7,377	126%
014583-200101-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T12 <=40 Watt Lamp	3026			183	183	40	15	2,758	1.11	11,698	13,955	119%
Total										17,566	21,332	121%

The annual lighting hours of operation verified during the M&V site visit (ranging between 2,758 and 2,906) are greater than the hours of operation used to calculate ex ante savings (2,557).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁷⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 121%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	17,566	21,332	121%	4.05
Total		17,566	21,332	121%	4.05

¹⁷⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed four photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 11/17/16 and 12/8/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015330-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	102	102	53	9	2,192	1.01	8,430	9,895	117%
015330-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			17	17	53	8	2,411	1.01	1,437	1,856	129%
015330-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			2	2	72	11	2,627	1.01	226	325	144%
				17	17	72	12	2,351	1.01	1,873	2,413	129%
015330-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			3	3	50	9	2,395	1.01	148	296	200%
Total										12,114	14,785	122%

The annual lighting hours of operation verified during the M&V site visit (ranging between 2,192 and 2,627) are greater than the hours of operation used to calculate ex ante savings (1,900).

The ex ante savings estimate used LM adjusted base wattages of 52.5W, 70W, and 35W for the first, third, and fifth line items in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used adjusted base wattages of 53W and 72W for the first through fourth line items to meet EISA 2007 requirements for a 75W and 100W incandescent lamp. The base lamps for the fifth line item (MR16) are exempt from an adjusted wattage calculation.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.01, applicable to an electrically heated, air conditioned small retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁸⁰

¹⁸⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 122%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	12,114	14,785	122%	2.81
Total		12,114	14,785	122%	2.81

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014534-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008	Lighting	Standard	32	32	65	17	7,528	1.09	13,455	12,654	94%
Total										13,455	12,654	94%

The annual lighting hours of operation verified during the M&V site visit range between 6,570 and 8,760. The average annual lighting hours of operation (7,528) are less than the hours of operation used to calculate ex ante savings (8,760). It was verified by facility personnel that 18 of the 32 lights are turned off from midnight until 6 a.m.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned care facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁸¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 94%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	13,455	12,654	94%	2.40
Total		13,455	12,654	94%	2.40

¹⁸¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 11/10/16 and 1/30/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015658-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	SBDI	390	390	32	15	2,922	1.11	20,341	21,427	105%
				1	1	32	15	2,329	1.11	52	44	84%
			Standard	26	26	32	15	2,329	1.11	1,356	1,138	84%
Total										21,749	22,609	104%

The annual lighting hours of operation verified during the M&V site visit (ranging from 2,329 to 2,922) are less than the annual hours of operation used to calculate ex ante savings (3,068).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small office in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁸²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 104%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	20,393	21,471	105%	4.08
Standard		1,356	1,138	84%	0.22
Total		21,749	22,609	104%	4.29

¹⁸² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Custom and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff visually inspected newly installed equipment to verify equipment installation. Baseline and post-retrofit connected loads were obtained through review of project documentation. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate				
014443-100208-Lighting-Non Linear LED Fixture Replacing Metal Halide Fixture	1169	Lighting	Custom	141	141	215	50	8,760	1.00	203,801	203,801	100%				
				15	15	215	50	8,760	1.00	21,681	21,681	100%				
				15	18	215	25	8,760	1.00	24,309	24,309	100%				
015440-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026		Standard		160	160	68	15	4,380	1.09	74,285	61,000	82%			
							34	7.5	4,380	1.09						
015440-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025					130	130	64	15	4,380	1.09	55,801	45,822	82%		
								32	7.5	4,380	1.09					
								88	88	64	15	4,380	1.09	37,773	31,018	82%
										32	7.5	4,380	1.09			
Total										417,650	387,631	93%				

The annual lighting hours of operation verified during the M&V site visit for the first three line items in the table above (8,760) concur with the hours of operation used to calculate the ex ante savings estimate. The remaining line items above equal annual hours of operation of 8,760 but show half power, half of the time since the fixtures turn one lamp off during inactivity.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned large office facility in St. Louis, was applied to the ex post lighting energy savings for the interior lamps in line items four through nine in the table above. The ex ante savings estimate did not account for heating and cooling interactive effects. The first three line items in the table above did not account for heating and cooling interactive effects because the fixtures were installed in an unconditioned parking garage.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁸³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 93%.

¹⁸³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	249,791	249,791	100%	34.46
Standard		167,859	137,840	82%	26.18
Total		417,650	387,631	93%	60.64

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/8/16 and 12/29/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015169-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	Standard	43	43	65	7	1,986	1.11	3,970	5,491	138%
015169-201316-Lighting-LED or Electroluminescent Replacing Incandescent Exit Sign	793			2	2	10	1	8,760	1.11	149	165	111%
015169-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			24	12	40	22	1,632	1.11	1,669	1,259	75%
015169-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			34	34	43	9	1,986	1.11	2,691	2,545	95%
015169-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			5	5	65	10	1,869	1.11	426	570	134%
015169-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture				2	2	53	14	1,869	1.11	187	164	88%
Total										9,092	10,195	112%

The annual lighting hours of operation verified during the M&V site visit range between 1,632 and 8,760. The average annual lighting hours of operation (1,949) are less than the average hours of operation used to calculate ex ante savings (2,427).

The ex ante savings estimates used LM adjusted base wattages of 45.5W, 42W, 45.5W, and 52.5W for the first, fourth, fifth, and sixth measures respectively by multiplying the provided wattage by 70%. The ex post savings estimates used EISA adjusted base wattages of 43W and 53W for the fourth and sixth measures respectively. The base lamps for the first and fifth measures (65W BR/R) are exempt from an adjusted wattage calculation.

The measure name for the fourth line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned restaurant facility in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁸⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 112%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	9,092	10,195	112%	1.94
Total		9,092	10,195	112%	1.94

¹⁸⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed six photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 10/18/16 and 11/28/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014283-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	Standard	85	85	65	8	2,452	1.15	12,093	13,754	114%
014283-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025			2,054	2,054	32	15	2,445	1.15	134,578	100,872	75%
014283-100213-Lighting-Non Linear LED Fixture Replacing CFL Fixture	1169		Custom	10	10	40	21	8,760	1.15	1,664	1,911	115%
				2	2	42	21	8,760	1.15	368	422	115%
014283-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lam	3011		Standard	4	4	29	7	-	1.15	320	-	0%
Total										149,023	116,959	78%

The annual lighting hours of operation verified during the M&V site visit for the first and second line item in the above table (ranging from 2,445 to 2,452) are less than the annual hours of operation used to calculate ex ante savings (3,744). The ex ante assumed higher usage within the office suites than was verified. The third and fourth line items were installed in public areas with the ex post annual hours of operation confirming the ex ante estimate (8,760). The fifth line item above was installed within an unoccupied/unleased office space, with no annual hours of operation verified. The client confirmed that 20% of the building annually is unoccupied.

The ex ante savings estimate used an adjusted base wattage of 45.5W for the first line item in the above table and 28W for the fifth line item by multiplying the provided wattage by 70%. An adjusted base wattage of 29W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 40W incandescent lamp. The base lamps for the 45.5W adjustment (BR reflector) are exempt from an adjusted wattage calculation.

A heating and cooling interactive factor of 1.15, applicable to an electric heated, air conditioned large office building in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁸⁵

¹⁸⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 78%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	146,991	114,626	78%	21.77
Custom		2,032	2,333	115%	0.44
Total		149,023	116,959	78%	22.22

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015497-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Misc.	Standard	42	42	43	10	8,760	1.00	11,741	12,141	103%
Total										11,741	12,141	103%

The annual lighting hours of operation verified during the M&V site visit (8,760) are greater than the annual hours of operation used to calculate ex ante savings (8,736). The application 'notes' and

An adjusted base wattage of 43W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W incandescent lamp. The ex ante base wattage of 42W was computed within the application by factoring 70% of a 60W incandescent lamp.

The measure name for the first measure is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁸⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 103%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Miscellaneous	11,741	12,141	103%	1.67
Total		11,741	12,141	103%	1.67

¹⁸⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed four photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/26/17 and 2/16/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015479-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	Standard	142	142	53	15	3,685	1.11	15,200	22,315	147%
015479-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			69	69	63	13	4,009	1.11	10,000	15,319	153%
015479-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture				72	72	53	9	3,693	1.11	8,700	12,959	149%
Total										33,900	50,593	149%

The annual lighting hours of operation verified during the M&V site visit (ranging between 3,685 and 4,009) are greater than the hours of operation used to calculate ex ante savings (2,000).

The ex ante savings estimate used an LM adjusted base wattage of 52.5W for the first and third line items in the table above and 63W for the second line item by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 53W for the first and third line items to meet EISA 2007 requirements for a 75W incandescent lamp.

During the M&V site visit, ADM staff visually verified a count of 142, 69, and 72 for the first, second and third line items in the table above respectively, which is fewer than what was used to calculate ex ante savings (200, 100, and 100 respectively). Only 6 Aline lamps were in storage and the contact had no idea why so many were listed since not needed within the store.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁸⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 149%.

¹⁸⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	33,900	50,593	149%	9.61
Total		33,900	50,593	149%	9.61

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/5/16 and 12/22/16.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015583-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	SBDI	7	7	32	9	4,031	1.14	862	721	84%
015583-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			68	68	65	9	4,345	1.14	13,775	18,958	138%
Total										14,637	19,679	134%

The annual lighting hours of operation verified during the M&V site visit (ranging between 4,031 and 4,345) are less than the hours of operation used to calculate ex ante savings (5,475).

The ex ante savings estimate used LM adjusted base wattages of 31.5W and 45.5W for the first and second line items in the table above respectively by multiplying the provided wattage by 70%. The base lamp for the first line item (65W BR/R) is exempt from an adjusted wattage calculation.

The measure name for the first line item in the table above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned assisted care facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁸⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 134%.

¹⁸⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	14,637	19,679	134%	3.74
Total		14,637	19,679	134%	3.74

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed one photo-sensor logger to monitor lighting operation. The photo-sensor loggers collected data between 11/18/16 and 12/14/16.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014720-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	200	200	32	12	5,548	1.11	25,860	24,544	95%
Total										25,860	24,544	95%

The annual lighting hours of operation verified during the M&V site visit (5,548) are fewer than the hours of operation used to calculate ex ante savings (6,465).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁸⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 95%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	25,860	24,544	95%	4.66
Total		25,860	24,544	95%	4.66

¹⁸⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed one photo-sensor logger to monitor lighting operation. The photo-sensor loggers collected data between 11/18/16 and 12/14/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014676-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	240	240	32	18	2,187	1.11	11,424	8,126	71%
Total										11,424	8,126	71%

The annual lighting hours of operation verified during the M&V site visit (2,187) are fewer than the hours of operation used to calculate ex ante savings (3,400).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small office facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁹⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 71%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	11,424	8,126	71%	1.54
Total		11,424	8,126	71%	1.54

¹⁹⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule at three large retail locations. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules. The lighting is controlled through an existing Energy Management System.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015084-305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture	3005-1	Lighting	Standard	478	478	400	200	4,009	1.10	401,520	423,002	105%
015085-305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture				581	581	400	200	4,009		488,040	514,150	105%
015086-305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture				596	596	400	200	4,453		500,640	585,831	117%
Total										1,390,200	1,522,983	110%

The annual lighting hours of operation verified during the M&V site visit for the first and second line item in the above table (4,009) are less than the annual hours of operation used to calculate ex ante savings (4,200). For the third line item above the annual lighting hours of operation (4,453) is greater than the annual hours of operation used to calculate ex ante savings (4,200). One third of the lighting in the facility has annual hours of operation of 8,069.

A heating and cooling interactive factor of 1.10, applicable to a gas heated, air conditioned large retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁹¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 110%.

¹⁹¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	1,390,200	1,522,983	110%	289.31
Total		1,390,200	1,522,983	110%	289.31

Data Collection

The participant received Custom and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed ten photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/5/16 and 12/22/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate	
014926-100104-Lighting-Linear Tube LED Fixture Replacing T8 Fixture	1169	Lighting	Custom	4	8	248	43	1,789	1.09	2,106	1,264	60%	
014927-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025		Standard		15	15	32	20	2,357	1.09	540	463	86%
					575	575	32	14	2,357	1.09	31,050	26,609	86%
015078-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008				12	12	63	13	1,351	1.09	1,818	893	49%
015078-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025				400	400	32	17	3,040	1.09	18,000	19,899	111%
					499	499	32	17	3,589	1.09	22,455	29,309	131%
					1,200	1,200	32	17	2,212	1.09	54,000	43,434	80%
015415-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008				8	8	65	13	2,214	1.09	840	1,015	121%
015415-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025				700	700	32	14	2,214	1.09	37,800	30,436	81%
015415-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026				100	100	40	15	2,214	1.09	7,500	6,039	81%
Total										176,109	159,360	90%	

The annual lighting hours of operation verified during the M&V site visit range between 1,351 and 3,589. The annual lighting hours of operation are fewer than the hours of operation used to calculate ex ante savings regarding line item one in the table above (3,250), and line items two, three, four, seven, nine and ten (3,000). The annual lighting hours of operation are greater than the hours of operation used to calculate ex ante savings regarding line items five and six (3,000), and line item eight (2,000).

The ex ante and ex post savings estimates used an LM adjusted base wattage of 63W for the fourth line item in the table above by multiplying the provided wattage by 70%.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned high school facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁹²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 90%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	2,106	1,264	60%	0.24
Standard		174,003	158,096	91%	22.91
Total		176,109	159,360	90%	23.15

¹⁹² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and post-retrofit connected load, and installed five photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 8/5/16 to 8/22/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014574-211111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	1,293	1,293	43	9	1,787	1.13	155,742	88,879	57%
014610-100212-Lighting-Non Linear LED Fixture Replacing Incandescent/Halogen Lamp Fixture	1169		Custom	684	684	29	4	1,787	1.13	59,919	34,572	58%
Total										215,661	123,451	57%

The hours of operation verified during the M&V site visit (1,787) are fewer than the hours of operation used to perform the ex ante savings estimate (3,650), resulting in realized lighting retrofit energy savings being lower than expected. The ceiling-mounted fixtures were installed in residential living quarters. Residents reported mainly relying upon table and floor lamps for their lighting needs, rather than the newly-installed lamps inside ceiling-mounted fixtures.

The ex ante savings estimate used an LM adjusted base wattage of 42W regarding the first line item in the table above, and 28W regarding the second line item by multiplying the provided wattage by 70%. The ex post savings estimate used adjusted wattages of 43W and 29W to meet EISA 2007 requirements for a 60W and 40W incandescent lamp.

A heating and cooling interactive factor of 1.13, applicable to an electrically heated, air conditioned nursing home in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁹³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 57%.

¹⁹³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post Peak kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	215,661	123,451	57%	38.84
Total		215,661	123,451	57%	38.84

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014169-100108-Lighting-Linear Tube LED Fixture Replacing Metal Halide Fixture	1169	Misc	Custom	174	140	461	216	8,760	1.00	300,468	437,772	146%
Total										300,468	437,772	146%

The annual lighting hours of operation verified during the M&V site visit (8,760) are equal to the annual hours of operation used to calculate ex ante savings.

During the M&V site visit, ADM staff verified a baseline quantity of 174 lamps, which is greater than the quantity referenced to calculate ex ante energy savings (140).

No heating and cooling interactive factor was referenced in determining an ex ante or ex post energy savings estimate due to lighting being installed in an area with gas heat and no cooling.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁹⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 146%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	300,468	437,772	146%	83.16
Total		300,468	437,772	146%	83.16

¹⁹⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed four photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/14/17 and 3/3/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014619-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp	3007	Lighting	Standard	142	142	65	8	4,631	1.12	34,506	41,901	121%
014619-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			8	8	43	10	5,840	1.12	1,669	1,734	104%
Total										36,175	43,635	121%

The annual lighting hours of operation verified during the M&V site visit (ranging between 4,631 and 5,840) are less than the hours of operation used to calculate ex ante savings (6,480).

The ex ante savings estimate used LM adjusted base wattages of 45.5W and 42W for the first and second line item in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W for the second line item to meet EISA 2007 requirements for a 60W incandescent lamp. The base lamps for the first measure (65W BR/R) are exempt from an adjusted wattage calculation.

The measure names in the table above is not accurate. The baseline lamps were incandescent BR/R and A-line, and were replaced with LED BR/R and A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.12, applicable to a gas heated, air conditioned restaurant facility in St. Louis, was applied to the ex post lighting energy savings regarding lighting installed in the diner area. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁹⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 121%.

¹⁹⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	36,175	43,635	121%	8.29
Total		36,175	43,635	121%	8.29

Data Collection

The participant received Custom and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014385-100216-Lighting-Non Linear LED Fixture Replacing Existing Inefficient Lighting Fixture	1169	Misc.	Custom	65	65	243	65	6,570	1.00	101,473	76,105	75%
015937-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	Standard	33	33	65	9	2,668	1.01	2,505	4,988	199%
Total										103,978	81,093	78%

The annual lighting hours of operation verified during the M&V site visit for the first line item in the table above (6,570) is less than the hours of operation used to calculate ex ante savings (8,760). This measure was installed in a garage and controlled by a timer to operate from 6a.m. until 12a.m. The annual lighting hours of operation for the second line item above (2,668) are greater than the hours of operation used to calculate ex ante savings (2,080).

The ex ante savings estimate used an LM adjusted base wattage of 45.5W for the second line item in the above table by multiplying the provided wattage by 70%. The base lamps for this measure (65W BR/R) are exempt from an adjusted wattage calculation.

The measure name for the second line item in the table above is not accurate. The baseline lamps were incandescent BR/R and were replaced with LED BR/R lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.01, applicable to an electrically heated, air conditioned office facility in St. Louis, was applied to the ex post lighting energy savings regarding lighting installed in office areas. No heating and cooling interactive factor was referenced for lighting installed in the garage since it is an unconditioned space. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁹⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 78%.

¹⁹⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Miscellaneous	101,473	76,105	75%	10.50
Standard	Lighting	2,505	4,988	199%	0.95
Total		103,978	81,093	78%	11.45

Data Collection

The participant received Custom and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014081-100601-Lighting-T8 25 Watt Fixture Replacing T12 Fixture	1169	Lighting	Custom	24	24	62	45	8,760	1.11	3,574	3,954	111%
015024-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011		Standard	68	68	43	10	1,145	1.11	2,542	2,884	113%
015174-100201-Lighting-Non Linear LED Fixture Replacing T12 Fixture	1169		Custom	14	15	164	61	8,760	1.11	12,124	13,413	110%
015174-100201-Lighting-Non Linear LED Fixture Replacing T12 Fixture	1169			10	10	82	33	8,760	1.11	4,275	4,729	111%
015717-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011		Standard	68	68	43	10	8,760	1.11	19,360	22,076	114%
Total										41,875	47,057	112%

The annual lighting hours of operation verified during the M&V site visit for the second line item in the table above (1,145¹⁹⁷) are less than the annual hours of operation used to calculate ex ante savings (1,150). The hours of operation for all other lines above equal the hours of operation used in the ex ante savings calculation (8,760).

The ex ante savings estimate used an adjusted base wattage of 42W for the second and fifth line items in the above table by multiplying the provided wattage by 70%. An adjusted base wattage of 43W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W and 40W incandescent lamp.

The measure name for the first and fifth line item in the above table is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned lodging facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

¹⁹⁷ The ex post savings analysis cites the DEER 2005 guest room lighting operation estimate (1,145). This average value has been corroborated through ADM's extensive fixture-level and circuit-level monitoring of guest room lighting operation.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.¹⁹⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 112%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	19,973	22,086	111%	4.20
Standard		21,902	24,961	114%	4.74
Total		41,875	47,057	112%	8.94

¹⁹⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015943-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026	Lighting	SBDI	120	240	60	17	2,659	1.00	8,100	8,616	106%
				1	1	40	17	2,659	1.00	59	62	106%
			Standard	72	120	60	17	2,659	1.00	5,850	6,223	106%
				26	2	40	17	2,659	1.00	2,518	2,678	106%
				4	8	60	17	8,760	1.00	946	946	100%
Total									17,472	18,525	106%	

The annual lighting hours of operation verified during the M&V site visit for the first four line items in the table above (2,659) are greater than the annual hours of operation used to calculate ex ante savings (2,500), while the hours of operation for the fifth measure is equal to the hours of operation used to calculate ex ante savings.

Lighting was installed in a location with gas heat and no air conditioning, resulting in a heating and cooling interactive factor of 1. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.¹⁹⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 106%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
SBDI	Lighting	8,159	8,679	106%	1.60
Standard		9,313	9,847	105%	1.90
Total		17,472	18,525	106%	3.50

¹⁹⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff visually inspected newly-installed equipment to verify equipment installation. Baseline and post-retrofit connected loads were obtained through review of project documentation. ADM staff interviewed facility personnel regarding lighting operating schedules, and installed one photo-sensor loggers to monitor lighting operation. The photo-sensor loggers monitored lighting operation between 1/5/17 and 1/24/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014652-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp	3007	Lighting	Standard	12	12	65	8.5	6,092	1.12	2,972	4,617	155%
014652-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			39	39	32	14	6,092	1.12	4,636	4,781	103%
Total										7,608	9,398	124%

The annual lighting hours of operation verified during the M&V site visit (6,092) are less than the annual hours of operation used to calculate ex ante savings (6,604).

The ex ante savings estimate used an adjusted base wattage of 45.5W for the first line item in the above table by multiplying the provided wattage by 70%. The base lamps for these measures (65W BR/R) are exempt from an adjusted wattage calculation.

During the M&V visit, ADM staff verified an efficient wattage of 8.5W for the first line item in the table above, instead of 8W used to calculate the ex ante savings estimate.

A heating and cooling interactive factor of 1.12, applicable to a gas heated, air conditioned restaurant facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²⁰⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 124%.

²⁰⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	7,608	9,398	124%	1.79
Total		7,608	9,398	124%	1.79

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014524-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008	Lighting	Standard	28	28	49	17	3,598	1.18	3,261	3,816	117%
015409-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			18	18	50	7	8,760	1.18	4,415	8,026	182%
				27	27	50	7	8,760	1.18	6,623	12,038	182%
Total										14,299	23,880	167%

The annual lighting hours of operation verified during the M&V site visit for the first line item in the table above (3,598) are less than the annual hours of operation used to calculate ex ante savings (3,640). The annual lighting hours of operation verified during the M&V site visit are equal to the annual hours of operation used to calculate ex ante savings regarding the second and third line items.

The ex ante savings estimate used an LM adjusted base wattage of 49W for the first line item in the table above, and 35W for the second and third line items by multiplying the provided wattage by 70%. The base lamps for the second and third line items (MR16) are exempt from an adjusted wattage calculation.

The measure names in the table above is not accurate. The baseline lamps were incandescent PAR and MR-16, and were replaced with LED PAR and MR-16 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.18, applicable to a gas heated, air conditioned hotel in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²⁰¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 167%.

²⁰¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	14,299	23,880	167%	4.54
Total		14,299	23,880	167%	4.54

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed five photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/1/17 and 2/21/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015391-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008	Lighting	Standard	91	91	63	17	4,258	1.14	18,033	20,277	112%
015391-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			20	20	43	11	1,682	1.14	2,671	1,225	46%
015391-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			272	272	45	12	6,388	1.14	38,434	64,830	169%
Total										59,138	86,332	146%

The annual lighting hours of operation verified during the M&V site visit for the first and second line item in the above table (4,258 and 1,682, respectively) are less than the hours of operation used to calculate ex ante savings (4,308). These measures were located within areas that are rented out for events. The third line item in the above table had annual hours of operation (6,388) greater than the hours of operation used to calculate the ex ante savings (4,308). These measures were installed within meeting rooms.

The ex ante savings estimate used an LM adjusted base wattage of 63W for the first line item in the table above, 42W for the second line item, and 44.8W for the third line item by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W for the second line item to meet EISA 2007 requirements for a 60W incandescent lamp.

The measure names in the table above are not accurate. The baseline lamps were incandescent PAR, A-line, and BR/R, and were replaced with LED PAR, A19, and BR/R lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned assembly facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²⁰²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 146%.

²⁰² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	59,138	86,332	146%	16.40
Total		59,138	86,332	146%	16.40

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/7/17 and 2/23/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015872-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	SBDI	11	11	29	9.5	4,293	1.12	872	1,029	118%
015872-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp or Fixture	3012			4	4	35	5	4,293	1.12	501	576	115%
015872-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			13	13	44.8	8	4,290	1.12	1,995	2,294	115%
Total										3,368	3,900	116%

The annual lighting hours of operation verified during the M&V site visit, ranging between 4,290 and 4,293, are greater than the hours of operation used to calculate ex ante savings (4,171).

The ex ante savings estimate used an LM adjusted base wattage of 28W and 44.8W for the first and third line item in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 29W for the first line item to meet EISA 2007 requirements for a 40W incandescent lamp.

The measure name for the first and third line items in the table above is not accurate. The baseline lamps were incandescent A-line and BR/R, and were replaced with LED A19 and BR/R lamps. The lamps are stated correctly in the application.

During the M&V visit, ADM staff verified an efficient wattage of 9.5W regarding the first line item in the table above, which is greater than the efficient wattage referenced to calculate ex ante savings (9W).

A heating and cooling interactive factor of 1.12, applicable to a gas heated, air conditioned restaurant facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²⁰³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 116%.

²⁰³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	3,368	3,900	116%	0.74
Total		3,368	3,900	116%	0.74

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed four photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/19/17 and 2/10/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014797-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	Standard	37	37	50	9	2,962	1.14	3,793	5,111	135%
015115-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			24	24	50	9	2,253	1.14	2,460	2,521	102%
015115-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			21	21	75	20	2,368	1.14	2,888	3,112	108%
015115-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			42	42	43	10	2,253	1.14	3,413	3,605	106%
015115-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			72	72	72	18	2,253	1.14	9,360	9,962	106%
015115-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			18	18	43	10	1,658	1.14	1,463	1,137	78%
015115-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			47	47	50	17	1,658	1.14	3,878	2,925	75%
Total												27,255

The annual lighting hours of operation verified during the M&V site visit for the first line item in the table above (2,962) are greater than the annual hours of operation used to calculate ex ante savings (2,500). The annual hours of operation for the remaining line items above (ranging from 1,658 – 2,368) are less than the hours of operation used to calculate ex ante savings (2,500).

The ex ante savings estimate used an adjusted base wattage of 42W for the fourth and sixth line item in the above table and 70W for the fifth line item by multiplying the provided wattage by 70%. An adjusted base wattage of 43W and 72W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W and 100W incandescent lamp.

The measure name for the fourth through sixth line items above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned assembly facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁰⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 104%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	27,255	28,374	104%	5.39
Total		27,255	28,374	104%	5.39

²⁰⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed one photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/23/17 and 2/25/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014555-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp	3007	Lighting	Standard	17	17	65	10	2,846	1.14	2,681	3,054	114%
014555-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			50	50	29	7	3,924	1.14	4,709	5,021	107%
014555-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			60	60	35	7	3,133	1.14	7,490	6,093	81%
014555-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp	3007			83	83	65	9	2,461	1.14	13,269	13,013	98%
014934-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008			48	48	60	11	3,340	1.14	10,302	8,935	87%
Total										38,451	36,116	94%

The annual lighting hours of operation verified during the M&V site visit (ranging from 2,461 – 3,924) are less than the annual hours of operation used to calculate ex ante savings (4,380).

The ex ante savings estimate used an adjusted base wattage of 45.5W, for the first and fourth line item in the above table, 28W for the second line item, and 35W for third line item by multiplying the provided wattage by 70%. An adjusted base wattage of 29W for the second line item above was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 40W incandescent lamp. The base lamps for the first and fourth line item in the table above (Incandescent BR/R) are exempt from an adjusted wattage calculation.

The measure name for the second line item above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned assembly facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁰⁵

²⁰⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 94%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	38,451	36,116	94%	6.86
Total		38,451	36,116	94%	6.86

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015956-305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture	3005-1	Lighting	Standard	29	29	454	180	8,760	1.00	44,788	69,607	155%
Total										44,788	69,607	155%

The annual lighting hours of operation verified during the M&V site visit (8,760) are greater than the annual hours of operation used to calculate ex ante savings (7,020). The ex ante savings estimate refers to the annual hours of operation for another store location.

During the M&V visit, ADM staff verified that the baseline HID fixture had a system wattage of 454W, which is greater than the base wattage used to calculate ex ante savings (400W). A non-retrofitted baseline fixture was still installed in another location during the time of the M&V visit, allowing visual verification of base wattage.

Lighting was installed in a location with no air conditioning and gas heat, resulting in an ex post heating and cooling interactive factor of 1. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²⁰⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 155%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	44,788	69,607	155%	13.22
Total		44,788	69,607	155%	13.22

²⁰⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Custom and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed four photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/19/17 and 3/01/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014161-100212-Lighting-Non Linear LED Fixture Replacing Incandescent/Halogen Lamp Fixture	1169	Lighting	Custom	8	8	100	19	3,381	1.08	2,856	2,381	83%
				25	25	100	19	3,381	1.08	8,924	7,440	83%
				16	16	60	9	3,381	1.08	3,574	2,980	83%
				8	8	132	48	5,813	1.08	2,943	4,219	143%
				4	4	210	32	5,813	1.08	3,119	4,470	143%
014995-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025		Standard	100	100	32	17	3,489	1.08	4,200	5,653	135%
				75	75	32	17	3,489	1.08	3,150	4,240	135%
Total										28,766	31,382	109%

The annual lighting hours of operation verified during the M&V site visit for the first three line items in the above table (3,381) are less than the annual hours of operation used to calculate ex ante savings (4,380). These measures were installed within the theater with large unoccupied periods of time. The annual lighting hours of operation for the fourth and fifth line items above (5,813) are greater than the hours of operation used to calculate ex ante savings (4,380). These measures were installed in hallways and the lobby. Line items six and seven above have hours of operation (3,489) which are greater than the hours of operation used to calculate ex ante savings (2,800).

A heating and cooling interactive factor of 1.08, applicable to a gas heated, air conditioned high school in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁰⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 109%.

²⁰⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	21,416	21,489	100%	4.08
Standard		7,350	9,893	135%	1.88
Total		28,766	31,382	109%	5.96

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed eight photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/14/17 and 3/09/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015015-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	170	170	43	10	1,245	1.14	10,370	6,718	78%
015104-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			20	20	72	15	2,054	1.14	2,295	2,664	116%
015104-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			20	20	49	13	2,054	1.14	1,523	1,706	112%
				18	18	63	12	1,230	1.14	1,193	1,285	108%
Total										15,381	13,717	89%

The annual lighting hours of operation verified during the M&V site visit for the four line items in the above table (1,245, 2,054, 2,054, and 1,230, respectively) are less than the annual hours of operation used to calculate ex ante savings (1,877, 2,086, 2086, and 1,300, respectively).

The ex ante savings estimate used an adjusted base wattage of 42W, 70W, 49W, and 63W for the line items in the above table by multiplying the provided wattage by 70%. An adjusted base wattage of 43W and 72W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W and 100W incandescent lamp for the first two line items in the table above.

The measure name for the first two line items above is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned assembly facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁰⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 89%.

²⁰⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	15,381	13,717	89%	2.61
Total		15,381	13,717	89%	2.61

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed one photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/18/17 and 2/26/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014421-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008	Lighting	Standard	24	24	49	17	3,306	1.11	4,461	2,812	63%
014483-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008			24	24	49	17	3,306	1.11	3,846	2,812	73%
015156-100204-Lighting-Non Linear LED Fixture Replacing T8 Fixture	1169		Custom	23	23	114	43	3,306	1.11	6,538	5,979	91%
015815-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008		Standard	24	24	55	13	3,542	1.11	2,122	4,001	189%
Total										16,967	15,605	92%

The annual lighting hours of operation verified during the M&V site visit for the first three line items in the above table (3,306) are less than the annual hours of operation used to calculate ex ante savings (5,808, 5,008, and 4,004, respectively). The annual hours of operation for the fourth line item above (3,542) are greater than the hours of operation used to calculate ex ante savings (2,080).

The ex ante savings estimate used an adjusted base wattage of 49W for the first two line items in the above table by multiplying the provided wattage by 70%.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁰⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 92%.

²⁰⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	10,429	9,625	92%	1.83
Custom	Lighting	6,538	5,979	91%	1.14
Total		16,967	15,605	92%	2.96

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed four photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/26/17 and 2/17/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015375-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	360	360	32	18	2,879	1.02	12,852	14,755	115%
Total										12,852	14,755	115%

The annual lighting hours of operation verified during the M&V site visit (2,879) are greater than the annual hours of operation used to calculate ex ante savings (2,550).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings for 56 of the lamps. The ex ante savings estimate did not account for heating and cooling interactive effects. The remaining quantity was installed in an unconditioned space.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²¹⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 115%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	12,852	14,755	115%	2.80
Total		12,852	14,755	115%	2.80

²¹⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed four photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/24/17 and 2/13/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014571-200707-Lighting-LED 111-130 Watt Lamp Replacing Interior HID 301-400 Watt Lamp	3005-1	Lighting	Standard	9	9	400	143	2,359	1.00	6,318	5,457	86%
014571-200101-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T12 <=40 Watt Lamp	3026			30	30	40	24	2,191	1.00	1,248	1,052	84%
015344-305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture	3005-1			39	39	400	143	2,261	1.00	26,060	22,666	87%
Total										33,626	29,175	87%

The annual lighting hours of operation verified during the M&V site visit (ranging between 2,191 and 2,359) are less than the hours of operation used to calculate ex ante savings (2,600).

ADM staff has verified through visual inspection during the M&V visit, and review of project invoices and equipment specification sheets, that the installed LED wattage of the first line item is greater than what was used to calculate ex ante savings (130W). All LED wall packs purchased and installed (48), regarding line items one and three in the table above, were of the same type and wattage at 143W.

No heating and cooling interactive factor was considered due to lighting being installed in an unconditioned space.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²¹¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 87%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	33,626	29,175	87%	5.54
Total		33,626	29,175	87%	5.54

²¹¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015305-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	36	36	32	19	8,760	1.09	4,100	4,484	109%
015808-305005-Lighting-<=80 Watt Lamp or Fixture Replacing Interior HID 100-175 Watt Lamp or Fixture	3006-1			29	29	100	18	8,760	1.09	20,831	22,786	109%
015809-305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture	3005-1			24	24	455	100	8,760	1.09	74,635	81,639	109%
015810-305106-Lighting-62-130 Watt Lamp or Fixture Replacing Interior HID 176-300 Watt Lamp or Fixture	3004-1			48	48	250	85	8,760	1.09	69,379	75,890	109%
Total										168,945	184,799	109%

The annual lighting hours of operation verified during the M&V site visit are equal to the annual hours of operation used to calculate ex ante savings (8,760).

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned industrial facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²¹²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 109%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	168,945	184,799	109%	35.11
Total		168,945	184,799	109%	35.11

²¹² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/7/17 and 3/3/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015059-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	796	796	43	10	1,906	1.17	40,461	60,163	149%
015059-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			158	158	53	12	1,906	1.17	10,008	14,615	149%
Total										50,469	74,778	149%

The annual lighting hours of operation verified during the M&V site visit (1,906) are greater than the annual hours of operation used to calculate ex ante savings (1,564). The hours of 1,145²¹³ were used for the lamps installed in guest rooms. Each measure in the above table had 10% of the quantity installed in public areas with continuous use.

The ex ante savings estimate used an LM adjusted base wattage of 42W and 52.5W for the first and second line item in the above table respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W and 53W to meet EISA 2007 requirements for a 60W and 75W incandescent lamp.

The measure names in the table above are not accurate. The baseline lamps were incandescent A-line and PAR, and were replaced with LED A19 and PAR lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.17, applicable to a gas heated, air conditioned hotel facility in St. Louis, was applied to the ex post lighting energy savings regarding lighting installed in common areas. A heating and cooling interactive factor of 1.18, applicable to an electrically heated, air conditioned hotel facility in St. Louis, was applied to the ex post lighting energy savings regarding lighting installed guest rooms. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²¹⁴

²¹³ The ex post savings analysis cites the DEER 2005 guest room lighting operation estimate (1,145). This average value has been corroborated through ADM's extensive fixture-level and circuit-level monitoring of guest room lighting operation.

²¹⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 149%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	50,469	74,778	149%	14.21
Total		50,469	74,778	149%	14.21

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed five photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/14/17 and 3/9/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014546-100204-Lighting-Non Linear LED Fixture Replacing T8 Fixture	1169	Lighting	Custom	10	10	114	55	2,463	1.08	1,888	1,569	83%
014546-100212-Lighting-Non Linear LED Fixture Replacing Incandescent/Halogen Lamp Fixture				4	4	105	30	2,176	1.08	960	705	73%
014565-100204-Lighting-Non Linear LED Fixture Replacing T8 Fixture				40	40	114	55	2,810	1.08	7,578	7,186	95%
014673-100208-Lighting-Non Linear LED Fixture Replacing Metal Halide Fixture				16	16	1,080	387	3,390	1.08	33,264	40,598	122%
Total										43,690	50,059	115%

The annual lighting hours of operation verified during the M&V site visit for the first three line items in the table above (2,463, 2,176, and 2,810, respectively) are less than the hours of operation used to calculate ex ante savings (3,200). The hours of operation for the fourth line item in the above table (3,390) is greater than the hours of operation used to calculate ex ante savings (3,000). This measure was installed in the gymnasium with additional occupancy due to various activities.

The ex ante savings estimate used an LM adjusted base wattage of 105W second line item in the above table by multiplying the provided wattage by 70%.

A heating and cooling interactive factor of 1.08, applicable to a gas heated, air conditioned high school facility in St. Louis was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²¹⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 115%.

²¹⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	43,690	50,059	115%	9.51
Total		43,690	50,059	115%	9.51

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed one photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 11/11/16 and 12/22/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014531-200101-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T12 <=40 Watt Lamp	3026	Lighting	Standard	543	543	32	15	8,760	1.09	80,864	88,452	109%
014531-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025			66	66	40	15	8,760	1.09	14,454	15,810	109%
014531-100201-Lighting-Non Linear LED Fixture Replacing T12 Fixture	1169		Custom	15	15	138	72	8,760	1.09	8,672	9,486	109%
				13	13	455	108	8,760	1.09	39,516	43,225	109%
014689-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025		Standard	51	51	32	12	6,570	1.09	6,382	7,330	115%
014689-100101-Lighting-Linear Tube LED Fixture Replacing T12 Fixture	1169		Custom	29	29	164	44	6,570	1.09	21,865	25,113	115%
				37	37	164	44	6,570	1.09	27,897	32,041	115%
Total										199,649	221,458	111%

The annual lighting hours of operation verified during the M&V site visit regarding the first four line items in the table above (8,760) are equal to the annual hours of operation used to calculate ex ante savings, while the annual lighting hours of operation regarding line items five through seven are greater than the annual hours of operation used to calculate ex ante (6,257).

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned industrial facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²¹⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 111%.

²¹⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	101,699	111,593	110%	21.20
Custom		97,950	109,865	112%	20.87
Total		199,649	221,458	111%	42.07

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed six photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/31/17 and 2/20/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015008-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	Standard	50	50	55	10	1,883	1.10	5,221	4,695	90%
015008-305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture	3005-1			60	60	400	180	2,207	1.10	30,294	31,933	105%
015008-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			186	186	40	18	3,097	1.10	9,391	13,889	148%
015008-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			253	253	32	18	1,534	1.10	8,129	5,956	73%
				56	56	32	17	2,393	1.10	1,928	2,203	114%
015008-100208-Lighting-Non Linear LED Fixture Replacing Metal Halide Fixture	1169		Custom	6	2	455	200	1,684	1.10	5,347	4,301	80%
Total										60,310	62,978	104%

The annual lighting hours of operation verified during the M&V site visit for the first, second, fourth, and sixth line items in the above table (1,883, 2,207, 1,534, and 1,684, respectively) are less than the hours of operation used to calculate ex ante savings (2,295), while the annual hours of operation regarding the third and fifth line items above (3,097 and 2,393, respectively) are greater.

A heating and cooling interactive factor of 1.10, applicable to a gas heated, air conditioned storage facility in St. Louis, was applied to the ex post lighting energy saving. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²¹⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 104%.

²¹⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	54,963	58,676	107%	11.15
Custom		5,347	4,301	80%	0.82
Total		60,310	62,978	104%	11.96

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014553-100211-Lighting-Non Linear LED Fixture Replacing High Pressure Sodium Fixture	1169	Misc.	Custom	24	24	295	78	8,760	1.00	45,622	45,622	100%
Total										45,622	45,622	100%

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²¹⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 100%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	45,622	45,622	100%	6.29
Total		45,622	45,622	100%	6.29

²¹⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Custom and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed five photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/19/17 and 2/9/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014779-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008	Lighting	Standard	40	40	50	13	2,763	1.09	9,150	4,521	49%
				10	10	65	13	2,763	1.09	3,172	1,567	49%
014882-100213-Lighting-Non Linear LED Fixture Replacing CFL Fixture	1169			60	60	32	15	2,717	1.09	4,897	3,024	62%
015402-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			30	30	50	13	2,763	1.09	2,813	3,391	121%
015402-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			150	150	32	12	2,763	1.09	7,500	9,042	121%
Total										27,532	21,545	78%

The annual lighting hours of operation verified during the M&V site visit for the first three lines items in the above table (2,763, 2,763, and 2,717, respectively) are less than the hours of operation used to calculate ex ante savings (6,100, 6,100, and 4,801, respectively). The hours of operation for the fourth and fifth lines items in the table above (2,763) are greater than the hours of operation used to calculate the ex ante savings (2,500).

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned educational facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²¹⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 78%.

²¹⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	22,635	18,522	82%	3.52
Custom		4,897	3,024	62%	0.57
Total		27,532	21,545	78%	4.09

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014878-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	168	168	65	10	4,975	1.17	44,778	53,796	120%
014878-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			36	36	65	8	8,760	1.17	10,136	21,035	208%
014878-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			1,290	1,290	43	9	1,145	1.17	42,570	58,767	138%
014878-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			4	4	40	7	8,760	1.17	991	1,353	137%
014878-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			302	302	32	10	1,145	1.17	6,644	8,902	134%
Total										105,119	143,853	137%

The annual lighting hours of operation verified during the M&V site visit for the first line item in the table above (4,975) is less than the hours of operation used to calculate ex ante savings (7,508). These lamps were installed in several locations with hours ranging from 1,460 to 8,760. The hours of operation for the second through fifth line items (8,760, 1,145, 8,760, and 1,145, respectively) are greater than the hours of operation used to calculate ex ante savings (7,508, 1,000, 7,508, and 1,000, respectively). Line items two and four in the above table were installed in public areas with continuous use while the third and fifth line items above were installed within guest rooms.²²⁰

The ex ante savings estimate used an LM adjusted base wattage of 42W by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 43W to meet EISA 2007 requirements for 60W incandescent lamp.

The ex ante savings estimate also used an LM adjusted base wattage for the Incandescent 65W BR lamps. These lamps are exempt from the EISA 2007 requirements for lumens per watt. ADM used the actual base wattage.

²²⁰ The ex post savings analysis cites the DEER 2005 guest room lighting operation estimate (1,145). This average value has been corroborated through ADM’s extensive fixture-level and circuit-level monitoring of guest room lighting operation.

A heating and cooling interactive factor of 1.17, applicable to a hotel in St Louis with Packaged HVAC units for common areas and PTHP for guest rooms was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²²¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 137%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	105,119	143,853	137%	27.33
Total		105,119	143,853	137%	27.33

²²¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015867-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	Standard	38	10	65	38	2,022	1.11	4,347	4,673	108%
015867-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			148	148	32	14	2,022	1.11	5,541	5,957	108%
015867-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			7	7	50	8	2,022	1.11	612	657	107%
015867-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			8	8	43	10	2,022	1.11	541	599	111%
Total										11,041	11,887	108%

The annual lighting hours of operation verified during the M&V site visit (2,022) are less than the annual hours of operation used to calculate ex ante savings (2,080) due to the inclusion of observed holidays identified during the site visit.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned office in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²²²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 108%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	11,041	11,887	108%	2.26
Total		11,041	11,887	108%	2.26

²²² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015138-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	12	12	46	10	2,471	1.11	950	1,189	125%
015138-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			6	6	72	9	2,471	1.11	805	1,041	129%
015138-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			30	30	35	11	2,471	1.11	1,584	1,982	125%
015138-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			6	6	53	11	2,471	1.11	548	694	127%
Total										3,887	4,906	126%

The annual lighting hours of operation verified during the M&V site visit (2,471) are more than the annual hours of operation used to calculate ex ante savings (2,200). All lights are scheduled with the posted store operating hours.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail building, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²²³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 126%.

²²³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	3,887	4,906	126%	0.93
Total		3,887	4,906	126%	0.93

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015054-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	480	480	32	20	5,522	1.14	31,450	36,182	115%
			Custom	62	62	360	168	5,239	1.14	64,996	70,946	109%
015054-100107-Lighting-Linear Tube LED Fixture Replacing T5 HO Fixture	1169		Custom	48	48	360	168	5,522	1.14	50,320	57,891	115%
Total										146,766	165,018	112%

The annual lighting hours of operation verified during the M&V site visit for the first and third line items in the above table (5,522) are greater than the hours of operation used to calculate ex ante savings (5,460). The hours of operation for the second line item in the above table (5,239) are less than the hours of operation used to calculate ex ante savings (5,460).

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned assembly space in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²²⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 112%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	31,450	36,182	115%	6.9
Custom		115,316	128,837	112%	23.5
Total		146,766	165,018	112%	31.3

²²⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified the equipment installation, the facilities cooling/heating type, and the post-retrofit connected load. The lighting operating schedule was not able to be determined during the site verification as the facility is currently unoccupied.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
HID to LED	3005-1	Lighting	Standard	202	202	455	155	5,200	1.10	315,120	345,356	110%
Total										315,120	345,356	110%

Lighting Controls Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Quantity	TRM Deemed Per Unit kWh	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
Controls	3077	Lighting	Standard	202	300	60,600	60,600	100%
Total						60,600	60,600	100%

During the M&V visit, the new fixtures, and occupancy sensors, were verified to have been installed throughout the warehouse, but the facility was verified to be unoccupied and in search of a new tenant. Due to the facility not being in operation, the ex post energy savings were calculated using lighting hours of operation deemed from the TRM for a warehouse facility type, which were used in the ex ante estimate as well.

A heating and cooling interactive factor of 1.10 - applicable to a gas heated, air conditioned storage facility in St. Louis - was applied to the ex post fixture energy savings. The ex ante estimate claimed the warehouse to have neither heating or cooling, which led to the high gross ex post kWh realization rate.

For the installed lighting controls, the ex ante estimate applied the TRM deemed, per unit, energy reduction of 300 kWh for each individual occupancy sensor. Shown in the table above, ADM staff calculated the control savings using the same method, resulting in a 100% realization rate for the controls.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²²⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 108%.

²²⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	375,720	405,956	108%	77.12
Total		375,720	405,956	108%	77.12

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified the equipment installation, the post-retrofit connected load, and determined the lighting operating schedule. The annual lighting operating hours were verified to be 8,760 through an interview with facility personnel. These hours were further verified on-site as all of the parking garage fixtures were on during the daytime verification visit.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014853-305013-Lighting-<=80 Watt Lamp or Fixture Replacing Garage or Exterior 24/7 HID 100-175 Watt Lamp or Fixture_	3006-1	Misc.	Standard	76	76	150	43.5	8,760	1.00	70,903	70,903	100%
				4	4	100	35.7	8,760	1.00	2,243	2,254	101%
014853-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			47	47	32	17.8	8,760	1.00	5,764	5,834	101%
				4	4	32	17.8	8,760	1.00	245	497	202%
014853-305013-Lighting-<=80 Watt Lamp or Fixture Replacing Garage or Exterior 24/7 HID 100-175 Watt Lamp or Fixture	3006-1			30	30	175	43.5	8,760	1.00	34,558	34,558	100%
				10	10	100	41	8,760	1.00	5,256	5,168	98%
Total										118,970	119,215	100%

During the M&V visit, the annual lighting hours of operation were verified to be 8,760. The entire parking garage was claimed to operate on this verified schedule. The fourth line item in the above table had ex ante hours of operation for an office (4,380) however all of the lighting for the project was installed in the garage.

Through a review of the submitted fixture specification sheets, the claimed 18W LED linear lamps were verified to be 17.83W. Additionally, the claimed 40W LED wall pack fixtures were verified to be 41W in total.

The fourth line item in the above table had an ex ante end use of lighting. The actual end use is miscellaneous since the installation took place within the garage.

A heating and cooling interactive factor of 1.00, applicable to a non-heated, non-air conditioned, space type, was applied to the ex post lighting energy savings.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²²⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 100%.

²²⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Miscellaneous	118,970	119,215	100%	16.44
Total		118,970	119,215	100%	16.44

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified the equipment installation, the post-retrofit connected load, interviewed facility personnel regarding the annual lighting hours of operation, and placed four on/off lighting loggers to monitor the lighting hours of operation. The lighting loggers monitored the facility between 10/5/2016 and 10/31/2016.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014679-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026	Lighting	Standard	1,490	1,490	40	15	2,461	1.09	101,991	99,990	98%
014679-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			373	373	32	15	2,601	1.09	17,362	17,995	104%
Total										119,353	117,985	99%

The annual lighting hours of operation verified during the M&V site visit (2,461) are less than the hours of operation used to calculate ex ante savings (2,738). The site contact confirmed that school closures were not taken into account for annual hours of operation.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned primary school in St. Louis - was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²²⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 99%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	119,353	117,985	99%	22.41
Total		119,353	117,985	99%	22.41

²²⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified the equipment installation, the post-retrofit connected load, interviewed facility personnel regarding the annual lighting hours of operation, and placed three intensity lighting loggers to monitor the lighting hours of operation. The intensity loggers monitored the facility between 2/7/2017 and 2/23/2017.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
016313-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	4	4	72	9	2,673	1.10	914	739	81%
016313-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			27	27	53	15	3,765	1.03	3,791	3,993	105%
016313-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			24	24	65	8	3,765	1.03	3,370	5,324	158%
Total										8,075	10,056	125%

The annual lighting hours of operation verified during the M&V site visit for the first line item in the table above (2,673) is less than the hours of operation used to calculate the ex ante savings (3,744), while the hours of operation for the second and third line items above (3,765) are greater. Three of the first line item above are rarely used where the client stated the annual use at 730 hours.

The ex ante savings estimate used an adjusted base wattage of 70W, 52.5W, and 45.5W, respectively for the three line items in the table above by multiplying the provided wattage by 70%. An adjusted base wattage of 72W and 53W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 100W and 75W incandescent lamp regarding the first and second line above. The base lamps for the third line item above (BR/R) are exempt from an adjusted wattage calculation.

A heating and cooling interactive factor of 1.29, applicable for a medium temperature refrigerated space was applied to one of the lamps in the first line item above. While a heating and cooling interactive factor of 1.03 - applicable to an electric heated, air conditioned restaurant in St. Louis - was applied to the ex post lighting energy savings for the remaining lamps. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²²⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 125%.

²²⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	8,075	10,056	125%	1.91
Total		8,075	10,056	125%	1.91

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed four photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 11/11/16 and 12/04/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014821-305106-Lighting-62-130 Watt Lamp or Fixture Replacing Interior HID 176-300 Watt Lamp or Fixture	3004-1	Lighting	Standard	68	68	250	100	3,873	1.09	39,892	43,039	108%
014821-305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture	3005-1			11	11	400	153	3,873	1.09	10,626	11,464	108%
014821-100201-Lighting-Non Linear LED Fixture Replacing T12 Fixture	1169		Custom	31	31	164	44	1,929	1.09	14,549	7,818	54%
014821-100201-Lighting-Non Linear LED Fixture Replacing T12 Fixture	1169			6	6	164	82	5,370	1.09	1,924	2,878	150%
Total										66,991	65,201	97%

The annual lighting hours of operation verified during the M&V site visit (ranging from 1,929 to 5,370) vary from the annual hours of operation used to calculate ex ante savings (3,911). Classrooms were either not scheduled for use the entire day, or all the days of the week.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned university education building, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²²⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 97%.

²²⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	50,518	54,504	108%	10.35
Custom		16,473	10,697	65%	2.03
Total		66,991	65,201	97%	12.39

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified the equipment installation, the post-retrofit connected load, interviewed facility personnel regarding the annual lighting hours of operation, and placed five intensity lighting loggers to monitor the lighting hours of operation. The intensity loggers monitored the facility between 1/26/2017 and 2/20/2017.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015150-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008	Lighting	Standard	12	12	90	17	240	1.00	3,942	210	5%
015150-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			6	6	43	9	3,525	1.11	891	795	89%
015150-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			1	1	72	10	712	1.00	270	44	16%
015150-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			224	224	40	15	4,575	1.11	25,425	22,000	87%
Total										30,528	23,049	76%

The annual hours of operation verified during the M&V site visit for the first three line items in the table above (240, 3,525, and 712, respectively) are less than the hours of operation used to calculate ex ante savings (4,500), while the fourth line above (4,574) is greater. The garage and warehouse area of the facility were verified to have very low hours of operation (240 and 712).

The LED tube lamps were claimed to be a total of 15W while the lamp specification sheet shows them to be 14.5W each.

The ex ante savings estimate used an adjusted base wattage of 42W and 70W for the second and third line items in the above table by multiplying the provided wattage by 70%. An adjusted base wattage of 43W and 72W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W and 100W incandescent lamp.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned office in St. Louis - was applied to the ex post lighting energy savings for only the office spaces. The ex ante savings estimate did not account for heating and cooling interactive effects. For the garage and Christmas warehouse areas, a heating and cooling interactive factor of 1.00 was applied as those spaces are neither heated nor cooled.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²³⁰

²³⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 76%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	30,528	23,049	76%	4.38
Total		30,528	23,049	76%	4.38

Data Collection

The participant received custom and standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015000-100208-Lighting-Non Linear LED Fixture Replacing Metal Halide Fixture	1169	Lighting	Custom	107	107	455	155	8,132	1.09	262,706	285,540	109%
015000-305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture	3005-1		Standard	36	36	227	125	8,760	1.09	27,320	35,185	129%
Total										290,026	320,725	111%

The annual lighting hours of operation verified during the M&V site visit for lines in the above table (8,132 and 8,760) are greater than the hours of operation used to calculate ex ante savings (7,440). There were 13 lamps in the first line item that were not continuously in operation.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned light manufacturing space in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²³¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 111%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Custom	Lighting	262,706	285,540	109%	54.24
Standard		27,320	35,185	129%	6.68
Total		290,026	320,725	111%	60.93

²³¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Custom & Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed seven photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 11/15/16 and 12/14/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014584-100208-Lighting-Non Linear LED Fixture Replacing Metal Halide Fixture	1169	Lighting	Custom	45	45	455	150	7,082	1.10	85,891	106,534	124%
015176-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007		Standard	8	8	65	9	2,738	1.10	1,071	1,344	125%
015176-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			36	36	18	9	2,738	1.10	1,188	972	82%
				498	493	32	18	3,917	1.10	25,903	30,316	117%
015176-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			4	4	50	7	2,738	1.10	631	516	82%
Total										114,685	139,682	122%

Lighting Controls Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Quantity	Controlled Wattage	Baseline Hours	Efficient Hours	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014584-201618-Lighting-Single Technology Occupancy Sensor Controlling Lighting Circuit >120 Watts	3079	Lighting	Standard	135	150	7,082	6,124	1	62,100	21,254	34%
015176-201618-Lighting-Single Technology Occupancy Sensor Controlling Lighting Circuit >120 Watts				19	233	5,096	3,376	1	8,740	8,345.85	95%
Total									70,840	29,600	42%

The annual lighting hours of operation verified during the M&V site visit for the first line item in the first table above (7,082) are greater than the annual hours of operation used to calculate ex ante savings (6,258). The stated warehouse hours for the facility (7,091) align with the logged hours. For the second, third, and fifth line items in the first table above the annual hours of operation (2,738) are less than the annual hours of operation used in the ex ante savings (3,668), while the fourth line item in the first table (3,917) has annual hours of operation greater.

During the M&V site visit, the baseline behavior for controlling lighting was determined by survey questions per usage area. The survey indicated some efficient behavior with turning off lighting during the workday and the end of the workday.

The ex ante savings estimate used an adjusted base wattage of 45.5W for the second line item in the first table above by multiplying the provided wattage by 70%. The base lamps for this measure (BR reflector) are exempt from an adjusted wattage.

A heating and cooling interactive factor of 1.10, applicable to a gas heated, air conditioned warehouse facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²³²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 91%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	85,891	106,534	124%	20.24
Standard		99,634	62,748	63%	19.75
Total		185,525	169,282	91%	39.99

²³² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed six photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/2/17 and 3/3/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014491-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025	Lighting	Standard	112	112	32	14	5,058	1.00	10,302	10,196	99%
014491-200104-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 25 Watt Lamp	3023			58	58	25	17	3,907	1.14	2,519	2,191	87%
				15	15	25	9	1,783	1.14	1,265	502	40%
014491-200103-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 28 Watt Lamp	3024			1	1	28	11	83	1.14	89	2	2%
014491-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			5	5	43	10	83	1.14	830	16	2%
014491-100213-Lighting-Non Linear LED Fixture Replacing CFL Fixture	1169		Custom	14	14	32	12	3,873	1.14	1,431	1,234	86%
Total										16,436	14,141	86%

The annual lighting hours of operation verified during the M&V site visit (ranging between 83 and 5,058) in the above table are less than the hours of operation used to calculate ex ante savings (5,110). The site contact confirmed that several areas with new lighting installations are rarely activated.

An adjusted base wattage of 43W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W incandescent lamp. The ex ante base wattage of 42W was computed within the application by factoring 70% of a 60W incandescent lamp.

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned assembly facility in St. Louis, was applied to the ex post lighting energy savings for all measures, except for line item 1. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²³³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 86%.

²³³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	15,006	12,907	86%	2.45
Custom		1,431	1,234	86%	0.23
Total		16,436	14,141	86%	2.69

Data Collection

The participant received Custom and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed seven photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/2/17 and 3/2/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014492-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025	Lighting	Standard	152	152	32	14	4,113	1.00	13,981	11,253	80%
014492-200104-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 25 Watt Lamp	3023			6	6	25	9	3,049	1.14	491	333	68%
014492-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			21	21	65	11	4,293	1.14	3,702	5,538	150%
014492-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			4	4	43	10	3,138	1.14	664	478	72%
014492-100113-Lighting-Linear Tube LED Fixture Replacing CFL Fixture	1169		Custom	28	28	32	12	3,138	1.14	2,862	1,999	70%
014492-100101-Lighting-Linear Tube LED Fixture Replacing T12 Fixture				43	43	118	66	1,284	1.14	11,426	3,266	29%
Total										33,126	22,867	69%

The annual lighting hours of operation verified during the M&V site visit (ranging between 1,284 and 4,293) are less than the hours of operation used to calculate ex ante savings (5,110). The client stated that several areas that received new lighting have a low usage.

An adjusted base wattage of 43W for the fourth line item above was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W incandescent lamp. The ex ante base wattage of 42W was computed within the application by factoring 70% of a 60W incandescent lamp.

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned assembly facility in St. Louis, was applied to the ex post lighting energy savings; a heating and cooling interactive factor was not applied to lighting in the garage area. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²³⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 69%.

²³⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	18,838	17,602	93%	3.34
Custom		14,288	5,265	37%	1.00
Total		33,126	22,867	69%	4.34

Data Collection

The participant received Custom and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed five photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/2/17 and 3/1/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014505-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025	Lighting	Standard	212	212	32	14	5,253	1.06	19,500	21,150	108%
014505-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			4	4	60	10	1,658	1.14	664	381	57%
014505-100116-Lighting-Linear Tube LED Fixture Replacing Existing Inefficient Lighting Fixture	1169		Custom	14	14	324	162	2,822	1.14	11,590	7,281	63%
				34	34	32	12	2,662	1.14	3,475	2,059	59%
Total										35,229	30,871	88%

The annual lighting hours of operation verified during the M&V site visit for the second through fourth line items in the above table (1,658, 2,822, and 2,662, respectively) are less than the hours of operation used to calculate ex ante savings (5,110), while the first line item above had hours of operation (5,253) greater than the ex ante. The site contact stated that several areas that received new lighting had low hours of use.

An adjusted base wattage of 43W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W incandescent lamp for the second line item in the table above. The ex ante base wattage of 42W was computed within the application by factoring 70% of a 60W incandescent lamp.

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned assembly facility in St. Louis, was applied to the ex post lighting energy savings, except for . The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²³⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 88%.

²³⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	20,164	21,531	107%	4.09
Custom		15,065	9,340	62%	1.77
Total		35,229	30,871	88%	5.86

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate		
015274-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	5	5	43	10	2,427	1.09	400	437	109%		
015274-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			6	6	75	8	2,427	1.09	1,005	1,064	106%		
				78	78	75	13	2,427	1.09	12,090	12,805	106%		
				8	8	75	15	2,427	1.09	1,200	1,271	106%		
015274-201316-Lighting-LED or Electroluminescent Replacing Incandescent Exit Sign	793					5	5	22	4	8,760	1.09	784	855	109%
015274-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007					18	18	65	11	1,456	1.09	1,944	1,544	79%
015274-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025					32	32	32	14	3,883	1.09	2,016	2,440	121%
015274-100113-Lighting-Linear Tube LED Fixture Replacing CFL Fixture	1169				Custom	16	16	36	12	3,883	1.09	1,536	1,627	106%
				4		8	68	12	3,883	1.09	704	746	106%	
		4	12	104		12	3,883	1.09	1,088	1,152	106%			
Total										22,767	23,942	105%		

The annual lighting hours of operation verified during the M&V site visit for the fifth line item in the table above (8,760) equals the hours used in the ex ante calculation. This measure represented emergency exit signs with continuous use. The remaining line items above had hours of operation (ranging from 1,456 to 3,883) greater than the hours of operation used to calculate ex ante savings (ranging between 2,000 and 4,000).

An adjusted base wattage of 43W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W incandescent lamp for the first line item in the above table. The ex ante base wattage of 42W was computed within the application by factoring 70% of a 60W incandescent lamp.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned primary school building in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²³⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 105%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	19,439	20,417	105%	3.88
Custom		3,328	3,525	106%	0.67
Total		22,767	23,942	105%	4.55

²³⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/7/17 and 2/23/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015130-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026	Lighting	Standard	130	130	40	15	2,230	1.01	7,605	7,334	96%
Total										7,605	7,334	96%

The annual lighting hours of operation verified during the M&V site visit (2,230) are less than the annual hours of operation used to calculate ex ante savings (2,340).

A heating and cooling interactive factor of 1.01, applicable to an electrically heated, air conditioned small office in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²³⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 96%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	7,605	7,334	96%	1.39
Total		7,605	7,334	96%	1.39

²³⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015580-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	9	9	53	9	2,801	1.11	1,115	1,242	111%
Total										1,115	1,242	111%

The annual lighting hours of operation verified during the M&V site visit (2,801) is similar to the annual hours of operation used to calculate ex ante savings (2,815).

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned St Louis retail building, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²³⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 111%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
SBDI	Lighting	1,115	1,242	111%	0.24
Total		1,115	1,242	111%	0.24

²³⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed three photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/20/17 and 2/27/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014416-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp	3007	Lighting	Standard	6	6	65	9	289	1.14	339	110	33%
014416-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			9	9	43	10	934	1.14	295	320	109%
014416-100212-Lighting-Non Linear LED Fixture Replacing Incandescent/Halogen Lamp Fixture	1169		Custom	10	10	300	32	934	1.14	2,702	2,846	105%
015120-100212-Lighting-Non Linear LED Fixture Replacing Incandescent/Halogen Lamp Fixture	1169			29	29	210	32	1,044	1.14	5,203	6,129	118%
Total										8,539	9,405	110%

The annual lighting hours of operation verified during the M&V site visit for the first three line items in the table above (289, 934, and 934, respectively) are less than the hours of operation used to calculate ex ante savings (1,008), while the fourth line item above has annual hours (1,044) greater.

An adjusted base wattage of 43W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W incandescent lamp for the second line item in the table above. The ex ante base wattage of 42W was computed within the application by factoring 70% of a 60W incandescent lamp.

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned assembly facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²³⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 110%.

²³⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	634	430	68%	0.08
Custom		7,905	8,975	114%	1.70
Total		8,539	9,405	110%	1.79

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014806-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	50	50	32	12	4,257	1.14	4,500	4,842	108%
014872-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			50	50	32	12	4,257	1.14	4,500	4,842	108%
015010-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			50	50	32	12	4,257	1.14	4,500	4,842	108%
015646-100213-Lighting-Non Linear LED Fixture Replacing CFL Fixture	1169		Custom	20	20	46	15	4,535	1.14	3,100	3,199	103%
Total										16,600	17,726	107%

The annual lighting hours of operation verified during the M&V site visit for the first three lines in the above table (4,257) and the fourth line above (4,535) are less than the annual hours of operation used to calculate ex ante savings (4,500 & 5,000, respectively) due to the inclusion of observed holidays identified during the site visit and a portion of the lighting installed in offices with less hours than the workout areas.

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned assembly building in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁴⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 107%.

²⁴⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	13,500	14,527	108%	2.76
Custom		3,100	3,199	103%	0.61
Total		16,600	17,726	107%	3.37

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were determined by applying the lodging-guest rooms' hours from the Database for Energy Efficiency Resource (DEER).

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Ref Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interact Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014400-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	36	36	43	9	1,145	1.11	1,486	1,550	104%
014400-201212-Lighting-LED 12-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			108	108	53	12	1,145	1.11	5,472	5,609	103%
				12	12	53	12	1,145	1.11	608	623	103%
014400-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			54	54	43	9	1,145	1.11	2,229	2,326	104%
014400-201212-Lighting-LED 12-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			347	347	72	15	1,145	1.11	23,875	25,054	105%
014400-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			60	60	43	9	1,145	1.11	2,477	2,584	104%
014400-201212-Lighting-LED 12-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			30	30	72	15	1,145	1.11	2,064	2,166	105%
				4	4	72	16	1,145	1.11	270	284	105%
				10	10	72	15	1,145	1.11	688	722	105%
				207	207	72	15	1,145	1.11	14,243	14,946	105%
				8	8	72	15	1,145	1.11	550	578	105%
Total										53,962	56,441	105%

The annual lighting hours of operation (1145²⁴¹) are less than the annual hours of operation used to calculate ex ante savings (1,251). A sample of all the room types where measures were installed were visited.

The ex ante estimate used an adjusted base wattage of 42W for the first, fourth, and sixth line items in the above table, 52.5W for the second and third items above, and 70W for the fifth and seventh through eleventh line items above by multiplying the provided wattage by 70%. An adjusted base wattage of 43W, 53W, and 72W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for 60W, 75W, and 100W incandescent lamps.

²⁴¹ The ex post savings analysis cites the DEER 2005 guest room lighting operation estimate (1,145). This average value has been corroborated through ADM's extensive fixture-level and circuit-level monitoring of guest room lighting operation.

The measure names are not accurate. The baseline lamps were incandescent and correctly stated in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned St Louis hotel, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁴²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 105%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	53,962	56,441	105%	10.72
Total		53,962	56,441	105%	10.72

²⁴² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules for the off season period and also the operating season.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Ref Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interact Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015234-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	SBDI	62	62	53	9	2,201	1.11	6,311	6,670	106%
				16	16	45	8	2,201	1.11	1,404	1,467	104%
015234-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			3	3	53	9	2,201	1.11	305	323	106%
Total										8,020	8,460	105%

The annual lighting hours of operation verified during the M&V site visit (2,201) are less than the hours of operation used to calculate ex ante savings (2,340).

The ex ante savings estimate used an adjusted base wattage of 52.5W for both the first and second line items in the table above by multiplying the provided wattage by 70%. An adjusted base wattage of 53W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 75W incandescent lamp.

The measure names are not accurate. The baseline lamps were incandescent and were stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned Jefferson City small office, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁴³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 105%.

²⁴³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	8,020	8,460	105%	1.61
Total		8,020	8,460	105%	1.61

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were determined by lighting loggers placed in the store from 11/17/16 to 11/29/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interact Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015209-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	1,024	1,024	32	17	8,760	1.10	134,554	148,494	110%
				60	60	32	17	8,760	1.10	7,884	8,701	110%
				80	80	32	17	8,760	1.10	10,512	11,601	110%
				10	10	32	17	8,760	1.10	1,314	1,450	110%
				340	340	32	17	8,760	1.10	44,676	49,305	110%
				8	8	32	17	8,760	1.10	1,052	1,160	110%
				1,836	933	28	17	7,643	1.10	311,392	299,823	96%
				720	720	32	17	8,760	1.10	94,608	104,410	110%
015209-101113-Lighting-New Efficient Lighting Fixture Replacing CFL Fixture	1169		Custom	10	10	26	21	8,760	1.10	375	483	129%
015209-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025		Standard	1,836	903	28	17	8,760	1.10	237,868	348,585	147%
Total										844,235	974,013	115%

The annual lighting hours of operation verified during the M&V site visit or the seventh line item in the table above (7,643) is less than the hours used to calculate the ex ante savings (8,760). This measure has several lamps that turn off during the overnight hours. The annual hours of operation for the ninth line item above (8,760) is greater than the hours used to calculate ex ante savings (7,500). All other lines match the ex ante savings hours of operation (8,760).

A heating and cooling interactive factor of 1.10, applicable to a gas heated, air conditioned St Louis large retail building, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁴⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 115%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	843,860	973,529	115%	184.93
Custom		375	483	129%	0.09
Total		844,235	974,013	115%	185.03

²⁴⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed one photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/9/16 and 1/121/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015182-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	20	20	43	10	2,047	1.09	1,356	1,496	110%
015182-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			60	60	63	17	2,047	1.09	5,757	6,164	107%
Total										7,113	7,661	108%

The annual lighting hours of operation verified during the M&V site visit (2,047) are less than the annual hours of operation used to calculate ex ante savings (2,086).

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned high school in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁴⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 108%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	7,113	7,661	108%	1.46
Total		7,113	7,661	108%	1.46

²⁴⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were determined by lighting loggers placed in the store from 11/17/16 to 11/29/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Ref Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interact Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015210-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	36	36	32	17	6,935	1.10	3,726	4,133	111%
				4	4	32	17	6,935	1.10	414	459	111%
				66	66	32	17	6,935	1.10	6,831	7,577	111%
				39	39	32	17	6,935	1.10	4,036	4,477	111%
				708	708	32	17	6,935	1.10	73,278	81,280	111%
8	8			32	17	6,935	1.10	828	918	111%		
015210-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026		2	2	30	11	6,935	1.10	269	298	111%	
015210-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025		1,746	1,746	32	17	6,935	1.10	180,711	200,446	111%	
			28	28	32	17	6,935	1.10	2,898	3,214	111%	
015210-101113-Lighting-New Efficient Lighting Fixture Replacing CFL Fixture	1169		Custom	12	12	26	21	6,608	1.10	312	438	140%
015210-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025		Standard	704	704	32	17	6,935	1.10	72,864	80,821	111%
		80		80	32	17	8,760	1.10	10,512	11,601	110%	
Total										356,679	395,663	111%

The annual lighting hours of operation verified during the M&V site visit for the first eleven rows in the table above (ranging from 6,608 - 6,935) is greater than the hours of operation used to calculate ex ante savings (ranging from 5,200 - 6,900). The twelfth line item above matches the hours used to calculate ex ante (8,760).

A heating and cooling interactive factor of 1.10, applicable to a gas heated, air conditioned St Louis large retail building, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁴⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 111%.

²⁴⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	356,367	395,226	111%	75.08
Custom		312	438	140%	0.08
Total		356,679	395,663	111%	75.16

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed six photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 11/29/16 and 12/27/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014633-200101-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T12 <=40 Watt Lamp	3026	Lighting	Standard	293	293	40	15	1,821	1.14	15,998	15,177	95%
014633-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			8	8	46	12	1,718	1.14	586	524	89%
014633-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			81	81	55	14	1,645	1.14	7,254	6,216	86%
014633-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025			44	44	32	15	1,997	1.14	1,634	1,700	104%
014633-201212-Lighting-LED 12-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			4	4	72	19	1,718	1.14	446	414	93%
014633-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			49	49	43	10	1,718	1.14	3,425	3,159	92%
014633-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			24	24	50	15	1,718	1.14	1,835	1,641	89%
014633-100212-Lighting-Non Linear LED Fixture Replacing Incandescent/Halogen Lamp Fixture	1169		Custom	12	12	250	30	1,468	1.14	5,766	4,410	76%
Total										36,942	33,241	90%

The estimated annual lighting hours of operation verified during the M&V site visit (ranging between 1,420 and 1,997) are less than the hours of operation used to calculate ex ante savings (2,184).

The ex ante savings estimate used an LM adjusted base wattage of 45.5W for the second line item in the table above, 70W for the fifth line item, and 42W for the sixth line item by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 72W for the fifth line item, and 43W for the sixth line item to meet EISA 2007 requirements for a 100W and 60W incandescent lamp.

The measure names for the fifth and sixth line items in the table above are not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned public assembly space in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁴⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 90%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	31,176	28,831	92%	5.48
Custom		5,766	4,410	76%	0.84
Total		36,942	33,241	90%	6.31

²⁴⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Custom and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/24/17 and 3/02/17.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014936-100212-Lighting-Non Linear LED Fixture Replacing Incandescent/Halogen Lamp Fixture	1169	Lighting	Custom	80	80	43	4	2,798	1.14	9,240	10,056	109%
014875-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011		Standard	50	50	43	5	4,768	1.14	9,250	10,304	111%
Total										18,490	20,360	110%

The annual lighting hours of operation verified during the M&V site visit (2,796 and 4,768) are less than the hours of operation used to calculate ex ante savings (3,000 and 5,000).

The ex ante savings estimate used an adjusted base wattage of 42W by multiplying the provided wattage by 70%. An adjusted base wattage of 43W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 60W incandescent lamp.

A heating and cooling interactive factor of 1.14, applicable to a gas heated, air conditioned public assembly space in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁴⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 110%.

²⁴⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	9,240	10,056	109%	1.91
Standard		9,250	10,304	111%	1.96
Total		18,490	20,360	110%	3.87

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
016325-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	300	300	32	17	7,717	1.09	36,055	37,986	105%
				100	100	32	17	7,717	1.09	12,018	12,662	105%
				150	150	32	17	7,717	1.09	18,027	18,993	105%
Total										66,100	69,641	105%

The annual lighting hours of operation verified during the M&V site visit (7,717) are similar to the annual hours of operation used to calculate ex ante savings (7,704).

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned industrial building in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate used a heating and cooling interactive factor of 1.04.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁴⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 105%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	66,100	69,641	105%	13.23
Total		66,100	69,641	105%	13.23

²⁴⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Custom and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, and verified annual lighting operating hours by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014650-100201-Lighting-Non Linear LED Fixture Replacing T12 Fixture	1169	Misc.	Custom	18	18	164	41	8,760	1.00	19,395	19,395	100%
014925-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008	Lighting	Standard	8	8	55	13	1,528	1.01	1,862	526	28%
016301-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture				8	8	50	13	1,528	1.01	1,643	464	28%
Total										22,900	20,384	89%

The annual lighting hours of operation regarding the first line item in the table above are equal to the hours of operation used to calculate ex ante savings (8,760), while the lighting hours of operation regarding the second and third line items (1,528) are less than the hours of operation used to calculate ex ante savings (1,825). These measures were installed within a conference room with lower verified hours.

The ex ante end use category regarding the first line item in the table above was incorrectly categorized as “lighting”. The “miscellaneous” end use category should be referenced since lighting was installed in a garage location.

During the M&V visit, ADM staff verified that 16 LED PAR lamps were installed regarding the second and third line items in the table above, which is fewer than the lamp quantity used to calculate ex ante savings (48). The remaining lamps purchased were found to be in storage.

A heating and cooling interactive factor of 1.01, applicable to an electrically heated, air conditioned office facility in St. Louis, was applied to the ex post lighting energy savings. No heating and cooling interactive factor was referenced regarding the first line item in the table above since lighting was installed in an unconditioned space. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²⁵⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 89%.

²⁵⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Miscellaneous	19,395	19,395	100%	3.68
Standard	Lighting	3,505	990	28%	0.19
Total		22,900	20,384	89%	3.87

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were determined by recording light levels with data loggers from 11/10/16 to 12/5/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Ref Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interact Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014409-100216-Lighting-Non Linear LED Fixture Replacing Existing Inefficient Lighting Fixture	1169	Lighting	Custom	65	52	351	178	5,750	1.18	118,777	91,992	77%
				25	20	351	178	7,785	1.15	45,683	46,691	102%
				3	3	231	120	6,296	1.18	2,917	2,474	85%
				8	8	351	120	7,785	1.15	16,188	16,546	102%
				9	5	351	178	4,683	1.18	19,876	12,540	63%
				4	3	221	120	3,122	1.18	4,590	1,931	42%
				18	18	231	120	5,750	1.18	17,502	13,556	77%
				18	10	351	236	7,785	1.15	34,672	35,437	102%
Total									260,205	221,165	85%	

The annual lighting hours of operation verified during the M&V site visit (ranging from 3,122 to 7,785) were less than the hours of operation used to calculate ex ante savings (8,760). The new fixtures had individual occupancy sensors. The project did not incentivize the occupancy sensors. The site contact stated that the existing fixtures had occupancy sensors as well.

A heating and cooling interactive factor of 1.15 to 1.18, applicable to a freezer space and conditioned food storage in a typical St. Louis building, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁵¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 85%.

²⁵¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	Lighting	260,205	221,165	85%	42.01
Total		260,205	221,165	85%	42.01

Data Collection

The participant received Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014468-100204-Lighting-Non Linear LED Fixture Replacing T8 Fixture	1169	Lighting	Custom	21	21	114	32	3,754	1.00	6,448	6,465	100%
014468-100216-Lighting-Non Linear LED Fixture Replacing Existing Inefficient Lighting Fixture				24	24	219	67	8,760	1.00	31,956	31,956	100%
014468-100204-Lighting-Non Linear LED Fixture Replacing T8 Fixture				365	365	114	40	8,760	1.00	236,608	236,608	100%
014468-100216-Lighting-Non Linear LED Fixture Replacing Existing Inefficient Lighting Fixture				42	42	60	36	3,754	1.00	3,774	3,784	100%
014468-100216-Lighting-Non Linear LED Fixture Replacing Existing Inefficient Lighting Fixture				26	26	219	95	8,760	1.00	28,242	28,242	100%
014468-100204-Lighting-Non Linear LED Fixture Replacing T8 Fixture				121	121	114	40	3,754	1.00	33,524	33,616	100%
Total										340,552	340,671	100%

The annual lighting hours of operation verified during the M&V site visit for the first, fourth, and sixth line items in the table above (3,754) are greater than the annual hours of operation used to calculate ex ante savings (3,744). The annual hours of operation for the second, third, and fifth line items above (8,760) match the ex ante hours of operation.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, ventilated industrial building in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁵²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 100%.

Site-Level Energy Savings

Incentive	kWh Savings
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²⁵² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

	<i>End Use Category</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	<i>Gross Ex Post kW Reduction</i>
Custom	Lighting	340,552	340,671	100%	64.72
Total		340,552	340,671	100%	64.72

Data Collection

The participant received Custom and Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed five photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/18/17 and 2/26/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014089-100106-Lighting-Linear Tube LED Fixture Replacing T5 Fixture	1169	Lighting	Custom	58	58	234	95	8,760	1.00	54,015	70,623	131%
015980-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025		Standard	690	690	32	17	3,134	1.10	90,666	35,536	39%
Total										144,681	106,159	73%

The annual lighting hours of operation verified during the M&V site visit for the first line item in the above table (8,760) is greater than the annual hours of operation used to calculate ex ante savings (6,700). This measure was installed within a warehouse area that operates 24/7. The second line item in the table above has annual operating hours (3,134) less than the hours of operation used to calculate the ex ante savings (8,760). These lamps were installed within office areas with a lower operating schedule.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small office facility in St. Louis, was applied to the ex post lighting energy savings for the second line item above. The first line item above was installed within an unconditioned space. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁵³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 73%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Custom	Lighting	54,015	70,623	131%	13.42
Standard		90,666	35,536	39%	6.75
Total		144,681	106,159	73%	20.17

²⁵³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Ref Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interact Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015195-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	6	6	32	17	8,760	1.10	815	899	110%
				136	136	32	15	8,760	1.10	20,253	22,351	110%
				84	84	32	15	8,760	1.10	12,509	13,805	110%
				1,088	1,088	32	15	8,760	1.10	162,025	178,812	110%
				390	390	32	15	8,760	1.10	58,079	64,096	110%
				2	2	25	11	8,760	1.10	254	280	110%
				3	3	32	17	8,760	1.10	394	435	110%
Total										627,225	692,209	110%

The annual lighting hours of operation verified during the M&V site visit (8,760) are the same as the annual hours of operation used to calculate ex ante savings (8,760).

A heating and cooling interactive factor of 1.10, applicable to a gas heated, air conditioned St Louis large retail building, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁵⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 110%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
Standard	Lighting	627,225	692,209	110%	131.49
Total		627,225	692,209	110%	131.49

²⁵⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules, as well as by having installed one photo-sensor logger to monitor lighting operation. The photo-sensor loggers collected data between 1/25/17 and 2/19/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014767-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp	3007	Lighting	Standard	79	79	53	9	8,760	1.09	30,021	33,339	111%
014767-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008			248	248	55	13	8,760	1.09	90,994	99,902	110%
014767-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			39	39	72	10	8,760	1.09	10,249	23,191	226%
014767-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008			18	18	50	12	8,760	1.09	5,975	6,560	110%
014767-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lam	3012			42	42	35	9	8,760	1.09	4,875	10,675	219%
014767-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008			10	10	72	17	5,008	1.09	2,321	3,016	130%
014949-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	3008			33	33	72	17	5,008	1.09	7,661	9,953	130%
Total												152,096

Lighting Controls Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Quantity	Controlled Wattage	Baseline Hours	Efficient Hours	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014724-103621-Lighting-On/Off Occupancy Sensor Replacing No Existing Equipment or Replacing Failed Equipment	1169	Lighting	Custom	1,696	203	2,477	1,734	1.09	308,672	280,091	91%
Total									308,672	280,091	91%

The annual lighting hours of operation verified during the M&V site visit for the sixth and seventh line items in the first table above (5,008) is greater than the hours of operation used to calculate the ex ante savings (4,380). These measures were installed in a first floor boardroom. The hours of operation for the remaining lines in the first table above (8,760) are greater than the hours used to calculate ex ante savings (ranging from 4,380 – 8,736). All of these measures were confirmed to operate continuously.

For the lighting controls, the ex ante savings estimate assumes a greater impact on lighting hours than was verified on site. The controls were installed on existing fixtures within office areas. During the M&V

site visit, the baseline behavior for controlling lighting was determined by survey questions per usage area. The survey indicated some efficient behavior with turning off lighting during the workday and the end of the workday.

The ex ante savings estimate used an adjusted base wattage of 52.5W for the first line item in the first table above, 70W for the third, sixth, and seventh line items, and 35W for the fifth line item by multiplying the provided wattage by 70%. An adjusted base wattage of 53W and 72W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 75W and 100W incandescent lamp.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned office in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁵⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 101%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	152,096	186,636	123%	35.45
Custom		308,672	280,091	91%	58.64
Total		460,768	466,727	101%	94.09

²⁵⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015286-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	16	16	72	9	2,759	1.11	2,440	3,099	127%
015286-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			4	4	32	18	2,759	1.11	140	172	123%
015286-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			21	21	53	8	2,759	1.11	2,336	2,905	124%
Total										4,916	6,176	126%

The annual lighting hours of operation verified during the M&V site visit (2,759) are greater than the annual hours of operation used to calculate ex ante savings (2,500).

The ex ante savings estimate used an adjusted base wattage of 70W for the first line item in the above table and 52.5W for the third line item by multiplying the provided wattage by 70%. An adjusted base wattage of 72W and 53W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 100W and 75W incandescent lamp.

The measure name for the first and third line item above is not accurate. The baseline lamps were incandescent and are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁵⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 126%.

²⁵⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	4,916	6,176	126%	1.17
Total		4,916	6,176	126%	1.17

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed five photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 1/24/17 and 2/22/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014778-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	Lighting	Standard	23	23	65	8	2,471	1.09	5,775	3,544	61%
014778-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			280	280	32	17	2,948	1.09	23,100	13,544	59%
014778-100107-Lighting-Linear Tube LED Fixture Replacing T5 HO Fixture	1169		Custom	190	190	59	24	2,471	1.09	36,575	17,977	49%
014778-100213-Lighting-Non Linear LED Fixture Replacing CFL Fixture				17	17	46	15	2,948	1.09	4,774	1,699	36%
015469-201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008		Standard	24	24	53	13	2,948	1.09	4,930	3,096	63%
015469-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			7	7	72	9	2,471	1.09	7,296	1,192	16%
Total										82,450	41,052	50%

The annual lighting hours of operation verified during the M&V site visit (ranging between 2,471 and 2,948) are less than the hours of operation used to calculate ex ante savings (ranging from 5,200-5,500). The client confirmed that the second floor of the facility is rarely used.

During the M&V visit, ADM staff verified an installed quantity for the first, fourth, and sixth line items in the above table (23, 17, and 7, respectively) which is less than the quantity used to determine the ex ante savings estimate (28, 28, and 23 respectively). The remaining lamps were found to be in storage.

The ex ante savings estimate used an LM adjusted base wattage of 45.5W for the first line item in the table above, 52.5W for the fifth line item, and 70W for the sixth line item by multiplying the provided wattage by 70%. The ex post savings estimate used adjusted base wattages of 53W and 72W for the fifth and sixth line items to meet EISA 2007 requirements for a 75W and 100W incandescent lamp respectively. The base lamps for the first line item (65W BR/R) are exempt from an adjusted wattage calculation.

The measure names for the first, fifth, and sixth line items in the table above are not accurate. The baseline lamps were incandescent BR/R, PAR and A-line and were replaced with LED BR/R, PAR and A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned industrial facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²⁵⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 50%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	41,101	21,376	52%	4.06
Custom		41,349	19,676	48%	3.74
Total		82,450	41,052	50%	7.80

²⁵⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Custom incentives from Ameren Missouri to replace an existing air-cooled chiller with a high efficiency chiller.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads and determined the operating schedule. Annual operating hours were verified by interviewing facility personnel regarding chiller operations.

Analysis Results

Chiller Retrofit Savings Calculations

Savings for the chiller replacement were calculated using the following equation:

$$\Delta kWh = TONS * (IPLV_{base} - IPLV_{ee}) * EFLH$$

Where:

ΔkWh	= Annual energy savings
TONS	= Nominal Chiller Cooling Capacity
$IPLV_{base}$	= Baseline Chiller Integrated Part Load Value
$IPLV_{ee}$	= Energy Efficient Chiller Integrated Part Load Value
EFLH	= Equivalent Full Load hours

The customer replaced the existing 70 ton air-cooled chiller with a high efficiency air-cooled chiller.

Since the exact specifications of the existing chiller were unknown, the baseline integrated part load value (IPLV) is a 12.5 EER unit per the IECC 2009. As installed, the new efficient chiller has an IPLV of 14.8 EER. The EFLH for cooling is 1,195 hours per year as referenced for primary schools in the 2017 Statewide MO TRM.

The ex ante analysis used a computer model simulation with a prototypical box model to determine the chiller energy use. The model input files and software version were not available to review assumptions. The ex ante output baseline chiller efficiency is 1.501 kW/ton and the efficient chiller efficiency is 1.079 kW/ton. The ex post analysis has efficiencies of 0.96 kW/ton baseline and 0.81 kW/ton for the new efficient unit. It is likely that the ex ante efficiencies are representative of the larger HVAC system rather than the chiller in the isolation model.

The site-level realization rate is 99%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	HVAC	12,319	12,248	99%	14.3
Total		12,319	12,248	99%	14.3

Data Collection

The participant received Standard and Custom lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed eleven photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 2/6/17 and 3/7/17.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate	
014452-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	100	100	43	9	6,988	1.09	14,454	26,000	180%	
014452-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025			25	25	32	14	8,760	1.09	1,971	4,314	219%	
014452-201316-Lighting-LED or Electroluminescent Replacing Incandescent Exit Sign	793			2	2	30	4	8,760	1.09	463	506	109%	
014452-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			13	13	43	10	1,145	1.09	1,822	538	30%	
014452-201316-Lighting-LED or Electroluminescent Replacing Incandescent Exit Sign	793			5	5	30	4	8,760	1.09	1,156	1,265	109%	
014605-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			100	100	43	9	4,493	1.09	14,454	16,717	116%	
014605-200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	3025			25	25	32	14	2,368	1.09	1,971	1,166	59%	
014847-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp	3007			20	20	65	11	1,901	1.09	1,005	2,246	224%	
014847-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			68	68	43	9	1,901	1.09	3,267	4,809	147%	
014847-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			25	25	32	14	8,760	1.09	1,971	4,314	219%	
014918-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			25	25	32	14	6,176	1.09	1,971	3,041	154%	
014918-100213-Lighting-Non Linear LED Fixture Replacing CFL Fixture	1169			Custom	20	20	29	15	8,760	1.09	1,270	2,780	219%
015483-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			Standard	100	100	43	10	1,145	1.09	14,016	4,135	30%
015483-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025				50	50	32	14	8,760	1.09	3,942	8,628	219%
015742-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011		100		100	43	10	1,280	1.09	14,016	4,623	33%	
015742-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	25	25		32	14	6,347	1.09	1,971	3,125	159%		
015742-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007	20	20		65	11	4,493	1.09	3,022	5,310	176%		

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
016329-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011			120	120	43	10	4,451	1.09	16,773	19,289	115%
016329-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			25	25	32	14	8,760	1.09	1,971	4,314	219%
015946-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			30	30	65	11	4,451	1.09	4,521	7,891	175%
015946-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp or Fixture	3012			5	5	50	7	2,368	1.09	612	557	91%
015946-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			25	25	32	14	8,760	1.09	1,971	4,314	219%
Total										108,590	129,882	120%

The annual lighting hours of operation verified during the M&V site visit range between 1,145 and 8,760. The annual lighting hours of operation regarding line items one, two, six, ten, eleven, twelve, fourteen, sixteen, seventeen, nineteen and twenty two in the table above are greater than the hours of operation used to calculate ex ante savings (4,380), while line items four, seven, thirteen, and fifteen are fewer. The annual lighting hours of operation regarding line items eight and nine are greater than the hours of operation used to calculate ex ante savings (1,456). The annual lighting hours of operation regarding line items eighteen and twenty are greater than the hours of operation used to calculate ex ante savings (4,368), while line item twenty one is fewer. The annual lighting hours of operation regarding line items three and five are equal to the hours of operation used to calculate ex ante savings.

The ex ante savings estimate used an LM adjusted base wattage of 42W for line items one, four, six, nine, thirteen, fifteen, and eighteen, 45.5W for line items eight, seventeen, and twenty, and 35W for line item twenty one by multiplying the provided wattage by 70%. The ex post savings estimated used an adjusted base wattage of 43W for line items one, four, six, nine, thirteen, fifteen, and eighteen. The base lamps for line items eight, seventeen, twenty, and twenty one (65W BR/R and MR16) are exempt from an adjusted wattage calculation.

The measure names regarding LED A-line, BR/R and MR-16 lamps in the table above are not accurate. The baseline lamps were incandescent and were replaced with LED lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned assisted living facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²⁵⁸

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 120%.

²⁵⁸ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	107,320	127,102	118%	24.14
Custom		1,270	2,780	219%	0.82
Total		108,590	129,882	120%	24.96

Data Collection

The participant received New Construction lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules of the new tenants.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015343-406123-Lighting-New Construction Lighting Power Density (LPD)	3000	Lighting	New Construction	1,660	1,660	91	45	2,973	1.09	236,630	246,840	104%
Total										236,630	246,840	104%

The annual lighting hours of operation verified during the M&V site visit (2,973) are less than the annual hours of operation used to calculate ex ante savings (3,120). The tenants were not occupying the space during the site visit, so the ex post hours captured the hours of operation in the tenant's current offices, and also included the county government holiday schedule for the government agencies moving into the building.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned large office building in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁵⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 104%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
New Construction	Lighting	236,630	246,840	104%	46.89
Total		236,630	246,840	104%	46.89

²⁵⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Retro-Commissioning (RCx) incentives from Ameren Missouri.

ADM performed a desk review of the provided documentation and data. ADM verified the project completion with invoices and correspondence with facility personnel and the trade ally.

The customer repaired several leaks in the compressed air system, totaling approximately 61 cfm, as follows:

Leak Repair Log

Tag	Location	Description	Size of Leak	CFM
4747887	Starch room - box 2 junction	regulator off of solenoid	S	0.44
4747888	Starch room - control disconnect	solenoid	M	1.80
4747889	Starch room sv7192 # 2 storage	fitting on solenoid	S	0.44
4747890	Stacker bosch valve main reg	bosch valve 0820023991	M	1.80
4747891	Rotary sheer	filter aw30k-f03dsmc	M	1.80
4747892	Double Boiler air seal	quick connect	S	0.44
4747893	RS-1 op side	air hose 1/4"	S	0.44
4747895	RS-6 dry side	fitting on 1/4" hose	S	0.44
4747896	BHS mf starch return pump frl	dayton 42m22 regulator / filters	M	1.80
4747897	BHS mf starch return pump	fitting red hose	M	1.80
4747898	BHS ppit pump qd couplings	fitting off red hose	S	0.44
4747899	SF2 starch return pump	coupling / red hose	M	1.80
4747900	baker sideroom	valve to air hose	S	0.44
4747901	01D bander # 2	hose off solenoid valve	L	7.00
4747902	old take off line #2	hole in 1/2" hose	L	7.00
4747903	old take off line frl	fitter oiler - parker07i34be	S	0.44
4747904	old take off line supply	1" valve red	S	0.44
4747905	lower machine valve m2	solenoid 1/4" - pm/e111naaa	S	0.44
4747906	new take off air brake line	fitting on hose cut	S	0.44
4747907	new take off # 4 valve stack line	solenoid vavle pme-111naaa	S	0.44
4747908	old bander 1&2 air reel	fitting in air tool	L	7.00
4747909	lower stacker	air gun red air hose reel	S	0.44
4747910	top stacker break assembly	solneoid	S	0.44
4747911	sliter diverter	solenoid vavle	S	0.44
4747912	sliter diverter	solenoid fitting	S	0.44
4747913	sliter operator side	numerous fittings	S	0.44
4747914	glue mahcine center	fitting on valve	S	0.44
4747915	Glue machine operator side	solenoid 1/4" mecmen	M	1.80
4747916	bottom splicer operator side	fitting on solenoid	S	0.44
4747917	BHS middle splicer op side	fitting to solenoid	S	0.44
4747918	BHS middle splicer op side	fittings on solenoid cluster	S	0.44
4747919	BHS roll pusher	fitting on roll pusher	L	7.00
4747920	BHS top splicer	fitting on filter regulator	M	1.80
4747921	SF2 starch pump	oiler needs replaced 1"	M	1.80
4747922	SF2 top splier op side	fitting on transducer	S	0.44
4747923	SF2 top splier op side	fitting 1/2" oiler	S	0.44
4747924	Roll stand 9 drive side	1/4" hose fitting	S	0.44
4747925	SF2 middle splicer drive side	filter main 1"	M	1.80
4747926	BHS top splicer drive side	fittings on actuator	S	0.44
4747927	EI guide for sliter	1/4" filter regulator	M	1.80
4747928	upper level GL guide	fitting to solenoid	S	0.44
4747929	SF2 roll pusher	fitting	M	1.80

Correcting these leaks reduced the load on the compressors, resulting in less energy consumption.

ADM reviewed all project documentation, including the “Preliminary Air Study” provided by the contractor, and obtained the baseline monitoring data referenced in the study. The monitoring data totaled a week (seven days) in 12 second intervals. Variables monitored included current (amperage) for each of the two compressors, and flow rate (cfm) and pressure (psi) at the main 3” header. The only compressor that operated during the monitoring period was the 2-stage compressor. There are two 150 hp compressors at the facility, one of which is 1-stage, the other being the 2-stage.

Analysis Results

Compressed Air Leak Repair Savings Calculations

ADM estimated energy savings using the facility’s compressed air load profile derived from baseline monitoring data. The current data was used to calculate power, using the following algorithm:

$$P = \frac{\sqrt{3} \times V \times A \times pf}{1,000}$$

Where:

<i>P</i>	= Power (kW)
<i>V</i>	= Voltage (460)
<i>A</i>	= Amperage
<i>pf</i>	= Power factor (0.9 assumed)

The load (cfm) at each monitoring point was determined using the performance curve (%Power vs %Flow) for the applicable control type (inlet modulation without blowdown) from the Uniform Methods Project²⁶⁰. In cases where the %Power was less than the minimum given by the curve (71% Power at 0% Flow), the %Flow was set equal to zero.

The effect of the measure was then imposed on the established load profile by subtracting the total leaks repaired (61 cfm) from each data point. This “new” load profile represented the decreased demand as a result of repaired leaks. The compressor performance curve was then once again used to determine power requirements at each data point.

Energy savings were calculated by taking the difference in energy requirements of baseline and post-RCx compressed air systems, at each monitoring point, summing over the monitoring period, and scaling to an annual basis. This method assumes the monitoring period represented a typical demand profile at the facility.

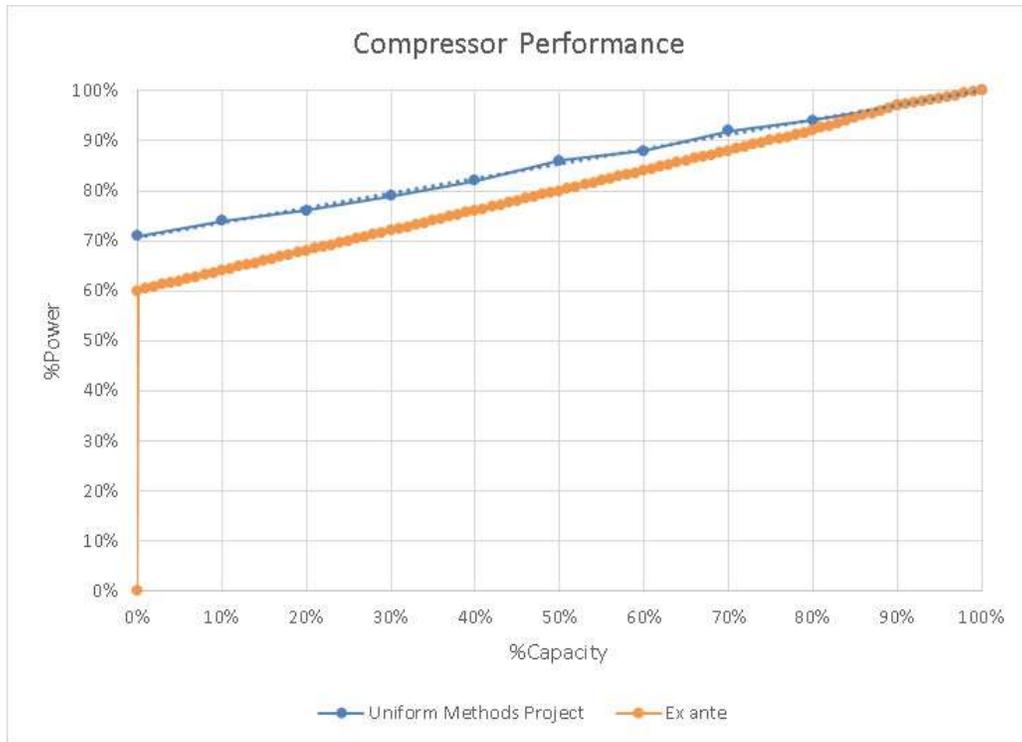
The site-level realization rate is 21%. This is primarily due to a modeling inaccuracy in the ex ante analysis, where the operating two-stage compressor was assumed to be drawing 0 power at 0 flow. A plot of their current data indicates the compressor drawing substantial current at 0 flow. If this correction is made, the realization rate would have been 67%.

The remaining difference in realization rate is due to a couple of factors:

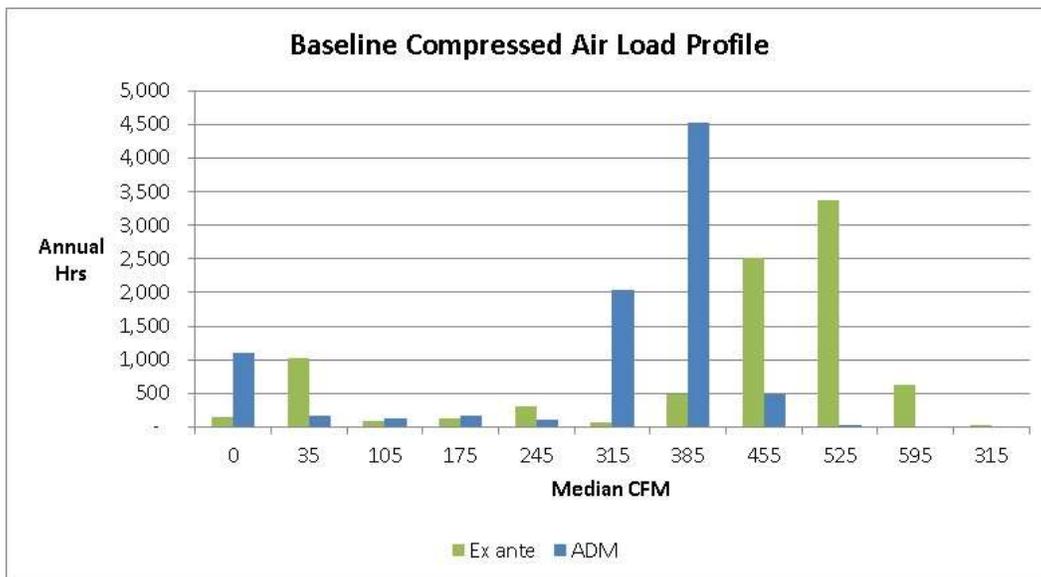
- Different compressor performance curves used. As discussed previously, ADM referenced the Uniform Methods Project, while the ex ante’s reference is undocumented. The ex ante curve has a steeper slope, or, in other words, represents a more efficient compressor. This translates into

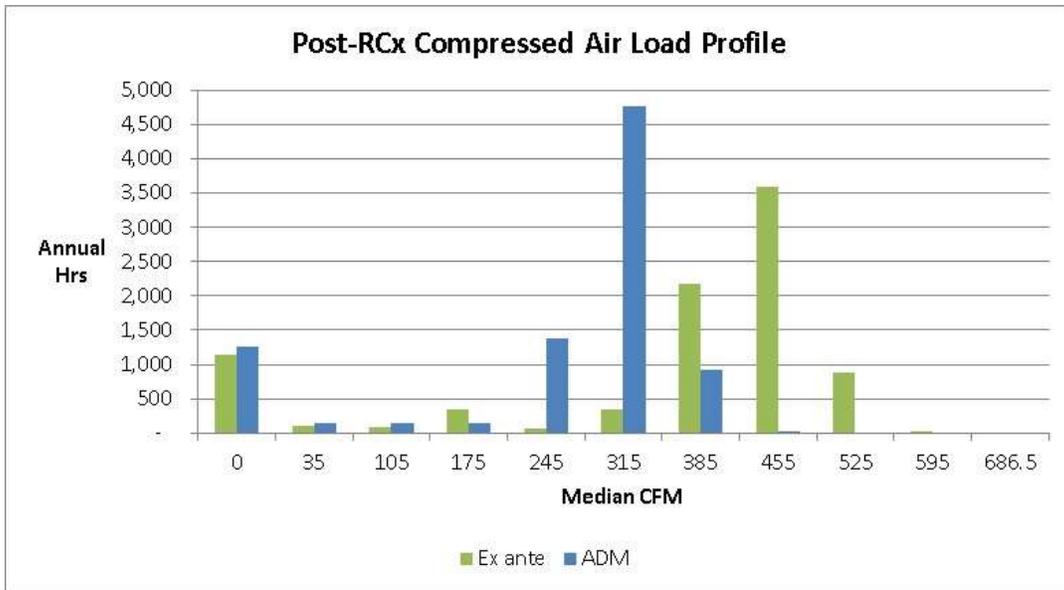
²⁶⁰ "Methods for Determining Energy Efficiency Savings for Specific Measures", Chapter 22: Compressed Air Evaluation Protocol. Page 6. Inlet Valve Modulation (w/o Blowdown).

a larger power reduction (and energy savings) for the given reduction in cfm associated with fixing the leaks. A plot illustrating the two curves is as follows:

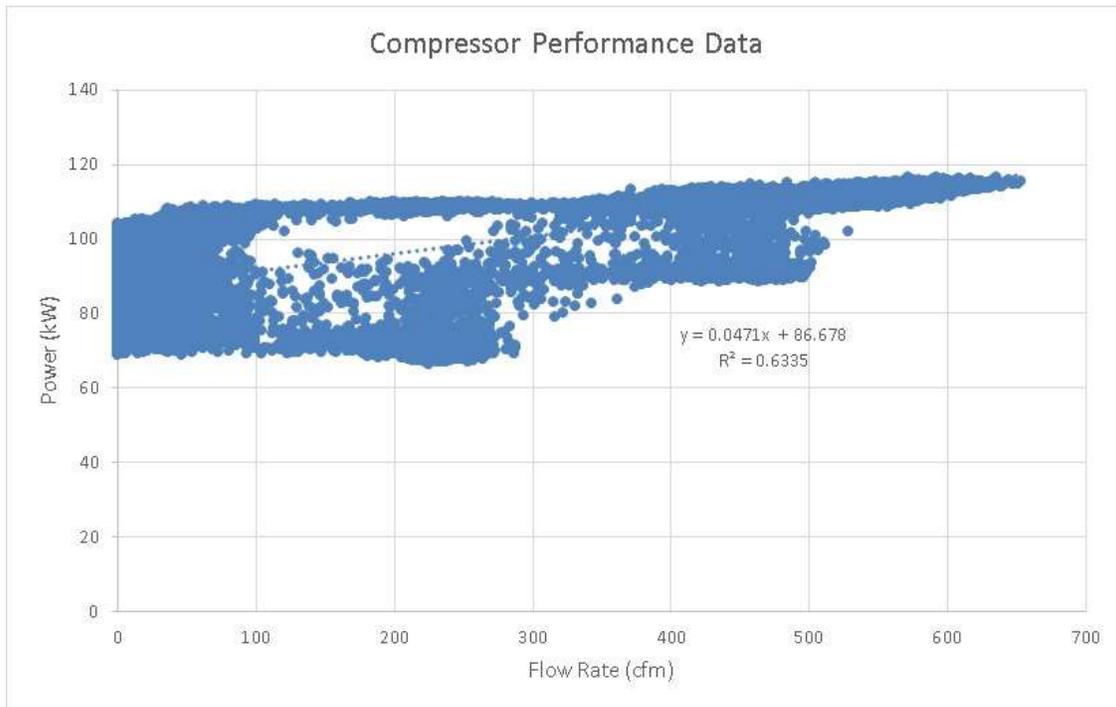


- The ex ante analysis used monitored flow data directly, rather than monitored current data. The result of this difference was the ex ante analysis using a load profile with higher demand, as illustrated in the following baseline and post-RCx plots:





The accuracy of the monitored flow data is unknown, so current data was used for the analysis. For example, there were several instances of measured flow being less than zero, as low as -15.8 cfm (negative), while the compressor has a demand in excess of 134 amps. In addition, the curve fit of monitored current (and resulting power) and flow was poor, as indicated by the low R2 value, in the following plot:



Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
RCx	Compressed Air	113,004	23,727	21%	3.27
Total		113,004	23,727	21%	3.27

Data Collection

The participant received Custom incentives from Ameren Missouri for Phase 2 of facility-wide HVAC control retrofit. During the M&V visit, ADM staff verified the control strategy from building energy management system and the facility trend data. The chilled water production and temperature from chiller plant from 2/1/2017 to 2/21/2017 were verified.

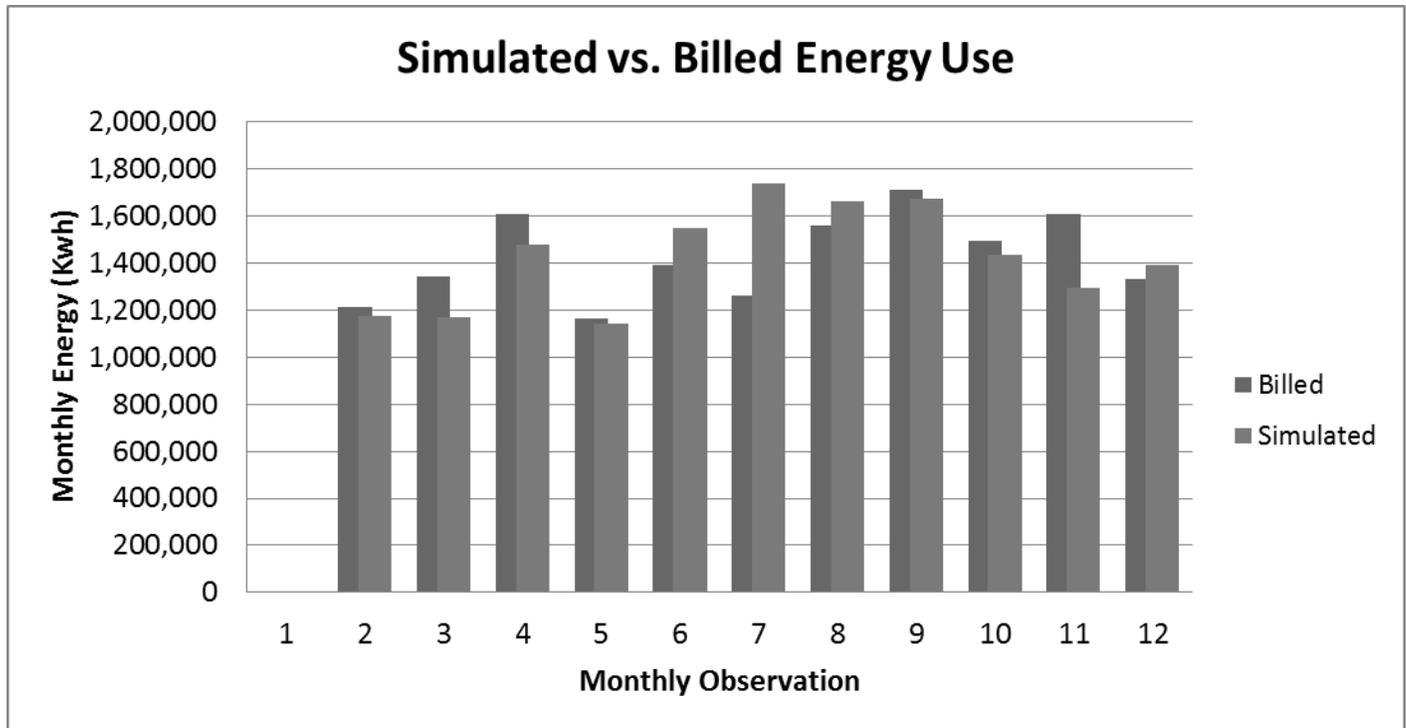
Analysis Results

The analysis followed IPMVP option D, calibrated simulation, for the evaluation. The calibrated simulation can capture all interactive effects from energy efficiency measures.

eQuest was used to compile ten building simulation models, one for the baseline conditions and nine models adding one energy efficiency measure on each model. The ninth model has all energy efficiency measures applied to create the as-built model for the facility. Simulation models were separated by multiple measures as the savings were claimed by three components from ex ante savings calculation.

The baseline model is calibrated to actual billing data from 2015. The weather profile used is St. Louis Downtown Airport weather.

eQuest Baseline Model Calibration



The annual savings for the energy efficiency measures was calculated by subtracting the measure model energy consumption from the baseline model consumption. TMY3 weather data for St. Louis Downtown Airport was used to calculate the typical year energy savings.

Lighting Retrofit Savings Calculations

Energy Efficiency Measure	Misc. Equipment	Cooling Equipment	Cooling Tower	Pumps	Ventilation Fans	Refrigeration Systems	TOTAL
Rink Chiller Condenser Water Temperature Control	0	72,072	-1,674	3,096	0	0	73,494
Implement Schedules and Setback Temperature	-10,841	2,112,978	115,182	369,781	619,100	697,816	3,904,016
Chilled Water Supply Reset to Peabody	405	46,951	-418	3,313	5	0	50,256
Static Pressure Reset	-196	9,980	99	927	36,081	-2	46,889
Economizer Control	-246,092	845,701	1,075	8,509	13,525	-34	622,685
Repair Main Kitchen MAU System to Make Operational	123	-227	12	-521	-15,760	-893	-17,265
Supply Air Reset on VAV AHUS (11-14)	-537	22,953	298	491	-7,461	35	15,778
Supply Air Reset on VAV AHUs (16-18)	-101	4,167	62	435	-383	1	4,182
Locker Room AHU-20 control upgrades	-82,358	400,939	9,391	18,998	91,330	-7	438,293
TOTAL	-339,597	3,515,514	124,028	405,029	736,437	696,917	5,138,328

The ex ante savings were determined using three components: Ventilation Savings (HVAC Controls/EMS), Cooling only savings, and Rink Chiller Condenser Water Temperature Control Savings (HVAC Controls/EMS).

The energy savings from all energy efficiency measures are reorganized to match the ex ante savings estimates and is shown in the table below. The overall realization rate is 106%. The primary reason for higher realization rate is mainly due to more events occurring at the facility than ex ante estimated.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Custom	HVAC Controls/EMS	830,640	736,437	89%	326.97
	HVAC – Cooling only	3,973,686	4,328,397	109%	1,921.73
	HVAC Controls/EMS	43,304	73,494	170%	32.63
Total		4,847,630	5,138,328	106%	2,281.33

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 12/5/16 and 12/20/16.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015197-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025	Lighting	Standard	2	2	72	11	8,760	1.10	869	1,189	137%
				2,090	2,090	32	15	6,323	1.10	233,432	247,946	106%
				522	522	32	15	8,760	1.10	77,736	85,790	110%
				42	42	32	15	4,084	1.10	2,785	3,218	116%
Total									314,822	338,143	107%	

The annual lighting hours of operation verified during the M&V site visit for the first and third line item in the table above (8,760) are greater than the hours of operation used to calculate ex ante savings for the first line item (7,300) and equal to the ex ante hours for the third line item. The hours of operation for the second line item above (6,323) are less than the hours used to calculate ex ante savings (6,570). For the fourth line item above the hours of operation (4,084) are greater than the hours of operation used to calculate ex ante savings (3,900).

A heating and cooling interactive factor of 1.10, applicable to a gas heated, air conditioned large retail building in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²⁶¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 107%.

²⁶¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	314,822	338,143	107%	64.23
Total		314,822	338,143	107%	64.23

Data Collection

The participant received New Construction lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014307-406123-Lighting-New Construction Lighting Power Density (LPD)	3000	Lighting	New Construction	84	84	812	228	2,527	1.00	127,452	123,881	97%
Total										132,724	129,004	97%

The annual lighting hours of operation verified during the M&V site visit (2,527) are less than the annual hours of operation used to calculate ex ante savings (2,600). The newly constructed facility was ramping up production rates; although the ex ante and ex post both used the expected production schedule, the ex post included the holiday schedule in the annual hours of operation.

A heating and cooling interactive factor of 1.00, applicable to an industrial building without electric heat nor AC in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate also use the 1.00 interactive factor.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁶²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 97%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
New Construction	Lighting	132,724	129,004	97%	24.51
Total		132,724	129,004	97%	24.51

²⁶² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received New Construction lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
016390-001412-Provisional NC Measure	3000	Lighting	New Construction	437	437	564	280	6,444	1.00	807,811	800,851	99%
Total										807,811	800,851	99%

The annual lighting hours of operation verified during the M&V site visit (6,444) are less than the annual hours of operation used to calculate ex ante savings (6,500). The newly rehabbed warehouse was ramping up production; both the ex ante and ex post used the expected production schedule. The ex post included the holidays in the annual hours of operation.

A heating and cooling interactive factor of 1.00, applicable to a gas heated, ventilated industrial building in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate also used 1.00 for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁶³

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 99%.

Site-Level Energy Savings

Incentive	End Use Category	kWh Savings			Gross Ex Post kW Reduction
		Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross Realization Rate	
New Construction	Lighting	807,811	800,851	99%	152.13
Total		807,811	800,851	99%	152.13

²⁶³ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard and Custom lighting incentives and Custom HVAC incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014462-200301- Lighting-T8 28 Watt Lamp Replacing T12 <=40 Watt Lamp	3019	Lighting	Standard	14	14	34	28	1,000	1.09	84	92	109%
				4	4	34	28	2,200	1.09	53	58	109%
014462-201010- Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	3008			10	10	90	14	3,400	1.09	2,584	2,819	109%
014462-200301- Lighting-T8 28 Watt Lamp Replacing T12 <=40 Watt Lamp	3019			476	476	34	28	3,400	1.09	9,710	10,593	109%
				16	16	34	28	3,400	1.09	326	356	109%
				2	2	34	28	2,200	1.09	26	29	109%
				34	34	34	28	2,378	1.09	485	529	109%
				3	3	34	28	3,400	1.09	61	67	109%
				8	8	34	28	2,378	1.09	114	125	109%
				32	32	34	28	1,100	1.09	211	230	109%
				27	27	34	28	2,378	1.09	385	420	109%
3	3			34	28	8,760	1.09	158	172	109%		
014462-201212- Lighting-LED 12-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009			1	1	72	18	3,400	1.09	177	200	113%
014462-200301- Lighting-T8 28 Watt Lamp Replacing T12 <=40 Watt Lamp	3019			6	6	34	28	2,378	1.09	86	93	109%
		14	14	34	28	3,400	1.09	286	312	109%		
		30	30	34	28	4,000	1.09	720	785	109%		
		2	2	34	28	1,100	1.09	13	14	109%		
		2	2	34	28	1,500	1.09	18	20	109%		
		12	12	34	28	1,000	1.09	72	79	109%		
		4	4	34	28	3,400	1.09	82	89	109%		
		76	76	34	28	2,378	1.09	1,084	1,183	109%		
		32	32	34	28	2,200	1.09	422	461	109%		
8	8	34	28	1,000	1.09	48	52	109%				
014462-201111- Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	2	2	43	9	1,100	1.09	73	82	112%		
		1	1	43	9	1,100	1.09	36	41	112%		
		1	1	43	9	3,400	1.09	112	126	112%		
		2	2	43	9	1,000	1.09	66	74	112%		

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014462-100501-Lighting-T8 28 Watt Fixture Replacing T12 Fixture	1169	Custom	7	7	164	50	1,500	1.09	1,197	1,306	109%	
			1	1	164	50	1,100	1.09	125	137	109%	
			4	4	164	50	3,400	1.09	1,550	1,691	109%	
			5	5	164	50	2,200	1.09	1,254	1,368	109%	
			124	124	164	50	2,378	1.09	34,005	36,672	108%	
			4	4	164	50	1,000	1.09	456	497	109%	
014462-101116-Lighting-New Efficient Lighting Fixture Replacing Existing Inefficient Lighting Fixture			6	6	52	11	3,400	1.09	836	912	109%	
014462-100516-Lighting-T8 28 Watt Fixture Replacing Existing Inefficient Lighting Fixture			89	89	72	38	2,378	1.09	7,196	7,850	109%	
014462-100208-Lighting-Non Linear LED Fixture Replacing Metal Halide Fixture			4	4	148	43	2,378	1.09	999	1,090	109%	
014462-100116-Lighting-Linear Tube LED Fixture Replacing Existing Inefficient Lighting Fixture			36	36	455	160	4,380	1.09	46,516	50,745	109%	
			24	24	455	160	4,380	1.09	31,010	33,830	109%	
			24	24	455	160	4,380	1.09	31,010	33,830	109%	
014462-100501-Lighting-T8 28 Watt Fixture Replacing T12 Fixture			4	4	100	14	3,400	1.09	1,170	1,276	109%	
014462-100501-Lighting-T8 28 Watt Fixture Replacing T12 Fixture	3	3	138	84	2,378	1.09	385	420	109%			
Total									175,204	190,724	109%	

Lighting Controls Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Quantity	Controlled Wattage	Baseline Hours	Efficient Hours	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
014462-201618-Lighting-Single Technology Occupancy Sensor Controlling Lighting Circuit >120 Watts	3079	Lighting	Standard	4	960	4,380	3,066	1	1,840	5,505	2.99
Total									1,840	5,505	2.99

The ex ante savings estimate used an adjusted base wattage of 70W for the thirteenth line item in the above table and 42W for the twenty-fourth through twenty-seventh line items by multiplying the provided wattage by 70%. An adjusted base wattage of 72W and 43W was used in the ex post savings analysis to meet the EISA 2007 standard lumen equivalent for a 100W and 60W incandescent lamp.

The occupancy control sensors were connected to a relay with a higher amount of watts compared to the measure name of “greater than 120 watts”. During the M&V site visit, the baseline behavior for controlling lighting was determined by survey questions per usage area. The survey indicated some efficient behavior with turning off lighting during the workday and the end of the workday.

A heating and cooling interactive factor of 1.09, applicable to a gas heated, air conditioned educational facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

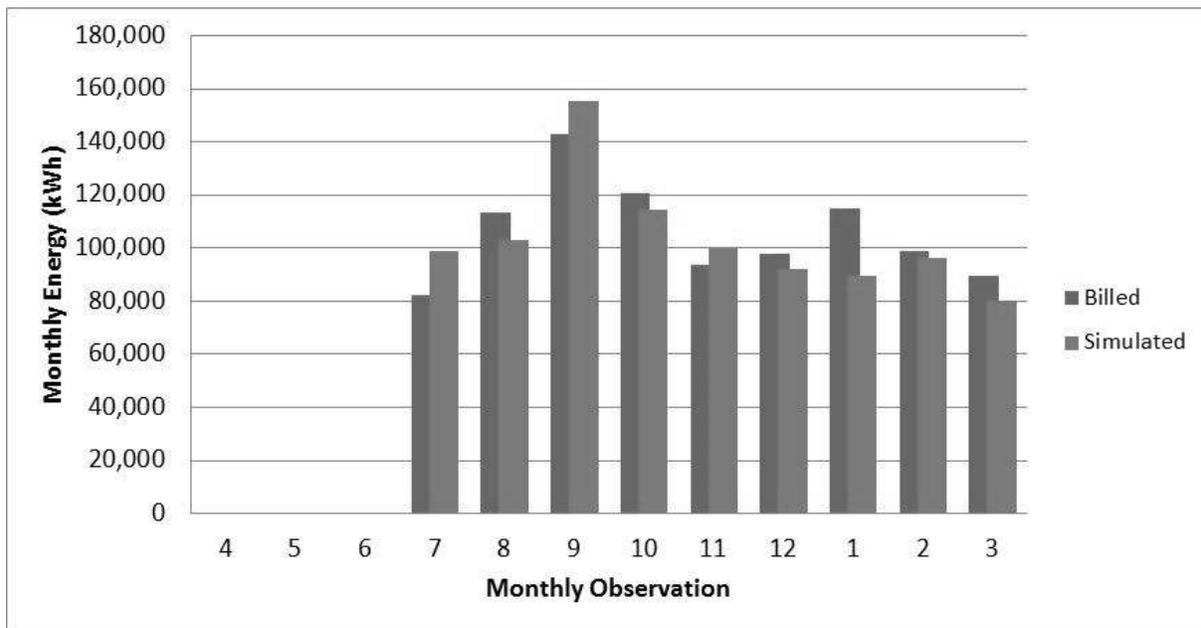
The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁶⁴

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The lighting realization rate is 109%.

HVAC Retrofit Savings Calculations

Annual energy savings for the HVAC measures were calculated using IPMVP Option D: Calibrated simulation. Using information collected during the site visit, an eQuest energy model of the entire campus was created. Upon compiling the eQuest model, a custom weather file was used to calibrate the model to electric billing data after project installation. The custom weather file was created using NOAA weather data for the St. Louis area. The calibration effort for the electric consumption can be seen in the following plot:

Billed vs Monthly Simulated kWh



Upon the calibration of the as-built model, a series of parametric runs were then used to remove the measures associated with this project and other measures that were a part of spillover energy savings. The model and associated parametric runs were then simulated using TMY3 weather for the St. Louis area. The savings for each measure is the difference between the annual consumption of the baseline model and subsequent runs. The following tables present the electric savings for the HVAC upgrades:

²⁶⁴ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Annual DCV kWh Savings

<i>End Use</i>	<i>Baseline</i>	<i>As-Built</i>	<i>Realized Savings</i>	<i>Expected Savings</i>	<i>Realization Rate</i>
Area Lights	483,768	483,768	0	-	-
Task Lights	0	0	0	-	-
Misc. Equip.	137,728	137,728	0	-	-
Space Heat	67,075	67,075	0	-	-
Space Cool	246,370	228,444	17,926	14,954	120%
Heat Reject.	1,307	1,307	0	-	-
Pumps & Aux.	116,873	116,873	0	-	-
Vent. Fans	162,752	162,752	0	15,242	0%
Refrigeration	7,862	7,862	0	-	-
HP Supp.	0	0	0	-	-
Ext. Usage	7	7	0	-	-
Total	1,223,742	1,205,816	17,926	30,196	59%

Annual Pump VFDs kWh Savings

<i>End Use</i>	<i>Baseline</i>	<i>As-Built</i>	<i>Realized Savings</i>	<i>Expected Savings</i>	<i>Realization Rate</i>
Area Lights	483,768	483,768	0	-	-
Task Lights	0	0	0	-	-
Misc. Equip.	137,728	137,728	0	-	-
Space Heat	66,799	67,075	-276	-	-
Space Cool	246,450	246,370	80	-	-
Heat Reject.	1,405	1,307	98	-	-
Pumps & Aux.	218,007	116,873	101,134	125,381	81%
Vent. Fans	162,751	162,752	-1	-	-
Refrigeration	7,862	7,862	0	-	-
HP Supp.	0	0	0	-	-
Ext. Usage	7	7	0	-	-
Total	1,324,777	1,223,742	101,035	125,381	81%

The difference in realized savings for the non-lighting incentives can be attributed to the ex ante analysis using a weather bin analyses. The bin analyses rely on several assumptions for each measure. For the DCV measure, the ex ante analysis assumed fan savings. Demand Controlled Ventilation (DCV) reduces the amount of outside air that the HVAC system has to condition. Fan energy usage is unaffected by the measure; thus, the ex post analysis realized only cooling savings for the measure and no fan savings. For the pump VFDs measure, the ex ante analysis assumes post speeds and loads. Those assumptions were not justified with data and resulted in an overestimation of savings. The ex post analysis uses calibrated simulation, which account for actual post conditions and HVAC interactive effects.

The HVAC realization rate is 76%. The total site-level realization rate for lighting and HVAC is 95%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	19,333	24,605	127%	3.98
Custom		157,710	171,624	109%	32.6
	HVAC	155,577	118,961	76%	61.2
Total		332,620	315,190	95%	97.8

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015153-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	92	92	72	9	1,920	1.11	11,224	12,327	110%
015153-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			11	11	35	5	1,920	1.11	660	706	107%
015153-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp	3007			3	3	65	11	1,920	1.11	207	347	167%
				44	44	65	7	1,920	1.11	3,388	5,460	161%
Total										15,479	18,913	122%

The annual lighting hours of operation verified during the M&V site visit (1,920) are less than the annual hours of operation used to calculate ex ante savings (2,000). The ex post included the holiday schedule with the store operating hours.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail in Jefferson City, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The baseline wattage for the Incandescent BR/R was reduced by the ex ante to 45.5. The ex post used the actual base watts of 65W as this reflector lamp is exempt from the EISA 2007 federal lighting standards.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁶⁵

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 122%.

²⁶⁵ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	15,479	18,913	122%	3.59
Total		15,479	18,913	122%	3.59

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015794-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026	Lighting	Standard	134	268	85	19	3,118	1.10	19,650	21,673	110%
				10	20	80	19	3,118	1.10	1,310	1,445	110%
015794-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			16	32	109	19	3,118	1.10	3,544	3,909	110%
015794-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			14	28	80	19	3,118	1.10	1,834	2,023	110%
				20	40	80	19	3,118	1.10	2,621	2,891	110%
015794-305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	3025			16	32	112	19	3,118	1.10	3,694	4,074	110%
Total										32,653	36,016	110%

The annual lighting hours of operation verified during the M&V site visit (3,118) are similar to the annual hours of operation used to calculate ex ante savings (3,120).

A heating and cooling interactive factor of 1.10, applicable to a gas heated, air conditioned large retail building in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁶⁶

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 110%.

²⁶⁶ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	32,653	36,016	110%	6.84
Total		32,653	36,016	110%	6.84

Data Collection

The participant received New Construction lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules for the new tenant.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
014361-406123-Lighting-New Construction Lighting Power Density (LPD)	3000	Lighting	New Construction	31	31	145	41	2,776	1.11	9,093	9,927	109%
Total										9,093	9,927	109%

The annual lighting hours of operation verified during the M&V site visit (2,776) are less than the annual hours of operation used to calculate ex ante savings (2,816). The ex post schedule included the holidays expected for the tenant.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned small retail building in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁶⁷

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 109%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
New Construction	Lighting	9,093	9,927	109%	1.89
Total		9,093	9,927	109%	1.89

²⁶⁷ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

Measure Name/ID	TRM Measure Reference Number	End Use Category	Program	Baseline Quantity	Efficient Quantity	Baseline Wattage	Efficient Wattage	Annual Hours of Operation	Heating Cooling Interaction Factor	Gross Ex Ante kWh Savings	Gross Ex Post kWh Savings	Gross kWh Realization Rate
015026-201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	3011	Lighting	Standard	708	708	43	7	1,145	1.17	24,780	34,150	138%
015026-305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	3026			850	850	40	15	8,760	1.17	186,150	217,825	117%
015026-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			352	352	65	10	1,145	1.17	19,360	25,939	134%
				295	295	46	14	4,380	1.17	40,701	47,627	117%
Total										270,991	325,541	120%

The annual lighting hours of operation verified during the M&V site visit for the first and third line items in the table above (1,145²⁶⁸) are greater than the hours of operation used to calculate the ex ante savings (1,000). These measures were installed within guest rooms. The second and fourth lines in the above table correspond with the hours of operation used in the ex ante calculation (8,760 and 4,380, respectively).

The ex ante savings estimate used an adjusted base wattage of 42W for the first line in the above table and 45.5W for the fourth line item by multiplying the provided wattage by 70%. An adjusted base wattage of 43W was used in the ex post savings analysis to meet the EISA 2007 lumen equivalent for a 60W incandescent lamp.

The measure name for the first line item in the above table is not accurate. The baseline lamps were incandescent A-line and were replaced with LED A19 lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.17, applicable to a gas heated, air conditioned hotel with PTAC and VAV units in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

²⁶⁸ The ex post savings analysis cites the DEER 2005 guest room lighting operation estimate (1,145). This average value has been corroborated through ADM's extensive fixture-level and circuit-level monitoring of guest room lighting operation.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁶⁹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 120%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	270,991	325,541	120%	61.84
Total		270,991	325,541	120%	61.84

²⁶⁹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received Standard lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation and post-retrofit connected loads, and determined the lighting operating schedule. Annual lighting operating hours were verified by interviewing facility personnel regarding lighting operating schedules.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015826-305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture	3005-1	Lighting	Standard	93	93	465	115	4,479	1.10	156,240	160,907	103%
Total										156,240	160,907	103%

The annual lighting hours of operation verified during the M&V site visit (4,479) are less than the annual hours of operation used to calculate ex ante savings (4,800). The ex post accounted for the store hours that are less on the weekend versus the weekday.

A heating and cooling interactive factor of 1.10, applicable to a gas heated, air conditioned large retail building in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The peak coincident kW reduction was determined by applying the corresponding end use kW factor to the kWh savings.²⁷⁰

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall realization rate is 103%.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
Standard	Lighting	156,240	160,907	103%	30.57
Total		156,240	160,907	103%	30.57

²⁷⁰ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 9/16/16 and 9/26/16.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015131-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	20	20	53	9	2,232	1.11	1,305	2,175	167%
015131-200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp	3012			4	4	50	5	2,232	1.11	180	445	247%
015131-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			31	31	65	8	2,232	1.11	1,744	4,368	250%
Total										3,229	6,988	216%

The annual lighting hours of operation verified during the M&V site visit (2,231) are greater than the annual hours of operation used to calculate ex ante savings (1,500).

The ex ante savings estimate used an LM adjusted base wattage of 52.5W for the first line item in the table above, 35W for the second line item, and 45.5W for the third line item by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 53W for the first line item to meet EISA 2007 requirements for a 75 incandescent lamp. The base lamps for the second and third line item (MR16 and 65W BR/R) are exempt from an adjusted wattage calculation.

The measure names in the table above are not accurate. The baseline lamps were incandescent A-line, MR-16, and BR/R and were replaced with LED A19, MR-16, and BR/R lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²⁷¹

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 216%.

²⁷¹ Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	3,229	6,988	216%	1.33
Total		3,229	6,988	216%	1.33

Data Collection

The participant received SBDI lighting incentives from Ameren Missouri.

During the M&V visit, ADM staff verified equipment installation, baseline and the post-retrofit connected loads, interviewing facility personnel regarding lighting operating schedules, and installed two photo-sensor loggers to monitor lighting operation. The photo-sensor loggers collected data between 9/16/16 and 9/26/16.

Analysis Results

Lighting Retrofit Savings Calculations

<i>Measure Name/ID</i>	<i>TRM Measure Reference Number</i>	<i>End Use Category</i>	<i>Program</i>	<i>Baseline Quantity</i>	<i>Efficient Quantity</i>	<i>Baseline Wattage</i>	<i>Efficient Wattage</i>	<i>Annual Hours of Operation</i>	<i>Heating Cooling Interaction Factor</i>	<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross kWh Realization Rate</i>
015143-301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	3009	Lighting	SBDI	51	51	72	9	2,234	1.11	5,911	7,950	135%
015143-200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	3007			23	23	65	11	2,234	1.11	1,508	3,073	204%
Total										7,419	11,023	149%

The annual lighting hours of operation verified during the M&V site visit (2,234) are fewer than the annual hours of operation used to calculate ex ante savings (1,900).

The ex ante savings estimate used LM adjusted base wattages of 70W and 45.5W for the first and second line item in the table above respectively by multiplying the provided wattage by 70%. The ex post savings estimate used an adjusted base wattage of 72W for the first line item to meet EISA 2007 requirements for a 100W incandescent lamp. The base lamps for the second line item (65W BR/R) are exempt from an adjusted wattage calculation.

The measure names in the table above are not accurate. The baseline lamps were incandescent A-line and BR/R, and were replaced with LED A19 and BR/R lamps. The lamps are stated correctly in the application.

A heating and cooling interactive factor of 1.11, applicable to a gas heated, air conditioned retail facility in St. Louis, was applied to the ex post lighting energy savings. The ex ante savings estimate did not account for heating and cooling interactive effects.

The verified peak coincident kW reduction was determined by applying the corresponding end use kW factor to the verified kWh savings.²⁷²

A table showing the energy savings achieved by the measures evaluated for this site is shown below. The overall gross realization rate is 149%.

²⁷² Ameren Missouri (Cycle 2) Missouri Energy Efficiency Investment Act (MEEIA) filing.

Site-Level Energy Savings

<i>Incentive</i>	<i>End Use Category</i>	<i>kWh Savings</i>			<i>Gross Ex Post kW Reduction</i>
		<i>Gross Ex Ante kWh Savings</i>	<i>Gross Ex Post kWh Savings</i>	<i>Gross Realization Rate</i>	
SBDI	Lighting	7,419	11,023	149%	2.09
Total		7,419	11,023	149%	2.09

3. Ex Post Gross Savings Technical Data

This appendix presents detailed technical data regarding the estimation of ex post gross energy savings.

3.1. M&V Sample Site-Level and Measure-Level Gross Savings

Table 3-1 shows the ex ante and ex post Custom Program energy savings by sample site.

Table 3-1 Ex Ante and Ex Post Gross Annual kWh Savings for Custom Program by Site

ID	Ex Ante kWh Savings	Ex Post kWh Savings	Gross kWh Savings Realization Rate
1002	41,250	29,154	71%
1009	41,114	35,120	85%
1081	82,828	93,086	112%
1090	25,148	24,576	98%
1130	300,468	437,772	146%
1150	1,270	2,780	219%
1200	427,518	414,567	97%
1201	1,431	1,234	86%
1202	14,288	5,264	37%
1203	15,065	9,340	62%
1230	96,814	87,456	90%
1265	38,010	38,010	100%
1290	45,622	45,622	100%
1296	3,328	3,525	106%
1297	126,715	63,099	50%
1299	101,473	76,105	75%
1301	20,311	19,975	98%
1400	136,771	136,771	100%
1439	8,147	8,281	102%
1440	20,774	17,069	82%
1450	417,429	458,296	110%
1470	2,106	1,264	60%
1475	19,973	22,096	111%
1490	110,726	110,178	100%
1500	3,100	3,199	103%

ID	Ex Ante kWh Savings	Ex Post kWh Savings	Gross kWh Savings Realization Rate
1512	308,672	280,091	91%
1525	4,730	5,232	111%
1540	59,919	34,572	58%
1550	181,682	181,682	100%
1630	2,716	3,089	114%
1650	325,783	303,132	93%
1680	97,949	109,865	112%
1700	173,798	173,798	100%
1701	495,869	495,869	100%
1702	358,459	358,459	100%
1723	7,905	8,975	114%
1730	115,316	128,837	112%
1760	272,912	197,026	72%
1790	213,821	164,121	77%
1800	11,416	10,466	92%
1805	4,188	3,542	85%
1820	1,631,321	1,631,322	100%
1821	19,395	19,395	100%
1860	903,152	1,010,679	112%
1870	822,795	902,137	110%
1900	35,975	27,473	76%
1912	5,347	4,301	80%
1930	2,566,816	2,572,466	100%
1950	330,470	377,938	114%
2010	260,205	221,167	85%
2050	81,478	86,699	106%
2100	16,473	10,697	65%
2110	340,552	340,671	100%
2143	54,015	70,623	131%
2177	41,349	19,676	48%
2220	4,847,630	5,138,328	106%
2221	51,242	39,079	76%
2290	375	483	129%
2300	312	438	140%

ID	Ex Ante kWh Savings	Ex Post kWh Savings	Gross kWh Savings Realization Rate
2320	205,650	200,321	97%
2360	7,822	6,210	79%
2391	3,965	3,363	85%
2395	43,690	50,059	115%
2421	279,067	279,067	100%
2426	9,240	10,056	109%
2427	21,416	21,489	100%
2429	6,538	5,979	91%
2530	10,951	10,574	97%
2572	27,320	35,185	129%
2577	4,897	3,024	62%
2580	5,766	4,410	76%
2660	249,791	249,791	100%
2680	85,891	106,534	124%
2690	2,032	2,333	115%
Total	17,709,752	18,064,561	102%
All Non-Sample Measures	23,858,122	23,347,350	98%
Total	41,567,874	41,411,911	100%

The ex post gross kWh savings for the sampled Custom Program measures are presented by measure in Table 3-2.

Table 3-2 Ex Ante and Ex Post Gross Annual kWh Savings for Sampled Custom Program Measures

<i>Measure Name</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post Gross kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
100101-Lighting-Linear Tube LED Fixture Replacing T12 Fixture	313,317	264,749	84%
100104-Lighting-Linear Tube LED Fixture Replacing T8 Fixture	3,100,188	3,094,135	100%
100106-Lighting-Linear Tube LED Fixture Replacing T5 Fixture	54,015	70,623	131%
100107-Lighting-Linear Tube LED Fixture Replacing T5 HO Fixture	151,891	146,814	97%

<i>Measure Name</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post Gross kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
100108-Lighting-Linear Tube LED Fixture Replacing Metal Halide Fixture	1,028,754	1,210,634	118%
100111-Lighting-Linear Tube LED Fixture Replacing High Pressure Sodium Fixture	7,726	7,726	100%
100113-Lighting-Linear Tube LED Fixture Replacing CFL Fixture	16,222	16,475	102%
100116-Lighting-Linear Tube LED Fixture Replacing Existing Inefficient Lighting Fixture	12,760	8,557	67%
100201-Lighting-Non Linear LED Fixture Replacing T12 Fixture	143,925	150,403	105%
100202-Lighting-Non Linear LED Fixture Replacing T12 HO Fixture	27,320	35,185	129%
100204-Lighting-Non Linear LED Fixture Replacing T8 Fixture	473,862	412,225	87%
100207-Lighting-Non Linear LED Fixture Replacing T5 HO Fixture	19,185	20,814	108%
100208-Lighting-Non Linear LED Fixture Replacing Metal Halide Fixture	4,050,907	4,070,361	100%
100209-Lighting-Non Linear LED Fixture Replacing Pulse Start Metal Halide Fixture	903,152	1,010,679	112%
100211-Lighting-Non Linear LED Fixture Replacing High Pressure Sodium Fixture	1,073,748	1,073,748	100%
100212-Lighting-Non Linear LED Fixture Replacing Incandescent/Halogen Lamp Fixture	288,648	259,409	90%
100213-Lighting-Non Linear LED Fixture Replacing CFL Fixture	240,886	242,577	101%
100216-Lighting-Non Linear LED Fixture Replacing Existing Inefficient Lighting Fixture	421,877	357,470	85%
100501-Lighting-T8 28 Watt Fixture Replacing T12 Fixture	38,972	42,091	108%
100516-Lighting-T8 28 Watt Fixture Replacing Existing Inefficient Lighting Fixture	999	1,090	109%
100601-Lighting-T8 25 Watt Fixture Replacing T12 Fixture	3,574	3,954	111%

<i>Measure Name</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post Gross kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
100807-Lighting-T5 HO Fixture Replacing T5 HO Fixture	4,730	5,232	111%
101113-Lighting-New Efficient Lighting Fixture Replacing CFL Fixture	687	921	134%
101116-Lighting-New Efficient Lighting Fixture Replacing Existing Inefficient Lighting Fixture	8,033	8,762	109%
103621-Lighting-On/Off Occupancy Sensor Replacing No Existing Equipment or Replacing Failed Equipment	308,672	280,091	91%
112320-HVAC-Air Cooled Chiller Replacing Existing Inefficient Equipment or Early Replacement	12,318	12,248	99%
113121-HVAC-Demand Control Ventilation Replacing No Existing Equipment or Replacing Failed Equipment	30,196	17,926	59%
113220-HVAC-HVAC Controls / EMS Replacing Existing Inefficient Equipment or Early Replacement	873,944	809,931	93%
115920-HVAC-Cooling Only HVAC Equipment Replacing Existing Inefficient Equipment or Early Replacement	3,973,686	4,328,397	109%
164121-Motors-VFD for Pump Replacing No Existing Equipment or Replacing Failed Equipment	125,381	101,134	81%
201212-Lighting-LED 12-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	177	200	113%

Table 3-3 shows the ex ante and ex post Standard Program annual energy savings by sample site.

Table 3-3 Ex Ante and Ex Post Gross Annual kWh Savings for Standard Program by Site

<i>ID</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
1000	22,447	24,447	109%
1002	69,090	69,905	101%
1010	504,519	409,563	81%
1020	120,376	90,516	75%
1078	15,943	17,718	111%
1080	87,815	80,874	92%

<i>ID</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
1090	141,892	165,912	117%
1148	17,540	22,866	130%
1150	107,320	127,102	118%
1160	31,888	13,432	42%
1161	17,254	24,234	140%
1180	17,512	18,471	105%
1182	11,262	9,705	86%
1183	18,770	33,720	180%
1184	15,016	14,494	97%
1185	13,139	12,007	91%
1191	10,558	10,568	100%
1201	15,005	12,907	86%
1202	18,838	17,602	93%
1203	20,164	21,531	107%
1206	36,175	43,635	121%
1219	1,113	1,472	132%
1240	95,786	117,304	122%
1250	25,860	24,544	95%
1260	11,424	8,126	71%
1265	1,382	1,632	118%
1270	29,190	75,578	259%
1283	18,419	21,595	117%
1296	19,439	20,417	105%
1299	2,505	4,988	199%
1300	5,464	5,421	99%
1301	83	84	102%
1340	401,520	423,002	105%
1350	488,040	514,150	105%
1360	500,640	585,831	117%
1370	196,915	332,585	169%
1380	105,119	143,853	137%
1390	70,536	85,684	121%
1437	270,991	325,541	120%
1439	3,663	7,790	213%
1440	7,560	6,581	87%
1470	174,003	158,095	91%
1475	21,902	24,961	114%

<i>ID</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
1476	1,061	3,085	291%
1480	3,869	5,512	142%
1481	156,240	160,907	103%
1489	11,041	11,887	108%
1492	7,605	7,334	96%
1494	66,100	69,641	105%
1500	13,500	14,527	108%
1512	152,096	186,636	123%
1525	2,343	2,546	109%
1526	9,313	9,847	106%
1540	155,742	88,879	57%
1543	16,087	19,253	120%
1545	7,608	9,398	124%
1562	61,278	52,179	85%
1576	118,348	117,818	100%
1580	60,339	64,559	107%
1603	51,627	31,087	60%
1606	46,644	85,617	184%
1607	65,977	45,835	69%
1611	15,816	42,234	267%
1612	67,063	82,544	123%
1613	14,299	23,880	167%
1630	5,987	7,515	126%
1640	53,962	56,441	105%
1650	19,155	24,405	127%
1680	101,700	111,592	110%
1711	59,138	86,332	146%
1712	8,394	4,015	48%
1723	634	430	68%
1730	31,450	36,182	115%
1735	44,788	69,607	155%
1738	12,852	14,755	115%
1762	33,626	29,175	87%
1790	328,500	359,669	109%
1800	9,507	9,049	95%
1802	72,216	108,663	150%
1804	7,113	7,661	108%

<i>ID</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
1805	75,030	56,914	76%
1809	31,317	35,442	113%
1820	86,495	107,597	124%
1821	3,505	990	28%
1836	16,714	13,928	83%
1840	15,554	17,338	111%
1841	25,671	25,173	98%
1852	7,902	9,141	116%
1865	4,020	6,677	166%
1900	127,800	89,102	70%
1901	168,945	184,799	109%
1902	10,547	11,959	113%
1912	54,963	58,676	107%
1920	20,548	16,084	78%
1930	1,136,800	1,138,576	100%
1931	11,097	5,784	52%
1932	8,640	7,516	87%
1934	27,255	28,373	104%
1935	32,653	36,015	110%
1945	37,318	40,858	109%
1981	38,652	29,733	77%
1988	14,664	8,230	56%
1990	375,720	405,956	108%
2030	139,698	101,096	72%
2040	29,919	48,045	161%
2058	8,289	9,103	110%
2070	118,970	119,214	100%
2090	119,353	117,985	99%
2100	50,518	54,504	108%
2120	90,850	106,257	117%
2121	66,215	31,716	48%
2132	10,142	10,014	99%
2140	29,611	29,022	98%
2142	9,779	7,963	81%
2143	90,666	35,536	39%
2150	106,868	96,573	90%
2160	118,072	104,658	89%

<i>ID</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
2170	121,692	108,234	89%
2172	30,528	23,049	76%
2177	41,101	21,376	52%
2180	27,698	19,709	71%
2199	37,412	27,874	75%
2215	50,469	74,778	148%
2216	18,570	18,567	100%
2217	5,466	4,568	84%
2221	25,337	28,528	113%
2250	627,225	692,209	110%
2280	314,822	338,143	107%
2290	843,860	973,529	115%
2300	356,367	395,226	111%
2340	43,884	46,123	105%
2350	21,048	15,615	74%
2360	15,844	12,431	78%
2392	25,308	26,967	107%
2411	38,451	36,116	94%
2421	13,432	18,976	141%
2426	9,250	10,304	111%
2427	7,350	9,893	135%
2428	15,381	13,717	89%
2429	10,429	9,625	92%
2432	17,885	29,786	167%
2480	195,228	138,299	71%
2512	36,001	64,051	178%
2513	31,422	50,663	161%
2516	16,075	25,378	158%
2530	19,303	19,115	99%
2550	36,545	38,608	106%
2560	500,654	613,185	122%
2561	17,566	21,332	121%
2572	262,706	285,540	109%
2577	22,635	18,522	82%
2580	31,176	28,831	92%
2611	13,455	12,654	94%
2650	1,356	1,138	84%

<i>ID</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
2661	167,859	137,840	82%
2670	9,092	10,195	112%
2680	99,634	62,748	63%
2690	146,991	114,626	78%
2691	11,741	12,141	103%
2703	33,900	50,594	149%
Sample Total	13,350,003	14,058,493	105%
All Non Sampled	16,330,755	17,794,090	109%
Total	29,680,758	31,144,093	105%

The ex post gross kWh savings for the sampled Standard Program measures are presented by measure in Table 3-4.

Table 3-4 Ex Ante and Ex Post Gross Annual kWh Savings for Sampled Standard Measures

<i>Measure Name</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post Gross kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
200101-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T12 <=40 Watt Lamp	109,183	170,410	156%
200102-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 32 Watt Lamp	2,421,743	2,249,269	93%
200103-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 28 Watt Lamp	89	2	2%
200104-Lighting-Linear LED Lamp <=22 Watt Lamp Replacing T8 25 Watt Lamp	4,366	3,054	70%
200301-Lighting-T8 28 Watt Lamp Replacing T12 <=40 Watt Lamp	14,444	15,759	109%
200302-Lighting-T8 28 Watt Lamp Replacing T8 32 Watt Lamp	3,604	5,336	148%
200402-Lighting-T8 25 Watt Lamp Replacing T8 32 Watt Lamp	7,165	5,035	70%
200505-Lighting-LED <=80 Watt Lamp Replacing Interior HID 100-175 Watt Lamp	69,090	69,905	101%
200707-Lighting-LED 111-130 Watt Lamp Replacing Interior HID 301-400 Watt Lamp	172,002	294,265	171%
200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp or Fixture	134,240	179,335	134%

<i>Measure Name</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post Gross kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp	207,437	239,117	115%
200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	382,166	534,457	140%
201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp	357,658	315,325	88%
201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	223,569	216,701	97%
201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	916,332	892,129	97%
201212-Lighting-LED 12-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	74,105	79,860	108%
201316-Lighting-LED or Electroluminescent Replacing Incandescent Exit Sign	7,990	8,669	108%
201518-Lighting-Single Technology Occupancy Sensor Controlling Lighting Circuit >50 and <=120 Watts	9,500	9,023	95%
201618-Lighting-Single Technology Occupancy Sensor Controlling Lighting Circuit >120 Watts	72,680	35,104	48%
201718-Lighting-Dual Technology Occupancy Sensor Controlling Lighting Circuit >150 Watts	7,410	5,226	71%
223328-Refrigeration-31-50 cubic ft ENERGY STAR Commercial Glass Door Freezer Replacing Non ENERGY STAR Unit	3,869	5,512	142%
301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	162,171	190,654	118%
301818-Lighting-Fixture Mounted Occupancy Sensor Controlling >50 and <=200 Watts Replacing No Controls	66,900	63,093	94%
305005-Lighting-<=80 Watt Lamp or Fixture Replacing Interior HID 100-175 Watt Lamp or Fixture	71,436	69,321	97%
305013-Lighting-<=80 Watt Lamp or Fixture Replacing Garage or Exterior 24/7 HID 100-175 Watt Lamp or Fixture	112,960	112,883	100%
305106-Lighting-62-130 Watt Lamp or Fixture Replacing Interior HID 176-300 Watt Lamp or Fixture	109,271	118,929	109%
305233-Lighting-85-225 Watt Lamp or Fixture Replacing Interior HID 301-500 Watt Lamp or Fixture	2,562,491	2,795,157	109%
305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	766,650	813,770	106%

<i>Measure Name</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post Gross kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	4,214,330	4,491,852	107%
305501-Lighting-Linear ft T8 25 Watt (<=7 Watts/ft) Replacing T12 <=40 Watt Linear ft	28,410	19,554	69%
305502-Lighting-Linear ft T8 25 Watt (<=7 Watts/ft) Replacing T8 32 Watt Linear ft	56,742	49,787	88%

The ex post gross kWh savings for the sampled New Construction Program are presented by sample site in Table 3-5.

Table 3-5 Ex Ante and Ex Post Gross kWh Savings for New Construction Program by Project

<i>ID</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
1163	9,093	9,927	109%
1551	236,630	246,840	104%
1763	208,729	63,217	30%
1801	31,465	25,900	82%
1982	28,395	25,015	88%
2519	132,724	129,004	97%
2562	807,811	800,851	99%
Sample Total	1,454,847	1,300,754	89%
All Non Sampled	382,868	117,683	31%
Total	1,837,715	1,572,530	86%

Only one measure was implemented under the New Construction Program during PY2016 – lighting power density reduction (406123-Lighting-New Construction Lighting Power Density (LPD)).

Only one Retro-Commissioning Program project was completed during PY2016, and this project was subject to M&V. The ex post gross kWh savings of the Retro-Commissioning Program during PY2016 are presented in Table 3-6. The ex post kWh savings of 23,727 kWh are equal to 21% of the ex ante kWh savings.

Table 3-6 Ex Ante and Ex Post Gross Annual kWh Savings for Retro-Commissioning Program

<i>Ex Ante kWh Savings</i>	<i>Ex Post Gross kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
113,004	23,727	21%

The ex post gross kWh savings for the Retro-Commissioning census are presented by measure in *Table 3-7*.

Only one measure was implemented under the Retro-Commissioning Program during PY2016 – compressed air leakage repair (187320-Compressed Air-Compressed Air System Leak Repair).

Table 3-7 Ex Ante and Ex Post Gross Annual kWh Savings for Sampled Retro-Commissioning Program Measures

<i>Measure Name</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post Gross kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
<i>187320-Compressed Air-Compressed Air System Leak Repair</i>	113,004	23,727	21%

Table 3-8 shows the ex ante and ex post SBDI Program annual energy savings by sample site.

Table 3-8 Ex Ante and Ex Post Gross Annual kWh Savings for SBDI Non-HIM by Project

<i>ID</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
1001	2,012	3,415	170%
1023	22,102	52,621	238%
1024	4,459	5,744	129%
1030	5,928	5,214	88%
1050	3,042	2,806	92%
1081	13,619	12,900	95%
1085	10,722	8,927	83%
1140	3,229	6,988	216%
1145	7,404	7,541	102%
1151	9,291	11,693	126%
1155	4,865	3,831	79%
1162	8,190	7,891	96%

<i>ID</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
1181	3,707	2,559	69%
1208	3,225	3,539	110%
1210	5,469	8,033	147%
1435	3,601	3,972	110%
1441	7,344	11,001	150%
1493	3,888	3,877	100%
1505	10,259	16,152	157%
1507	20,395	13,454	66%
1510	1,768	1,968	111%
1521	13,032	13,510	104%
1522	18,077	15,153	84%
1524	3,588	3,376	94%
1526	8,159	8,679	106%
1530	4,916	6,176	126%
1564	12,789	8,805	69%
1570	1,115	1,242	111%
1590	3,349	4,070	122%
1591	2,171	2,612	120%
1592	7,630	7,740	101%
1601	6,986	10,235	147%
1604	17,523	21,118	121%
1605	1,448	1,849	128%
1608	7,199	10,734	149%
1610	3,887	4,906	126%
1620	965	398	41%
1670	9,882	9,930	100%
1690	15,479	18,913	122%
1733	3,247	3,200	99%
1740	8,020	8,460	105%
1750	7,419	11,023	149%
1751	1,950	1,613	83%
1793	10,759	11,482	107%
1801	17,304	22,482	130%
1803	3,368	3,899	116%
1835	2,108	2,107	100%
1851	3,208	3,039	95%
1911	6,624	6,897	104%

<i>ID</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
1983	3,537	597	17%
2000	10,720	8,455	79%
2001	11,652	14,325	123%
2002	8,755	9,836	112%
2021	4,830	5,285	109%
2091	8,075	10,056	125%
2109	5,397	6,512	121%
2200	2,956	4,416	149%
2201	1,441	1,181	82%
2218	10,012	6,688	67%
2219	1,659	1,382	83%
2230	4,067	4,196	103%
2333	2,811	2,884	103%
2361	2,702	2,406	89%
2430	14,930	19,257	129%
2446	11,441	9,568	84%
2447	3,930	4,152	106%
2448	4,583	5,491	120%
2449	5,954	5,911	99%
2450	4,134	1,099	27%
2460	4,441	5,471	123%
2468	8,136	8,577	105%
2470	5,068	6,330	125%
2497	4,283	3,835	90%
2500	7,679	7,944	103%
2510	8,171	11,000	135%
2514	2,278	2,821	124%
2515	3,785	4,903	130%
2517	11,297	20,206	179%
2518	2,354	2,054	87%
2520	3,704	3,198	86%
2570	12,114	14,785	122%
2620	14,373	15,715	109%
2650	20,393	21,471	105%
2700	13,920	12,711	91%
2704	11,442	15,788	138%
2705	14,637	19,679	134%

<i>ID</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
<i>Sample Total</i>	628,382	717,959	114%
<i>All Non Sampled</i>	1,737,159	2,133,468	123%
<i>Total</i>	2,365,541	2,761,850	117%

The ex post gross kWh savings for the sampled SBDI Non-HIM are presented by measure in Table 3-9.

Table 3-9 Ex Ante and Ex Post Gross Annual kWh Savings for Sampled SBDI Non-HIM Measures

<i>Measure Name</i>	<i>Ex Ante kWh Savings</i>	<i>Ex Post Gross kWh Savings</i>	<i>Gross kWh Savings Realization Rate</i>
200808-Lighting-LED <=13 Watt Lamp Replacing Halogen MR-16 35-50 Watt Lamp or Fixture	33,423	45,007	135%
200909-Lighting-LED <=14 Watt Lamp Replacing Halogen BR/R 45-66 Watt Lamp or Fixture	236,116	292,527	124%
201010-Lighting-LED <=20 Watt Lamp Replacing Halogen PAR 48-90 Watt Lamp or Fixture	62,400	65,433	105%
201111-Lighting-LED <=11 Watt Lamp Replacing Halogen A 28-52 Watt Lamp	58,321	55,459	95%
201316-Lighting-LED or Electroluminescent Replacing Incandescent Exit Sign	254	281	111%
201518-Lighting-Single Technology Occupancy Sensor Controlling Lighting Circuit >50 and <=120 Watts	250	21	8%
301132-Lighting-LED 7-20 Watt Lamp Replacing Halogen A 53-70 Watt Lamp	104,748	122,125	117%
305401-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T12 <=40 Watt Linear ft	91,328	94,307	103%
305402-Lighting-Linear ft LED (<=5.5 Watts/ft) Replacing T8 32 Watt Linear ft	38,994	40,380	104%
305501-Lighting-Linear ft T8 25 Watt (<=7 Watts/ft) Replacing T12 <=40 Watt Linear ft	2,548	2,418	95%

3.2. High Impact Measures

BizSavers measures may or may not be characterized in the Ameren Missouri Technical Reference Manual (TRM). High Impact Measures (HIM) are defined at the program-level

as those measures with the greatest program-level ex ante energy savings that, in the aggregate, account for at least 50% of the total program-level ex ante savings associated with all TRM measures. Measures were implemented under the Standard Program and SBDI Program that are characterized in the Ameren Missouri TRM. The top contributing measures varied early in the program year, and then remained consistent during the remainder of the program year. The HIMs are all lighting measures. The Standard Program HIMs include three LED linear tube measures and two LED screw in lamp measures. The SBDI Program HIMs include two LED screw in lamp measures. The results are presented to include the values of the input parameters for the lighting measure savings algorithm:

$$kWh\ Savings = Hours \times (Q_{Base} \times W_{Base} - Q_{Post} \times W_{Post}) \times HCIF / 1000$$

Where,

Hours = Annual hours of use

Q_{base} = Baseline quantity

W_{base} = Baseline watts

Q_{post} = Installed quantity

W_{post} = Installed watts

HCIF = Heating Cooling Interactive Factor

1000 = W/kW conversion

3.2.1. Standard HIM Measure Number 305402: LED Linear Tube Replacing T8

This Standard measure applies to the removal to T8 linear tubes or fixtures and replacing with LED linear tubes or fixtures. This measure is similar to the HIM measure 200102, but incentivized in units of lamps instead of per foot. This running change was made in June 2016 along with an application change to include lamps and fixtures.

3.2.1.1. *Sampling*

Summary data regarding the sampling plan is presented in report Volume I. This HIM measure included 120 measure samples across 69 Standard projects. The 9,000,169 kWh from this HIM measure is 30% of the total Standard program ex ante savings. The sample group of 4,214,330 kWh achieved a precision of 9.89% at 90% confidence level.

3.2.1.2. *Results*

The results are presented to review the inputs of the savings algorithm for lighting measures.

Figure 3-1 Measure 305402 Quantities

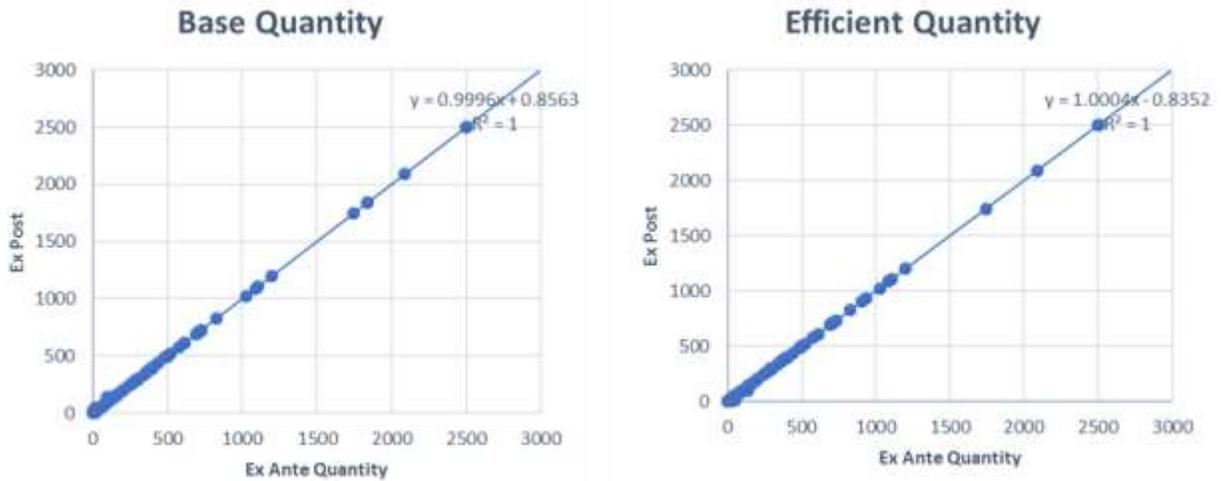


Table 3-10 Measure 305402 Quantities

	Ex Ante Base Quantity		Ex Post Base Quantity		Ex Ante Efficient Quantity		Ex Post Efficient Quantity	
Mean	362.2		361.5		347.1		346.4	
Min/Max	2	6685	0	6685	2	6685	0	6685
Observations	120		120		120		120	
Pearson Correlation	0.99998				0.99998			

Figure 3-2 Measure 305402 Watts

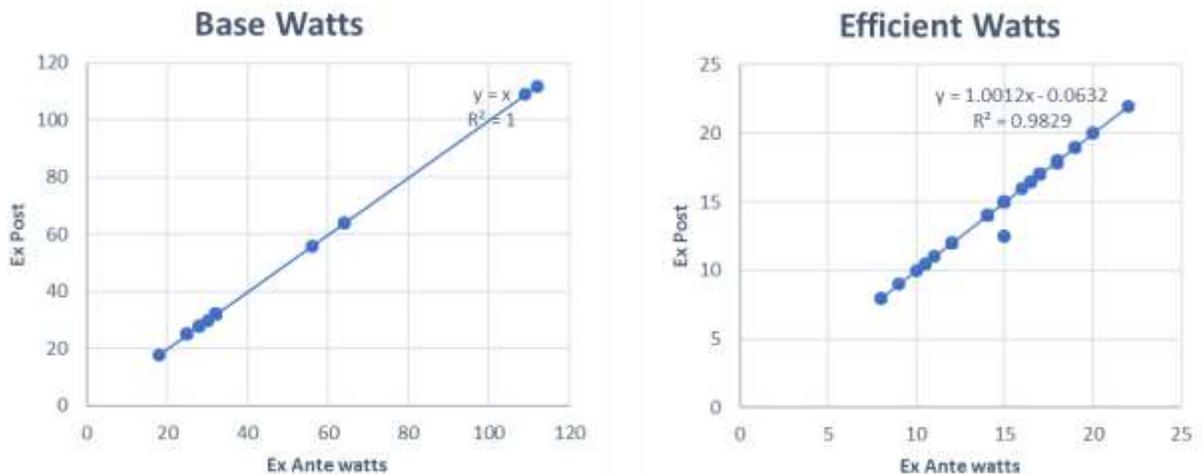


Table 3-11 Measure 305402 Watts

	Ex Ante Base Watts		Ex Post Base Watts		Ex Ante Efficient Watts		Ex Post Efficient Watts	
Mean	33.58		33.58		15.32		15.28	
Min/Max	18	112	18	112	8	22	8	22
Observations	120		120		120		120	
Pearson Correlation	1.00000				0.99154			

Figure 3-3 Measure 305042 HOU, HCIF

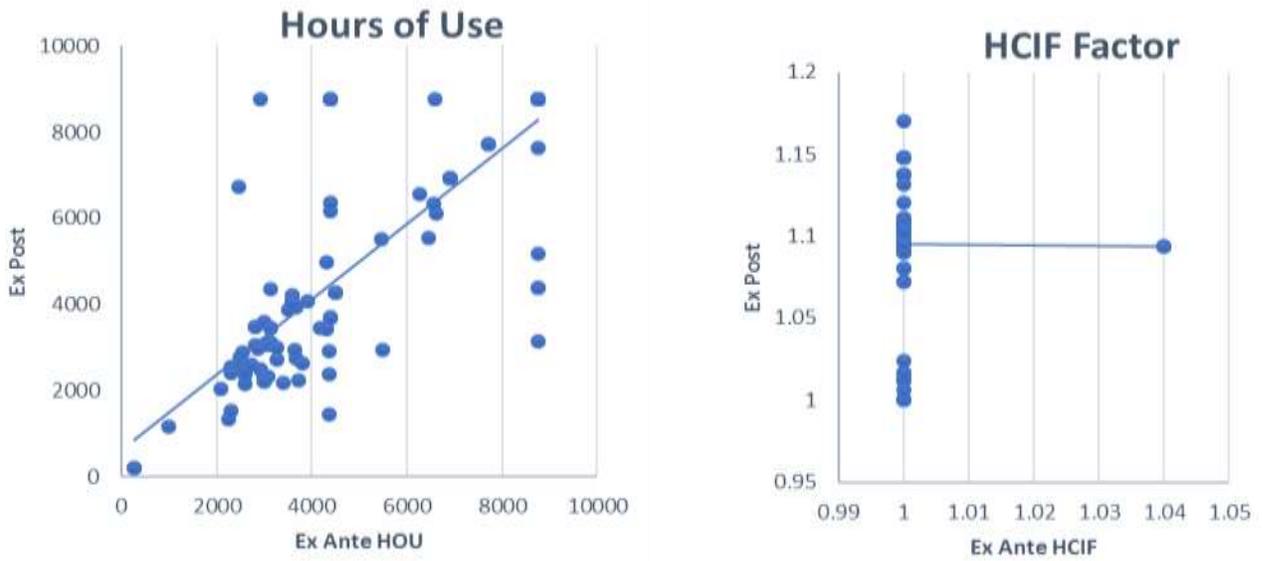


Table 3-12 Measure 305402 HOU, HCIF

	Ex Ante HOU		Ex Post HOU		Ex Ante HCIF		Ex Post HCIF	
Mean	5,037		5,030		1.00		1.10	
Min/Max	260	8,760	204	8,760	1.00	1.04	1.00	1.17
Observations	119		119		120		120	
Pearson Correlation	0.82181				-0.00780			
t Stat	0.047				-31.548			

3.2.1.3. Observations

There is an opportunity for an update to the HCIF, heating cooling interactive factor used for ex ante savings estimation. Although, there is a single outlier in Figure 3-3 HCIF Factor, that was implemented after the program year started to revise the application to include a HCIF factor of 1.04, the data suggests a revised value. Performing hypothesis testing on the evaluated data by shifting the ex ante mean by a positive 0.09, increases the “p” value (calculated probability) over an alpha value of .05 indicating the ex ante and ex post

simulated data would become more similar, although the lower “t” stat indicates the static HCIF value will often be incorrect.

Hours of use has variability from the ex ante application value to the evaluated ex post value, as also exhibited on other lighting measures.

Table 3-13 Measure 305402 HCIF

Hypothesized Mean Difference	0.09
t Stat	-31.5
t Stat	1.5
p Value	0.00
p Value	0.07

The annual per unit kWh savings for measure 305402 Linear LED replacing T8 is presented in the following table. The expected range of per units savings based on ex post results is 98 to 119 kWh, which is more than the current TRM value of 79 kWh.

Table 3-14 Measure 305402 Ex Post and TRM

	<i>TRM Effective 12/16</i>	<i>Ex Post kWh</i>
TRM Measure	3025	
Non Zero Samples		118
Annual weighted kWh	195.9	108.4
Standard deviation of per unit kWh		67
Alpha significance level		0.1
Confidence Interval		10.2
Expected Range kWh	79	98 to 119

3.2.2. Standard HIM Measure Number 305233: LED Screw-in Lamp, 85-225W

This Standard measure applies to the removal of High Intensity Discharge (HID) lamps or fixtures from 300 to 501W and replacing with new LED screw in lamps or fixtures from 85 to 225W. HID lamps are generally used in large open interior areas as commonly found in warehouses, manufacturing buildings, or gymnasiums and also used for outdoor lighting.

3.2.2.1. Sampling Plan

Summary data regarding the sampling plan is presented in report Volume I. This HIM measure included 20 measure samples across 20 Standard projects. The 4,152,563 kWh from this HIM measure is 14% of the total Standard program ex ante savings. The sample group of 2,562,491 kWh achieved a precision of 9.7% at 90% confidence level.

3.2.2.2. Results

Figure 3-4 Measure 305233 Quantity

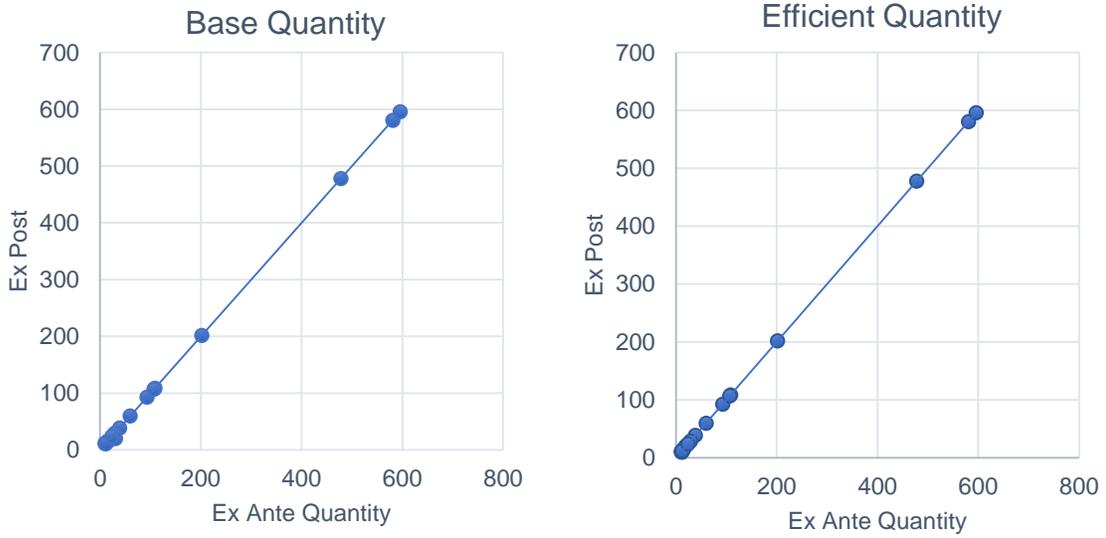


Table 3-15 Measure 305233 Quantity

	<i>Ex Ante Base Quantity</i>		<i>Ex Post Base Quantity</i>		<i>Ex Ante Efficient Quantity</i>		<i>Ex Post Efficient Quantity</i>	
Mean	122.1		122.5		122.1		122.0	
Min/Max	11	596	10	596	11	596	10	596
Observations	20		20		20		20	
Pearson Correlation	0.99991				1.00000			

Figure 3-5 Measure 305233 Watts

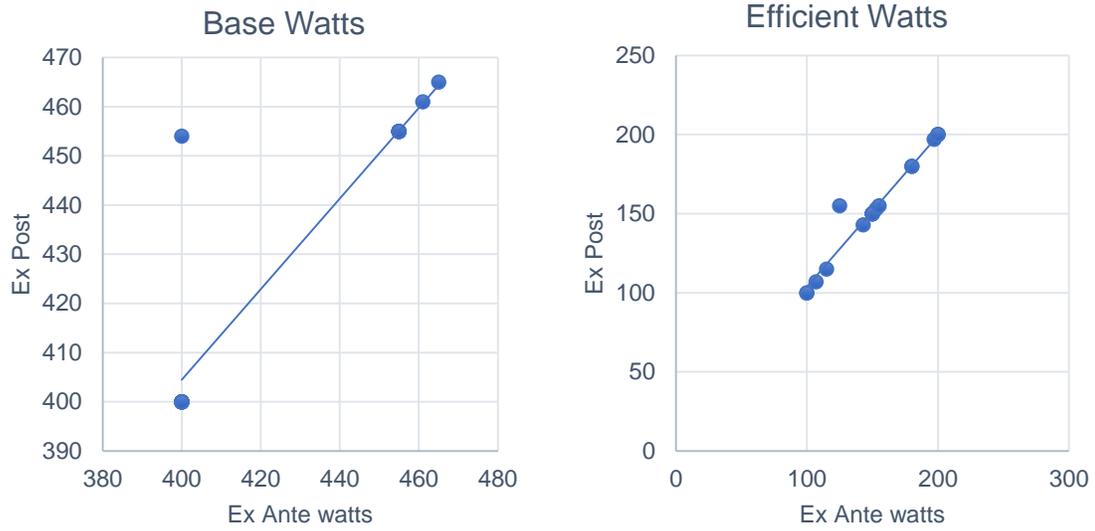


Table 3-16 Measure 305233 Watts

	<i>Ex Ante Base Watts</i>		<i>Ex Post Base Watts</i>			<i>Ex Ante Efficient Watts</i>		<i>Ex Post Efficient Watts</i>	
Mean	422.80		425.50			152.75		154.25	
Min/Max	400	465	400	465		100	200	100	200
Observations	20		20			20		20	
Pearson Correlation	0.91267					0.97854			
t Stat	-1.000					-1.000			

Figure 3-6 Measure 305233 HOU, HCIF

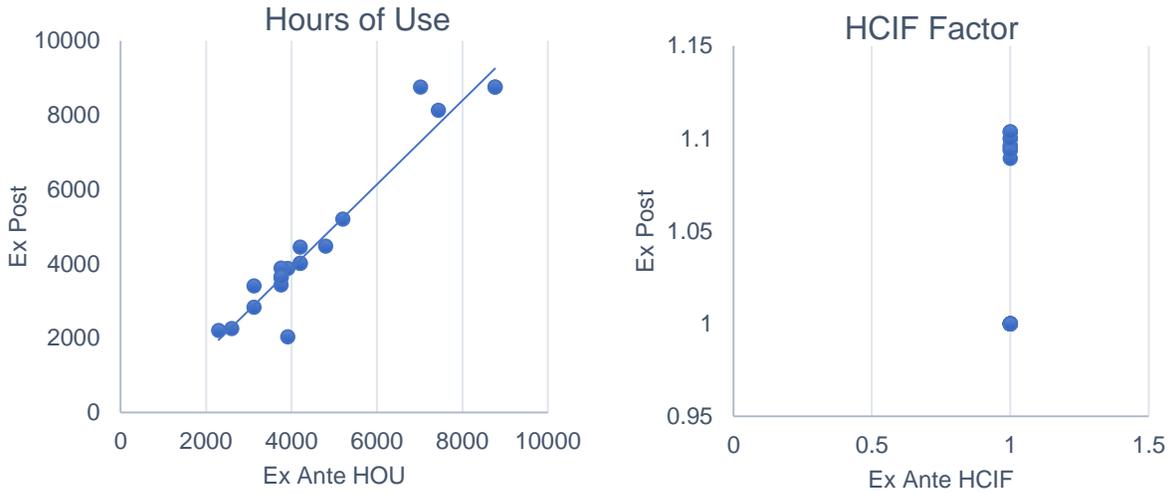


Table 3-17 Measure 305233 HOU, HCIF

	Ex Ante HOU		Ex Post HOU		Ex Ante HCIF		Ex Post HCIF	
Mean	4,615		4,570		1.00		1.05	
Min/Max	2295	8,760	2038	8,760	1.00	1.00	1.00	1.10
Observations	20		20		20		20	
Pearson Correlation	0.96441				NA			
t Stat	0.317				4.807			

3.2.2.3. Observations

The annual per unit kWh savings for measure 305233 LED lamp replacing HID is presented in the following table. The expected range of per unit savings based on the ex post results is 826 to 1465 kWh which contains the TRM value of 1130 kWh.

Table 3-18 Measure 305233 Ex Post and TRM

	TRM Effective 12/16	TRM Effective 12/17	Ex Post kWh
TRM Measure	3005	3005	
Non Zero Samples			20
Annual weighted kWh	1226	1130	1,145.6
Standard deviation per measure			868
Alpha significance level			0.1
Confidence Interval			319.1
Expected Range kWh	1226	1130	826 to 1465

3.2.3. Standard HIM Measure Number 200102: LED Linear Tube Replacing T8

This Standard measure applies to the removal to T8 linear tubes and replacing with LED linear tubes. This measure is similar to the HIM measure 305402, but incentivized in units of feet instead of per lamp. This running change was made in June 2016 along with an application change.

3.2.3.1. Sampling Plan

Summary data regarding the sampling plan is presented in report Volume I. This HIM measure included 42 measure samples across 20 Standard projects. The 3,086,270 kWh from this HIM measure is 10% of the total Standard Program ex ante savings. The sample group of 2,421,743 kWh achieved a precision of 7.2% at 90% confidence level.

3.2.3.2. Results

Figure 3-7 Measure 200102 Quantity

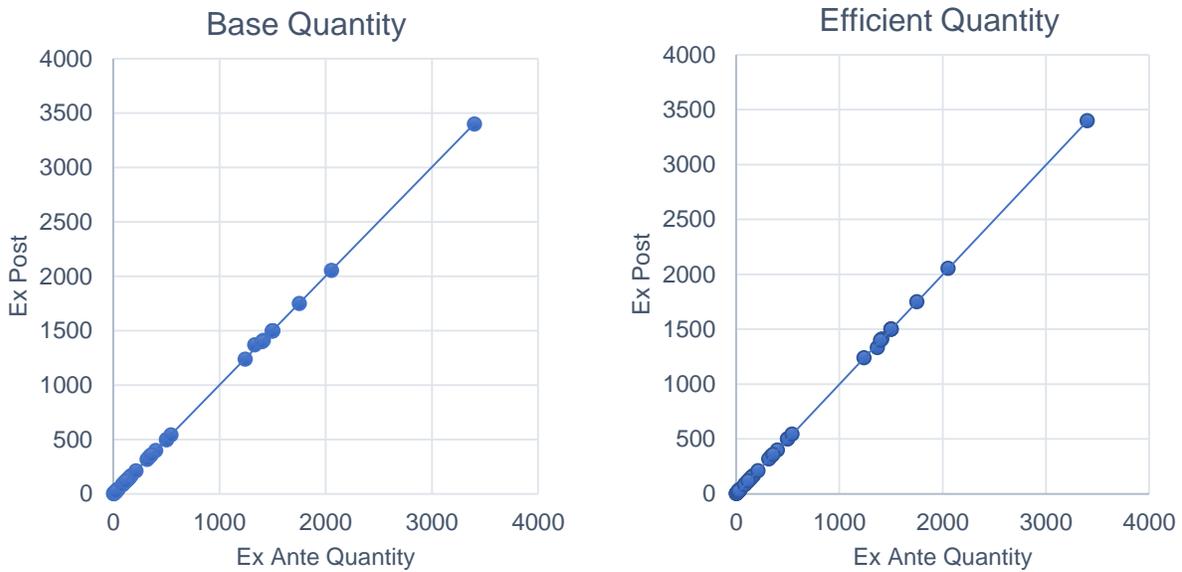


Table 3-19 Measure 200102 Quantity

	<i>Ex Ante Base Quantity</i>		<i>Ex Post Base Quantity</i>		<i>Ex Ante Efficient Quantity</i>		<i>Ex Post Efficient Quantity</i>	
Mean	550.0		549.9		550.8		549.9	
Min/Max	3	3,400	3	3,400	3	3,400	3	3,400
Observations	42		42		42		42	
Pearson Correlation	0.99997				0.99997			

Figure 3-8 Measure 200102 Watts

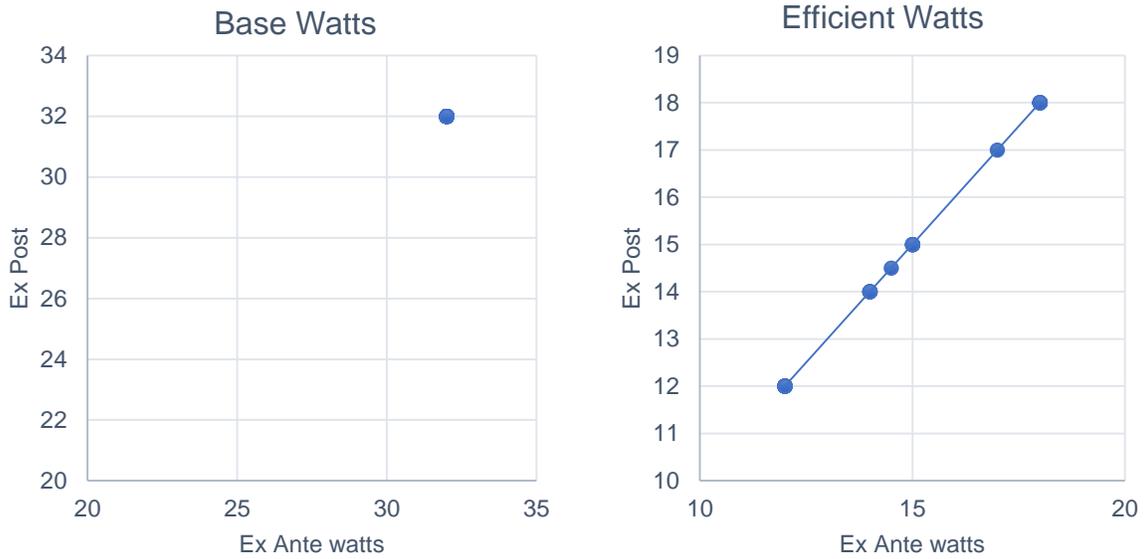


Table 3-20 Measure 200102 Watts

	<i>Ex Ante Base Watts</i>		<i>Ex Post Base Watts</i>		<i>Ex Ante Efficient Watts</i>		<i>Ex Post Efficient Watts</i>	
Mean	32		32		15		15	
Min/Max	32	32	32	32	12	18	12	18
Observations	42		42		42		42	
Pearson Correlation	N/A				1.00000			
t Stat	N/A				N/A			

Figure 3-9 Measure 200102 HOU, HCIF

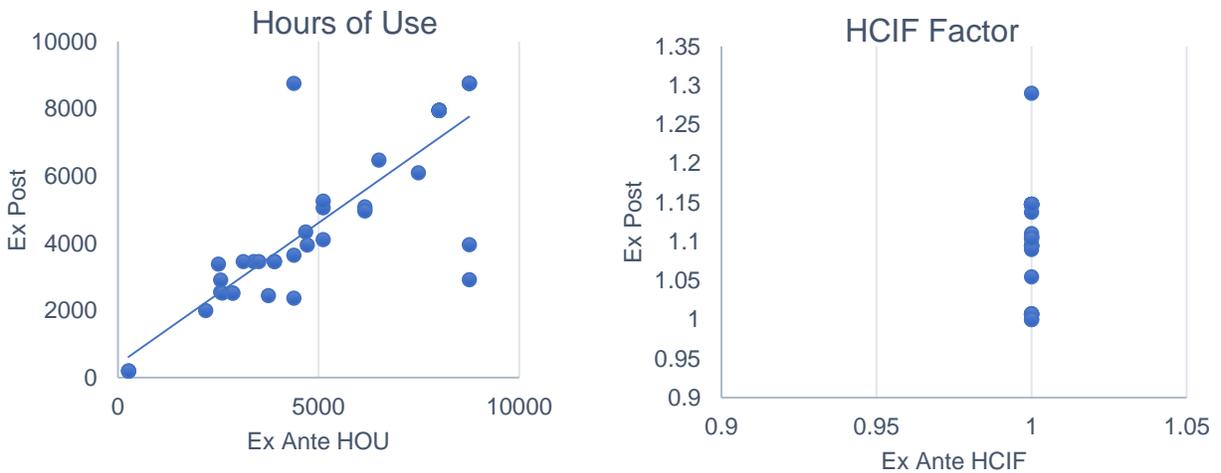


Table 3-21 Measure 200102, HOU, HCIF

	<i>Ex Ante HOU</i>		<i>Ex Post HOU</i>		<i>Ex Ante HCIF</i>		<i>Ex Post HCIF</i>	
Mean	5,204		4,778		1.13		1.1	
Min/Max	260	8,760	204	8,760	1.00	1.00	1.00	1.29
Observations	42		42		42		42	
Pearson Correlation	0.84620				NA			
t Stat	1.926				-9.6			

3.2.3.3. Observations

The measure 200102 Linear LED replacing T8 is presented in the following table. The expected range of 86 to 97 kWh is more than the current TRM value of 54.7kWh

Table 3-22 Measure 200102 Ex Post and TRM

	<i>TRM Effective 12/16</i>	<i>TRM Effective 12/17</i>	<i>Ex Post kWh-As Installed Qty</i>
TRM Measure	3025	3025	
Non Zero Samples			42
Annual kWh	48.6	54.7	97.4
Standard deviation			44
Alpha			0.1
Confidence Interval			11.1
Expected Range kWh	48.6	54.7	86 to 97

3.2.4. Standard HIM Measure Number 201111: LED Screw-in Lamp, <11W

This Standard measure applies to the removal of A-Line lamps that are halogen or equivalent to a halogen rating of lumens per watt and replacing with an A-Line LED lamp, less than 11W.

3.2.4.1. Sampling Plan

Summary data regarding the sampling plan is presented in report Volume I. This HIM measure included 97 measure samples across 76 Standard projects. The 2,739,805 kWh from this HIM measure is 9% of the total Standard Program ex ante savings. The sample group of 916,332 kWh achieved a precision of 10% at 90% confidence level.

3.2.4.2. Results

Figure 3-10 Measure 201111 Quantity

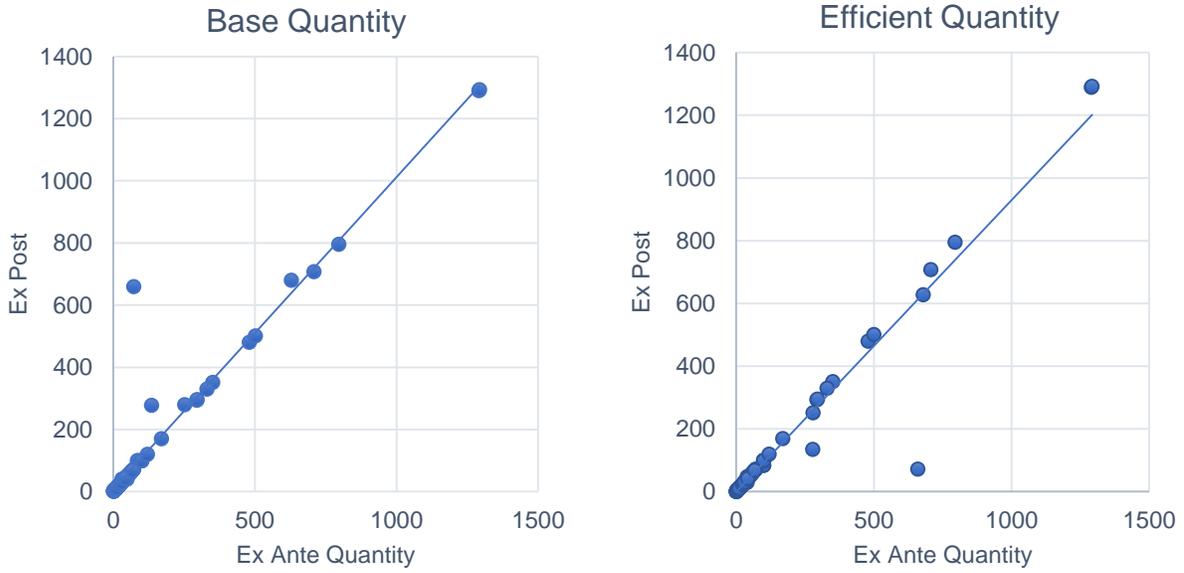


Table 3-23 Measure 200111 Quantity

	<i>Ex Ante Base Quantity</i>		<i>Ex Post Base Quantity</i>		<i>Ex Ante Efficient Quantity</i>		<i>Ex Post Efficient Quantity</i>	
Mean	114.4		105.7		114.4		105.7	
Min/Max	1	1,293	0	1,293	1	1,293	0	1,293
Observations	97		97		97	97	97	
Pearson Correlation	0.96540				0.96540			

Figure 3-11 Measure 200111 Watts

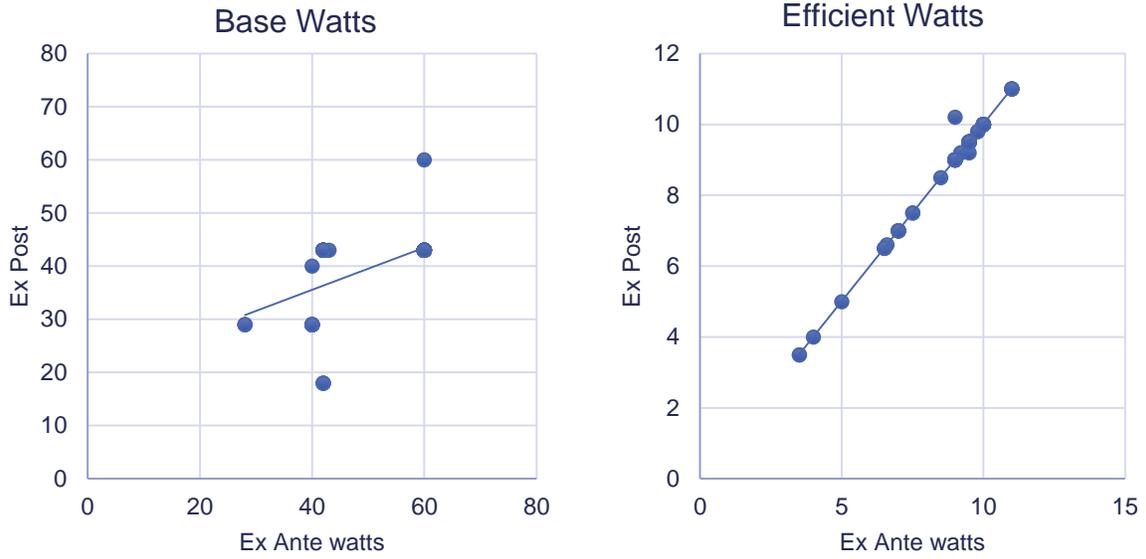


Table 3-24 Measure 200111 Watts

	<i>Ex Ante Base Watts</i>		<i>Ex Post Base Watts</i>		<i>Ex Ante Efficient Watts</i>		<i>Ex Post Efficient Watts</i>	
Mean	52		40		9		9	
Min/Max	28	60	18	60	3.5	11	3.5	11
Observations	97		97		97		97	
Pearson Correlation	0.59925				0.99625			
t Stat	14.854				-0.726			

Figure 3-12 Measure 200111 HOU, HCIF

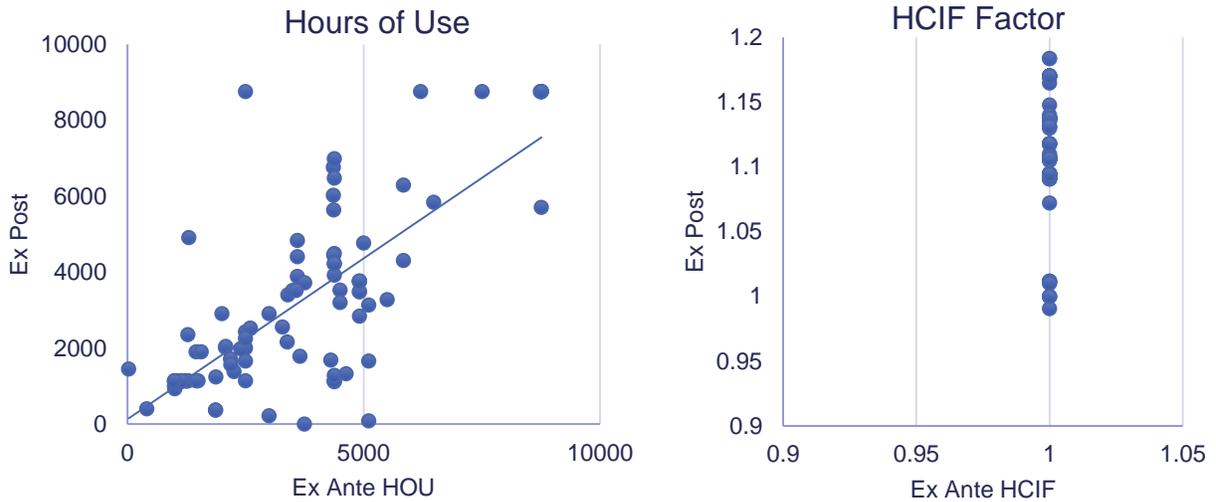


Table 3-25 Measure 200111 HOU, HCIF

	Ex Ante HOU		Ex Post HOU		Ex Ante HCIF		Ex Post HCIF	
Mean	3,486		3,082		1.00		1.11	
Min/Max	29.12	8,760	0	8,760	1.00	1.00	0.99	1.18
Observations	97		97		97		97	
Pearson Correlation	0.75190				NA			
t Stat	2.500				-23.613			

3.2.4.3. Observations

The annual per unit savings for measure 200111 LED Screw in A-Line lamp less than 11W is presented in the following table. The expected range of per unit savings based on ex post results is 73 to 101 kWh, which contains the current TRM value of 85 kWh. Data affirms the current value, no recommendation for change.

Table 3-26 Measure 200111 Ex Post and TRM

	TRM Effective 12/16	Ex Post kWh
TRM Measure	3011	
Non Zero Samples		97
Annual kWh	85	87.0
Standard deviation		84
Alpha significance level		0.1
Confidence Interval		14.1
Expected Range kWh	85	73 to 101

3.2.5. Standard HIM Measure Number 305401: LED Linear Tube Replacing T12

This Standard measure applies to the removal to T12 linear tubes or fixtures and replacing with LED linear tubes or fixtures.

3.2.5.1. Sampling Plan

Summary data regarding the sampling plan is presented in report Volume I. This HIM measure included 60 measure samples across 31 Standard projects. The 1,842,819 kWh from this HIM measure is 6% of the total Standard Program ex ante savings. The sample group of 766,650 kWh achieved a precision of 9.9% at 90% confidence level.

3.2.5.2. Results

Figure 3-13 Measure 305401 Quantity

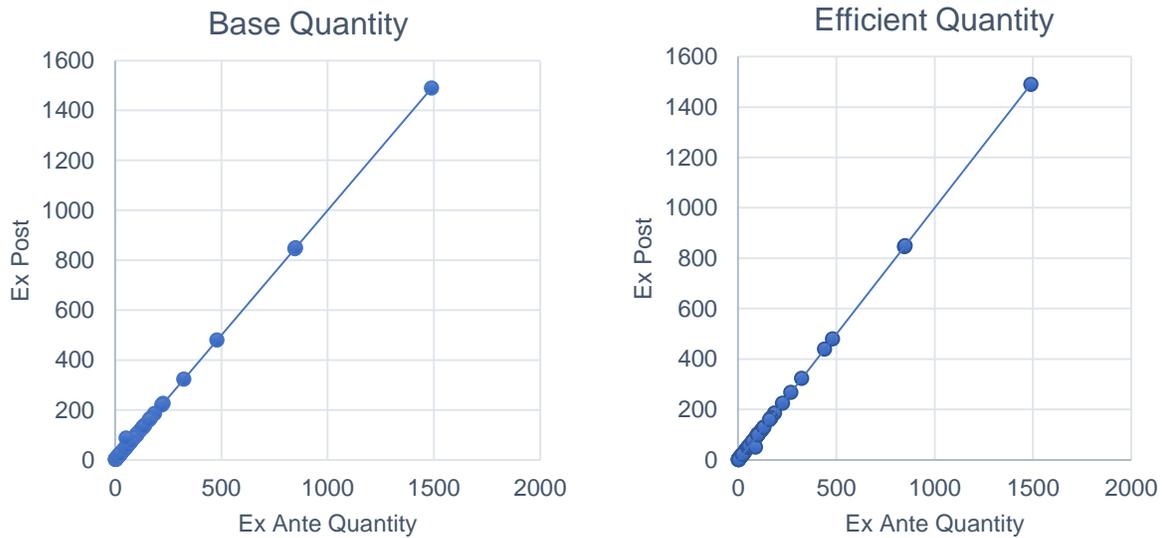


Table 3-27 Measure 305401 Quantity

	<i>Ex Ante Base Quantity</i>		<i>Ex Post Base Quantity</i>		<i>Ex Ante Efficient Quantity</i>		<i>Ex Post Efficient Quantity</i>	
Mean	119.4		118.8		47.2		47.2	
Min/Max	2	1,490	2	1,490	2	1,490	2	1,490
Observations	60		60		60	60	60	
Pearson Correlation	0.99982				1.00000			

Figure 3-14 Measure 305401 Watts

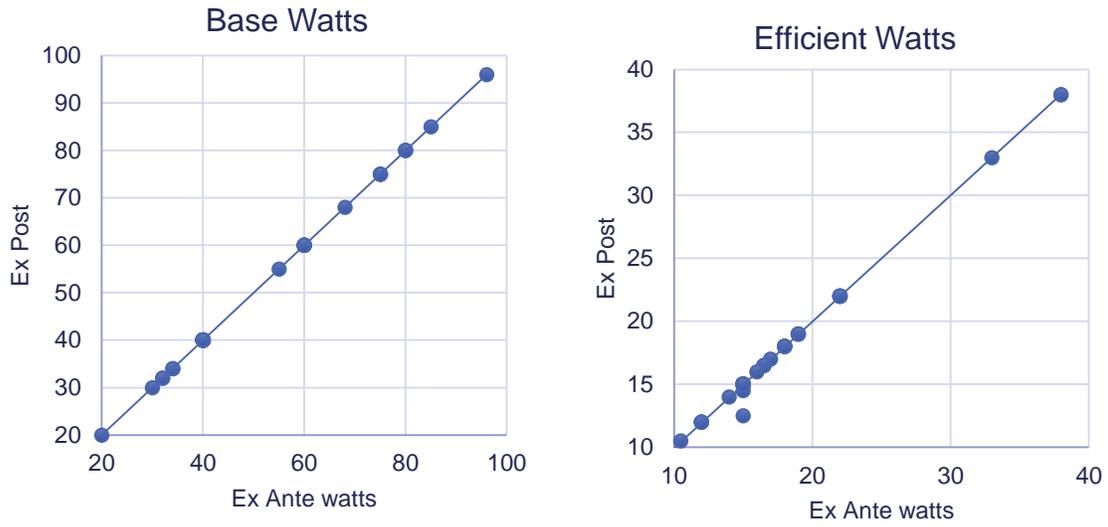


Table 3-28 Measure 305401 Watts

	<i>Ex Ante Base Watts</i>		<i>Ex Post Base Watts</i>			<i>Ex Ante Efficient Watts</i>		<i>Ex Post Efficient Watts</i>	
Mean	47		47			17		17	
Min/Max	20	96	20	96		8	38	8	38
Observations	60		60			60		60	
Pearson Correlation	1.00000					0.99822			
t Stat	N/A					1.181			

Figure 3-15 Measure 305401 HOU, HCIF

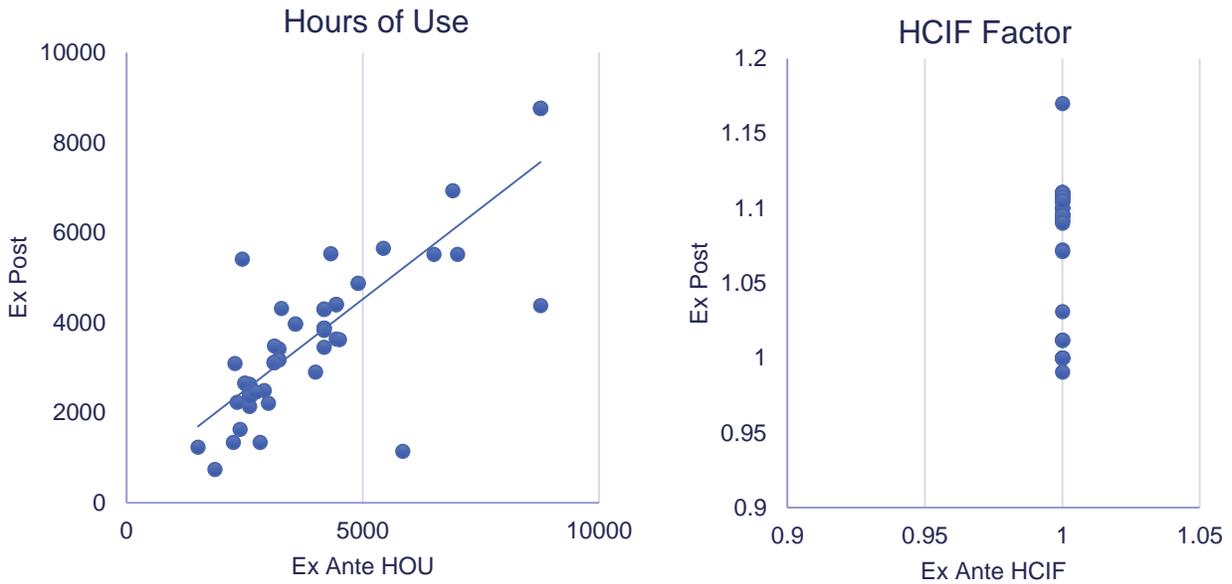


Table 3-29 Measure 305401HOU, HCIF

	Ex Ante HOU		Ex Post HOU		Ex Ante HCIF		Ex Post HCIF	
Mean	3,897		3,629		1.00		1.08	
Min/Max	1512	8,760	740	8,760	1.00	1.00	0.99	1.17
Observations	60		60		60		60	
Pearson Correlation	0.82546				NA			
t Stat	2.019				-15.513			

3.2.5.3. Observations

The annual per unit kWh savings for measure 305401 LED linear tube replacing T12 is presented in the following table. The expected range of per unit savings based on ex post results is 71 to 144 kWh, which is more than the current TRM value of 54.7 kWh.

Table 3-30 Measure 305401 Ex Post and TRM

	TRM Effective 12/16	Ex Post kWh
TRM Measure	3026	
Non Zero Samples		60
Annual weighted kWh	54.7	107.4
Standard deviation per measure		171
Alpha significance		0.1
Confidence Interval		36.3
Expected Range kWh	54.7	71 to 144

3.2.6. SBDI HIM Measure Number 200909: LED Screw-in BR/R, <14W

This SBDI measure applies to the removal of halogen BR/R style reflector lamp 45 to 66W and replacing with a LED screw in lamp less than 14W.

3.2.6.1. Sampling Plan

Summary data regarding the sampling plan is presented in report Volume I. This HIM measure included 77 measure samples across 60 SBDI projects. The 885,700 kWh from this HIM measure is 37% of the total SBDI Program ex ante savings. The sample group of 236,116 kWh achieved a precision of 9.2% at 90% confidence level

3.2.6.2. Results

Figure 3-16 Measure 200909 Quantity

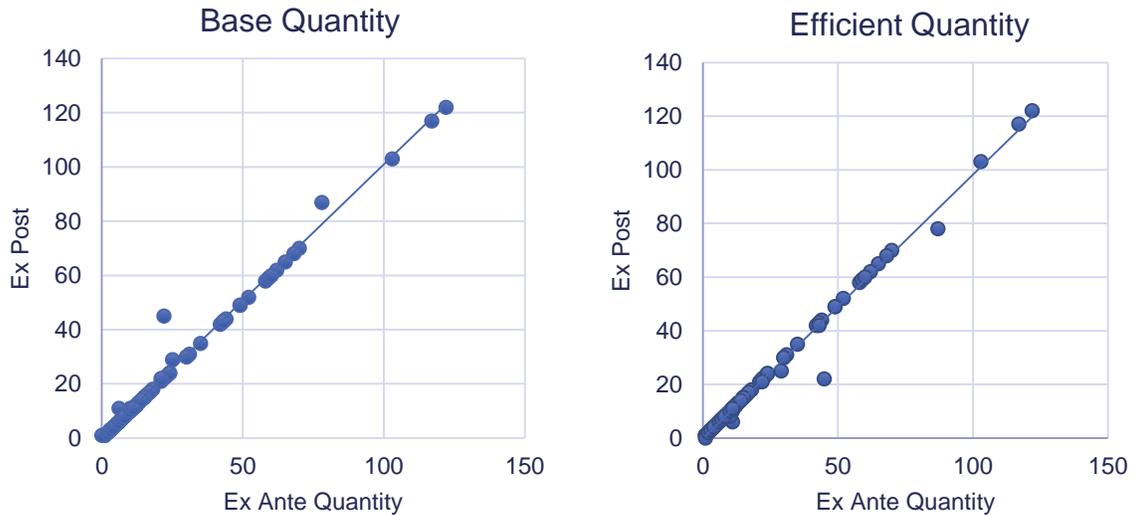


Table 3-31 Measure 200909 Quantity

	<i>Ex Ante Base Quantity</i>		<i>Ex Post Base Quantity</i>		<i>Ex Ante Efficient Quantity</i>		<i>Ex Post Efficient Quantity</i>	
Mean	25.1		24.5		25.1		24.5	
Min/Max	1	122	0	122	1	122	0	122
Observations	77		77		77	77	77	
Pearson Correlation	0.99436				0.99434			

Figure 3-17 Measure 200909 Watts

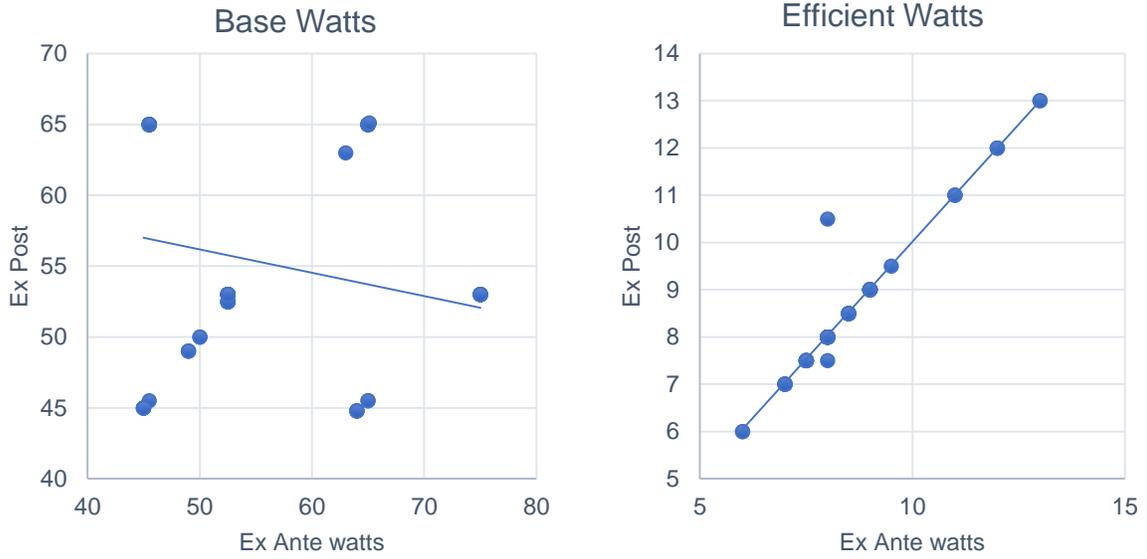


Table 3-32 Mesure 200909 Watts

	<i>Ex Ante Base Watts</i>		<i>Ex Post Base Watts</i>		<i>Ex Ante Efficient Watts</i>		<i>Ex Post Efficient Watts</i>	
Mean	56		55		8		9	
Min/Max	45	75	15	65.1	6	13	6	13
Observations	77		77		77		77	
Pearson Correlation	-0.19748				0.97803			
t Stat	0.591				-0.782			

Figure 3-18 Measure 200909 HOU, HCIF

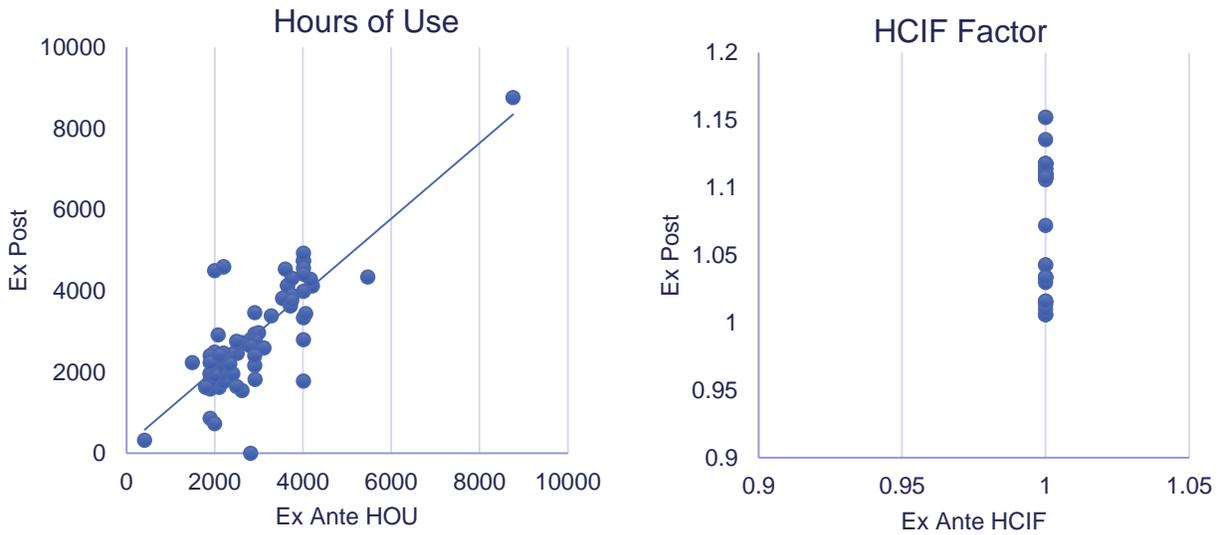


Table 3-33 Measure 200909 HOU, HCIF

	Ex Ante HOU		Ex Post HOU		Ex Ante HCIF		Ex Post HCIF	
Mean	2,855		2,851		1.00		1.09	
Min/Max	416	8,760	0	8,760	1.00	1.00	0.90	1.15
Observations	77		77		77		77	
Pearson Correlation	0.79283				NA			
t Stat	0.048				-15.051			

3.2.6.3. Observations

The annual per unit kWh savings for measure 200909 LED Screw in BR/R lamp less than 14W is presented in the following table. The expected range of per unit savings based on ex post results is 141 to 170 kWh, which is less than the current TRM value of 181 kWh.

Table 3-34 Measure 200909 Ex Post and TRM

	TRM Effective 12/16	TRM Effective 12/17	Ex Post kWh
TRM Measure	3007	3007	
Non Zero Samples			77
Annual weighted kWh	195.9	181.3	155.5
Standard deviation per measure			77
Alpha significance level			0.1
Confidence Interval			14.4
Expected Range kWh	195.9	181.3	141 to 170

3.2.7. SBDI HIM Measure Number 301132: LED A-Line Lamp, 7-20W

This SBDI measure applies to the removal of halogen A-line lamp 53 to 70W and replacing with a LED screw in lamp from 7 to 20W.

3.2.7.1. Sampling Plan

Summary data regarding the sampling plan is presented in report Volume I. This HIM measure included 35 measure samples across 34 SBDI projects. The 597,109 kWh from this HIM measure is 25% of the total SBDI Program ex ante savings. The sample group of 104,778 kWh has not reached significance yet with 15% precision at 90% confidence level

3.2.7.2. Results

Figure 3-19 Measure 301132 Quantity

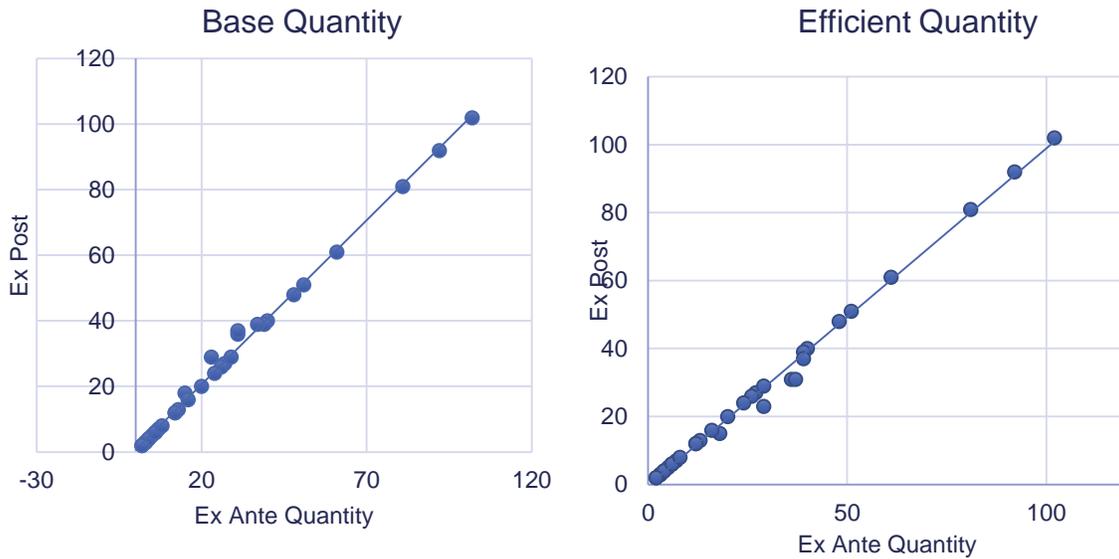


Table 3-35 Measure 301132 Quantity

	Ex Ante Base Quantity		Ex Post Base Quantity		Ex Ante Efficient Quantity		Ex Post Efficient Quantity	
Mean	26.0		25.4		26.0		25.4	
Min/Max	2	102	2	102	2	102	2	102
Observations	35		35		35		35	
Pearson Correlation	0.99791				0.99791			

Figure 3-20 Measure 301132 Watts

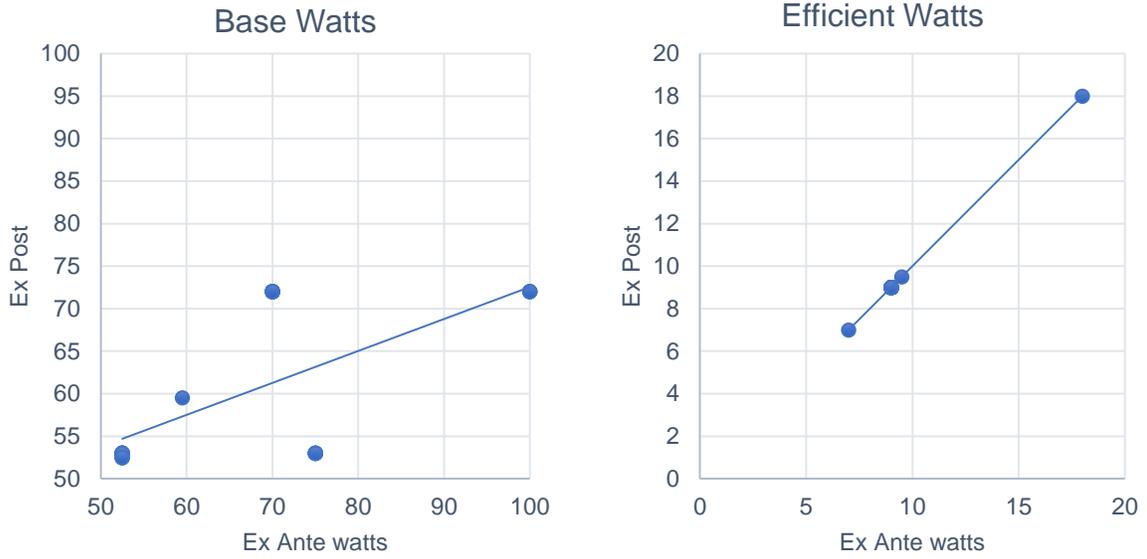


Table 3-36 Measure 301132 Watts

	<i>Ex Ante Base Watts</i>		<i>Ex Post Base Watts</i>		<i>Ex Ante Efficient Watts</i>		<i>Ex Post Efficient Watts</i>	
Mean	67		60		9		9	
Min/Max	52.5	100	52.5	72	7	18	7	18
Observations	35		35		35		35	
Pearson Correlation	0.61708				1.00000			
t Stat	3.421				N/A			

Figure 3-21 Measure 301132 HOU, HCIF

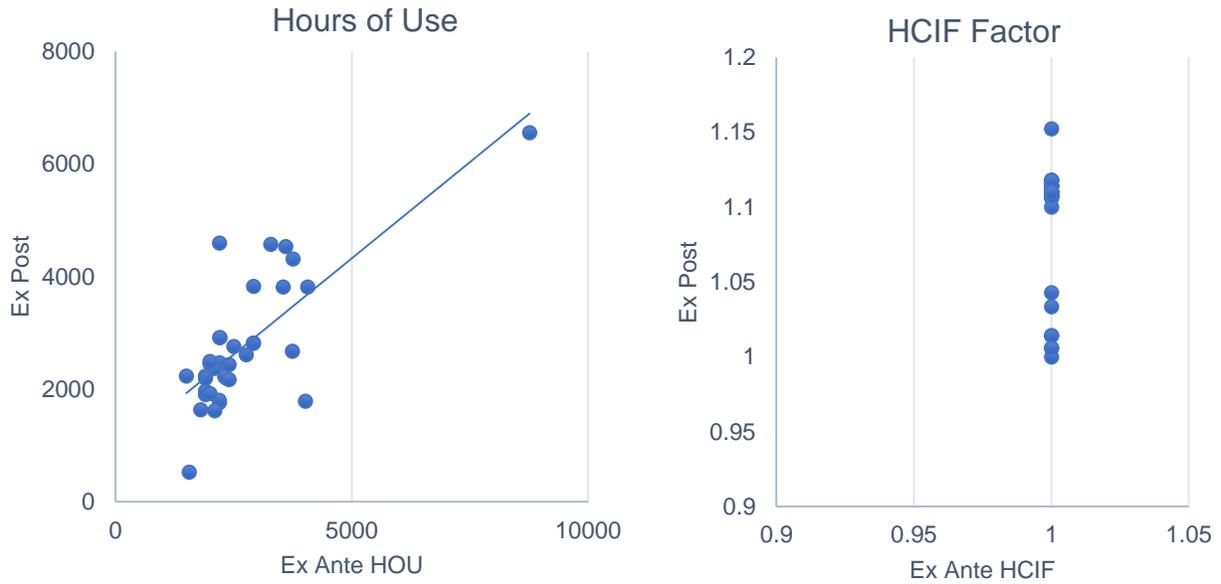


Table 3-37 Measure 301132 HOU, HCIF

	Ex Ante HOU		Ex Post HOU		Ex Ante HCIF		Ex Post HCIF	
Mean	2,688		2,741		1.00		1.09	
Min/Max	1500	8,760	528	6,558	1.00	1.00	1.00	1.15
Observations	35		35		35		35	
Pearson Correlation	0.75711				NA			
t Stat	-0.369				-13.728			

3.2.7.3. Observations

The annual per unit kWh savings for measure 301132 LED A-Line lamp 7 to 20W is presented in the following table. The expected range of per unit savings based on ex post results is 120 to 155 kWh, which is inclusive of the TRM value at 148 kWh.

Table 3-38 Measure 301132 Ex Post and TRM

	TRM Effective 12/16	Ex Post kWh
TRM Measure	3009	
Non Zero Samples		35
Annual weighted kWh	148.8	137.4
Standard deviation per measure		63
Alpha significance		0.1
Confidence Interval		17.4
Expected Range kWh	148.8	120 to 155

4. Staff and Implementer Interview Guides

Ameren Invoice Review & Audit - Staff In-Depth Interview Guide

Roles & Responsibilities

- Q1. Let's start with a bit about you. Can you please confirm your current job title? [*Insert job title here for confirmation*]
- Q2. Have your job title or responsibilities regarding the BizSavers program changed since last time we spoke? If so, how?
- Q3. About how much of your time is devoted to the Ameren Missouri BizSavers program?
- Q4. And are your job responsibilities the same for all the BizSavers programs, including EMS and SBDI? If not, which ones do they not cover? Who is responsible for those?

Invoice Review and Auditing

Now, I'd like to hear about invoice review and auditing.

[In all questions, probe as appropriate about the EMS and SBDI]

- Q5. First, please briefly describe your activities relating to the BizSavers program. [*Probe about reports received*]
- Q6. Who do you interact with, both at Ameren and Lockheed, in your invoice review and auditing function?
- Q7. Is the level and type of interaction sufficient? If not, in what way is it insufficient? What should be changed?
- Q8. What kinds of invoice issues, if any, have you identified through your review and audit activities? [*Probe: How about invoices for the new EMS and SBDI? Any issues there?*]
- Q9. What happens when you identify such issues? Who do you report them to and how do you report them?
- Q10. What kinds of corrective measures are taken? Have those measures been effective?
- Q11. In general, what do you think should be done, if anything, to improve communication between Ameren and Lockheed staff?

Conclusion

Q12. Is there anything that you would like to see changed in how Lockheed is implementing the program?

Q13. Is there anything else about the program that we have not discussed that you feel should be mentioned?

Q14. What would you like to learn from the program evaluation?

Those are all of my questions. Thank you very much for your time

Ameren Program Manager - Staff In-Depth Interview Guide

Roles & Responsibilities

Q1. Let's start with a bit about you. Can you please confirm your current job title? [Insert job title here for confirmation]

Q2. Have your job title or responsibilities regarding the BizSavers program changed since last time we spoke? If so, how?

Q3. About how much of your time is devoted to the Ameren Missouri BizSavers program?

Q4. And are your job responsibilities the same for all of the BizSavers programs, including EMS and SBDI? If not, which ones do they not cover? Who is responsible for those?

Q5. What changes have there been, if any, at Ameren in staffing, responsibilities, or the reporting structure since we last spoke?

Q6. What changes have there been, if any, in who you interact with at Ameren relating to the BizSavers programs? [*If needed: For example, any changes relating to KAEs or CSAs*]

Q7. Are there any other planned changes in staffing, responsibilities, or reporting structure? If so, what are they?

Q8. Do you think the current staffing levels are sufficient for supporting the administration and oversight needs of the program?

Program Changes

I'd like to learn a little about recent program changes, particularly the introduction of the new SBDI and EMS offerings.

- Q9. What led to the decision to introduce the new EMS offering? [*Probes: Who proposed it? How did Ameren/Lockheed determine that it would provide cost-effective savings? How did Ameren/Lockheed settle on the incentives and rules?*]
- Q10. How well is EMS designed to meet its goals? Why do you say that?
- Q11. What barriers, if any, do you see to the success of EMS?
- Q12. What might be done to address those barriers?
- Q13. So far, how has the roll-out fit with your expectations? [*Probes: Is uptake as expected? How much higher or lower?*]
- [*If roll-out does not fit expectations, ask Q14 to Q16*]
- Q14. What adjustments, if any, do you think need to be made?
- Q15. Have you discussed adjustments with Lockheed? If so, what did you discuss and how did that go?
- Q16. Is EMS getting the support it needs from other Ameren staff? If not, what additional support is needed and who is it needed from?
- Q17. And please tell me how the SBDI Program works.
- Q18. The SBDI Participation Overview document states that “SBDI incentives are capped at \$2,500 *per account*” for the current program period but that “total incentives across all programs shall be capped at \$3,000,000 *per customer*” for the program period. I understand that the first statement refers to the cap specific to SBDI incentives and the second refers to the cap for incentives across all programs, but I also would like to know what the distinction here is, if any, between an account and a customer.
- Q19. And tell me about how SBDI was developed. [*Probes: Who proposed it? How did Ameren/Lockheed determine that it would provide cost-effective savings? How did Ameren/Lockheed settle on the incentives and rules?*]
- Q20. How well is SBDI designed to meet its goals? Why do you say that?
- Q21. What barriers, if any, do you see to the success of SBDI?
- Q22. What might be done to address those barriers?
- Q23. As of early November, there were 53 projects completed in the program. How does that fit with your expectations?
- [*If concerns about participation, ask Q24 to Q26*]
- Q24. What adjustments, if any, do you think need to be made?
- Q25. Have you discussed adjustments with Lockheed? If so, what did you discuss and how did that go?

Q26. Nearly 90% of the projects done by early November were done by the same SBDI Service Provider. Is that a concern to you?

[If concerns about contractor activity, ask Q27 and Q28]

Q27. What adjustments, if any, do you think need to be made?

Q28. Have you discussed adjustments with Lockheed? If so, what did you discuss and how did that go?

Q29. Is SBDI getting the support it needs from other Ameren staff? If not, what additional support is needed and who is it needed from?

Program Progress

Let's talk about program goals and progress.

Q30. So far, how are the other program elements – i.e., not SBDI and EMS – doing relative to goals? *[Probe about savings goals, project completions, pipeline, achievement of non-lighting savings.]*

[If not doing well, ask Q31]

Q31. What might the program do to improve progress toward goals?

Q32. Aside from the EMS and SBDI Programs, what measures been added or modified in the past year, if any? *[Probe about reasons and uptake. Were these new prescriptive measures?]*

Marketing and Outreach

[For all questions, probe about EMS and SBDI]

Now, just a couple of questions about the current status of marketing and outreach activities for the program.

Q33. Please briefly review how program marketing is coordinated between Ameren and Lockheed – specifically, which company is responsible for what activities and how they work together. *[Probe: Does Ameren conduct any program marketing independent of Lockheed? If so, what?]*

Q34. How have Lockheed Martin's program marketing and outreach efforts in the current program year fit with your expectations? *[Probe: What are they doing well? In what ways, if any, do they fall short of expectations?]*

Q35. From your perspective, how well is Lockheed Martin recruiting and managing trade allies or other program partners?

Q36. Lockheed recently moved the person who had been the TA Coordinator to another position and is currently recruiting a new TA Coordinator. Do you have any insights into why Lockheed is making that change?

[If concerns are noted about TA recruitment/management, ask Q37]

- Q37. What is being done about those concerns? What else should be done? *[Probe about the various aspects of managing TAs – recruiting, training, keeping them informed, maintaining a TA list on the website.]*
- Q38. Lockheed, on behalf of Ameren Missouri, sent out an email about the Missouri Division of Energy's Energy Loan Program. Who all did Lockheed send this email to? (Probe: TAN members, non-TAN contractors, program participants, non-participating customers, etc.)
- Q39. Is Ameren Missouri or the BizSavers program marketing the Energy Loan Program in any other way besides this email blast?
- Q40. Is Ameren Missouri or the BizSavers program coordinating in any other way with the Missouri Division of Energy or the Energy Loan Program?
- Q41. Will Ameren Missouri or the BizSavers program track which program participants do and do not apply for and receive funding through the Energy Loan Program?

Communication

Next I'd like to hear briefly about how communication processes are working both within Ameren and between Ameren and Lockheed.

[In all questions, probe about EMS and SBDI]

- Q42. How has communication been among Ameren staff regarding the BizSavers program, including the new EMS and SBDI offerings? *[Probe about any changes in frequency or type of meeting.]*

[If issues identified, ask Q43]

- Q43. What do you think should be done to improve communication among Ameren staff?
- Q44. And how has communication been between Ameren and Lockheed staff? *[Probe about: Frequency and type of reports and meetings, monthly meetings/webinars with KAEs and CSAs, LM reports to CSAs about projects in their territory, Ameren keeping LM informed on key accounts, LM presentations to Ameren.]*

[If issues identified, ask Q45 and Q46]

- Q45. What do you think should be done to improve communication between Ameren and Lockheed staff?
- Q46. Have you discussed this with Lockheed? If so, how did that go?

Tracking, Reporting, QA/QC

Next, I'd also like to hear about tracking, reporting, and QA/QC.

- Q47. How well is the current tracking and reporting process working to meet your needs? [*Probe about additional reports or information that would be useful.*]
- Q48. What tracking and reporting changes were made, if any, this program year? How have those worked out?
- Q49. From your perspective, how is Lockheed doing with program QA/QC? [*Probe about any problems or challenges identified*]

[*If problems or challenges identified, ask:*]

- Q50. What has been done to address those issues? What else needs to be done?

Conclusion

- Q51. Is there anything that you would like to see changed in how Lockheed is implementing the program?
- Q52. Is there anything else about the program that we have not discussed that you feel should be mentioned?
- Q53. What would you like to learn from the program evaluation?

Those are all of my questions. Thank you very much for your time.

Lockheed Martin Business Development Lead - Implementer In-Depth Interview Guide

Roles & Responsibilities

- Q1. Let's start with a bit about you. Can you please confirm your current job title? [Insert job title here for confirmation]
- Q2. Have your job title or responsibilities regarding the BizSavers program changed since last time we spoke? If so, how?
- Q3. About how much of your time is devoted to the Ameren Missouri BizSavers program?
- Q4. And are your job responsibilities the same for all of the BizSavers programs, including EMS and SBDI? If not, which ones do they not cover? Who is responsible for those?
- Q5. What changes have there been, if any, in who you or other Lockheed staff interact with at Ameren relating to the BizSavers programs? [*If needed: For example, any changes relating to KAEs or CSAs*]

Business Development

[*In all questions, probe about SBDI and EMS*]

- Q6. Can you update me on the effort to identify and conduct outreach with customer “towers”? [*“Towers” are large (> 2M kWh) customers with many locations – e.g., McD, schools, airport. Probe about other possible usage - e.g., compressed air companies and the customers they service.*]
- Q7. How, if at all, does the development and use of customer towers for outreach related to identifying and recruiting participants in SBDI?
- Q8. Any other updates on efforts to reach small and medium-sized businesses? [*Probe about efforts to work with TAs to target small biz.*]
- Q9. What changes, if any, have been made to the BizSavers Solutions electronic newsletters? [*Find out who it is sent to and how often.*]
- Q10. Please update me on outreach in outlying areas, including any role that Ameren staff are playing.
- Q11. What other changes have been made, or are planned, for business development during this program year? [*Probe about reason for changes, how the efforts are going.*]
- Q12. Overall, what’s your perspective about how well the program’s business development strategies have been working this past year? [*Probe about: Activities specific to each strategies? How M&O effectiveness differs by: Program, Participant type, and TA type?*]
- Q13. What challenges, if any, do you see to expanding market penetration?
- Q14. [If any challenges:] What could the program do to overcome those challenges? What is preventing the program from implementing these changes?

Communication

Next I'd like to hear briefly about how communication processes are working between and within staff at Ameren Missouri and Lockheed.

[*In all questions, probe about EMS and SBDI*]

- Q15. I'd like to start by reviewing how you communicate with other Lockheed staff and with Ameren about the program:

Regular meetings – when, where, how, with whom:

Other communication:

- Q16. How has communication been among Lockheed staff regarding the BizSavers program? [*Probe about any changes in frequency or type of meeting.*]

[*If issues identified, ask Q17*]

Q17. What do you think should be done to improve communication among Lockheed staff?

Q18. And how has communication been *between Lockheed and Ameren* staff? [*Probe about: Frequency and type of reports and meetings, monthly meetings/webinars with KAEs and CSAs, LM reports to CSAs about projects in their territory, Ameren keeping LM informed on key accounts, LM presentations to Ameren.*]

[*If issues identified, ask Q19*]

Q19. What do you think should be done to improve communication between Lockheed and Ameren staff?

Tracking & Reporting

Next, I'd also like to hear about tracking and reporting.

Q20. From your perspective, how well is the current tracking and reporting process working? [*Probe about additional reports or information that would be useful.*]

Conclusion

Q21. Is there anything that you would like to see changed in program offerings in the future?

Q22. Is there anything else about the program that we have not discussed that you feel should be mentioned?

Q23. What would you like to learn from the program evaluation?

Those are all of my questions. Thank you very much for your time.

Lockheed Martin Marketing Lead - Implementer In-Depth Interview Guide

Roles & Responsibilities

Q1. Let's start with a bit about you. Can you please confirm your current job title? [Insert job title here for confirmation]

Q2. Have your job title or responsibilities regarding the BizSavers program changed since last time we spoke? If so, how?

Q3. About how much of your time is devoted to the Ameren Missouri BizSavers program?

Q4. And are your job responsibilities the same for all of the BizSavers programs, including EMS and SBDI? If not, which ones do they not cover? Who is responsible for those?

Q5. What changes have there been, if any, in who you or other Lockheed staff interact with at Ameren relating to the BizSavers programs? *[If needed: For example, any changes relating to KAEs or CSAs]*

Marketing and Outreach

Now, I'd like to hear about the status of marketing activities for the program, including those for the EMS and SBDI offerings.

[Interviewer should review and have available the monthly marketing summaries]

[In all questions, probe about SBDI and EMS]

Q6. Let's start with marketing materials. What marketing materials are currently being distributed? May I get copies?

Q7. Also, what are the strategies for getting those materials into the hands of customers and TAs? How, when, and where are they being distributed?

Q8. The BizSavers Monthly Summary for September talked about finalizing design changes to collateral, including for the SBDI Customer Brochure and Handbook, the BizSavers Program Overview Trifold, and the Ameren Pocket Folder. Does this mean those things have not yet been distributed?

Q9. The September Monthly Summary also refers to a flyer on TLED incentives being circulated by BDs, CDAs, and KAEs. Do you know how many have been circulated so far? Is there some way I can find out?

Q10. Please update me on direct mail activities.

[Probes:

Is this all email or is there postal mail?

The BizSavers Monthly Summary summarizes the email campaign to TAs. Does direct mail also go to customers? If so, please tell me about that.

Q11. Do you expect this program year's community outreach activities to be similar to those for previous program years? If not, how are they expected to differ? Why? *[Probe about any new associations they plan to include in outreach]*

Q12. Do you have a list of planned community outreach events for the current program year? If so, may I have it?

Q13. Please update me on the plans for using video case studies, social media, media kits, and so forth.

Q14. What are the plans for program cross-marketing?

- Q15. And what are the plans for using market segmentation in marketing? [*The Program Template references marketing segmentation to include “hospitality/lodging, grocery/convenience, etc.”*]
- Q16. I’ll be talking with Kristin McKee, who I understand oversees the TA Coordinator position, but is there anything you can tell me about TA training & education?
- Q17. What changes have been made to the program website, if any, in the past year? How are those working out?
- Q18. What other changes have been made, or are planned, for marketing and outreach during this program year? [*Probe about reason for changes, how the efforts are going.*]
- Q19. Overall, what’s your perspective about how well the program’s marketing and outreach strategies have been working this past year? [*Probe about: Activities specific to each strategies? How M&O effectiveness differs by: Program, Participant type, and TA type?*]
- Q20. What challenges, if any, do you see to expanding market penetration?
- Q21. [If any challenges:] What could the program do to overcome those challenges? What is preventing the program from implementing these changes?

Communication

Next I'd like to hear briefly about how communication processes are working between and within staff at Ameren Missouri and Lockheed.

[*In all questions, probe about EMS and SBDI*]

- Q22. I’d like to start by reviewing how you communicate with other Lockheed staff and with Ameren about the program:

Regular meetings – when, where, how, with whom:

Other communication:

- Q23. How has communication been among Lockheed staff regarding the BizSavers program? [*Probe about any changes in frequency or type of meeting.*]

[*If issues identified, ask Q24*]

- Q24. What do you think should be done to improve communication among Lockheed staff?
- Q25. And how has communication been between Lockheed and Ameren staff? [*Probe about: Frequency and type of reports and meetings, monthly meetings/webinars with KAEs and CSAs, LM reports to CSAs about projects in their territory, Ameren keeping LM informed on key accounts, LM presentations to Ameren.*]

[If issues identified, ask Q26]

Q26. What do you think should be done to improve communication between Lockheed and Ameren staff?

Tracking & Reporting

Next, I'd also like to hear about tracking and reporting.

Q27. From your perspective, how well is the current tracking and reporting process working? [*Probe about additional reports or information that would be useful.*]

Conclusion

Q28. Is there anything that you would like to see changed in program offerings in the future?

Q29. Is there anything else about the program that we have not discussed that you feel should be mentioned?

Q30. What would you like to learn from the program evaluation?

Those are all of my questions. Thank you very much for your time.

Lockheed Martin Operations and Engineering Leads - Implementer In-Depth Interview Guide

Roles & Responsibilities

Q1. Let's start with a bit about you. Can you please confirm your current job title? [Insert job title here for confirmation]

Q2. Have your job title or responsibilities regarding the BizSavers program changed since last time we spoke? If so, how?

Q3. About how much of your time is devoted to the Ameren Missouri BizSavers program?

Q4. And are your job responsibilities the same for all of the BizSavers programs, including EMS and SBDI? If not, which ones do they not cover? Who is responsible for those?

Q5. What changes have there been, if any, in who you or other Lockheed staff interact with at Ameren relating to the BizSavers programs? [*If needed: For example, any changes relating to KARs or CSAs*]

EMS Pilot

Q6. From your perspective, how well is the roll-out of EMS working?

- Q7. Are you getting the support you need from both Lockheed and Ameren? If not, what additional support do you need? [*Probe about CSAs and KARs – Do they understand and promote the EMS measure? Do they need additional training?*]
- Q8. From what you've seen so far, what changes, if any, to the EMS offering are needed?
- Q9. Have you discussed those changes with anyone else? If so, who? What is the outcome of those discussions?

Measures

- Q10. Regarding the continuing parts of the program – Custom, Standard, New Construction, and RCx – what measures been added or modified in the past year, if any? [*Probe about reasons and uptake. Were these new prescriptive measures?*]
- Q11. Do any other measures need to be added or modified?
- Q12. Have you discussed those possible additions or modifications with anyone else? If so, who? What is the outcome of those discussions?

Communication

Next I'd like to hear briefly about how communication processes are working between and within staff at Ameren Missouri and Lockheed.

[*In all questions, probe about EMS and SBDI*]

- Q13. I'd like to start by reviewing how you communicate with other Lockheed staff and with Ameren about the program:

Regular meetings – when, where, how, with whom:

Other communication:

- Q14. How has communication been among Lockheed staff regarding the BizSavers program? [*Probe about any changes in frequency or type of meeting.*]

[*If issues identified, ask Q18*]

- Q15. What do you think should be done to improve communication among Lockheed staff?

- Q16. And how has communication been *between Lockheed and Ameren* staff? [*Probe about: Frequency and type of reports and meetings, monthly meetings/webinars with KARs and CSAs, LM reports to CSAs about projects in their territory, Ameren keeping LM informed on key accounts, LM presentations to Ameren.*]

[*If issues identified, ask Q20 and Q21*]

- Q17. What do you think should be done to improve communication between Lockheed and Ameren staff?

Tracking & Reporting

Next, I'd also like to hear about tracking and reporting.

- Q18. From your perspective, how well is the current tracking and reporting process working? [*Probe about additional reports or information that would be useful.*]
- Q19. What tracking and reporting changes were made, if any, this program year? How have those worked out?
- Q20. What changes have been made, if any, to QA/QC procedures?

Conclusion

- Q21. Is there anything that you would like to see changed in program offerings in the future?
- Q22. Is there anything else about the program that we have not discussed that you feel should be mentioned?
- Q23. What would you like to learn from the program evaluation?

Those are all of my questions. Thank you very much for your time.

Lockheed Martin Program Manager - Implementer In-Depth Interview Guide

Roles & Responsibilities

- Q1. Let's start with a bit about you. Can you please confirm your current job title? [Insert job title here for confirmation]
- Q2. Have your job title or responsibilities regarding the BizSavers program changed since last time we spoke? If so, how?
- Q3. About how much of your time is devoted to the Ameren Missouri BizSavers program?
- Q4. And are your job responsibilities the same for all of the BizSavers programs, including EMS and SBDI? If not, which ones do they not cover? Who is responsible for those?
- Q5. The organization chart you sent shows some changes in staffing and responsibilities since we last spoke. In particular, I see that you are recruiting a new TA Coordinator and (name removed) was moved to a different role. Does this reflect a change in Lockheed's strategy in working with TAs?
- Q6. What changes have there been, if any, in who you or other Lockheed staff interact with at Ameren relating to the BizSavers programs? [*If needed: For example, any changes relating to KAEs or CSAs*]

- Q7. Are there any other planned changes in staffing, responsibilities, or reporting structure? If so, what are they?
- Q8. Do you think the current level of staff support is sufficient for supporting the program implementation needs?

Program Changes

I'd like to learn a little about recent program changes, particularly the introduction of the new SBDI and EMS offerings.

- Q9. First, please tell me about the EMS offering – what is being offered that wasn't offered before?
- Q10. What led to the decision to introduce that new offering? [*Probes: Who proposed it? How did Ameren/Lockheed determine that it would provide cost-effective savings? How did Ameren/Lockheed settle on the incentives and rules?*]
- Q11. So far, how has the roll-out fit with expectations? [*Probes: Is uptake as expected? How much higher or lower?*]

[*If roll-out does not fit expectations, ask Q12 and Q13*]

- Q12. What adjustments, if any, do you think need to be made?
- Q13. Have you discussed adjustments with Ameren? If so, what did you discuss and how did that go?
- Q14. And please tell me how the SBDI Program works.
- Q15. The SBDI Participation Overview document states that “SBDI incentives are capped at \$2,500 *per account*” for the current program period but that “total incentives across all programs shall be capped at \$3,000,000 *per customer*” for the program period. I understand that the first statement refers to the cap specific to SBDI incentives and the second refers to the cap for incentives across all programs, but I also would like to know what the distinction here is, if any, between an account and a customer.
- Q16. And tell me about how SBDI was developed. [*Probes: Who proposed it? How did Ameren/Lockheed determine that it would provide cost-effective savings? How did Ameren/Lockheed settle on the incentives and rules?*]
- Q17. As of early November, there were 53 projects completed in the program. How does that fit with your expectations?

[*If concerns about participation levels, ask Q18 and Q19*]

- Q18. What adjustments, if any, do you think need to be made?

Q19. Have you discussed adjustments with Ameren? If so, what did you discuss and how did that go?

Q20. Nearly 90% of the projects done by early November were done by the same SBDI Service Provider. What is Lockheed doing to promote active participation by the other SBDI Service Providers?

[If concerns about contractor activity, ask Q21 and Q22]

Q21. What adjustments, if any, do you think need to be made?

Q22. Have you discussed adjustments with Ameren? If so, what did you discuss and how did that go?

Program Progress

Q23. So far, how are the other program elements – i.e., not SBDI or EMS – doing relative to goals? *[Probe about savings goals, project completions, pipeline, non-lighting.]*

[If not doing well, ask Q24]

Q24. What might the program do to improve progress toward goals?

Q25. I understand that exterior lighting measures have been removed from the program and that incentives were increased for measures that provide peak demand savings. What information and analyses did Ameren and Lockheed use to make those decisions?

Q26. Aside from the changes I just asked about and the EMS and SBDI Programs, what measures have been added or modified in the past year, if any? *[Probe about reasons and uptake. Were these new prescriptive measures?]*

Marketing and Outreach

[For all questions, probe about EMS and SBDI]

Now, just a couple of questions about the status of marketing and outreach activities for the program.

Q27. Overall, how well have the program marketing and outreach efforts in the current program year worked? *[Probe: Are they sufficient to deliver the program participation and savings goals?]*

[If concerns are noted about marketing and outreach, ask Q28]

Q28. What is being done about those concerns? What else should be done?

Q29. I plan to talk to Kristin McKee, who I believe oversees the TA Coordinator, but I'd like your perspective on how well recruiting and managing of trade allies and other program partners is going.

[If concerns are noted about TA recruitment/management, ask Q30]

Q30. What is being done about those concerns? What else should be done? [*Probe about the various aspects of managing TAs – recruiting, training, keeping them informed, maintaining a TA list on the website.*]

Communication

Next I'd like to hear briefly about how communication processes are working between and within staff at Ameren Missouri and Lockheed.

[*In all questions, probe about EMS and SBDI*]

Q31. I'd like to start by reviewing how Lockheed staff communicate with each other and with Ameren about the program:

Regular meetings – when, where, how, who:

Other communication:

Q32. In general, how has communication been among Lockheed staff regarding the BizSavers program? [*Probe about any changes in frequency or type of meeting.*]

[*If issues identified, ask Q33*]

Q33. What do you think should be done to improve communication among Lockheed staff?

Q34. And how has communication been between Lockheed and Ameren staff? [*Probe about: Frequency and type of reports and meetings, monthly meetings/webinars with KAEs and CSAs, LM reports to CSAs about projects in their territory, Ameren keeping LM informed on key accounts, LM presentations to Ameren.*]

[*If issues identified, ask Q35 and Q36*]

Q35. What do you think should be done to improve communication between Lockheed and Ameren staff?

Q36. Have you discussed this with Ameren? If so, how did that go?

Tracking, Reporting, QA/QC

Next, I'd also like to hear about tracking, reporting, and QA/QC.

Q37. How well is the current tracking and reporting process working to meet your needs? [*Probe about additional reports or information that would be useful.*]

Q38. What tracking and reporting changes were made, if any, this program year? How have those worked out?

Q39. What changes have been made, if any, to QA/QC procedures?

- Q40. What issues, if any, have arisen with program QA/QC, including anything that Ameren identified and brought to your attention through its review and audit of invoices?
- Q41. What kinds of corrective measures have been taken? Have those measures been effective?

Conclusion

- Q42. Is there anything that you would like to see changed in how Ameren is managing Lockheed's implementation of the program?
- Q43. Is there anything else about the program that we have not discussed that you feel should be mentioned?
- Q44. What would you like to learn from the program evaluation?

Those are all of my questions. Thank you very much for your time.

Lockheed Martin Specialty Programs Lead - Implementer In-Depth Interview Guide

Roles & Responsibilities

- Q1. Let's start with a bit about you. Can you please confirm your current job title? [Insert job title here for confirmation]
- Q2. Have your job title or responsibilities regarding the BizSavers program changed since last time we spoke? If so, how?
- Q3. About how much of your time is devoted to the Ameren Missouri BizSavers program?
- Q4. And are your job responsibilities the same for all of the BizSavers programs, including EMS and SBDI? If not, which ones do they not cover? Who is responsible for those?
- Q5. What changes have there been, if any, in who you or other Lockheed staff interact with at Ameren relating to the BizSavers programs? [*If needed: For example, any changes relating to KAEs or CSAs*]

SBDI Program

- Q6. From your perspective, how well is the roll-out of SBDI working? [*Probe about level of participation and involvement by SBDI SPs.*]
- Q7. Are you getting the support you need from both Lockheed and Ameren? If not, what additional support do you need? [*Probe about CSAs and KAEs – Do they understand and promote SBDI Program? Do they need additional training?*]
- Q8. From what you've seen so far, what changes, if any, to SBDI are needed?

Q9. Have you discussed those changes with anyone else? If so, who? What is the outcome of those discussions?

Trade Allies & Other Service Providers

I'd also like to get an update on how the program is working with trade allies and other program partners.

Q10. Can you give me an update on trade ally recruitment and training? [*Probe about: Getting TAs from bordering TANS, the TA taskforce, and recruiting at conferences and through DOE FEMP.*]

Q11. Please tell me about recruitment and training of SBDI Service Providers, or SPs – how are you recruiting and training them and how is it going?

Q12. What is the reason for requiring that SBDI Service Providers already be members of the Ameren TAN?

Q13. What kinds of barriers are you seeing to TAN recruitment and training, including for SBDI SPs? [*Probe about: Awareness of the requirement to re-join the TAN after the bridge year, insurance requirements, and the application process. Specific firms or TA types they are having difficulty reaching – what they might do next.*]

Q14. And can you give me an update on efforts to keep TAs informed of program offerings and changes? [*Probe about training, events, and newsletters. They send one newsletter to all TAs; one goes only to TAN members.*]

Q15. What changes, if any, have been made to the BizSavers Solutions electronic newsletters?

[*Find out who it is sent to and how often.*]

Q16. Are you planning to carry out, or have you carried out, special events and activities for SBDI SPs?

Q17. Can you tell me a little about any special campaign, like the money-savings deals and “4 simple steps” campaigns Lockheed did last year? [*Probe about purpose and goals; how they track success (e.g., could they tell that campaigns increased number of applications?)*]

Q18. What changes have there been, if any, in the TAN tier ranking system, including any changes in members’ ranks? [*Last year, found that some TAs might lose status but interviews suggested this was minimal.*]

Q19. [If any changes:] What has been the effect of those changes?

Q20. How are things going with encouraging trade allies to use co-branded marketing materials?

- Q21. How are things going with the Distributor Partnership Program? [*Probe about uptake with large distributors such as Grainger – it was low last time.*]
- Q22. What other changes, if any, are planned for outreach to, and interaction with, trade allies and other service providers? [*Probe about types of TA, including RSPs and NC.*]

Communication

Next I'd like to hear briefly about how communication processes are working between and within staff at Ameren Missouri and Lockheed.

[*In all questions, probe about EMS and SBDI*]

- Q23. I'd like to start by reviewing how you communicate with other Lockheed staff and with Ameren about the program:

Regular meetings – when, where, how, with whom:

Other communication:

- Q24. How has communication been among Lockheed staff regarding the BizSavers program? [*Probe about any changes in frequency or type of meeting.*]

[*If issues identified, ask Q18*]

- Q25. What do you think should be done to improve communication among Lockheed staff?

- Q26. And how has communication been between Lockheed and Ameren staff? [*Probe about: Frequency and type of reports and meetings, monthly meetings/webinars with KAEs and CSAs, LM reports to CSAs about projects in their territory, Ameren keeping LM informed on key accounts, LM presentations to Ameren.*]

[*If issues identified, ask Q20 and Q21*]

- Q27. What do you think should be done to improve communication between Lockheed and Ameren staff?

Tracking & Reporting

Next, I'd also like to hear about tracking and reporting.

- Q28. From your perspective, how well is the current tracking and reporting process working? [*Probe about additional reports or information that would be useful.*]

Conclusion

- Q29. Is there anything that you would like to see changed in program offerings in the future?

Q30. Is there anything else about the program that we have not discussed that you feel should be mentioned?

Q31. What would you like to learn from the program evaluation?

Those are all of my questions. Thank you very much for your time.

5. Online Participant Survey

Ameren Invoice Review & Audit - Staff In-Depth Interview Guide

GROUP: Participants across five programs: Standard, Custom, Retro-commissioning, New Construction, SBDI, and EMS Pilot (component of Custom Program)
Participants

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

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

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

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

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

2. Could you please provide the name and contact information of the person most knowledgeable about the decision to install the energy efficient equipment at [LOC_1]?
 1. [OPEN ENDED] Name and Email

[CONTINUE IF Q1 = 1]

3. What is your job title or role?
 1. Facilities Manager
 2. Energy Manager
 3. Other facilities management/maintenance position
 4. Chief Financial Officer
 5. Other financial/administrative position
 6. Proprietor/Owner
 7. President/CEO
 8. Manager

9. Other (Specify) _____
4. Which of the following, if any, does your company have in place at [LOCATION]?
[Select all that apply]
1. A person or persons responsible for monitoring or managing energy usage
 2. Defined energy savings goals
 3. A specific policy requiring that energy efficiency be considered when purchasing equipment
 4. Carbon reduction goals
 5. Other – please describe: _____
 6. None of the above
 88. Don't know

Awareness [Do Not Display in Survey]

5. How did you learn about Ameren Missouri's incentives for efficient equipment or upgrades? (Select all that apply)
1. From a Trade Ally/contractor/equipment vendor/ energy consultant
 2. From an Ameren Missouri Account Representative
 3. From a BizSavers representative
 4. From a search engine (Google, Yahoo, Bing)
 5. At an event/trade show
 6. Received an email blast or electronic newsletter
 7. Received an informational brochure
 8. From a program sponsored webinar
 9. From mobile advertising
 10. From Ameren Missouri's website
 11. TV / radio ad's sponsored by Ameren Missouri
 12. Friends or colleagues
 13. Through past experience with the program
 14. Other (please explain)
 88. Don't know

[DISPLAY Q6 ONLY IF INCENTIVE TYPE = STANDARD OR SBDI]

6. 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
 88. Don't know

[DISPLAY Q7 AND Q8 ONLY IF PROJECT = NEW CONSTRUCTION]

7. You recently received incentives through Ameren Missouri's New Construction program. Which of this program's incentive options are you aware of? (Select all that apply)
1. Whole Building Performance incentives
 2. Standard Lighting incentives
 3. Standard non-lighting incentives
 4. Custom measure incentives
 5. None of the above
8. How well did the New Construction program's range of incentive options fit your needs?
- | | | | | | | |
|------------|---|---|---|--|------------|------------|
| Not at all | | | | | Completely | Don't know |
| 1 | 2 | 3 | 4 | | 5 | |

[DISPLAY Q9 ONLY IF Q8 < 4]

9. What caused the range of incentive options offered to fail to meet your needs completely? _____

[DISPLAY Q10 and Q11 ONLY IF PROJECT = RETRO-COMMISSIONING]

10. 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
11. How well did the Retro-commissioning program's range of incentive options fit your needs?
- | | | | |
|------------|--|------------|------------|
| Not at all | | Completely | Don't know |
|------------|--|------------|------------|

1 2 3 4 5

[DISPLAY Q12 ONLY IF Q11 < 4]

12. In what way did the range of incentive options offered fail to meet your needs completely? _____
13. Were you aware that the custom incentives for cooling equipment increased from \$.07/kWh to \$.15/kWh, starting in 2016?
1. Yes
 2. No
 88. Don't know

Program Delivery Efficiency [Do Not Display in Survey]

Application Process [do not display]

14. Regarding your organization's decision to participate in the incentive program, who initiated the discussion about the incentive opportunity? Would you say...
1. Your organization initiated it
 2. Your vendor or contractor initiated it
 3. The idea arose in discussion between your organization and your vendor or contractor
 4. Some other way. Please describe: _____
 88. Don't know
15. Which of the following people worked on completing your application for program incentives (including gathering required documentation)? (Select all that apply)
1. Yourself
 2. Another member of your company
 3. A contractor
 4. An equipment vendor
 5. A designer or architect
 6. Someone else – please define: _____
 88. Don't know

[DISPLAY Q16 through Q17 ONLY IF Q15 = Yourself]

16. Which version of the application worksheet did you use?
1. Online Fast Track Application

2. Downloadable Fast Track Application

3. Other – please specify: _____

88. Don't know

17. Thinking back to the application process, please rate the clarity of information on how to complete the application...

Not at all clear					Completely clear	Don't know
1	2	3	4	5		

[DISPLAY Q18 ONLY IF 17 < 4]

18. What information, including instructions on forms, needs to be further clarified?

[DISPLAY Q19 ONLY IF Q15 = MYSELF]

19. Using a 5-point scale, where 1 = “completely unacceptable” and 5 = “completely acceptable,” how would you rate...

a. the ease of finding forms on Ameren Missouri’s website

Completely unacceptable					Completely acceptable	Don't know	N/A – Did not get forms from website
1	2	3	4	5			

b. the ease of using the electronic application worksheets

Completely unacceptable					Completely acceptable	Don't know
1	2	3	4	5		

c. the time it took to approve the application

Completely unacceptable					Completely acceptable	Don't know
1	2	3	4	5		

d. the effort required to provide required invoices or other supporting documentation

Completely unacceptable					Completely acceptable	Don't know	N/A – No documentation required
1	2	3	4	5			

e. the overall application process

Completely unacceptable					Completely acceptable	Don't know
1	2	3	4	5		

20. Did you have a clear sense of whom you could go to for assistance with the application process?

1. Yes

2. No

88. Don't know

[DISPLAY Q21 ONLY IF PROGRAM = CUSTOM OR RETRO-COMMISSIONING OR NEW CONSTRUCTION]

21. 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

88. Don't know

[DISPLAY Q22 ONLY IF Q21=YES]

22. 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. [DISPLAY IF PROGRAM=RETRO-COMMISSIONING] Other issues related to the Audit

3. [DISPLAY IF PROGRAM=NEW CONSTRUCTION-WHOLE BLDG PERF] Other issues related to the Technical Analysis study

4. Issues related to additional supporting documentation such as invoices

5. Other issues – please specify: _____

88. Don't know

23. 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

88. Don't know

Equipment Selection [Do Not Display]

24. How did each of the following affect your decision to install the efficient equipment? (Select all that apply)

	No interaction with this type of person or they provided no input	Input had no effect on decision	Small effect on decision	Moderate to large effect on decision	Critical effect – could not have made decision without it	I don't know how the interactions affected the decision
[Display if Standard, Custom, EMS]						
a. Vendor (retailer)	()	()	()	()	()	()
[Display if Standard, Custom, RCx, EMS]						
b. Contractor (installer)	()	()	()	()	()	()
[Display if Standard, Custom, NC]						
c. Designer or architect	()	()	()	()	()	()
[Display if SBDI]						
d. SBDI Service Provider (contractor)	()	()	()	()	()	()
e. Ameren Missouri staff member, such as an account representative	()	()	()	()	()	()
f. BizSavers Program Representative	()	()	()	()	()	()
[Display if RCx]						
g. Audit Results	()	()	()	()	()	()
[Display if RCx]						
h. Your RCx Service Provider	()	()	()	()	()	()
[Display if NC]						
i. The “design team” process	()	()	()	()	()	()
[Display if NC]						
j. General Contractor	()	()	()	()	()	()
[Display if NC]						
k. The technical analysis study (energy modeling study)	()	()	()	()	()	()
l. Someone else, please specify:						

[DISPLAY Q25 IF ANY RESPONSES TO Q24 = “Moderate to large effect” OR “Critical effect”]

25. What did they do that affected your decision? _____ [OPEN-ENDED RESPONSE]

[DISPLAY Q26 ONLY IF PROGRAM = STANDARD or SBDI]

26. You were required to submit a completed application, along with invoices and other documentation within 180 days after installing your project. Does this time frame limit the types of projects, like HVAC, water heating or other standard upgrades that you might propose to do through the program?

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

27. Using a scale of 1-5 where one means Very Dissatisfied and 5 means very satisfied, please rate your satisfaction with the following elements...

	1 – Very Dissatisfied	2	3	4	5 – Very Satisfied	Not sure	Not applicable – no equipment installed
a. the equipment that was installed	()	()	()	()	()	()	()
b. the quality of the installation	()	()	()	()	()	()	()
c. The amount of time it took to deliver and install the equipment	()	()	()	()	()	()	()

Measurement and Verification [Do Not Display]

28. After your project was completed, did a program representative inspect the work done through the program?

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

[DISPLAY Q29 If Q23=1]

29. Using a scale of 1-5 where one means Not at all agree and 5 means Completely agree, please rate your agreement with the following statements:

	1-Not at all agree	2	3	4	5- Completely agree	Don't know
a. The inspector was courteous	()	()	()	()	()	()
b. The inspector was efficient	()	()	()	()	()	()

Customer Satisfaction [Do Not Display Heading; Display Intro]

The following few questions pertain to your communications with the program staff. Program staff are anyone that reviewed your application, conducted site inspections, determined your incentive amount, or processed your incentive check. Program staff are not anyone hired by you to conduct an audit, design your system, or install your hardware.

30. In the course of doing this project did you have any interactions with program staff?
1. Yes
 2. No
 88. Not sure

[DISPLAY Q31 If Q30 = 1]

31. On the scale provided, please indicate how knowledgeable were program staff about the issues you discussed with them?

1 – Not at all knowledgeable	2	3	4	5 – Very knowledgeable	Not sure
()	()	()	()	()	()

[DISPLAY Q0 If Q30 = 1]

32. On the scale of 1-5 where 1 means not at all satisfied and 5 means completely satisfied, please indicate how satisfied you are with the following:

	1 – Not at all satisfied	2	3	4	5 – Very satisfied	Not sure	Not applicable – had no questions or concerns
a. how long it took program staff to address your questions or concerns	()	()	()	()	()	()	()
b. how thoroughly they addressed your question or concern	()	()	()	()	()	()	()

33. On the scale of 1-5 where 1 means not at all satisfied and 5 means completely satisfied, please indicate how satisfied you are with the following:

	1 – Not at all satisfied	2	3	4	5 – Very satisfied	Not sure
a. the steps you had to take to get through the program	()	()	()	()	()	()
b. the amount of time it took to get your rebate or incentive	()	()	()	()	()	()
c. the range of equipment that qualifies for incentives	()	()	()	()	()	()
d. the program, overall	()	()	()	()	()	()

[DISPLAY Q34 If Q31, Q0a or b, or Q33a, b, c, or d = 1 or 2]

34. Please describe the ways in which you were not satisfied with the aspects of the program mentioned above? _____

Net-To-Gross Section [Do Not Display]

Free-Ridership [Do Not Display]

35. Before you knew about the BizSavers Program had you purchased and installed any energy efficient equipment at the [FR_LOC1] location?

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

36. Has your organization purchased any significant energy efficient equipment in the last three years for which you did not apply for a financial incentive through an energy efficiency program at the [FR_LOC1] location?

- 1. Yes. Our organization purchased energy efficient equipment but did not apply for incentive.
- 2. No. Our organization purchased significant energy efficient equipment and applied for an incentive.
- 3. No significant energy efficient equipment was purchased by our organization.
- 4. Don't know

37. Before participating in the BizSavers Program had you [INSTALLED] any equipment or measure similar to [FR_MEAS 1] at the [FR_LOC1] location?

- 1. Yes

2. No

88. Don't know

38. Did you have plans to [INSTALL] the [FR_MEAS 1] at the [FR_LOC1] location before participating in the BizSavers Program?

1. Yes

2. No

88. Don't know

[DISPLAY Q39 IF Q38= 1]

39. Would you have gone ahead with this planned project even if you had not participated in the program?

1. Yes

2. No

88. Don't know

40. How important was previous experience with the BizSavers Program in making your decision to [INSTALL] the [FR_MEAS 1] at the [FR_LOC1] location?

1. Did not have previous experience with program

2. Very important

3. Somewhat important

4. Only slightly important

5. Not at all important

88. Don't know

[DISPLAY Q41 IF SBDI = 1]

41. If the Service Provider that completed the onsite energy assessment had nor not recommended [INSTALLING] the [FR_MEAS 1], how likely is it that you would have [INSTALLED] it anyway?

1. Definitely would have installed

2. Probably would have installed

3. Probably would not have installed

4. Definitely would not have installed

88. Don't know

42. Did a BizSavers Program or other Ameren Missouri representative recommend that you [INSTALL] the [FR_MEAS 1] at the [FR_LOC1] location?
1. Yes
 2. No
 88. Don't know

[DISPLAY Q43 IF Q42 = 1 OR SBDI = 1]

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

[DISPLAY Q46 IF QUANT > 1]

46. We would like to know whether the availability of information and financial incentives through the [PROGRAM] affected the quantity (or number of units) of [FR_MEAS1] that you purchased and [INSTALLED] at the [LOCATION] location.
- Did you purchase and [INSTALL] more [FR_MEAS 1] than you otherwise would have without the program?

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

[DISPLAY Q47 IF ENERGY_USING = 1]

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

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

1. Yes
 2. No, program did not affect level of efficiency chosen for equipment.
88. Don't know

[DISPLAY 48 IF Q47 = 1]

48. How much more efficient [MEASURE2] did you install? (i.e., "xx% more efficient")

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

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

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

88. Don't know

[DISPLAY Q50 IF Q49 = 1]

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

1. Less than 6 months later
 2. 6-12 months later
 3. 1-2 years later
 4. 3-5 years later
 5. More than 5 years later
88. Don't know

[DISPLAY Q51 IF NUMBER OF MEASURE TYPES > 1

51. Our records indicate you installed [FR_MEAS1] at the [FR_LOC1 location in addition to [FR_MEAS2] at the [FR_MEAS2] location. Did both of these projects go through the same decision making process or was a separate decision made for each?

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

[IF Q51 = 1, Cycle through Q37- Q50 for FR_MEAS2]

Spillover [DO NOT DISPLAY]

Lockheed Tracked Spillover [DO NOT DISPLAY]

[DISPLAY IF SPILLOVER = 1]

52. According to our records, you also installed some [SPILL_MEASURES] at the [SPILL_LOC] that you did not receive an incentive for. Is that correct?

1. Yes
2. No, did not install that equipment
3. No, we received an incentive for the equipment we installed
88. Don't know

[DISPLAY Q53 IF Q52 = 1]

53. How important was your experience with the BizSavers Program in your decision to install this [SPILL_MEASURES], using a scale of 0 to 10, where 0 is not at all important and 10 is extremely important?"

[SCALE 0 "Not at all important" - 10 "Very important"]

88. Don't know

54. If you had not participated in the BizSavers Program, how likely is it that your organization would still have installed this [SPILLOVER], using a 0 to 10 scale, where 0 means you definitely WOULD NOT have installed this equipment and 10 means you definitely WOULD have installed this equipment?

[SCALE 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

88. Don't know

[DISPLAY Q55IF Q53=0,1,2,3 AND Q54=0,1,2,3 AND Q52=1 OR IF Q53=8,9,10 AND Q54=8,9,10]

55. You scored the importance of your program experience to your decision to implement additional lighting measures with [Q53 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 [Q54 RESPONSE] out of 10 possible points. Can you please explain the role the program made in your decision to implement this measure?

00 [OPEN ENDED]

98 (Don't know)

[DISPLAY Q56 IF SPILLOVER = 1]

56. Because of your experience with the program, has your organization installed any other energy efficiency measures at this facility or at your other facilities within Ameren Missouri's service territory that did NOT receive incentives through Ameren Missouri's BizSavers Program?

1. Yes

2. No

88. Don't know

General Spillover Questions [DO NOT DISPLAY]

[DISPLAY IF SPILLOVER = 0]

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

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

1. Yes

2. No

88. Don't know

[DISPLAY Q58 IF Q0= 1 OR Q56 =1]

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

1 Lighting

2 Lighting controls or occupancy sensors

3 HVAC Equipment

- 4 Room air conditioners
- 5 Efficient motors
- 6 Refrigeration equipment
- 7 Kitchen equipment
- 8 Something else [OPEN ENDED]
96. Didn't implement any measures [SKIP TO FIRMOGRAPHICS]
88. Don't know [SKIP TO FIRMOGRAPHICS]

[DISPLAY Q59 IF Q57 = 1 OR Q56 =1]]

59. Why didn't you apply for or receive incentives for those items? [MULTI SELECT RANDOMIZE ORDER, BUT FIX OTHER AND DON'T KNOW]
1. Didn't know whether equipment qualified for financial incentives
 2. Equipment did not qualify for financial incentives
 3. Too much paperwork for the financial incentive application
 4. Financial incentive was insufficient
 5. Didn't have time to complete paperwork for financial incentive application
 6. Didn't know about financial incentives until after equipment was purchased
 7. Other reason (please describe): _____
 8. We did receive an incentive from Ameren Missouri for that equipment [SKIP TO FIRMOGRAPHICS]
88. Don't know

Lighting [DO NOT DISPLAY]

[DISPLAY Q60 IF Q58 = 1]

60. What type of lighting did you install? [MULTI-SELECT]
- 1 T8 lamps
 - 2 T5 lamps
 - 3 Highbay Fixtures
 - 4 CFLs
 - 5 LED lamps
 - 6 Another type
88. Don't know

[DISPLAY Q61 IF Q60 = 6]

61. What other type of lighting equipment did you install?

1. [OPEN ENDED]

[LOOP Q62 - Q68 FOR EACH TYPE SELECTED IN Q60]

[DISPLAY Q62 IF Q60 = 1-5]

62. How many [Q60 RESPONSE] did you install?

1. [OPEN ENDED]

[DISPLAY Q63 IF Q60 = 1-5]

63. What was the average wattage of the [Q60 RESPONSE]?

1. [OPEN ENDED]

[DISPLAY Q64 IF Q60 = 1-5]

64. Were they installed inside or outside?

1. Inside

2. Outside

88. Don't know

65. What type of building did you install the [Q60 RESPONSE] lighting in?

1. Assisted Living

2. Childcare/Pre-School

3. College

4. Convenience Store

5. Elementary School

6. Garage

7. Grocery

8. Healthcare Clinic

9. High School

10. Hospital

11. Manufacturing Facility

12. Hotel/Motel - Guest

13. Hotel/Motel - Common

14. Movie Theater

15. Office - High Rise
16. Office - Low Rise
17. Office - Mid Rise
18. Religious Building
19. Restaurant
20. Retail - Department Store
21. Retail - Strip Mall
22. Warehouse
23. Other (Please specify)

[DISPLAY Q66 IF Q60 = 1-5]

66. Is the inside space heated, cooled, or both?
1. Heated
 2. Cooled
 3. Both
 88. Don't know

[DISPLAY Q67 IF Q60 = 1-5]

67. What type of lighting did the [Q60 RESPONSE] replace?
1. T12s (LINEAR FLOURESCENTS)
 2. T8s (LINEAR FLOURESCENTS)
 3. Something else (VERBATIM)
 88. Don't know

[DISPLAY Q68 IF Q60 = 1-5]

68. How many of the old lamps or bulbs did you remove?
1. [OPEN ENDED]

[DISPLAY Q69 IF Q60 = 1-6]

69. How important was your experience with the BizSavers Program in your decision to install this lighting equipment, using a scale of 0 to 10, where 0 is not at all important and 10 is extremely important?"

[SCALE 0 "Not at all important" - 10 "Very important"]

88. Don't know

[DISPLAY Q70 IF Q60 = 1-6]

70. If you had not participated in the BizSavers Program, how likely is it that your organization would still have installed this lighting equipment, using a 0 to 10 scale, where 0 means you definitely WOULD NOT have installed this equipment and 10 means you definitely WOULD have installed this equipment?

[SCALE 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

88. Don't know

[DISPLAY Q71 IF Q69=0,1,2,3 AND Q70=0,1,2,3

OR IF Q69=8,9,10 AND Q70=8,9,10]

71. You scored the importance of your program experience to your decision to implement additional lighting measures with [Q69 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 [Q70 RESPONSE] out of 10 possible points. Can you please explain the role the program made in your decision to implement this measure?

00 [OPEN ENDED]

88. Don't know

Lighting Controls [DO NOT DISPLAY]

[DISPLAY Q72 IF Q58 = 2]

72. How many fixtures are being controlled by the lighting controls?

1. [OPEN ENDED]

[DISPLAY Q73 IF Q58 = 2]

73. On average, how many lamps or bulbs does each fixture contain?

1. [OPEN ENDED]

[DISPLAY Q74 IF Q58 = 2]

74. What is the average wattage of these lamps?

1. [OPEN ENDED]

[DISPLAY Q75 IF Q58= 2]

75. How important was your experience with the BizSavers Program in your decision to install lighting controls, using a scale of 0 to 10, where 0 is not at all important and 10 is extremely important?"

[SCALE 0 "Not at all important" - 10 "Very important"]

88. Don't know

[DISPLAY Q76 IF Q58 = 2]

76. If you had not participated in the BizSavers Program, how likely is it that your organization would still have installed lighting controls, using a 0 to 10 scale, where 0 means you definitely WOULD NOT have installed this equipment and 10 means you definitely WOULD have installed this equipment?

[SCALE 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

88. Don't know

[DISPLAY Q77 IF Q75=0,1,2,3 AND Q76=0,1,2,3

OR IF Q75=8,9,10 AND Q76=8,9,10]

77. You scored the importance of your program experience to your decision to implement lighting controls with [Q75 RESPONSE] out of 10 possible points. You ALSO scored the likelihood of implementing lighting controls if your organization had not participated in the program with [Q76 RESPONSE] out of 10 possible points. Can you please explain the role the program made in your decision to implement this measure?

1. [OPEN ENDED]

98 Don't know

HVAC Measures [DO NOT DISPLAY]

[DISPLAY Q78 IF Q58 = 3]

78. 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

88. Don't know

[DISPLAY Q79 IF Q78 = 6]

79. What other type of HVAC equipment did you install?

1. [OPEN ENDED]

[REPEAT Q80 - Q82 FOR EACH SELECTED IN Q78]

80. We would like to know more about what type of [Q78 RESPONSE] you installed. For each level of efficiency of the equipment you installed, please provided the rated efficiency and the number of units.

1. [OPEN ENDED]

81. What type of building did you install the [Q78 RESPONSE] equipment in?

1. Assembly
2. Assisted Living
3. College
4. Convenience Store
5. Elementary School
6. Garage
7. Grocery
8. Healthcare Clinic
9. High School
10. Hospital
11. Hotel/Motel
12. Manufacturing Facility
13. Movie Theater
14. Office - High Rise
15. Office - Mid Rise
16. Office - Low Rise
17. Religious Building
18. Restaurant
19. Retail - Department Store
20. Retail - Strip Mall

21. Warehouse

22. Other (Please specify)

82. What city is the building where you installed the [Q78 RESPONSE] located in?

1. [OPEN ENDED]

[DISPLAY Q83 IF Q58=3]

83. How important was your experience with the BizSavers Program in your decision to install this HVAC equipment, using a scale of 0 to 10, where 0 is not at all important and 10 is extremely important?"

[SCALE 0 "Not at all important" - 10 "Very important"]

88. Don't know

[DISPLAY Q84 IF Q58 = 3]

84. If you had not participated in the BizSavers Program, how likely is it that your organization would still have installed this HVAC equipment, using a 0 to 10 scale, where 0 means you definitely WOULD NOT have installed this equipment and 10 means you definitely WOULD have installed this equipment?

[SCALE 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

88. Don't know

[DISPLAY Q85 IF Q83=0,1,2,3 AND Q84=0,1,2,3

OR IF Q83=8,9,10 AND Q84=8,9,10]

85. You scored the importance of your program experience to your decision to implement HVAC measures with [Q83 RESPONSE] out of 10 possible points. You ALSO scored the likelihood of implementing HVAC measures if your organization had not participated in the program with [Q84 RESPONSE] out of 10 possible points. Can you please explain the role the program made in your decision to implement this measure?

1. [OPEN ENDED]

Room Air Conditioners [DO NOT DISPLAY]

[DISPLAY Q86 IF Q58 = 4]

86. How many room air conditioners did you install?

1. [OPEN ENDED]

87. What type of building did you install the room air conditioners in?

1. Assembly

2. Assisted Living
 3. College
 4. Convenience Store
 5. Elementary School
 6. Garage
 7. Grocery
 8. Healthcare Clinic
 9. High School
 10. Hospital
 11. Hotel/Motel
 12. Manufacturing Facility
 13. Movie Theater
 14. Office - High Rise
 15. Office - Mid Rise
 16. Office - Low Rise
 17. Religious Building
 18. Restaurant
 19. Retail - Department Store
 20. Retail - Strip Mall
 21. Warehouse
 22. Other (Please specify)
88. What city is the building where you installed the room air conditioners located in?
1. [OPEN ENDED]
- [DISPLAY Q89 IF Q58=3 OR 4]
89. How important was your experience with the BizSavers Program in your decision to install this HVAC equipment, using a scale of 0 to 10, where 0 is not at all important and 10 is extremely important?"
- [SCALE 0 "Not at all important" - 10 "Very important"]
88. Don't know
- [DISPLAY Q90 IF Q58 = 3 OR 4]

90. If you had not participated in the BizSavers Program, how likely is it that your organization would still have installed this HVAC equipment, using a 0 to 10 scale, where 0 means you definitely WOULD NOT have installed this equipment and 10 means you definitely WOULD have installed this equipment?

[SCALE 0 “Definitely would not have installed” - 10 “Definitely would have installed”

88. Don't know

[DISPLAY Q91 IF Q89=0,1,2,3 AND Q90=0,1,2,3 OR IF Q89=8,9,10 AND Q90=8,9,10]

91. You scored the importance of your program experience to your decision to implement HVAC measures with [Q89 RESPONSE] out of 10 possible points. You ALSO scored the likelihood of implementing HVAC measures if your organization had not participated in the program with [Q90 RESPONSE] out of 10 possible points. Can you please explain the role the program made in your decision to implement this measure?

1. [OPEN ENDED]

Efficient Motors [DO NOT DISPLAY]

[DISPLAY Q92 IF Q58 = 5]

92. How many motors did you install?

1. [OPEN ENDED]

[DISPLAY Q93 IF Q58 = 5]

93. What is the approximate average horsepower of the new motors?

1. [OPEN ENDED] horsepower

[DISPLAY Q94 IF Q58 = 5]

94. What is the approximate average efficiency of the new motors?

1. [OPEN ENDED, 0 -100%]

[DISPLAY Q95 IF Q58 = 5]

95. On average, how many hours per day do the motors operate?

1. [OPEN ENDED] hours per day

[DISPLAY Q96 IF Q58 = 5]

96. How important was your experience with the BizSavers Program in your decision to install the efficient motors, using a scale of 0 to 10, where 0 is not at all important and 10 is extremely important?”

[SCALE 0 “Not at all important” - 10 “Very important”]

88. Don't know

[DISPLAY Q97 IF Q58 = 5]

97. If you had not participated in the BizSavers Program, how likely is it that your organization would still have installed efficient motors, using a 0 to 10 scale, where 0 means you definitely WOULD NOT have installed this equipment and 10 means you definitely WOULD have installed this equipment?

[SCALE 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

88. Don't know

[DISPLAY Q98 IF Q96=0,1,2,3 AND Q97=0,1,2,3 OR IF Q96=8,9,10 AND Q97=8,9,10]

98. You scored the importance of your program experience to your decision to implement efficient motors with [Q96 RESPONSE] out of 10 possible points. You ALSO scored the likelihood of implementing HVAC measures if your organization had not participated in the program with [Q97 RESPONSE] out of 10 possible points. Can you please explain the role the program made in your decision to implement this measure?

1. [OPEN ENDED]

Commercial Refrigeration Equipment [DO NOT DISPLAY]

[DISPLAY Q99 IF Q58 = 6]

99. 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. Some other type of refrigeration equipment

88. Don't know

[DISPLAY Q100 IF Q99 = 4]

100. What other type of energy efficient refrigeration equipment did you install?

1. [OPEN ENDED]

[DISPLAY Q101 IF Q99 = 1]

101. How many ENERGY STAR commercial freezers did you install?

1. 1
2. 2
3. 3 or more (Please enter the number installed) [OPEN ENDED]

4. Don't know

[DISPLAY Q102 IF Q101 = 1, LOOP FOR EACH UP TO THREE TIMES]

102. What is the volume in cubic feet of the first freezer?

1. [OPEN ENDED] cubic feet

[DISPLAY Q103 IF Q101 = 1, LOOP FOR EACH UP TO THREE TIMES]

103. Does this freezer have a solid door or a glass door?

1. Solid door
2. Glass door

[DISPLAY Q104 IF Q101 = 1, LOOP FOR EACH UP TO THREE TIMES]

104. Is this a vertical freezer or a chest type freezer?

1. Vertical
2. Chest

[DISPLAY Q105 IF Q99 = 2]

105. How many ENERGY STAR commercial refrigerators did you install?

1. 1
2. 2
3. 3 or more (Please enter the number installed) [OPEN ENDED]
4. Don't know

[DISPLAY Q106 IF Q105 = 2, REPEAT FOR EACH UP TO THREE TIMES]

106. What is the volume in cubic feet of the first refrigerator?

1. [OPEN ENDED] cubic feet

[DISPLAY Q107 IF Q105 = 2, REPEAT FOR EACH UP TO THREE TIMES]

107. Does this refrigerator have a solid door or a glass door?

1. Solid door
2. Glass door

[DISPLAY Q108 IF Q105 = 2, REPEAT FOR EACH UP TO THREE TIMES]

108. Is this a vertical refrigerator or a chest type refrigerator?

1. Vertical
2. Chest

[DISPLAY Q109 IF Q99 = 3]

109. Did you install humidity-based controls or conductivity-based controls, or both types?

1. Humidity-based controls
2. Conductivity-based controls
3. Both types

[DISPLAY Q110 IF Q109= 1 OR 3]

110. How many humidity-based controls did you install?

1. [OPEN ENDED] Humidity based controls

[DISPLAY Q111 IF Q109= 1 OR 3]

111. What is the total number of freezer or refrigerator doors controlled by the humidity-based controls?

1. [OPEN ENDED] Refrigerator doors
- 2 [OPEN ENDED] Freezer doors

[DISPLAY Q112 IF Q109= 2 OR 3]

112. How many conductivity-based controls did you install?

1. [OPEN ENDED] Conductivity-based controls

[DISPLAY Q113 IF Q109= 2 OR 3]

113. What is the total number of freezer or refrigerator doors controlled by the conductivity-based controls?

1. [OPEN ENDED] Refrigerator doors
2. [OPEN ENDED] Freezer doors

[DISPLAY Q114 IF Q109 = 98]

114. How many anti-sweat heater controls did you install?

1. [OPEN ENDED] Anti-sweat heater controls

[DISPLAY Q115 IF Q109 = 98]

115. What is the total number of freezer or refrigerator doors controlled by the anti-sweat heater controls?

1. [OPEN ENDED]

[DISPLAY Q116 IF Q99 = 1-4]

116. How important was your experience with the BizSavers Program in your decision to install the energy efficient refrigeration equipment, using a scale of 0 to 10, where 0 is not at all important and 10 is extremely important?"

[SCALE 0 "Not at all important" - 10 "Very important"]

[DISPLAY Q117 IF Q99 = 1-4]

117. If you had not participated in the BizSavers Program, how likely is it that your organization would still have installed this energy efficient refrigeration equipment, using a 0 to 10 scale, where 0 means you definitely WOULD NOT have installed this equipment and 10 means you definitely WOULD have installed this equipment?

[SCALE 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

88. Don't know

[DISPLAY Q118 IF Q116=0,1,2,3 AND Q117=0,1,2,3 OR IF 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?

1. [OPEN ENDED]

Commercial Kitchen Equipment [DO NOT DISPLAY]

[DISPLAY Q119 IF Q58 = 7]

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

88. Don't know

[DISPLAY Q120 IF Q119 = 8]

120. What other type of kitchen equipment did you install?

1. [OPEN ENDED]

[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

[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?

1. [OPEN ENDED] Pre-rinse spray valves

[DISPLAY Q123 IF Q119 = 2]

123. How many ENERGY STAR commercial fryers did you install?

1. [OPEN ENDED] ENERGY STAR commercial fryers

[DISPLAY Q124 IF Q119 = 3]

124. How many ENERGY STAR commercial steam cookers did you install?

1. 3 pan steam cookers [OPEN ENDED]
2. 4 pan steam cookers [OPEN ENDED]
3. 5 pan steam cookers [OPEN ENDED]
4. 6 pan steam cookers [OPEN ENDED]

[DISPLAY Q125 IF Q119 = 4]

125. How many ENERGY STAR hot food holding cabinets did you install?

1. [OPEN ENDED] ENERGY STAR hot food cabinets

[DISPLAY Q126 IF Q119 = 5]

126. How many ENERGY STAR commercial griddles did you install?

1. [OPEN ENDED] ENERGY STAR commercial griddles

[DISPLAY Q127 IF Q119 = 6]

127. How many ENERGY STAR commercial convection ovens did you install?

1. [OPEN ENDED] ENERGY STAR commercial convection ovens

[DISPLAY Q128 IF Q119 = 7]

128. How many ENERGY STAR commercial combination ovens did you install?

1. [OPEN ENDED] Energy STAR commercial combination ovens

[DISPLAY Q129 IF Q119=1-8]

129. How important was your experience with the BizSavers Program in your decision to install this kitchen equipment, using a scale of 0 to 10, where 0 is not at all important and 10 is extremely important?"

[SCALE 0 "Not at all important" - 10 "Very important"]

88. Don't know

[DISPLAY Q130 IF Q119=1-8]

130. If you had not participated in the BizSavers Program, how likely is it that your organization would still have installed this kitchen equipment, using a 0 to 10 scale, where 0 means you definitely WOULD NOT have installed this equipment and 10 means you definitely WOULD have installed this equipment?

[SCALE 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

88. Don't know

[DISPLAY Q131 IF Q129=0,1,2,3 AND Q130=0,1,2,3 OR IF Q129=8,9,10 AND Q130=8,9,10]

131. You scored the importance of your program experience to your decision to implement energy efficient kitchen equipment with [Q129 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 [Q130 RESPONSE] out of 10 possible points. Can you please explain the role the program made in your decision to implement this measure?

1. [OPEN ENDED]

Firmographic [Do Not Display]

[Note to reviewer: The customer database has many fields indicating much of the "firmographic" data we will want to capture. However, we have not yet established how much of it is populated. Therefore, we propose the following questions. If the database provides sufficient firmographic data, we will be able to eliminate some or all of these questions.]

132. Which of the following best describes the type of work that your firm or organization does at [LOCATION]?

1. Industrial

2. Restaurant (not fast food)
 3. Fast food restaurant
 4. Retail
 5. Office
 6. Grocery and convenience
 7. School
 8. Lodging
 9. Warehouse
 10. Other – specify: _____
 88. Not sure
133. 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) _____
134. Please list any other properties that could benefit from energy efficient electric or gas equipment upgrades which may qualify for an incentive. Please provide company name, contact person, and phone number and/or email address. _____
[OPEN-ENDED RESPONSE]
135. How many square feet (indoor space) is the part of the property at [LOCATION] that your firm or organization occupies? (If your firm or organization occupies the entire property, indicate the total size of that property.)
1. Less than 5,000
 2. 5,001 to 10,000
 3. 10,001 to 20,000
 4. 20,001 to 50,000
 5. 50,001 to 75,000
 6. 75,001 to 100,000
 7. 100,001 to 250,000
 8. 250,001 to 500,000
 9. 500,001 to 1,000,000
 10. More than 1,000,000
 88. Not sure

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

6. New Construction Participant Interview Guide

Respondent Information

First, I'd like a little information about you and your company.

[ASK ALL]

Q1. Is your company in the business of building design or construction? If so, what role does it generally play? *[If needed: For example, architect, design consultant, design engineer, general contractor, subcontractor (specify system – e.g., electrical, HVAC, shell)]*

[ASK ALL]

Q2. And does your firm own buildings that it leases, or leases space in, to others?

[ASK ALL]

Q3. Does your firm design or build buildings to sell to others?

[ASK ALL]

Q4. Can you please tell me your title or role?

Project Information

Now, I'd like to confirm that I have correct information about the property where the new construction project occurred.

[ASK ALL]

Q5. Please let me know if the following information is correct and, if it's not correct, please give me the correct information.

[Fill in info from project data. Data shows all participants are building owner, except one: (name removed) Also, two don't indicate ownership: (name removed).]

	Information from Project Data	Correct?	Corrected Info (If appl.)
Address			
Building type			
Square feet			
Ownership	Owner or Tenant		

[ASK ALL]

Q6. Which of the following best describes the kind of project you did?

[Record most appropriate response, or other if none of the following is accurate]

1. A completely new building
2. An addition or expansion to an existing building, such as a new wing
3. A major renovation or redesign of an existing building space, such as to repurpose the space for something else
4. A build-out of a warm shell that had contained central mechanical systems and core lighting only

[Do not read:]

98. Don't know

99. Refused

[ASK IF NOT "COMPLETELY NEW BUILDING"]

Q7. And just to confirm, the square footage of the building – does that apply to the entire building or just the part affected by the new construction project? If just the part affected by the project, what is the square footage of the entire building?

[ASK ALL]

Q8. And will the new building [or part affected by the new construction project] be occupied by the owner or sold or leased to tenants?

[ASK ALL]

Q9. And when did you begin developing the design for this project? An approximate date is fine.

Awareness and Application

[ASK ALL]

Q10. The program provides incentives for specific equipment systems, like lighting and heating, as well as a "Whole Building Performance" incentive, which requires whole building energy modeling. Which of those types of incentives did your project get?

[ASK IF DID NOT GET WHOLE BUILDING PERFORMANCE INCENTIVE]

Q11. Did you know about the Whole Building Performance incentives?

[ASK ALL]

Q12. How far along were you in your project design and planning when you learned about the Ameren new construction incentives?

[ASK ALL]

Q13. How did you learn about the incentives?

[ASK ALL]

Q14. Tell me a little about how you decided to use the incentives?

Probe:

- *Who was influential in the decision and what did they do or say to that was influential?*

[ASK ALL]

Q15. Including yourself, who all was involved in completing the application for New Construction incentives? What was each person's involvement?

[ASK ALL]

Q16. And how was your experience with the application paperwork? [*Probe about: Clarity of instructions on how to complete the application. Information that needs to be clarified. Ease of finding application.*]

[ASK ALL]

Q17. What suggestions do you have, if any, for the application forms?

Project Decision Making

[ASK ALL]

Q18. How did participating in the Ameren New Construction Program affect your project design?

Probe:

- *What did the incentives lead you to do that you wouldn't have done if you hadn't learned about them?*
- *How did the suggestions of program reps affect the design?*

[ASK ALL]

Q19. How did your firm decide which efficiency measures to incorporate into the building design? [*Probe about influence of: Vendor/retailer, contractor, designer, program rep. Information on savings potentials on application and associated documentation. Audit/Technical Analysis Study. Other program technical assistance, Incentive levels.*]

[ASK ALL]

Q20. How well did the New Construction program's range of incentive options fit your needs?

[ASK ALL]

Q21. Were there any program-recommended energy efficiency equipment or construction practices that you decided not to include in the project design? If so, what were they and why did you decide not to include them?

[ASK ALL]

Q22. Were there any equipment or construction practices you had in your design but were ineligible for rebates through the program? If so, what were they?

[ASK ALL]

Q23. What changes would you suggest, if any, to the range of equipment types or construction practices that qualify for program incentives?

[ASK ALL]

Q24. In addition to the incentives you received, are you aware of any other Ameren Missouri incentives for new and existing buildings? If so, which ones?

Experience with Processes, Requirements, and Staff

[ASK ALL]

Q25. Overall, how was your experience with the New Construction program’s processes and requirements?

[Probes: What aspects of participation, if any, did you find surprising? What aspects, if any, did you find challenging?]

[If needed, mention: multiple meetings/stages, documentation requirements, inspections]

[ASK ALL]

Q26. On a scale of 1 to 5, where 1 means “not at all satisfied” and 5 means “very satisfied,” please rate your satisfaction with the following:

[SINGLE RESPONSE]

Item	Rating (1-5 or 97 – not applicable 98 – don’t know 99 – refused
1. The steps you had to go through to participate the program	
2. The range of equipment that qualifies for incentives	
3. The number of design meetings with program staff	
4. The quality of your interactions with program staff	

5.	The amount of documentation you were required to provide	
6.	Any inspections the program carried out at your work site	
7.	The program overall	
8.	Ameren Missouri	

[ASK IF Q26 REQUIRES EXPLANATION]

Q27. Optional comments about satisfaction

[ASK ALL]

Q28. How was your experience getting information you needed about the process or requirements?

[Probe about: Staff knowledgeability, speed of response, thoroughness of response]

[ASK ALL]

Q29. Did you know who to contact for information about any aspect of the application process or program requirements?

[ASK ALL]

Q30. What could the program do, if anything, to keep you better informed about the process or requirements?

[ASK ALL]

Q31. What suggestions do you have, if any, for improving the program's process and requirements?

[If needed: That is, the program's approval of planned upgrades, the documentation requirements, the program's review of paperwork, and so forth.]

[ASK ALL]

Q32. How did the incentive amount compare to what you expected?

[IF NOT ALREADY ADDRESSED]

Q33. Besides what you've already told me, in what ways, if any, could the program be improved?

[Probe about: Financing support, contractor selection, construction methods]

Future Building Plans

[ASK ALL]

Q34. In total, how many buildings does your company plan to build for nonresidential use in the next five years?

[IF ANY PLANNED]

Q35. For how many of those have you begun developing the designs?

[IF ANY PLANNED]

Q36. Will your firm again apply for Ameren Missouri new construction incentives? If not, why not?

[IF WILL APPLY FOR INCENTIVES]

Q37. At what point will you involve the Ameren New Construction Program in design discussions?

Energy Management Practices

[ASK ALL]

Q38. What, if anything, does your company do to monitor or manage energy use in buildings it occupies?

[ASK IF Q2 INDICATES COMPANY LEASES BUILDING SPACE TO OTHERS]

Q39. What, if anything, does your company do to monitor or manage energy use in buildings it leases to others?

[Probes: Staff who monitor or manager energy use, any defined energy savings or carbon reduction goals, policy related to purchase of EE equipment.]

Spillover

[ASK ALL]

Q40. I have a few questions about how your experience with the Ameren Missouri New Construction program may have influenced other decisions you have made about energy-using equipment. Because of your experience with the New Construction Program, have you bought, or are you likely to buy, energy efficient equipment without applying for a financial incentive or rebate from Ameren Missouri? If Yes, bought -> Did you install that?

[SINGLE RESPONSE]

1. Yes, have already installed non-incentivized efficiency equipment because of the experience with the program
2. Yes, likely to buy efficiency equipment because of the experience with the program

3. No

[Do not read:]

98. Don't know

99. Refused

[ASK IF Q40 =1]

Q41. What energy efficient equipment did you purchase? (Interviewer: Select each applicable type and record specific equipment)

[MATRIX QUESTION: SCALE]

Item	Purchased	Specific equipment
Lighting		
HVAC		
Motors/controls		
Shell		
Other		

[ASK IF Q40 =1]

Q42. Was this equipment installed at the same facility (or facilities) as the equipment for which you received a rebate?

[SINGLE RESPONSE]

1. Yes

2. No, where was the equipment installed _____

[Do not read:]

96. Other, please specify: [OPEN-ENDED RESPONSE]

97. Not applicable

98. Don't know

99. Refused

[ASK IF Q40 =1]

Q43. How important was your experience with the program on your decision to buy the additional energy efficiency measures?

[SINGLE RESPONSE]

1. Very important

2. Somewhat important
3. Neither important or unimportant
4. Somewhat important
5. Unimportant

[Do not read:]

98. Don't know
99. Refused

[ASK IF Q40 =1]

Q44. How important was your past participation in any programs offered by Ameren Missouri to your decision to implement the additional energy efficiency measures?

[SINGLE RESPONSE]

1. Very important
2. Somewhat important
3. Neither important or unimportant
4. Somewhat important
5. Unimportant

[Do not read:]

98. Don't know
99. Refused

[ASK IF Q40 =1]

Q45. Why didn't you apply for or receive incentives for those items?

[Record open-ended response. Do not read list. Use list to probe or clarify.]

1. Didn't know whether equipment qualified for financial incentives
2. Equipment did not qualify for financial incentives
3. Too much paperwork for financial incentive applications
4. Financial incentive was insufficient
5. Didn't have time to complete paperwork for financial incentive application
6. Didn't know about incentive until after equipment was purchased

[Do not read:]

96. Other, please specify: [OPEN-ENDED RESPONSE]

98. Don't know

99. Refused

End

[ASK ALL]

Q46. That is all the questions I have. Do you have any additional comments?

Thank you for your time

7. SBDI Participant Interview Guide

Role and Overview

- Q1. Can you please tell me your title and role at your firm?
- Q2. My information indicates your SBDI project was located at **[ADDRESS HERE]**. Is that correct? If not, what is the correct address?

Experience with Energy Efficiency Upgrades

- Q3. Other than the SBDI work, have you replaced or upgraded any energy-using equipment at your property in the last two years? If so, what equipment did you replace or upgrade and why?
1. Did the replacement or upgrade result in increased energy savings?
 2. Did you receive incentives from Ameren for this work?

Awareness

- Q4. Who first approached you about the SBDI Program opportunity and how did they approach you? *[If needed: Did a contractor approach you or someone from Ameren or Lockheed Martin, the program implementer?]*

[ASK IF Q6 CONTRACTOR TOLD THEM ABOUT OPPORTUNITY]

- Q5. Other than cost savings, what did the [contractor] tell you, if anything, about the benefits of replacing or upgrading equipment through the program?
- Q6. Did you already know about the SBDI Program when you were approached? If so, how did you learn about it?
- Q7. Before you learned about the SBDI Program, were you already thinking of replacing or upgrading any of your energy-using equipment? If so, what equipment were you thinking about replacing or upgrading, and why? *[Probes: Was the equipment starting to fail, were you solely attracted to costs savings, something else?]*
- Q8. When you first learned about the SBDI Program, including the walk-through assessment to identify energy saving opportunities and the incentives for energy-saving equipment, what questions or concerns did you have, if any?

[ASK IF QUESTIONS/CONCERNS]

- Q9. How did the contractor address your questions or concerns?

Participation Experience

Q10. Did the contractor ask you to accompany him/her around your facility to examine the existing equipment and determine the need for upgrades?

Q11. Did you accompany the contractor around the facility? If so, in what ways, if any, did doing so help you in making decisions about the recommended equipment replacements?

Q12. How appropriate were the contractor's recommendations for your business and/or building operating conditions?

Q13. Were there any recommended equipment replacements or upgrades that you were initially reluctant to do but ultimately chose to do? What were those measures?

[ASK IF HESITANT ABOUT ANY RECOMMENDED EQUIPMENT]

Q14. What did the contractor say or do to convince you to do those replacements or upgrades?

Q15. Of all the upgrades recommended in the assessment completed by your contractor, what items, if any, did you decide not to do?

[ASK IF ANY UPGRADES NOT MADE]

Q16. Why did you not make upgrades that the assessment recommended?

[ASK IF ANY UPGRADES NOT MADE]

Q17. Do you anticipate making any of those upgrades in the future? Why?

[ASK IF ANY UPGRADES NOT MADE]

Q18. How did you choose the upgrades you made over those you decided not to make?
[If needed: Were these items cheaper, better payback than other items, something else?]

Barriers to Saving Energy

Q19. Was there any energy-using equipment you would like to have replaced or upgraded but was not covered by the SBDI Program? If so, what equipment?

Q20. Did the program's maximum incentive amount of \$2,500 per account prevent you from replacing or upgrading any equipment that you wanted to replace or upgrade? If so, what?

Q21. What did the contractor tell you, if anything, about other Ameren incentives available for equipment?

Q22. Did you already know about those incentives?

Decision Making

Q23. Did you consult anyone other than the program contractor in deciding what upgrades to make through the SBDI Program? If so, who?

Q24. Are there any professional, community, or cultural associations whose opinions you would trust when making decisions about equipment upgrades? If so, who are they?

Program Satisfaction

Q25. Please tell me about your satisfaction with each of the following things? What were you satisfied and dissatisfied about for each element?

Element	Satisfied Comments <i>[Probe: Anything that could be improved?]</i>	Dissatisfied Comments <i>[Probe: How big of a problem was this]</i>
1. The steps you had to go through to get the efficient equipment		
2. The ease of completing program paperwork		
3. How well the contractor explained the program processes and rules		
4. How well the contractor explained the equipment recommendations		
5. How well the contractor explained how much the incentives would cover and how much your costs would be		
6. The walk-through assessment you received		
7. The cost of the new lighting (or other equipment)		
8. The time it took to get your new lighting or other equipment		
9. The program overall		

Firmographics

I just want to close with a few questions about your organization and the property where the work was done.

Q26. Does your organization own or lease the space where this work was done?

[SINGLE RESPONSE]

- 1. Own
- 2. Lease

98. Don't know

99. Refused

Q27. What is the primary use of the property where the work was done through the SBDI Program? [RECORD ONE OF THE FOLLOWING]

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. Other, please describe _____

98. Don't know

99. Refused

Q28. How many separate locations does your organization own or lease for its own use in Ameren Missouri territory?

Q29. How many square feet of indoor space is there at the property where the work was done through the SBDI Program?

Q30. How many employees do you have at that location?

Q31. What, if anything, does your organization do to monitor or manage energy use in buildings it occupies?

Q32. That is all the questions I have. Do you have any additional comments?

Thank you for your ti

8. Standard and Custom Near Participant In-Depth Interview Guide

Firm and Project Descriptors

First, I'd like to get a bit of background on your role and the project or projects that you were looking into doing. All my questions from this point on refer only to the project or projects for which you were exploring getting incentives from Ameren Missouri but for which the applications were discontinued, and to the properties where you were planning to do those projects.

[ASK ALL]

Q1. I would like to make sure I have accurate information about the applications your company has submitted. [REVIEW INFORMATION FROM LIST OF APPLICATIONS, INCLUDING DATE AND LOCATIONS.] Is that information accurate? If not, what is the correct information?

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

Q2. Can you please tell me your title or role?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK ALL]

Q3. What type of building is located at [ADDRESS] in [CITY]? [*If needed: Is it an office, manufacturing facility, school, etc.*]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK ONLY U HAUL AND PLAZA TIRE, ABOUT PROJECTS MISSING THIS INFO]

Q4. The project data doesn't specify whether you own, lease, or rent the facilities at some of the locations. [REVIEW LOCATIONS.] Does your company own, lease, or rent those facilities?

[SINGLE RESPONSE]

1. Own
2. Lease
3. Mix of own/lease/rent: explain _____

[Do not read:]

98. Don't know
99. Refused

[ASK ALL]

Q5. Ameren Missouri offers two ways to get incentives for equipment upgrades. One is the Standard incentive, which provides fixed incentives for common, proven energy efficient measures. The other is the Custom path, for non-standard efficiency measures, where the incentive is based on the estimated energy savings, which must be calculated specifically for each project. Which of those project type were you thinking about?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know
99. Refused

Awareness and Application

The following questions again are about applications for BizSavers incentives that became discontinued – not ongoing or completed projects.

[ASK ALL]

Q6. Please tell me how your firm came to apply for Ameren Missouri BizSavers incentives for those projects, including how the discussion got started and who played what role in the decision. [*Probe about: How they became aware of the incentives. Who initiated discussion - program rep, vendor, energy auditor, etc. Role that vendors/retailers, contractors, auditors, etc. played and how that affected decision.*]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know
99. Refused

[ASK ALL]

Q7. Including yourself, who all was involved in completing the application for BizSavers incentives? What was each person's involvement? [*Probe for involvement by a contractor, the CFO, others in decision making roles.*]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK ALL]

Q8. Please describe the application paperwork you completed. [*Probe about: Version of form - Excel spreadsheet, PDF version, a paper version, or other format. Method of submitting - email, fax, mail, other. Where they got form - website, program rep, trade ally, etc.*]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK ALL]

Q9. And how was your experience with the application paperwork? [*Probe: How, if at all, did your experience with the application paperwork influence the decision to discontinue the application?*]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK IF THEY IDENTIFIED ANY CHALLENGES WITH THE PAPERWORK]

Q10. What suggestions, if any, do you have for streamlining the application forms or the approval process?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

Experience with Processes, Requirements and Staff

[ASK ALL]

Q11. Please summarize the application processes and steps your firm went through before deciding not to continue with the process. [*Probes: How far had you gotten in the application process when the application was discontinued? What requirements had you completed?*]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK ALL]

Q12. Overall, how was your experience with the Ameren Missouri BizSavers program's processes and requirements? [*Probes: What aspects of participation [application, documentation requirements, etc., if any, did you find surprising? What aspects, if any, did you find challenging?*]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK ALL]

Q13. On a scale of 1 to 5, where 1 means “not at all satisfied” and 5 means “very satisfied,” please rate your satisfaction with the following aspects of the program: [*Interviewer: prompt with responses for each, do not read 97-99*]

[MATRIX QUESTION]

	NOT AT ALL SATISFIED 1	2	3	4	VERY SATISFIED 5	DK	NA	REASON NA
The steps you had to take to get through the program								
The range of equipment that qualifies for incentives								
The quality of your interactions with program staff								

The amount of documentation you were required to provide								
Any inspections the program carried out at your work site								
The program, overall								
Ameren Missouri								

[INTERVIEWER: “NA” applies only if the question is not applicable to the project (e.g., no documentation was required). It does not apply just because the respondent is not familiar with the issue (e.g., the respondent did not supply the documentation). In the latter case, record response as “DK.”]

[ASK ALL]

Q14. And why did you decide not to continue with the process? [Probes: Who decided to discontinue the application, and why? (Anything to do with external lighting?) Did BizSavers ask you to discontinue the application and resubmit as a FastTrack application? (If needed: explain FastTrack)]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK ALL]

Q15. Did you discuss your reasons with anyone from the program? If so, how did program staff respond to your concerns?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK ALL]

Q16. In addition to the incentives you were investigating, what other Ameren Missouri incentives for commercial buildings are you aware of?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[IF DID NOT CONSIDER CUSTOM INCENTIVE PATH]

Q17. Are you aware that incentives are available for equipment that doesn't qualify for the Standard path, through the Custom incentive path?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[IF DID NOT CONSIDER STANDARD INCENTIVE PATH]

Q18. Are you aware that incentives are available for certain lighting and non-lighting equipment through the Standard incentive path?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[IF AWARE OF OTHER INCENTIVES]

Q19. Have you applied for any of those incentives we have been talking about?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK ALL]

Q20. In what ways, if any, do you think the program could be improved? [*Probe about: Equipment selection that qualified for incentives.*]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

Spillover

[ASK ALL]

Q21. Because of your experience with the BizSavers Program, have you bought, or are you likely to buy energy efficient equipment without applying for a financial incentive from Ameren Missouri?

[SINGLE RESPONSE]

1. Yes
2. No

[Do not read:]

96. Other, please specify: [OPEN-ENDED RESPONSE]
97. Not applicable
98. Don't know
99. Refused

[ASK IF Q21 = 1 "YES"]]

Q22. What energy efficient equipment did you purchase? Specify equipment

[MULTIPLE RESPONSE]

1. Lighting
2. HVAC
3. Motors/controls
4. Shell

[Do not read:]

96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[ASK IF Q21 = 1 "YES"]

Q23. On a scale of 1 to 5, where 1 means "very important" and 5 means "not at all important," how important was your experience with the program to your decision to implement the additional energy efficiency measures?

[SINGLE RESPONSE]

1. Very important
2. Somewhat important
3. Neither important or unimportant
4. Somewhat unimportant

5. Not at all important

[Do not read:]

96. Other, please specify: [OPEN-ENDED RESPONSE]

97. Not applicable

98. Don't know

99. Refused

[ASK IF Q21 = 1 "YES"]

Q24. Again, on a scale of 1 to 5, where 1 means "very important" and 5 means "not at all important," how important was your past participation in any programs offered by Ameren Missouri to your decision to implement the additional energy efficiency measures?

[SINGLE RESPONSE]

1. Very important
2. Somewhat important
3. Neither important or unimportant
4. Somewhat unimportant
5. Not at all important

[Do not read:]

96. Other, please specify: [OPEN-ENDED RESPONSE]

97. Not applicable

98. Don't know

99. Refused

[ASK IF Q21 =2 "NO"]

Q25. Why didn't you apply for or receive incentives for those items?

[SINGLE RESPONSE]

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

[Do not read:]

96. Other, please specify: [OPEN-ENDED RESPONSE]

97. Not applicable

98. Don't know

99. Refused

Firmographics and Energy Practices

I'd like to learn a little more about your firm so we can know can better understand the market that the BizSavers program serves.

[ASK ALL]

Q26. How many separate locations does your organization own or lease for its own use in Ameren Missouri territory?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK ALL]

Q27. In how many of these locations would the BizSavers incentive program be applicable?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK ALL]

Q28. Will your firm consider applying for Ameren Missouri incentives in the future?

[SINGLE RESPONSE]

1. Yes

2. No

[Do not read:]

98. Don't know

99. Refused

[ASK IF Q28 =2 "NO"]

Q29. Why not?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK IF Q28 =1 "YES"]

Q30. Which types of Ameren Missouri incentives do you expect to apply for in the future?
(Probe to code)

[MULTIPLE RESPONSE]

1. Existing Buildings (Standard or Custom) Lighting
2. Existing Buildings non-lighting (specify measure)
3. New Construction
4. Retro-commissioning

[Do not read:]

96. Other, please specify: [OPEN-ENDED RESPONSE]

98. Don't know

99. Refused

[ASK ALL]

Q31. How many square feet of indoor space is the property or properties I was asking about? [IF NEEDED: I mean, at any of the properties for which you began, but did not complete, an application for Ameren Missouri incentives.]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK ALL]

Q32. How many employees do you have at that property/those properties

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK ALL]

Q33. What, if anything, does your company do to monitor or manage energy use in buildings it occupies?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

Those are all the questions I have. As I review and analyze your responses, would it be alright if I contacted you again if needed to clarify a response? Thanks again. Good bye.

9. Non-Participant Survey

Screening [ALL]

First, I need to ask a couple of questions to see if you are eligible for this survey.

[ALL]

S1. To the best of your knowledge, has your company or organization replaced or upgraded electricity-using equipment in the past three years for which it received or is expecting to receive a cash incentive from Ameren Missouri?

[Interviewer: “electricity-using equipment” means equipment that requires electricity to operate, such as lighting, motors, computers, etc.]

1. Yes [*THANK AND TERMINATE*]
2. No
98. Don't know
99. Refused

[ALL]

S2. When it comes to purchasing energy-using equipment for your facilities/sites, do you ...?

[Read list]

1. Make those decisions
2. Provide input to others who make those decisions
3. Have no involvement with those decisions [*INTERVIEWER: ASK FOR REFERRAL, THEN THANK AND TERMINATE*]

Program Awareness and Sources of Awareness

[ALL]

Q1. Before I called, were you aware that Ameren Missouri provides cash incentives for energy efficient equipment purchases and upgrades for existing and new buildings?

[SINGLE RESPONSE]

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

99. Refused

[IF Q1 = YES]

Q2. Which of the following types of incentives were you aware of?

[MULTIPLE BINARY RESPONSE]

[Read each item]

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. Other-specify: ____

98. Don't know

99. Refused

[IF Q1 = YES]

Q3. For how long have you known about the Ameren Missouri incentives?

[MULTIPLE BINARY RESPONSE]

[Do not read items]

1. Less than one year
2. One to two years
3. More than two years
4. Other-specify: ____

98. Don't know

99. Refused

[IF Q1 = YES]

Q4. In the past year, from what sources have you gotten information about the energy efficiency incentives from Ameren Missouri?

[MULTIPLE BINARY RESPONSE]

[Do not read; after each response, say: what else? Until respondent indicates no other sources]

1. A contractor or equipment vendor
2. Internet source (website, online search, web links, etc.)

3. Trade association (possible newsletters, websites, events)
4. News coverage (coverage of customer stories in news outlets)
5. Advertisement (bill insert, TV, radio or other advertising, newsletter, billboards, etc.)
6. Industry event (conference, seminar, workshop, etc.)
7. Utility or program representative(s) (includes person-to-person, phone, or email contact from Ameren Missouri or implementer marketing or sales representative, NOT contractor or vendor)
8. Word of mouth (friend, neighbor, family, co-worker, colleague)
9. Other, specify: _____
98. Don't know
99. Refused

[IF Q1 = YES]

Q5. What additional information would you like about the energy efficiency incentives from Ameren Missouri that you did not get from those sources? [OPEN-ENDED RESPONSE]

Upgrades to Energy-using Equipment

Now I'd like to ask about any recent or planned equipment purchases.

[ALL]

Q6. What equipment or building features, if any, has your organization replaced or upgraded in the past two years?

[MULTIPLE BINARY RESPONSE; HOWEVER, OPTIONS 11, 98, AND 99 CANNOT BE SELECTED IF ANY OTHER RESPONSES ARE SELECTED]

[Do not read items]

1. Windows
2. Insulation (ceiling, attic or wall)
3. Heating, cooling, HVAC
4. Water heating
5. Motors or motor controls
6. Cooking (ovens)
7. Refrigeration or freezing

8. Lighting or lighting controls
9. Data center or IT equipment
10. Other - specify: _____
11. None
98. Don't know
99. Refused

[IF Q6.11 AND Q6.98 AND Q6.99 NOT SELECTED (SOME EQUIPMENT REPLACED)]

- Q7. Thinking about equipment replacements or upgrades that your organization performed, did the energy efficiency rating for any of them exceed current codes and standards?
1. Yes
 2. No
 98. Don't know
 99. Refused

[IF Q7 = YES]

- Q8. Which equipment replacements or upgrades exceeded energy efficiency codes and standards?

[MULTIPLE BINARY RESPONSE]

[Do not read]

1. [IF Q6.1 is selected] Window
2. [IF Q6.2 is selected] Insulation
3. [IF Q6.3 is selected] HVAC
4. [IF Q6.4 is selected] Water heating
5. [IF Q6.5 is selected] Motor or motor control
6. [IF Q6.6 is selected] Cooking (oven)
7. [IF Q6.7 is selected] Refrigeration or freezing
8. [IF Q6.8 is selected] Lighting or lighting control
9. [IF Q6.9 is selected] Data center or IT equipment
10. [IF Q6.10 is selected] [INSERT OTHER SPECIFY]

[IF Q7 = YES (SOME EQUIPMENT WAS EE)]

Q9. Did you receive any financial incentives from any source for any of the replacements or upgrades that exceeded energy efficiency codes and standards?

1. Yes
2. No
98. Don't know
99. Refused

[IF Q9 = YES (SOME EQUIPMENT RECEIVED INCENTIVES)]

Q10. For which of the replacements or upgrades did you receive financial incentives ...?

[MULTIPLE BINARY RESPONSE]

[Do not read items. If the respondent reports all equipment exceeded efficiency codes and standards, select item 1]

1. All replacements and upgrades received incentives
2. [IF Q8.1 is selected] Windows
3. [IF Q8.2 is selected] Insulation
4. [IF Q8.3 is selected] HVAC
5. [IF Q8.4 is selected] Water heating
6. [IF Q8.5 is selected] Motors or motor controls
7. [IF Q8.6 is selected] Cooking (oven)
8. [IF Q8.7 is selected] Refrigeration or freezing
9. [IF Q8.8 is selected] Lighting or lighting controls
10. [IF Q8.9 is selected] Data center or IT equipment
11. [IF Q8.10 is selected] [INSERT OTHER SPECIFY]

[IF Q7 = YES AND (Q9 = NO (NO INCENTIVES) OR Q10 <> 1 (NOT ALL RECEIVED INCENTIVES))]

Q11. So you replaced or upgraded [INSERT LIST OF ITEMS THAT WERE ABOVE CODE (Q8) AND DID NOT RECEIVE INCENTIVES (Q10)] without financial incentives. Was the selection of any of that equipment influenced by any energy-efficiency-related messaging you may have seen from Ameren Missouri?

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

99. Refused

[IF Q11 = 1 (YES)]

Q12. How likely is it you would have replaced or upgraded the [FIRST ITEM THAT WAS ABOVE CODE (Q8) AND DID NOT RECEIVE INCENTIVES (Q10)] if you had NOT seen any energy-efficiency messages from Ameren? Please give me a number from 1 to 7, where 1 means you “definitely would **not**” and 7 means you “definitely **would**” have replaced or upgraded the item.

[INSERT 1-7 SCALE WITH 98=DK, 99=REF; [REPEAT FOR EACH ITEM THAT WAS ABOVE CODE (Q8) AND DID NOT RECEIVE INCENTIVES (Q10)]

[ALL]

Q13. And what equipment or building features, if any, does your business or organization plan to replace or upgrade in the coming two years?

[MULTIPLE BINARY RESPONSE; HOWEVER, OPTIONS 11, 98, AND 99 CANNOT BE SELECTED IF ANY OTHER RESPONSES ARE SELECTED]

[Do not read list. If respondent mentions lighting or controls, ask whether it is interior or exterior lighting.]

1. Windows
2. Insulation (ceiling, attic or wall)
3. Heating, cooling, HVAC
4. Water heating
5. Motors and motor controls
6. Cooking (ovens)
7. Refrigeration / freezing
8. Lighting fixtures, ballasts, and/or lamps - interior
9. Lighting fixtures, ballasts, and/or lamps - exterior
10. Lighting controls - interior
11. Lighting controls - exterior
12. Data center or IT equipment
13. Other - specify: _____
14. None
98. Don't know
99. Refused

[IF (Q6.11 NOT SELECTED AND Q6.98 NOT SELECTED AND Q6.99 NOT SELECTED)
OR (Q13.11 NOT SELECTED AND Q13.98 NOT SELECTED AND Q13.99 NOT
SELECTED) (HAS REPLACED OR PLANS TO REPLACE EQUIPMENT)]

Q14. In general, how much does input from each of the following types of people influence your company or organization's decisions about equipment replacements and upgrades? Please answer on a scale from 1 to 7, where 1 means "no influence" and 7 means "very great influence".

[INSERT 1-7 SCALE WITH 98=DK AND 99=REF. RANDOMIZE ORDER OF ITEMS 1-4]

[Read each item. Repeat response options as needed. If someone indicates they received no input from a type of person, record as 1 "no influence".]

1. Vendor or retailer
2. Contractor or installer
3. Designer or architect
4. Utility staff member, such as an account representative
5. Someone else, please specify: _____

[IF (Q6.11 NOT SELECTED AND Q6.98 NOT SELECTED AND Q6.99 NOT SELECTED)
OR (Q13.11 NOT SELECTED AND Q13.98 NOT SELECTED AND Q13.99 NOT
SELECTED) (HAS REPLACED OR PLANS TO REPLACE EQUIPMENT)]

Q15. When discussing past or planned equipment replacements, has your contractor mentioned the energy-efficiency incentives available from Ameren Missouri?

[Ask even if respondent indicated vendor or contractor had no influence. We want to know if vendors and contractors are mentioning incentives.]

1. Yes
 2. No
 3. Not applicable—organization has not yet talked to a contractor
98. Don't know
99. Refused

[ALL]

Q16. How likely is it that you will use Ameren Missouri incentives to increase the energy efficiency level of any equipment replacements or upgrades you will make in the next two years? Please answer on a scale from 1 to 7, where 1 means "not at all likely" and 7 means "extremely likely".

[INSERT 1-7 SCALE WITH 98 = DK, 99 = REF]

[If respondent states they are not planning any equipment replacements, say: "What about equipment replacements that might result from unexpected equipment failure?"]

Interest in New Construction

[ALL]

Q17. Is your firm considering undertaking any new construction or major building renovation projects within the next five years?

[If needed: Such as adding a new wing, gutting an existing building, or building an entirely new building.]

1. Yes
2. No
98. Don't know
99. Refused

[IF Q17 = YES]

Q18. Has your firm begun discussing the project design with an architect, design engineer, or other type of contractor?

1. Yes
2. No
98. Don't know
99. Refused

[IF Q18 = YES]

Q19. In those discussions, has anyone brought up the possibility of using energy-efficiency incentives from Ameren Missouri?

1. Yes
2. No
98. Don't know
99. Refused

[IF Q17 = YES]

Q20. The Ameren Missouri New Construction program pays incentives for equipment or design changes that improve energy efficiency over the existing project design. Incentives are up to 4 cents per kilowatt-hour saved on whole-building design or up to 15 cents per kilowatt-hour saved for custom upgrades for specific equipment. Based on that information, how likely is it your company or organization will apply

for Ameren Missouri incentives for a new construction project? Please use a 1-to-7 scale where 1 means “not at all likely” and 7 means “extremely likely.”

[INSERT 1-7 SCALE WITH 98 = DK, 99 = REF]

[IF Q20 <> 7]

Q21. What might keep your company from applying for Ameren Missouri’s energy efficiency incentives for new construction?

[MULTIPLE BINARY RESPONSE]

[Do not read. Select all mentions. Follow initial response with “What else?]

1. Will use equipment that does not qualify for incentives
2. Too much time or trouble
3. Incentive sounds too low
4. Prefer not to deal with utility
5. Other - specify: _____

97. Not applicable – all such decisions are made by a property or energy management firm

98. Don’t know

99. Refused

Interest in SBDI

[IF STRATUM=1 OR 3]

The Ameren Missouri Small Business Direct Install program provides free walk-through energy assessments and substantial cash incentives toward the purchase of new, efficient lighting equipment. Ameren Missouri has designated several contractors as Service Providers for this program. Their job is to find eligible businesses and offer to schedule a free walk-through assessment with them.

[IF STRATUM=1 OR 3]

Q22. Is your company responsible for purchasing the lighting at your location?

1. Yes
2. No
98. Don’t know
99. Refused

[IF STRATUM=1 OR 3]

Q23. Does the building space that your company occupies have any lighting that is at least three years old?

[SINGLE RESPONSE]

1. Yes
2. No

[Do not read:]

96. Other, please specify: [OPEN-ENDED RESPONSE]

98. Don't know

99. Refused

[IF STRATUM=1 OR 3]

Q24. If you had to guess, by what percentage do you think you could reduce your electricity costs by replacing your lighting with high-efficiency lighting?

1. [OPEN-ENDED RESPONSE]

98. Don't know

99. Refused

[IF STRATUM=1 OR 3]

Q25. If a Small Business Direct Install Service Provider contacted your organization, how likely is it that your organization would schedule a free walk-through energy assessment to identify energy-efficient lighting upgrades? Please use a 1-to-5 scale where 1 means "not at all likely" and 5 means "extremely likely."

[INSERT 1-7 SCALE WITH 98 = DK, 99 = REF]

[IF Q25 <> 7]

Q26. What might keep your company from scheduling a free walk-through energy assessment with an Ameren Missouri Small Business Direct Install Service Provider?

[MULTIPLE BINARY RESPONSE]

[Do not read. Select all mentions. Follow initial response with "What else?"]

1. Don't know enough about how an energy assessment and lighting upgrades would be beneficial
2. Energy savings from lighting upgrades are not worth the trouble
3. Too much time or trouble
4. Concerns about trustworthiness of the Service Provider

5. Prefer not to deal with utility
6. Other - specify: _____
97. Not applicable – all such decisions are made by a property or energy management firm
98. Don't know
99. Refused

Interest in EMS Pilot

[IF STRATUM=3 OR 4 (IS IN EMS TARGET POPULATION)]

Q27. I'd like to ask you a couple of questions about a kind of building equipment system called an Energy Management System, or EMS. That type of system controls, monitors, and logs energy consumption of an entire building or of specific equipment such as lighting, air conditioning, or security systems. Before I asked about it, how familiar were you with Energy Management Systems? Would you say you...

1. Knew a lot about them
2. Knew a moderate amount about them
3. Knew little or nothing about them
98. Don't know
99. Refused

[IF STRATUM=3 OR 4 (IS IN EMS TARGET POPULATION)]

Q28. Does your organization have an EMS installed at your facility?

1. Yes
2. No
98. Don't know
99. Refused

[IF STRATUM=3 OR 4 (IS IN EMS TARGET POPULATION) AND Q28 <> 1 (YES)]

Q29. Has your organization ever considered having an EMS installed at your facility?

1. Yes
2. No
98. Don't know
99. Refused

[IF Q29= 1 (YES)]

Q30. Has your organization gone as far as to have a contractor provide a bid on having an EMS installed at your facility?

1. Yes
2. No
98. Don't know
99. Refused

[IF STRATUM=3 OR 4 (IS IN EMS TARGET POPULATION) AND Q28 <> 1 (YES)]

Q31. What are the reasons your organization did not have an EMS installed?

[MULTIPLE BINARY RESPONSE]

[Do not read. Select all mentions. Follow initial response with "What else?"]

1. Too expensive / up-front cost / would not save enough energy to justify cost
2. Too complicated
3. Not appropriate for my facility – specify: _____
4. Have made plans and will do it
5. Have not gotten around to it
6. Other – specify: _____
98. Don't know
99. Refused

[IF STRATUM=3 OR 4 (IS IN EMS TARGET POP.) AND Q28 <> 1 (YES)]

Q32. Ameren Missouri is now offering incentives to tax-exempt organizations to install an EMS. The incentive is the lesser of \$35,000 or 50% of the cost of equipment and software. Based on that information, how likely is it your company or organization will apply for Ameren Missouri incentives for an energy management system? Please use a 1-to-7 scale where 1 means "not at all likely" and 7 means "extremely likely."

[INSERT 1-7 SCALE WITH 98 = DK, 99 = REF]

[IF Q32 <> 7]

Q33. What might keep your company from applying for these new incentives for Energy Management Systems?

[MULTIPLE BINARY RESPONSE]

[Do not read. Select all mentions. Follow initial response with “What else?]

1. Don't know enough about energy management systems
2. Energy savings from an energy management system in not worth the trouble
3. Too much time or trouble
4. Incentive sounds too low
5. Prefer not to deal with utility
6. Other - specify: _____
97. Not applicable – all such decisions are made by a property or energy management firm
98. Don't know
99. Refused

Company Description

We are almost finished. I'd like to ask you just a few final questions about your company.

[IF TYPE = NULL]

Q34. What is your company or organization's primary business or activity?

[Do not read list. Record one response. Probe to code. List is ordered from most to least common.]

“Professional services” covers a wide range of generally office-based services, including banking/financial, consulting, advertising, real estate management & sales, telecommunications, but excludes government offices, which is a separate category]

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. Other, please describe _____
- 98. Don't know
- 99. Refused

[ALL]

- Q35. Is there a specific person or group of persons at your company who are responsible for monitoring or managing energy usage?
- 1. Yes
 - 2. No
 - 98. Don't know
 - 99. Refused

[ALL]

- Q36. Does your company have a formal policy requiring that energy efficiency be considered when purchasing equipment?
- 1. Yes
 - 2. No
 - 98. Don't know
 - 99. Refused

[IF SFTOTAL = NULL]

- Q37. What is the approximate total square footage of the facility or facilities that your company or organization owns or leases in Ameren Missouri territory? [OPEN-END RESPONSE]

[ALL]

- Q38. What is your job title?

[Do not read list. Record one response. If necessary, ask: is that most like {and read list}]

- 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) _____
98. Don't know
99. Refused

[ALL]

Q39. Thinking about the facility at your 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
99. Refused

[ALL]

Q40. Aside from trade professionals like vendors or contractors, are there any organizations or groups, including community or cultural organizations, that you would trust for information about replacing or purchasing new energy-using equipment? If so, what are they?

[MULTIPLE BINARY RESPONSE]

[Do not read items]

1. Chamber of Commerce
2. Equipment manufacturers
3. Equipment manufacturer sales representatives
4. Trade associations [SPECIFY] _____
5. Ameren Missouri

6. Other [SPECIFY] _____

Spillover Follow-Up

[IF Q11 = 1 (YES)]

Q41. We'd like to call you for a very short follow-up to get more details about your efficiency equipment purchases if that would be all right. Would you be the correct person to speak with?

1. Yes
2. No
98. Don't know
99. Refused

[ASK Q41 <> 1 (YES)]

Q42. Please provide us with the best person to contact and their phone number:

Name: [RECORD NAME OR INDICATE OTHER RESPONSE]

Phone number: [RECORD PHONE NUMBER OR LEAVE BLANK IF NONE PROVIDED]

Implementer Contact

[ALL]

Q43. Would you be interested in having someone contact you to provide more **information on Ameren Missouri's cash incentives for energy-efficiency upgrades?**

1. Yes – respondent is correct contact
2. Yes – respondent provides different contact: _____
3. No
98. Don't know
99. Refused

10. Trade Ally Process In-Depth Interview Guide

A - Firmographics

To start with, I have a few questions about your firm.

Q01 Which of the following best describes your company?

[Read all items through "Other." If response is "Other," ask respondent to specify.]

- 1 Distributor
- 2 Manufacturer sales representative
- 3 Contractor or installer
- 4 Architect
- 5 Design engineer
- 6 Energy Service Company

Q02 Which of the following types of equipment does your company work with?

[Read all items through "Other." If response is "Other," ask respondent to specify.]

- 1 Lighting
- 2 Motors and drives [select if response is motors or drives]
- 3 HVAC [heating, cooling]
- 4 Water Heating
- 5 Building shell [insulation, windows, sealing]
- 6 Compressed Air
- 7 Refrigeration

Q03 How many business locations does your company have in Missouri?

Q04 How many employees work at all your company's locations in Missouri? Your best estimate is fine.

Q05 Which of the following areas do you serve?

[Multiple response]

- 1 St Louis Metro
- 2 Outer St Louis suburbs
- 3 North or Central Missouri
- 4 Southeastern Missouri

B - Program Interruption

Now I would like to talk with you about how the interruption of the Ameren Missouri incentive programs affected your customers, if at all.

- Q06 As you may recall, the Ameren Missouri incentive programs were suspended for about three months between January 2016 and March 2016. What effect, if any, did suspension of the program have on your business? [*PROBE: Were you doing fewer projects because of the program suspension or did your workload stay the same?*]
- Q07 What have you heard from your customers, if anything, about the effect the suspension of the Ameren Missouri business programs had on their plans for equipment purchase or upgrades? [*PROBES: Did they delay planning equipment purchases or carrying out purchases or upgrades they had been planning? Did the delay cause changes in upgrades implemented while the program was suspended?*]
- Q08 What types of customers, if any, did the suspension of the Ameren Missouri business programs affect most? [*PROBES: Did they delay planning equipment purchases or carrying out purchases or upgrades they had been planning? Did the delay cause changes in upgrades implemented while the program was suspended?*]

C - Program Changes

As you may know, the incentive structure for custom projects in the BizSavers program has changed somewhat. Previously, incentives were paid per kWh saved at two levels – one for lighting and one for non-lighting measures. Now, incentives are paid per kWh saved at five levels, depending on the end-use or equipment type. [*If needed: Cooling is \$.15; building shell, HVAC, and cooking are \$.08; lighting and water heating are \$.075; air compression, motors, and process are \$.07; and refrigeration and miscellaneous are \$.06.*]

- Q09 What effect, if any, has this change had on your ability to do custom projects with the BizSavers program? [*Probe about effect on measures recommended or types of customers targeted.*]
- Q10 What feedback, if any, have you gotten from your customers about this new incentive structure?
- Q11 What types of customers, if any, did this new incentive structure affect most?
- Q12 How well did Ameren and the BizSavers program inform and educate you about this change?

- Q13 Another change you may be aware of is the elimination of incentives for outdoor lighting. What effect, if any, has this change had on the work you have done through BizSavers? [*Probe: Harder to get jobs, sell jobs, fewer jobs.*]
- Q14 Again, with what types of customers, if any, did that change have the most effect on your work?

D - Reasons for Participation

- Q15 What are your reasons for your company's involvement with the Ameren Missouri BizSavers program? [*Probe about expected benefits of program involvement.*]

[IF BENEFITS IDENTIFIED]

- Q16 To what extent has your company benefitted from being involved in the Ameren Missouri BizSavers program?

E - Membership in TAN

- Q17 I understand your firm is currently a member of the Ameren Missouri Trade Ally network. Is that correct?

- 1 Yes
- 2 No

- Q18 Was your firm a member of the Ameren Missouri Trade Ally network before 2016?

- 1 Yes
- 2 No

[ASK if Q17 = 1 (Yes) and Q18 = 1 (yes)]

- Q19 What challenges or issues were there, if any, in re-joining the TAN for the current program cycle? [*PROBES: Did BizSavers contact you about re-joining in a timely manner? Did BizSavers provide you the information you needed to re-join?*]

- Q20 Why did you choose not to become a trade ally network member again?

[*IF NEEDED: Were you discouraged by the program interruption, forgot to re-enroll, thought you were enrolled as trade ally, etc?*]

F - Awareness of Small Business Program

The next few questions are about a new program that Ameren Missouri introduced in 2016, called the Small Business Direct Install program. It targets business accounts in the Ameren Missouri 2M Small General Service Electric Rate, which encompasses more than 90% of Ameren Missouri nonresidential customers. In addition to "traditional" small businesses such as local restaurants, salons, offices, and retailers, this includes

individual locations of larger businesses, including franchises and chains. The program provides incentives to those businesses to upgrade their lighting, HVAC equipment, and other energy using equipment.

Q21 Prior to today, had you heard of the Small Business Direct Install program for small businesses?

1 Yes

2 No

Q22 About what percentage of your company's work is done with the small business accounts I described earlier - those that are eligible for the Small Business Direct Install Program?

Q23 Does your company offer auditing/assessment services to commercial customers to identify energy savings opportunities?

1 Yes

2 No

[ASK IF Q23=1]

Q24 In order to participate in the Small Business Direct Install Program, were you aware that your company must be approved by Ameren Missouri as a Small Business Direct Install Service Provider or be an approved third-party installer working with an approved Small Business Direct Install Service Provider?

1 Yes

2 No

[ASK IF Q24 = 1 (YES)]

Q25 Have your company worked with an approved Small Business Direct Install Service Provider to do any installations for the Small Business Direct Install Program?

1 Yes

2 No

[ASK IF Q21 = 1 (YES) and Q25 = 2 (NO)]

Q26 What are your company's reasons for not working with an approved Small Business Direct Install Service Provider to do installations for the Small Business Direct Install Program?

G - EMS Pilot

The next few questions are about a new pilot offering that Ameren Missouri introduced in 2016, providing enhanced incentives to nonprofits and tax-exempt entities to install energy management systems.

Q27 Prior to today, had you heard of this new pilot offering for nonprofits and tax-exempt entities to encourage installation of energy management systems?

1 Yes

2 No

Q28 About what percentage of your company's work is done with nonprofits and tax-exempt entities?

Q29 In the coming year how many EMS projects do you think your company might do with nonprofits or tax-exempt entities that would receive the program incentives?

Q30 Why do you think that?

H - Successes, Challenges, and Suggestions

Q31 What are the biggest challenges to participating in the Ameren Missouri BizSavers programs? Probes: qualification of equipment, rebate applications, disruption, changes to program measures.

Q32 What suggestions do you have to improve the Ameren Missouri BizSavers programs?

Q33 Is there any way the program could better support your efforts to promote the program?

I - Conclusion and Spillover Recruitment

Those are all my questions. I appreciate your time. Before I left you go, I'd like to tell you about some other research that Ameren Missouri has asked us to do. Ameren is interested in learning about sales of high-efficiency equipment that does not receive BizSavers incentives, but which may be influenced by the BizSavers program. To show Ameren's appreciation, BizSavers is offering a \$50 gift card to everyone who answers a few questions on that topic.

[ASK ALL]

Q34 May I send you an email with a link to a few questions on that topic, allowing you to respond to them at a more convenient time? We will send this email to you within the next month.

- 1 Yes – Confirm email address if in record. Obtain email address if not already in record. Thank and terminate.
- 2 No – Thank and terminate.

11. Service Provider (SP) Interview Guide

Firmographics

To start with, I have a few questions about your firm.

[ASK IF NOT PROVIDED IN DATABASE]

Q1. Which of the following best describes your company?

[Read all items through "Other." If response is "Other," ask respondent to specify.]

1. Distributor
2. Manufacturer sales representative
3. Contractor or installer
4. Architect
5. Design engineer
96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[ASK IF NOT PROVIDED IN DATABASE]

Q2. Which of the following types of equipment does your company work with?

[Read all items through "Other." If response is "Other," ask respondent to specify.]

1. Lighting
2. Motors and drives [select if response is motors or drives]
3. HVAC
4. Building shell [insulation, windows, sealing]
96. Other, please specify: [OPEN-ENDED RESPONSE]
97. Not applicable
98. Don't know
99. Refused

Q3. How many business locations do you have?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

Q4. How many employees work at all your locations? Your best estimate is fine.

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

Membership in TAN

[IF NOT AVAILABLE FROM DATABASE]

Q5. Was your firm a member of the Ameren Missouri Trade Ally network before 2016?

1. Yes

2. No

[Do not read:]

98. Don't know

99. Refused

[ASK IF Q5= 1 (YES) OR DATABASE IDENTIFIES AS PRIOR MEMBER]

Q6. What challenges or issues were there, if any, in re-joining the TAN for the current program cycle? [*Probes: Did BizSavers contact you about re-joining in a timely manner? Did BizSavers provide you the information you needed to re-join?*]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

Small Business Program

The next few questions are about your involvement in Ameren Missouri's Small Business Direct Install program.

Q7. First, how did you learn about the program? [*Probe about expected benefits of program involvement.*]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

Q8. What are your reasons for your company's decision to become an SBDI Service Provider? [*Probe about expected benefits of program involvement.*]

1. [OPEN-ENDED RESPONSE]

[*Do not read:*]

98. Don't know

99. Refused

[IF BENEFITS IDENTIFIED]

Q9. To what extent has your company experienced those expected benefits?

1. [OPEN-ENDED RESPONSE]

[*Do not read:*]

98. Don't know

99. Refused

Q10. In general, how was the process for becoming an SBDI Service Provider? [*Probe about the RFQ process, information they had to provide, being informed of the decision.*]

1. [OPEN-ENDED RESPONSE]

[*Do not read:*]

98. Don't know

99. Refused

Q11. What kind of training or information did your company receive about how to participate, including how to find and enroll customers and complete the application process?

1. [OPEN-ENDED RESPONSE]

[*Do not read:*]

98. Don't know

99. Refused

Q12. How well did that information prepare you for participating?

1. [OPEN-ENDED RESPONSE]

[*Do not read:*]

98. Don't know

99. Refused

Q13. What additional information or assistance would have been useful?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK IF DID NOT INDICATE CAP TOO HIGH DURING LM CALLS]

Q14. The SBDI puts a \$2,500 cap on the incentives that each account may receive. Would you say this is too high, too low, or about right?

1. Too high

2. Too low

3. About right

[Do not read:]

98. Don't know

99. Refused

Q15. Why do you say that?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK ALL]

Q16. In about what percentage of the walk-throughs you do for potential SBDI participants, do you identify energy savings opportunities that would require going above the incentive cap?

[If needed: assuming the customer was willing to do everything you recommended.]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK IF Q16 <> 0%]

Q17. On those occasions when you do identify energy savings opportunities that would require going above the incentive cap, what advice do you give your customers about getting those additional energy savings? [*Probe about the Standard and Custom incentives.*]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK IF Q16 <> 0%]

Q18. And how have your customers responded to that information? [*Probes: Have they indicated interest in pursuing those other incentives? What kinds of concerns have they expressed about needing to apply for other incentives?*]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

[ASK IF Q16 <> 0%]

Q19. On those occasions when you have identified energy savings opportunities that would require going above the incentive cap, what additional measures were involved?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

Q20. On average, about what percentage of installed costs do the SBDI incentives cover?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

Q21. How does that compare to other BizSavers lighting incentives?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

Q22. How much variability is there in the percentage of installed costs that the SBDI incentives cover? [*Probes: What's the highest percentage of a job's installed costs the incentives covered? What's the lowest percentage?*]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

Q23. What factors affect how much of a job's installed costs the incentives cover? [*Probe: For example, does size of the job, type of lighting installed, or pre-existing conditions have an effect?*]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

Q24. What challenges or concerns, if any, have you had with the application process for SBDI incentives? [*Probe about clarity of instructions, assistance, speed of turnaround.*]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

Q25. How does that compare to other BizSavers incentive applications?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

Successes, Challenges, and Suggestions

Q26. In general, how have your interactions been with BizSavers program staff? [*Probe about any differences between SBDI and other programs.*]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

Q27. What suggestions do you have to improve the Ameren Missouri BizSavers SBDI Program? [*Probes: Are there ways to further reduce the participation barriers for small business customers? Is there any equipment not currently being offered that should be?*]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

Q28. Is there any way the program could better support your efforts to promote the SBDI Program?

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

Program Interruption Effects on Trade Allies and Their Customers

[IF RESPONDENT WAS A TA BEFORE 2016]

Now I would like to talk with you about how the interruption of the other Ameren Missouri incentive programs effected your customers, if at all.

Q29. As you may recall, the Ameren Missouri incentive programs were suspended for about three months between January 2016 and March 2016. What effect, if any, did suspension of the program have on your business? [*PROBE: Were you doing fewer projects because of the program suspension or did your workload stay the same?*]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

Q30. What have you heard from your customers, if anything, about the effect the suspension of the Ameren Missouri business programs had on their planned or actual equipment purchases or upgrades? [*PROBE: Did they delay planning equipment purchases or carrying out purchases or upgrades they had been planning?*]

1. [OPEN-ENDED RESPONSE]

[Do not read:]

98. Don't know

99. Refused

Conclusion and Spillover Recruitment

Those are all my questions. I appreciate your time. Before I left you go, I'd like to tell you about some other research that Ameren Missouri has asked us to do. Ameren is interested in learning about sales of high-efficiency equipment that does not receive BizSavers incentives, but which may be influenced by the BizSavers program. To show Ameren's appreciation, BizSavers is offering a \$50 gift card to everyone who answers a few questions on that topic.

Q31. May I send you an email with a link to a few questions on that topic, allowing you to respond to them at a more convenient time?

1. Yes – Obtain email address if not already in record. Thank and terminate.
2. No – Thank and terminate.

12. Non-Participant Spillover Methodology

The evaluation team estimated lighting-related spillover by estimating the number of program-attributable lighting measures that surveyed vendors and installation contractors sold during program year 2016 (PY2016). In brief, the team:

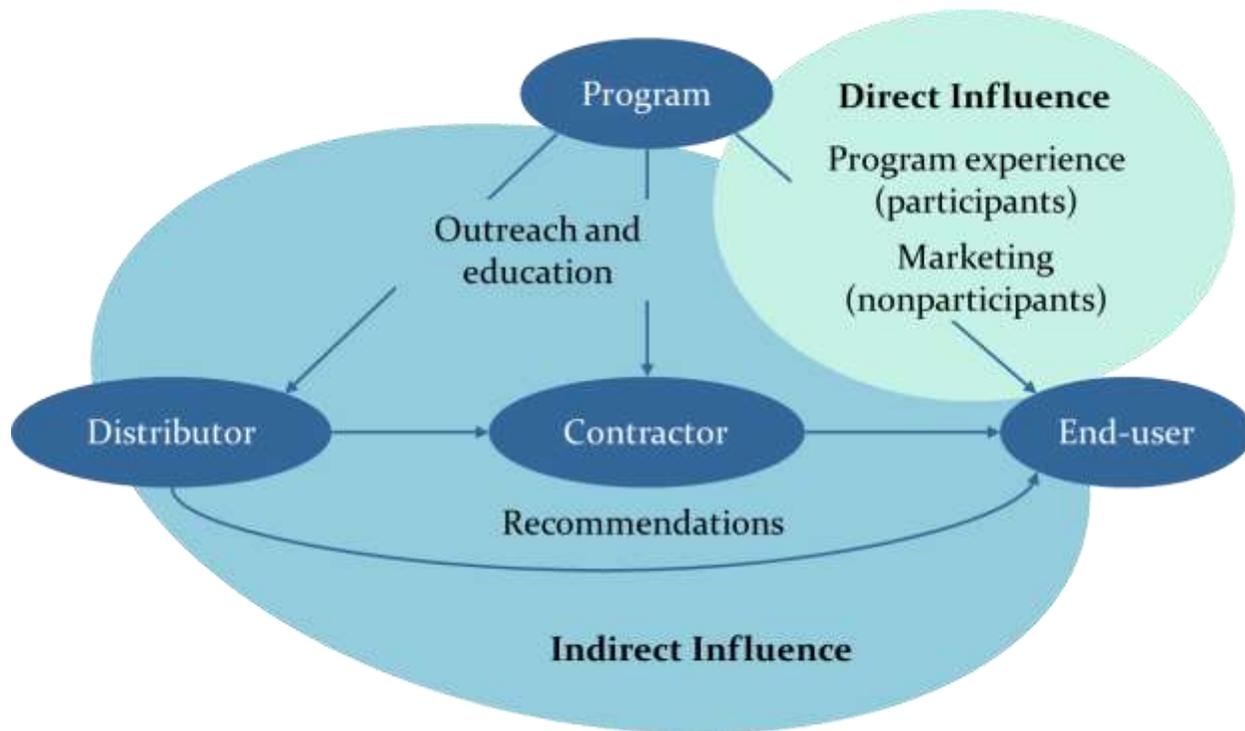
- Used data from surveys from vendors and contractors to estimate number of units of program-eligible lighting measures sold without incentives through each of five sales channels
- Used the vendor/contractor survey data together with participant and nonparticipant survey data to estimate the maximum program influence exerted within each of those channels
- For each vendor/contractor, used the estimated channel-specific influence values and un-incented sales totals to calculate a weighted mean influence percentage
- Multiplied the weighted mean influence percentage by the total number of measures reported, yielding the estimated number of program-attributable measures sold

For the first three of the above-identified stages of this process, the team applied an innovative approach developed for the previous evaluation. Details of how this approach differs from other commonly used approaches can be found in the 2015 BizSavers Evaluation Report.²⁷³

A key feature of this methodology is that it takes into account the various channels through which a program may exert direct and indirect influence through the interactions of the program, vendors, installation contractors, and end-users. Figure 12-1 illustrates these various channels. For example, program-influenced vendors making equipment recommendations in sales to end-users represent one channel; program-influenced vendors making equipment recommendations to contractors, who make recommendations to end-users is another channel; and program-influenced contractors who do not get recommendations from vendors but who make recommendations to end-users is yet a third channel.

²⁷³ <https://www.efis.psc.mo.gov/mpsc/commoncomponents/viewdocument.asp?DocId=936007290>

Figure 12-1 Channels of Program Influence



The Five Scenarios

The current approach identifies multiple scenarios representing all possible combinations of program influence on vendors, vendor influence on contractors or end-users, and contractor influence on end-users. Table 12-1 shows the five identified scenarios and the influence channels associated with each. Each scenario is defined based on: 1) whether the vendor sold equipment directly to an end-user (scenarios 1 and 2) or sold to a contractor (scenarios 3, 4, and 5); and 2) whether the sales in question involved equipment recommendations. Program direct influence on the end-user may occur in all scenarios. That also is the *only* possible influence in scenarios 2 and 5, as there are no equipment recommendations made to the end-user in those scenarios. Note that in scenario 5, it does not matter whether or not the vendor recommended equipment to the contractor, since the contractor did not recommend equipment to the end-user, so the vendor's recommendation could not influence the end-user.

As detailed below, the evaluation team used data from online surveys of vendors and contractors as well as from the program database to estimate the total sales of unincented high-efficiency equipment in each of the above scenarios and to estimate the mean program indirect influence via vendors and contractors. The team used data from participant and nonparticipant surveys to estimate program direct influence on end-users.

Description of Survey

The evaluation team designed separate online survey instruments for vendors and installation contractors. Both surveys asked respondents to select the types of high-efficiency lighting they sold within Ameren Missouri service territory from the list identified in Table 12-1.

Table 12-1 Types of High Efficiency Lighting

<i>Lighting Type</i>	
LED linear tube	LED exit signs
LED exterior wall pack	T5 high bay 150-400 watt
LED high bay	T5 or T8 tube
LED screw-in	Ceramic metal halide
LED screw-in reflectors	Induction exterior fixture
LED refrigerated case	CFL screw-in

Table 12-2 Five Scenarios of Equipment Sales and Recommendations

<i>Scenario</i>	<i>Sales Channel</i>	<i>Equipment Recommendations</i>			<i>Possible Influence Channels</i>
		<i>Vendor to End-User</i>	<i>Vendor to Contractor</i>	<i>Contractor to End-User</i>	
1	Vendor sells to end-user	Yes	n/a	n/a	(1.1) Program ⇒* end-user (1.2) Program ⇒ vendor ⇒ end-user
2		No	n/a	n/a	(2.1) Program ⇒ end-user
3	Vendor sells to contractor, who sells to end-user	n/a	Yes	Yes	(3.1) Program ⇒ end-user (3.2) Program ⇒ vendor ⇒ contractor ⇒ end-user (3.3) Program ⇒ contractor ⇒ end-user
4		n/a	No	Yes	(4.1) Program ⇒ end-user (4.2) Program ⇒ contractor ⇒ end-user
5		n/a	Yes or No	No	(5.1) Program ⇒ end-user

*⇒ = "influences"

Analysts aggregated the program-eligible lighting types into 39 typical categories of efficient lighting that varied by wattage. For each lighting type selected, the survey asked respondents how many units of various specific measures they sold within Ameren Missouri service territory. For example, the "LED linear tube" measure type included the measures "LED 4' linear tube, 1600-1800 lumens, 17-19 watt" and "LED 4' liner tube, 1801-2200 lumens, 20-22 wall."

The surveys then asked questions designed to allocate the total reported sales to the five scenarios identified above. The vendor survey asked what percentage of total sales (by

measure type) went to contractors versus to end-users. Both surveys asked about the percentages of sales in which the respondent made equipment recommendations – the vendor survey asked this separately about contractor and end-user sales, while the contractor survey asked this only about end-user sales.

Both surveys asked respondents to report the percentage of end-user sales for which the customers reported they would apply for *BizSavers* incentives, which provides an estimate of the percentage of un-incented sales.²⁷⁴

Finally, both surveys asked respondents to rate the program's influence on their recommendations and the contractor survey asked respondents to rate the influence of vendor recommendations on their recommendations to end-user customers; both surveys used a 1-5 scale. Both surveys assessed the respondents' influence on their end-user customers by asking what percentage of their recommendations the customers accepted.

Sampling and Data Collection Methodology

The target population for the spillover survey was any lighting vendors and contractors doing business in the Ameren Missouri service territory. On the assumption that most of the vendors and contractors with significant lighting work in the Ameren Missouri service territory had done at least one *BizSavers* project, we defined the survey frame as any firm that had done any *BizSavers* projects during the current program cycle.

From the *BizSavers* database, the evaluation team identified approximately 109 firms and 128 individual contacts that did lighting-related work. The evaluation team used "business type" information from the database to classify all members of the Ameren Missouri Trade Ally Network (TAN) into vendors (those who primarily sold, but did not install, equipment) and installation contractors. The team classified non-TAN firms based on information on the firms' websites, as confirmed in the survey. About one-third of the lighting firms were vendors and two-thirds were contractors.

The evaluation team conducted the spillover surveys shortly after completing telephone interviews of trade allies and SBDI service providers, in which 26 of the 128 contacts had been interviewed. During those telephone interviews, the interview told the trade allies about the online spillover survey and sought permission from each one to send them an email invitation to the survey; as an inducement to do the online survey in addition we offered each one a \$50 gift card to complete the online survey. All but one of the interviewed contacts gave permission, resulting in a final survey frame of 127 contacts representing 109 companies.

²⁷⁴ As described in the next subsection, the evaluation team also used a second method and data source to estimate the amount of un-incented sales and used the results that provided the more conservative estimate of un-incented sales.

The email invitation to complete the online survey explained the purpose of the survey. The invitation provided contact information for key evaluation team and Ameren Missouri staff. The team sent up to three weekly follow-up emails to all recipients of the email survey invitation (including those process survey respondents who agreed to complete the online survey).

The above efforts resulted in the completion of the online surveys by 19 vendors and 23 installation contractors. Together, those 42 respondents represented 40% of the PY2016 *BizSavers* lighting ex ante savings. For reasons explained below, this approach does not seek to extrapolate from sample results to the greater population of trade allies.

Estimation of Total and Un-Incented Savings

The evaluation team used the Ameren Missouri TRM to assign a kWh savings value for each of the evaluated lighting measure categories. This allowed the evaluation team to estimate the total energy savings that resulted from each survey respondent's sales of high-efficiency lighting. If a respondent reported selling a particular type of high-efficiency lighting but did not report the number of units sold, the team assigned zero savings to that lighting type for that respondent.

The team then subtracted each respondent's incented savings from total savings to generate an estimate of un-incented savings. The team had two sources for each respondent's estimate of incented savings: 1) the respondent's total savings multiplied by the respondent's estimated percentage of sales for which the customer applied for *BizSavers* incentives; and 2) the incented lighting savings for projects the respondent's firm had done, as tracked in the program database. To be conservative, the evaluation team used the source that produced the *lower* estimate of un-incented savings for each respondent. In the case of respondents that did not report sales of a given lighting type but the program database showed incented savings for that lighting type, the evaluation team assigned zero un-incented savings, rather than a negative number, to that lighting type.

The program implementer had already identified participant spillover savings associated with completed *BizSavers* projects ("project-level spillover") and recorded those savings in the program database. The evaluation team identified the project-level spillover savings for each surveyed vendor and contractor, and subtracted those savings from that vendor or contractor's total un-incented savings produced by the above method to produce a net un-incented sales value for each survey respondent.

The team then allocated the savings from the net un-incented sales to the five scenarios – vendor sales to end-users to scenarios 1 and 2, and contractor sales to scenarios 3, 4, and 5 (Table 12-3). The distribution of the vendor sales between scenarios 1 and 2 and of the contractor sales among scenarios 3 to 5 depended on the percentage of sales that involved recommendations.

Table 12-3 Allocation of Savings from Un-incented Sales to the Five Scenarios

Scenario	How Un-Incented Sales Are Calculated by Scenario				
1	Vendor un-incented sales to end-users	X	Percentage in which vendor recommended equipment		
2		X	Percentage in which vendor did not recommend equipment		
3	Contractor un-incented sales*	X	Percentage in which vendor recommended equipment	X	Percentage in which contractor recommended equipment
4		X	Percentage in which vendor <i>did not</i> recommend equipment	X	Percentage in which contractor recommended equipment
5		X	Percentage of sales in which contractor <i>did not</i> recommend equipment**		

*All contractor sales are to end-users.

**In this scenario, it does not matter whether or not the vendor recommended equipment, since the contractor did not recommend equipment, and therefore any vendor recommendations did not get passed on to the end-user.

None of the scenarios includes the vendors’ reported sales to contractors. That is because all vendor sales to contractors also represent contractor sales to end-users. Since this approach already counts the contractors’ reported sales to end-users, adding vendor sales to contractors would double-count those sales.

Calculation of Program Indirect Influence on End-Users

For each scenario, the team used the survey data to calculate mean program *indirect* influence through the various influence channels, as follows:

- Vendors and contractors rated the program’s influence on their recommendations, using a 1-5 scale, where 1 means “no influence” and 5 means “great influence.” The evaluation team converted the scaled responses to 0%, 25%, 50%, 75%, and 100%, respectively.
- Contractors rated the influence of vendor recommendations on their own recommendations, using the same a 1-5 scale, and the evaluation team similarly converted the scaled responses to 0% to 100%.
- The evaluation team used the respondents’ (vendors and contractors) reported percentage of accepted recommendations to end-user customers as the indicator of their influence on end-users.

For any given influence channel, the program *indirect* influence value is the product of the influence values for each “link” in that channel. For example, program-influenced vendors that make equipment recommendations to end-users represent one channel (designated as *program* ⇒ *vendor* ⇒ *end-user*). For that channel, the program direct influence is the product of the program’s influence on the vendor and the vendor’s influence on the end-

users. With this method, the evaluation team could calculate a single mean program indirect influence value for each influence channel for each survey respondent.

Calculation of Program Direct Influence on End-Users

This approach does not try to distinguish between un-incented sales to program participants versus nonparticipants. The approach instead uses a weighted average of the assessed program influence on energy efficiency upgrades undertaken by participants and nonparticipants from previous participant and nonparticipant surveys.

Of the 240 PY2016 BizSavers participants who completed the participant survey, 51 reported un-incented efficient lighting upgrades. Those 36 respondents reported the program's influence on those upgrades on a 0-to-10 scale, from "not at all important" to "very important." The evaluation team converted those scores to 0% to 100%.

Of the 95 respondents to the PY2016 nonparticipant survey, 19 reported they had done un-incented efficient lighting upgrades, all of whom reported that the upgrades were *not* influenced by any energy-efficiency-related messaging from Ameren Missouri. Further, all 52 respondents who reported *any* efficient equipment upgrades reported that Ameren Missouri staff had no influence on any of their equipment decisions.

The participant survey yielded a higher mean program influence score (60%) than did the nonparticipant survey (0%). To provide the weights for the two scores, the evaluation team estimated the participant and nonparticipant shares of the total sales of un-incented high-efficiency equipment, using data from the vendor and contractor survey and an independent estimate of the *participant* spillover rate. The estimates used the following formulas:

$$\begin{aligned} (1): & \quad x = y + z \\ (2): & \quad x = q + r \\ (3): & \quad r = y - (y * s) = y * (1 - s) \end{aligned}$$

Where x = total sales, y = participant sales, z = nonparticipant sales,
 q = un-incented sales, r = incented sales, and
 s = participant spillover rate.

Formulas (1) and (2) simply show that total sales are the sum of participant and nonparticipant sales, which are the sum of un-incented and incented sales. Formula (3) shows that the incented proportion of sales is equal to the total of participant sales minus the spillover (or un-incented) portion of participant sales.

The evaluation team calculated the savings-weighted mean percentages of incented (r) and un-incented sales (q) from the vendor and contractor surveys, yielding values of $r = .660$ and $q = .340$. These values are very consistent with those from the previous year's evaluation (.694 and .306, respectively).

The evaluation team separately estimated a participant spillover savings rate of .082 based on the total spillover rate reported in the previous evaluation.

Substituting the values of r and s into Formula (3), above, and solving for y :

$$.660 = y * (1-.082) = y * .918$$

$$y = .660 / .918 = .719$$

Thus, participant sales represent 71.9%, and nonparticipant sales represent 28.1% of un-incented high-efficiency sales. Again, these are highly consistent with the values from the previous evaluation (70.5% and 29.5%, respectively). The evaluation team used those values with the participant and nonparticipant influence values to produce a weighted mean value for program direct influence on end-users:

$$(.600 * .719) + (.0 * .281) = .400, \text{ or } 40\%$$

Calculation of Maximum Program Influence in Each Scenario

For each scenario, the team multiplied the total savings from un-incented measures by the influence value for that scenario to yield the estimated savings from program-influenced un-incented sales. As Table 12-2 showed, however, scenarios 1, 3, and 4 each have multiple possible channels of influence, each possibly having different influence values.

For each of scenarios 1, 3, and 4, then, the evaluation team used the *maximum* influence value from that scenario's various influence channels. For example, if the influence value for *program* \Rightarrow *contractor* \Rightarrow *end-user* is greater than for either *program* \Rightarrow *end-user* or *program* \Rightarrow *vendor* \Rightarrow *contractor* \Rightarrow *end-user*, then that is the value for scenario 3. Table 12-4 illustrates this, showing the evaluation team's computed spillover savings for the five spillover scenarios and the total across the five scenarios.

Estimation of Program-Attributable Measures

The team used each surveyed vendor/contractor's maximum program influence per channel and total un-incented sales per channel to calculate a weighted mean program influence percentage. For each surveyed vendor/contractor, the team then applied that percentage to the vendor/contractor's total reported number of units of each program-eligible measure. This produced an estimate of the number of program-attributable units of each eligible measure, for each vendor/contractor.

The evaluation team did not attempt to extrapolate the sample results to the population of trade allies. This is because the vendor- and contractor- reported sales data were highly skewed, which, combined with relatively small samples, produced large relative errors around the mean savings values, which would have produced population estimates with low precision.

Table 12-4 Five Scenarios of Equipment Sales and Recommendations

Scenario		Total Un-Incented Savings (kWh)	...Times Maximum Of...	Relative bounds at 90% confidence	Program-Influenced Un-Incented Savings (kWh) – Min 90%
1	Distributor recommends and sells to end-user	6,837,910	Program ⇒ end-user* 56% Program ⇒ distributor (96%) X = 85% distributor ⇒ end-user (88%) 85%	7%	5,409,412
2	Distributor sells to end-user without recommendation	772,213	Program ⇒ end-user 56% = 56%	5%	410,906
3	Distributor recommends and sells to contractor, who recommends and sells to end-user	6,775,447	Program ⇒ end-user 56% Program ⇒ distributor (96%) X distributor ⇒ contractor (86%) X contractor ⇒ end-user (73%) 60% = 62% Program ⇒ contractor (85%) X contractor ⇒ end-user (73%) 62%	9%	3,851,196
4	Distributor sells to contractor without recommendation, who recommends and sells to end-user	1,815,142	Program ⇒ end-user = 56% Program ⇒ contractor (85%) X = 62% contractor ⇒ end-user (73%) 62%	9%	1,031,735
5	Distributor sells to contractor**, who sells to end-user without recommendation	841,848	Program ⇒ end-user 56% = 56%	5%	447,960
Total		17,042,561		5%	11,510,886

*Read as “value of program influence on end-user.”

**With or without recommendation.

13. Heating and Cooling Interactive Factors

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

14. Cost Effectiveness Technical Data

The following appendix presents the critical technical data used to develop the cost effectiveness test results, at the portfolio and program level. ADM provided the inputs for the cost effectiveness testing by measure end use and effective useful life.

One of the key objectives of the economic modeling was to assure that the analysis was comparable to the Ameren Missouri's planning analysis. This allows Ameren Missouri to compare evaluated results with the expected numbers within the plan. First, the same analysis tool was used, DSMore. Second, Ameren Missouri provided economic and financial assumptions used to develop the model. Some of those assumptions include:

- Discount Rate = 6.46%
- Line losses = 4.84%
- Summer Peak would occur during the 16th hour of a July day on average
- Avoided Electric T&D = \$23.03/kW in 2016 and growing at a rate of 2% annually for the next 24 years
- Escalation rates for different costs occur at the component level with separate escalation rates for fuel, capacity, generation, T&D and customer rates carried out over 25 years.
- Cost Escalation Rate = 2%

The model assumptions are driven by measure loadshapes, which tells the model when to apply the savings during the day. This assures that the loadshape for that end use matches the system peak impacts of that end use and provides the correct summer coincident savings.

Table 14-2 presents actual PY2016 spending, broken down into various categories, including implementation (contractor costs), incentives and administration (other portfolio costs). These costs were allocated to the programs comprising the BizSavers portfolio.

There is no best practice regarding how to allocate portfolio administration expenses to individual energy efficiency programs. This is the approach used for allocating these costs in performing the cost effectiveness analysis of PY2016 program activity:

- The evaluation team fully allocated all portfolio administration costs incurred during PY2016 to the programs for the purposes of testing program cost effectiveness during the PY2016 program year. In other words, all program-level benefits and costs summate to the portfolio level benefits and costs.
- Table 14-2 presents Ameren Missouri's PY2016 actual program costs. However, net benefits and all other program cost/benefit ratios presented in this technical appendix

utilize cost/benefit values that were from the aggregations where the costs were discounted from 2016.

- The evaluation team allocated Portfolio Administration costs to the programs in proportion to the net present value of monetized benefits attributable to each program as determined by the Utility Cost Test (UCT). Table 14-1 and Table 14-2 below provide additional details regarding the apportionment factor and allocation values.

Table 14-1 Net Benefit Apportionment Factors (Expressed in 2016 Dollars)

<i>Program</i>	<i>NPV of UCT Benefits</i>	<i>Apportionment Factor</i>
Custom	\$33,752,845	60.24%
Standard	\$20,045,643	35.78%
New Construction	\$979,346	1.75%
Retro-Commissioning	\$10,239	0.02%
Small Business Direct Install	\$1,237,908	2.21%
Total	\$56,025,981	100%

Table 14-2 Ameren Missouri PY2016 Spending Data (Expressed in 2016 dollars)

<i>C&I EE PROGRAM COSTS (PY2016)</i>	<i>Administrative Costs</i>	<i>Incentive Costs</i>	<i>Other/Miscellaneous Costs</i>	<i>Total Costs</i>
Custom	\$3,339,856	\$3,150,993	\$21,251	\$6,512,100
Standard	\$1,720,831	\$2,045,456	\$12,043	\$3,778,330
New Construction	\$181,764	\$166,031	\$3,927	\$351,722
Retro-Commissioning	\$153,378	\$9,040	\$5,544	\$167,962
Small Business Direct Install	\$193,956	\$307,874	\$6,622	508,452
Total C&I Program Costs	\$6,579,693	\$5,679,394	\$49,388	\$11,318,565
Note: Incentive costs in excess of measure incremental costs are allocated to other/miscellaneous costs.				

Each cost test provides a benefit-cost ratio that reflects the net benefit or cost to a specific stakeholder. For example, the Utility Cost Test (UCT) takes into account all program costs and benefits from the utility (or program administrator) perspective, to demonstrate how the program impacts the utility relative to other program stakeholders. If the ratio is less than one, the costs outweigh the benefits; if the ratio is greater than one, the benefits outweigh the costs. Table 14-3 below is a summary of benefit and cost inputs for each cost test performed.

Table 14-3 Summary of Benefits and Costs Included in each Cost Effectiveness Test²⁷⁵

Test	Benefits	Costs
UCT	Perspective of utility, government agency, or third party implementing the program	
	<ul style="list-style-type: none"> ▪ Energy-related costs avoided by the utility, ▪ Capacity-related costs avoided by the utility, including generation, transmission, and distribution 	<ul style="list-style-type: none"> ▪ Program overhead costs ▪ Utility/program administrator incentive costs, ▪ Utility/program administrator installation costs
TRC	Benefits and costs from the perspective of all utility customers (participants and non-participants) in the utility service territory	
	<ul style="list-style-type: none"> ▪ Energy-related costs avoided by the utility, ▪ Capacity-related costs avoided by the utility, including generation, transmission, and distribution, ▪ Additional resource savings ▪ Applicable tax credits 	<ul style="list-style-type: none"> ▪ Program overhead costs, ▪ Program installation costs, ▪ Incremental measure costs (Whether paid by the customer of utility)
RIM	Impact of efficiency measure on non-participating ratepayers overall	
	<ul style="list-style-type: none"> ▪ Energy-related costs avoided by the utility, ▪ Capacity-related costs avoided by the utility, including generation, transmission, and distribution 	<ul style="list-style-type: none"> ▪ Program overhead costs, ▪ Utility/program administrator incentive costs, ▪ Utility/program administrator installation costs, ▪ Lost revenue due to reduced energy bills
PCT	Benefits and costs from the perspective of the customer installing the measure	
	<ul style="list-style-type: none"> ▪ Bill savings, ▪ Incremental installation costs ▪ Applicable tax credits or incentives 	<ul style="list-style-type: none"> ▪ Incentive payments, ▪ Incremental equipment costs
SCT	Benefits and costs from the perspective of society	
	<ul style="list-style-type: none"> ▪ Energy-related costs avoided by the utility, ▪ Capacity-related costs avoided by the utility, including generation, transmission, and distribution, ▪ Additional resource savings ▪ Non-monetized benefits (and costs) such as cleaner air or health impacts (not quantified in this analysis) 	<ul style="list-style-type: none"> ▪ Program overhead costs, ▪ Program installation costs, ▪ Incremental measure costs (Whether paid by the customer of utility)

*Incentives are considered incremental measure costs

The following sections provide a detailed review of the cost test results at the portfolio and program levels. The evaluation team presents the majority of costs and savings on a net basis, meaning that the net-to-gross ratio was applied to account for the impact of free ridership and spillovers. However, the evaluation team presents the participant borne costs, as applied to the Participant Cost Test (PCT), on a gross basis. For the PCT, the participant cost is based on what a single customer sees as the value times the number of participants.

BizSavers Portfolio Level Cost Test Inputs and Results

Table 14-4 summarizes the key financial benefit and cost inputs for the portfolio level Utility Costs Test (UCT). Ameren Missouri’s avoided cost of energy is \$56 million (energy savings). Incentives and overhead totaled \$11.3 million, which yields a benefit-cost ratio of 4.95. The UCT results show that the energy saved is approximately six times greater than the portfolio costs, from the utility perspective.

Table 14-4 Utility Cost Test (UCT) Inputs and Results - Portfolio Level

<i>UCT Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$34,102,305	
Avoided Electric Capacity	\$17,546,259	
Avoided T&D Electric	\$4,377,417	
Incentives		\$5,679,394
Other/Miscellaneous Costs		\$49,388
EM&V, Admin, Data Tracking		\$5,589,784
Total	\$56,025,981	\$11,318,565
UCT Benefit - Cost Ratio	4.95	
Note: Incentive costs in excess of measure incremental costs are allocated to other/miscellaneous costs.		

The TRC test results, shown in Table 14-5, reflect the BizSavers Program impacts on all customers in the Ameren Missouri service territory, participants and non-participants. The participant measure costs and overhead make up the total portfolio costs of \$23.1 million. The benefits consist of the utility’s total avoided costs of \$56 million, which yields a benefit-cost ratio of 2.42.

²⁷⁵ EPA, Understanding Cost-Effectiveness of energy efficiency Programs: Best Practices, Technical Methods, and Emerging Issues for Policy-Makers, 2008. <http://www.epa.gov/cleanenergy/documents/suca/cost-effectiveness.pdf>, pg. 3-2

Table 14-5 Total Resource Cost Test (TRC) Inputs and Results - Portfolio Level

<i>TRC Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$34,102,305	
Avoided Electric Capacity	\$17,546,259	
Avoided T&D Electric	\$4,377,417	
Participation Costs (net)		\$17,332,255
Other/Miscellaneous Costs		\$49,388
EM&V, Admin, Data Tracking		\$5,755,128
Total	\$56,025,981	\$23,136,770
TRC Benefit - Cost Ratio	2.42	
Note: Incentive costs in excess of measure incremental costs are allocated to other/miscellaneous costs.		

The portfolio level RIM test reflects the program impacts on utility rates. Table 14-6 summarizes key inputs for the RIM test. The net benefits include the avoided utility costs of \$56 million, and the costs of \$80.4 million. The same costs are included in the RIM, as they are in the UCT; however, lost revenues from reduced energy bills are also included. The financial data for the RIM test yields a benefit-cost ratio of .70. The ratio suggests that rates have potential to increase over time. However, a RIM < 1 does not always mean that rates will increase, in the long term. Energy efficiency programs are designed to reduce the capacity needs of the system, which may increase or decrease rates depending on the level of capital costs saved.²⁷⁶

²⁷⁶ EPA, Understanding Cost-Effectiveness of energy efficiency Programs: Best Practices, Technical Methods, and Emerging Issues for Policy-Makers, 2008. <http://www.epa.gov/cleanenergy/documents/suca/cost-effectiveness.pdf>, pg. 3-6

Table 14-6 Ratepayer Impact Measure Test (RIM) Inputs and Results - Portfolio Level

<i>RIM Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$34,102,305	
Avoided Electric Capacity	\$17,546,259	
Avoided T&D Electric	\$4,377,417	
Incentives		\$5,679,394
Other/Miscellaneous Costs		\$49,388
EM&V, Admin, Data Tracking		\$5,589,784
Lost Revenues		\$69,057,862
Total	\$56,025,981	\$80,376,427
RIM Benefit - Cost Ratio	0.70	
Note: Incentive costs in excess of measure incremental costs are allocated to other/miscellaneous costs.		

Table 14-7 summarizes the key financial inputs to the portfolio level PCT, which reflects the program impacts on the participants. The portfolio level benefits include the program incentives and energy bill savings, which total \$76 million. The costs include gross participant costs, totaling \$18 million and yielding a benefit-cost ratio of 4.23. The participants’ energy bill savings are nearly three times the costs.

Table 14-7 Participant Cost Test (PCT) Inputs and Results – Portfolio Level

<i>PCT Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Bill Savings (Gross)	\$70,406,355	
Incentives	\$5,671,098	
Participant Cost (Gross)		\$17,991,264
Total	\$76,077,453	\$17,991,264
PCT Benefit - Cost Ratio	4.23	

The portfolio level SCT reflects the program impacts on society; the key financial inputs are displayed in Table 14-8. The net benefits include the avoided utility costs of \$71.6 million and the costs of \$23 million. The financial data for the SCT test yields a benefit-cost ratio of 3.12.

Table 14-8 Societal Cost Test (SCT) Inputs and Results - Portfolio Level

<i>SCT Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$43,224,226	
Avoided Electric Capacity	\$22,997,210	
Avoided T&D Electric	\$5,409,294	
Participation Costs (net)		\$17,332,255
Other/Miscellaneous Costs		\$49,388
EM&V, Admin, Data Tracking		\$5,589,784
Total	\$71,630,730	\$22,971,426
SCT Benefit - Cost Ratio	3.12	
Note: Incentive costs in excess of measure incremental costs are allocated to other/miscellaneous costs.		

BizSavers Custom Program Cost Test Inputs and Results

The evaluation team performed cost tests for each of the four BizSavers Programs, those results were rolled into the portfolio level analysis that was presented above. The following sections provide a more in-depth look at how each individual program performed from a cost effectiveness perspective.

Table 14-9 summarizes the key financial benefit and cost inputs for the Custom Program UCT. The Custom Program attained \$33.7 million in avoided utility costs. Incentives, overhead and other program costs totaled \$6.5 million, which yields a benefit-cost ratio of 5.18. The UCT results show that the energy saved is approximately six times greater than the program costs, from the utility perspective.

Table 14-9 Utility Cost Test (UCT) Inputs and Results – Custom Program

<i>UCT Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$18,829,743	
Avoided Electric Capacity	\$11,973,502	
Avoided T&D Electric	\$2,949,600	
Incentives		\$3,150,993
Other/Miscellaneous Costs		\$21,251
EM&V, Admin, Data Tracking		\$3,339,856
Total	\$33,752,845	\$6,512,100
UCT Benefit - Cost Ratio	5.18	

The TRC test results, shown in Table 14-10, reflect the Custom Program impacts on all customers in the Ameren Missouri service territory, participants and non-participants. The participant measure costs, overhead, and other program costs total \$14.9 million. The benefits consist of the utility's total avoided costs of \$33.7 million, which yields a benefit-cost ratio of 2.27. The results show that the Custom Program benefits are almost one and a half times the program costs.

Table 14-10 Total Resource Cost Test (TRC) Inputs and Results - Custom Program

<i>TRC Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$18,829,743	
Avoided Electric Capacity	\$11,973,502	
Avoided T&D Electric	\$2,949,600	
Participation Costs (net)		\$11,377,827
Other/Miscellaneous Costs		\$21,251
EM&V, Admin, Data Tracking		\$3,505,623
Total	\$33,752,845	\$14,904,701
TRC Benefit - Cost Ratio	2.27	

The Custom Program RIM test reflects the program impacts on utility rates. Table 14-11 summarizes key inputs for the RIM test. The net benefits include the avoided utility costs of \$33.7 million. The same costs are included in the RIM, as they are in the UCT; however lost revenues from reduced energy bills are also included totaling \$43.5 million. The

financial data for the RIM test yields a benefit-cost ratio of .78. The ratio suggests that rates have potential to increase over time.

Table 14-11 Ratepayer Impact Measure Test (RIM) Inputs and Results - Custom Program

<i>RIM Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$18,829,743	
Avoided Electric Capacity	\$11,973,502	
Avoided T&D Electric	\$2,949,600	
Incentives		\$3,150,993
Other/Miscellaneous Costs		\$21,251
EM&V, Admin, Data Tracking		\$3,339,856
Lost Revenues		\$36,969,195
Total	\$33,752,845	\$43,481,295
RIM Benefit - Cost Ratio	0.78	

The Custom Program PCT reflects the program impacts on the participants; Table 14-12 summarizes the key financial inputs. The portfolio level benefits include the program incentives and energy bill savings, which total \$42 million. The costs include measure incentives and gross participant costs; totaling \$12 million and yielding a benefit-cost ratio of 3.52. The results indicate that participants' energy bill savings are two and a half times the costs.

Table 14-12 Participant Cost Test (PCT) Inputs and Results – Custom Program

<i>PCT Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Bill Savings	\$38,974,398	
Incentives	\$3,147,538	
Participant Cost (Gross)		\$11,969,940
Total	\$42,121,936	\$11,969,940
PCT Benefit - Cost Ratio	3.52	

The portfolio level SCT reflects the program impacts on society; Table 14-13 summarizes the key financial inputs. The net benefits include the avoided utility costs of \$43.4 million and the costs of \$14.7 million. The financial data for the SCT test yields a benefit-cost ratio of 2.94.

Table 14-13 Societal Cost Test (SCT) Inputs and Results – Custom Program

<i>SCT Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$23,975,435	
Avoided Electric Capacity	\$15,748,298	
Avoided T&D Electric	\$3,661,732	
Participation Costs (net)		\$11,377,827
Other/Miscellaneous Costs		\$21,251
EM&V, Admin, Data Tracking		\$3,339,856
Total	\$43,385,465	\$14,738,934
SCT Benefit - Cost Ratio	2.94	

BizSavers Standard Cost Test Inputs and Results

Table 14-14 provides the key financial benefit and cost inputs for the Standard Program UCT. The Custom Program attained \$20.1 million in avoided utility costs. Incentives and overhead totaled \$3.8 million, which yields a benefit-cost ratio of 5.31. The UCT results show that the energy saved is approximately six times greater than the program costs, from the utility perspective.

Table 14-14 Utility Cost Test (UCT) Inputs and Results – Standard Program

<i>UCT Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$13,741,356	
Avoided Electric Capacity	\$5,023,979	
Avoided T&D Electric	\$1,280,308	
Incentives		\$2,045,456
Other/Miscellaneous Costs		\$12,043
EM&V, Admin, Data Tracking		\$1,720,831
Total	\$20,045,643	\$3,778,330
UCT Benefit - Cost Ratio	5.31	
Note: Incentive costs in excess of measure incremental costs are allocated to other/miscellaneous costs.		

The TRC test results, shown in Table 14-15, reflect the Standard Program impacts on all customers in the Ameren Missouri service territory, participants and non-participants. The

participant measure costs, overhead, and other program costs total \$6.3 million. The benefits consist of the utility's total avoided costs of \$20.1 million, which yields a benefit-cost ratio of 3.19. The results show that the Standard Program benefits are approximately one and a half times greater than the costs.

Table 14-15 Total Resource Cost Test (TRC) Inputs and Results - Standard Program

<i>TRC Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$13,741,356	
Avoided Electric Capacity	\$5,023,979	
Avoided T&D Electric	\$1,280,308	
Participant Cost (Net)		\$4,590,482
Other/Miscellaneous Costs		\$12,043
EM&V, Admin, Data Tracking		\$1,692,064
Total	\$20,045,643	\$6,294,590
TRC Benefit - Cost Ratio	3.19	
Note: Incentive costs in excess of measure incremental costs are allocated to other/miscellaneous costs.		

The Standard Program RIM test reflects the program impacts on utility rates. Table 14-16 summarizes the key inputs for the RIM test. The net benefits include the avoided utility costs of \$20.1 million. The same costs are included in the RIM, as they are in the UCT; however lost revenues from reduced energy bills are also included totaling \$32.6 million. The financial data for the RIM test yields a benefit-cost ratio of 0.61. The ratio suggests that rates have potential to increase over time.

Table 14-16 Ratepayer Impact Measure Test (RIM) Inputs and Results - Standard Program

<i>RIM Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$13,741,356	
Avoided Electric Capacity	\$5,023,979	
Avoided T&D Electric	\$1,280,308	
Incentives		\$2,045,456
Other/Miscellaneous Costs		\$12,043
EM&V, Admin, Data Tracking		\$1,720,831
Lost Revenues		\$28,850,221
Total	\$20,045,643	\$32,628,551
RIM Benefit - Cost Ratio	0.61	
Note: Incentive costs in excess of measure incremental costs are allocated to other/miscellaneous costs.		

The Standard Program PCT reflects the program impacts on the participants; Table 14-17 displays the key financial inputs. The Standard Program benefits include the program incentives and energy bill savings, which total \$30 million. The costs include gross participant costs; totaling \$4.5 million and yielding a benefit-cost ratio of 6.62. The results indicate that participants’ energy bill savings are more than two and a half times the costs.

Table 14-17 Participant Cost Test (PCT) Inputs and Results – Standard Program

<i>PCT Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Bill Savings	\$27,973,563	
Incentives	\$2,040,615	
Participant Cost (Gross)		\$4,533,065
Total	\$30,014,178	\$4,533,065
PCT Benefit - Cost Ratio	6.62	

Table 14-18 summarizes the Standard Program SCT test results. The net benefits include the avoided utility costs of \$26 million and the costs of \$6.3 million. The financial data for the SCT test yields a benefit-cost ratio of 4.03.

Table 14-18 Societal Cost Test (SCT) Inputs and Results – Standard Program

<i>SCT Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$17,376,371	
Avoided Electric Capacity	\$6,553,905	
Avoided T&D Electric	\$1,571,583	
Participation Costs (net)		\$4,590,482
Other/Miscellaneous Costs		\$12,043
EM&V, Admin, Data Tracking		\$1,720,831
Total	\$25,501,589	\$6,323,356
SCT Benefit - Cost Ratio	4.03	
Note: Incentive costs in excess of measure incremental costs are allocated to other/miscellaneous costs.		

BizSavers New Construction Cost Test Inputs and Results

Table 14-19 provides the key financial benefit and cost inputs for the New Construction Program UCT. The New Construction Program attained \$.98 million in avoided utility costs. Incentives and overhead totaled \$.35 million, which yields a benefit-cost ratio of 2.78. The UCT results show that the energy saved is approximately seven times greater than the program costs, from the utility perspective.

Table 14-19 Utility Cost Test (UCT) Inputs and Results– New Construction Program

<i>UCT Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$669,647	
Avoided Electric Capacity	\$248,341	
Avoided T&D Electric	\$61,359	
Incentives		\$166,031
Other/Miscellaneous Costs		\$3,927
EM&C, Admin, Data Tracking		\$181,764
Total	\$979,347	\$351,723
UCT Benefit - Cost Ratio	2.78	

The TRC test results, shown Table 14-20 reflect the New Construction Program impacts on all customers in the Ameren Missouri service territory, participants and non-

participants. The participant measure costs, overhead, and other program costs total \$1.2 million. The benefits consist of the utility's total avoided costs of \$.98 million, which yields a benefit-cost ratio of 0.84. The results show that the New Construction Program costs are more than five times as much as the benefits (energy savings.)

Table 14-20 Total Resource Cost Test (TRC) Inputs and Results - New Construction Program

<i>TRC Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$669,647	
Avoided Electric Capacity	\$248,341	
Avoided T&D Electric	\$61,359	
Participant Costs (net)		\$969,590
Other/Miscellaneous Costs		\$3,927
EM&V, Admin, Data Tracking		\$199,799
Total	\$979,347	\$1,173,316
TRC Benefit - Cost Ratio	0.84	

The New Construction Program RIM test reflects the program impacts on utility rates. Table 14-21 summarizes the key inputs for the RIM test. The net benefits include the avoided utility costs of \$.98 million. The same costs are included in the RIM, as they are in the UCT; however lost revenues from reduced energy bills are also included totaling \$1.8 million. The financial data for the RIM test yields a benefit-cost ratio of 0.56. The ratio suggests that rates have potential to increase over time.

Table 14-21 Ratepayer Impact Measure Test (RIM) Inputs and Results - New Construction Program

<i>RIM Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$669,647	
Avoided Electric Capacity	\$248,341	
Avoided T&D Electric	\$61,359	
Incentives		\$166,031
Other/Miscellaneous Costs		\$3,927
EM&V, Admin, Data Tracking		\$181,764
Lost Revenues		\$1,397,426
Total	\$979,347	\$1,749,148
RIM Benefit - Cost Ratio	0.56	

The New Construction Program PCT reflects the program impacts on the participants; Table 14-22 summarizes the key financial inputs. The New Construction Program benefits include the program incentives and energy bill savings, which total \$1.7 million. The costs include measure incentives and gross participant costs, totaling \$1.1 million and yielding a benefit-cost ratio of 1.59. The results indicate that participants’ energy bill savings are approximately two times the costs.

Table 14-22 Participant Cost Test (PCT) Inputs and Results – New Construction Program

<i>PCT Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Bill Savings	\$1,566,538	
Incentives	\$166,031	
Participant Cost (Gross)		\$1,086,658
Total	\$1,732,569	\$1,086,658
PCT Benefit - Cost Ratio	1.59	

Table 14-23 summarizes the New Construction Program SCT test results. The net benefits include the avoided utility costs of \$1.3 million and the costs of \$1.2 million. The financial data for the SCT test yields a benefit-cost ratio of 1.08.

Table 14-23 Societal Cost Test (SCT) Inputs and Results – New Construction Program

<i>SCT Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$851,102	
Avoided Electric Capacity	\$325,288	
Avoided T&D Electric	\$75,898	
Participation Costs (net)		\$969,590
Other/Miscellaneous Costs		\$3,927
EM&V, Admin, Data Tracking		\$181,764
Total	\$1,252,289	\$1,155,280
SCT Benefit - Cost Ratio	1.08	

BizSavers Retro-Commissioning Cost Test Inputs and Results

Table 14-24 summarizes key financial benefit and cost inputs for the Retro-Commissioning Program UCT. The Retro-Commissioning Program attained \$10,239 in avoided utility costs. Incentives and overhead totaled \$167,962, which yields a benefit-cost ratio of 0.06.

Table 14-24 Utility Cost Test (UCT) Inputs and Results – Retro-Commissioning Program

<i>UCT Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$7,300	
Avoided Electric Capacity	\$2,287	
Avoided T&D Electric	\$652	
Incentives		\$9,040
Other/Miscellaneous Costs		\$5,544
EM&V, Admin, Data Tracking		\$153,378
Total	\$10,239	\$167,962
UCT Benefit - Cost Ratio	0.06	

The TRC test results, shown Table 14-25 reflect the Retro-Commissioning Program impacts on all customers in the Ameren Missouri service territory, participants and non-participants. The participant measure costs, overhead, and other program costs total \$168,421. The benefits consist of the utility’s total avoided costs of \$10,239, which yields

a benefit-cost ratio of 0.06. The results show that the Retro-Commissioning Program benefits are more than four and a half times as much as the costs.

Table 14-25 Total Resource Cost Test (TRC) Inputs and Results – Retro-Commissioning Program

<i>TRC Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$7,300	
Avoided Electric Capacity	\$2,287	
Avoided T&D Electric	\$652	
Participant Costs (net)		\$9,500
Other/Miscellaneous Costs		\$5,544
EM&V, Admin, Data Tracking		\$153,378
Total	\$10,239	\$168,421
TRC Benefit - Cost Ratio	0.06	

The Retro-Commissioning Program RIM test reflects the program impacts on utility rates. Table 14-26 summarizes key inputs for the RIM test. The net benefits include the avoided utility costs of \$10,239. The same costs are included in the RIM, as they are in the UCT; however lost revenues from reduced energy bills are also included totaling \$183,602. The financial data for the RIM test yields a benefit-cost ratio of 0.06. The ratio suggests that rates have potential to increase over time.

Table 14-26 Ratepayer Impact Measure Test (RIM) Inputs and Results – Retro-Commissioning Program

<i>RIM Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$7,300	
Avoided Electric Capacity	\$2,287	
Avoided T&D Electric	\$652	
Incentives		\$9,040
Other/Miscellaneous Costs		\$5,544
EM&V, Admin, Data Tracking		\$153,378
Lost Revenues		\$15,640
Total	\$10,239	\$183,602
RIM Benefit - Cost Ratio	0.06	

The Retro-Commissioning Program PCT reflects the program impacts on the participants; Table 14-27 displays the key financial inputs. The New Construction Program benefits include the program incentives and energy bill savings, which total \$24,680. The costs include gross participant costs totaling \$9,500 and yielding a benefit-cost ratio of 2.60. The results indicate that participants’ energy bill savings are approximately eleven and one half times the costs.

Table 14-27 Participant Cost Test (PCT) Inputs and Results – Retro-Commissioning Program

<i>PCT Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Bill Savings	\$15,640	
Incentives	\$9,040	
Participant Cost (Gross)		\$9,500
Total	\$24,680	\$9,500
PCT Benefit - Cost Ratio	2.60	

Table 14-28 summarizes the Retro-Commissioning Program SCT test. The net benefits include the avoided utility costs of \$12,056 and the costs of \$168,421. The financial data for the SCT test yields a benefit-cost ratio of 0.07.

Table 14-28 Societal Cost Test (SCT) Inputs and Results – Retro-Commissioning Program

<i>SCT Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$8,528	
Avoided Electric Capacity	\$2,776	
Avoided T&D Electric	\$752	
Participation Costs (net)		\$9,500
Other/Miscellaneous Costs		\$5,544
EM&V, Admin, Data Tracking		\$153,378
Total	\$12,056	\$168,421
SCT Benefit - Cost Ratio	0.07	

BizSavers SBDI Cost Test Inputs and Results

Table 14-29 summarizes key financial benefit and cost inputs for the SBDI Program UCT. The SBDI Program attained \$1.2 million in avoided utility costs. Incentives and overhead totaled \$508,452 which yields a benefit-cost ratio of 2.44. The UCT results show that the energy saved is approximately four times greater than the program costs, from the utility perspective.

Table 14-29 Utility Cost Test (UCT) Inputs and Results – SBDI Program

<i>UCT Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$854,259	
Avoided Electric Capacity	\$298,150	
Avoided T&D Electric	\$85,499	
Incentives		\$307,874
Other/Miscellaneous		\$6,622
EM&V, Admin, Data Tracking		\$193,956
Total	\$1,237,908	\$508,452
UCT Benefit - Cost Ratio	2.44	
Note: Incentive costs in excess of measure incremental costs are allocated to other/miscellaneous costs.		

The TRC test results, shown Table 14-30 reflect the SBDI Program impacts on all customers in the Ameren Missouri service territory, participants and non-participants. The participant measure costs, overhead, and other program costs total \$1.2 million. The benefits consist of the utility’s total avoided costs of \$595,742, which yields a benefit-cost ratio of 2.08. The results show that the SBDI Program benefits are more than four and a half times as much as the costs.

Table 14-30 Total Resource Cost Test (TRC) Inputs and Results – SBDI Program

<i>TRC Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$854,259	
Avoided Electric Capacity	\$298,150	
Avoided T&D Electric	\$85,499	
Participant Costs (net)		\$384,856
Other/Miscellaneous Costs		\$6,622
EM&V, Admin, Data Tracking		\$204,264
Total	\$1,237,908	\$595,742
TRC Benefit - Cost Ratio	2.16	
Note: Incentive costs in excess of measure incremental costs are allocated to other/miscellaneous costs.		

The SBDI Program RIM test reflects the program impacts on utility rates. Table 14-31 summarizes key inputs for the RIM test. The net benefits include the avoided utility costs of \$1.2 million. The same costs are included in the RIM, as they are in the UCT; however lost revenues from reduced energy bills are also included totaling \$2.3 million. The financial data for the RIM test yields a benefit-cost ratio of 0.53. The ratio suggests that rates have potential to increase over time.

Table 14-31 Ratepayer Impact Measure Test (RIM) Inputs and Results – SBDI Program

<i>RIM Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$854,259	
Avoided Electric Capacity	\$298,150	
Avoided T&D Electric	\$85,499	
Incentives		\$307,874
Other/Miscellaneous Costs		\$6,622
EM&V, Admin, Data Tracking		\$193,956
Lost Revenues		\$1,825,380
Total	\$1,237,908	\$2,333,832
RIM Benefit - Cost Ratio	0.53	
Note: Incentive costs in excess of measure incremental costs are allocated to other/miscellaneous costs.		

The SBDI Program PCT reflects the program impacts on the participants; Table 14-32 displays the key financial inputs. The New Construction Program benefits include the program incentives and energy bill savings, which total \$2.2 million. The costs include gross participant costs totaling \$392,101 and yielding a benefit-cost ratio of 5.57. The results indicate that participants' energy bill savings are approximately eleven and one half times the costs.

Table 14-32 Participant Cost Test (PCT) Inputs and Results – SBDI Program

<i>PCT Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Bill Savings	\$1,876,216	
Incentives	\$307,874	
Participant Cost (Gross)		\$392,101
Total	\$2,184,090	\$392,101
PCT Benefit - Cost Ratio	5.57	

Table 14-33 summarizes the SBDI Program SCT test. The net benefits include the avoided utility costs of \$1.5 million and the costs of \$585,434. The financial data for the SCT test yields a benefit-cost ratio of 2.53.

Table 14-33 Societal Cost Test (SCT) Inputs and Results – SBDI Program

<i>SCT Calculations</i>		
<i>Category</i>	<i>Benefits</i>	<i>Costs</i>
Avoided Electric Production	\$1,012,789	
Avoided Electric Capacity	\$366,943	
Avoided T&D Electric	\$99,330	
Participation Costs (net)		\$384,856
Other/Miscellaneous Costs		\$6,622
EM&V, Admin, Data Tracking		\$193,956
Total	\$1,479,062	\$585,434
SCT Benefit - Cost Ratio	2.53	
Note: Incentive costs in excess of measure incremental costs are allocated to other/miscellaneous costs.		

15. Glossary of Terms

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Monitoring: Gathering of relevant measurement data, including but not limited to energy-consumption data, over time to evaluate equipment or system performance. Examples include chiller electric demand, inlet evaporator temperature and flow, outlet evaporator temperature, condenser inlet temperature, and ambient dry-bulb temperature and relative

humidity or wet-bulb temperature, for use in developing a chiller performance map (e.g., kW/ton vs. cooling load and vs. condenser inlet temperature).

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

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

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

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

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

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

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

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

Portfolio: Either (a) a collection of similar programs addressing the same market (e.g., a portfolio of residential programs), technology (e.g., motor-efficiency programs), or mechanisms (e.g., loan programs) or (b) the set of all programs conducted by one organization, such as a utility (and which could include programs that cover multiple markets, technologies, etc.).

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

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

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

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

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

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

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

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

Spillover: A positive externality related to a participant or non-participant enacting additional energy efficiency measures without an incentive because of a participant's experience in the program.. There can be participant and/or non-participant spillover rates depending on the rate at which participants (and non-participants) adopt energy efficiency measures or take other types of efficiency actions on their own (i.e., without an incentive being offered).

Stipulated Values: See "deemed savings."

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

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

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