City of La Crosse, Wisconsin

City Hall
400 La Crosse Street
La Crosse, WI 54601

Meeting Agenda

Climate Action Plan Steering Committee

Monday, July 13, 2026 **4:00 PM** **Eagle Room**

This meeting will also be conducted through video conferencing.

Join Zoom Meeting:
https://cityoflacrosse-org.zoom.us/j/89556262687?pwd=TmzYMQRWEj7sOuWitzv04sLbpMOYp5.1

Meeting ID: 895 5626 2687 Passcode: 102161 Join by Phone: +1-507-473-4847

Call to Order

Roll Call

Approval of Minutes

Notices and Discussion

Agenda Items:

1 26-0690 Energy Saving Performance Contract Phase 3, Year 3 Measurement & Verification Report - Doug Carlson

Attachments: Report

2 26-0691 Energy Saving Performance Contract Phase 4, Year 1 Measurement & Verification Report - Doug Carlson

Attachments: Report

3 26-0692 Sustainability Institute Climate Fellows

Attachments: Request

Next Meeting / Agenda Items

Adjournment

Notice is further given that members of other governmental bodies may be present at the above scheduled meeting to gather information about a subject over which they have decision-making responsibility.

NOTICE TO PERSONS WITH A DISABILITY
Requests from persons with a disability who need assistance to participate in this meeting should call the City Clerk's office at (608) 789-7510 or send an email to ADAcityclerk@cityoflacrosse.org, with as much advance notice as possible.

City of La Crosse, Wisconsin

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400 La Crosse Street
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Text File

File Number: 26-0690

Agenda Date: 7/13/2026 **Version:** 1 **Status:** Agenda Ready

In Control: Climate Action Plan Steering Committee **File Type:** Report

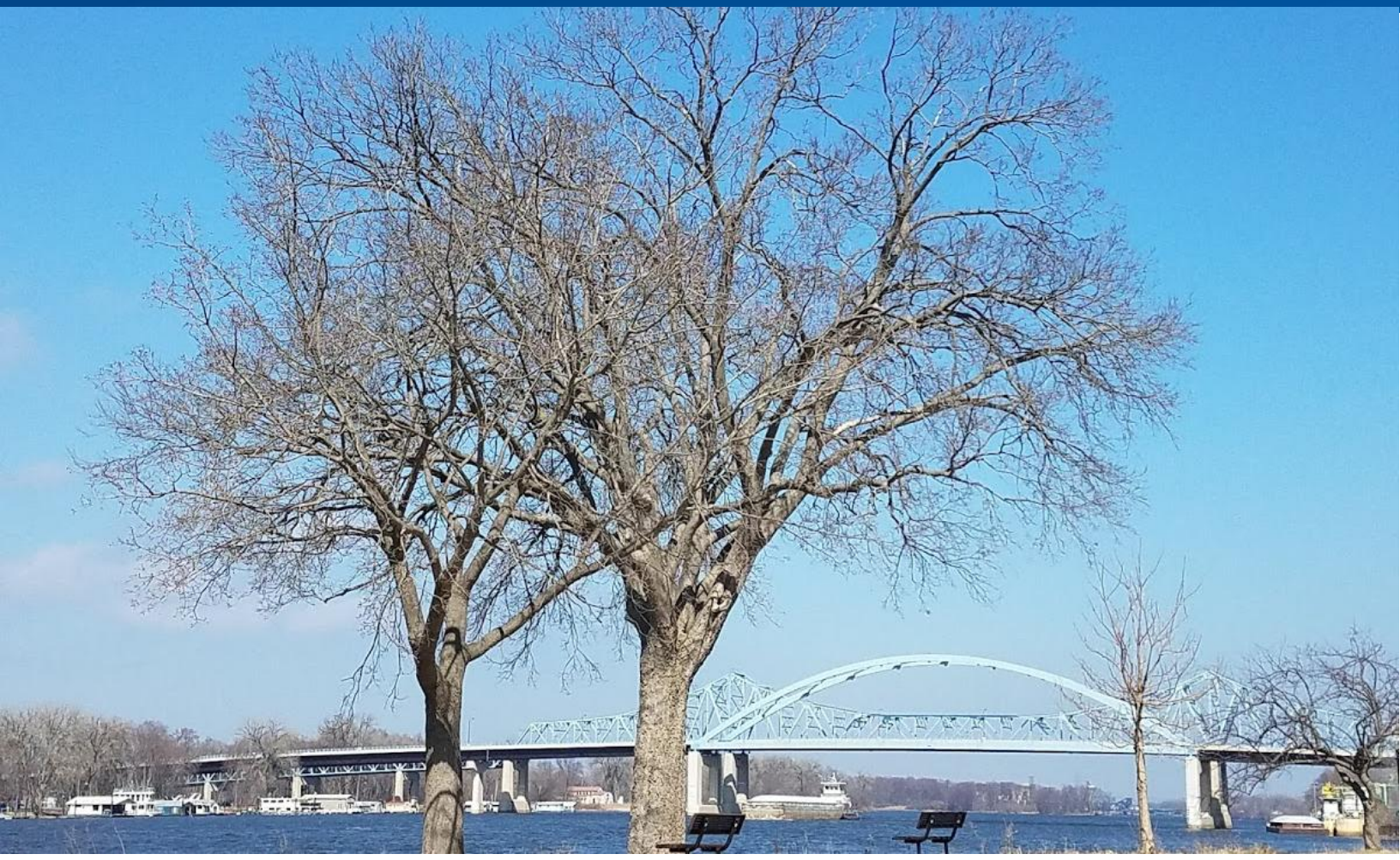
Agenda Number: 1

City of La Crosse

Facility Improvements Through Performance Contract

Phase 3: Measurement & Verification Report

Year Three of Three



Submitted by:
Jeff Van Ess
Douglas Carlson

April 2026

Presented to:
Lewis Kuhlman

The power behind **your mission**

Johnson Controls

May 8th, 2026

Lewis Kuhlman, AICP
Environmental Planner
400 La Crosse St.
La Crosse, WI 56401

Dear Mr. Kuhlman:

On April 22, 2019, the City of La Crosse partnered with Johnson Controls to complete an initial Performance Contract designed to reduce the City's energy consumption and associated operational cost. As a result of the success of the first two phases, on May 14, 2021, the City of La Crosse and Johnson Controls embarked on a third phase to reduce energy consumption and provide solar photovoltaic (PV) energy to additional facilities throughout La Crosse. This report has been prepared to detail the economic benefits realized by the City of La Crosse during Year Three (February 1, 2025 through January 31, 2026) of the three-year Guarantee Term associated with the Phase 3 energy conservation and facility improvement measures.

Please note, this Year Three report culminates Johnson Controls reporting responsibilities associated with the Phase 3 Performance Contract and no further analysis will be conducted nor future reports provided. Johnson Controls values our relationship with the City of La Crosse, and we look forward to working in partnership with the City's personnel to continue to provide programs, services, and support to enhance a comfortable, safe, and sustainable City.

Sincerely,

Jeff Van Ess
Senior Account Executive
Sustainable Infrastructure
262-505-0842
jeff.vaness@jci.com

Douglas Carlson
Senior Customer Experience Specialist
Sustainable Infrastructure
630-804-6399
douglas.r.carlson@jci.com

Acceptance

Following review and acceptance of this report, please return a signed copy of this letter to:

Johnson Controls
Attn: Douglas Carlson
douglas.r.carlson@jci.com

The Year Three report for the Performance Contract is accepted by the undersigned.

Signature: DocuSigned by: 6603D9B2F5504DF... Date: 6/25/2026

Title: Environmental Planner

Table of Contents

Executive Summary

The City of La Crosse's leadership team wished to deploy innovation to reduce the City's environmental footprint. In doing so, they would remain on track to reach their 2050 environmental goals, including achieving carbon neutrality and transitioning to 100% renewable energy. To reach these targets, enrich the community for generations to come and remain fiscally responsible to constituents, the City of La Crosse partnered with Johnson Controls. Together, we have embarked on a multi-phase sustainability and modernization initiative under a performance contract.

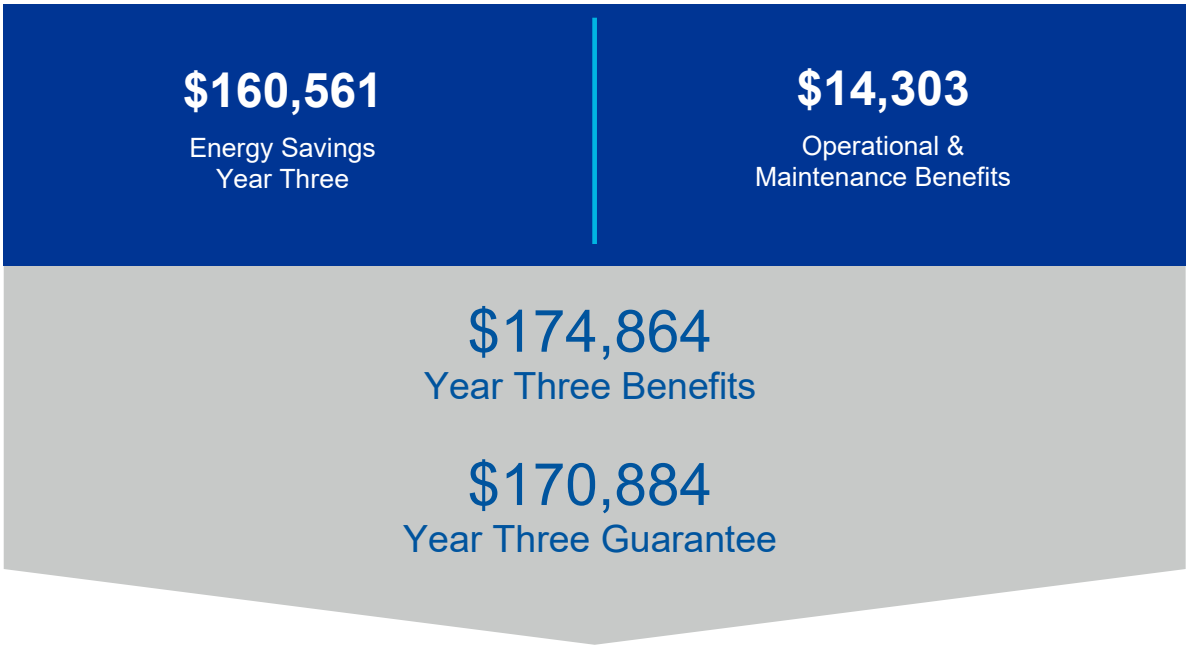
Via our partnership, the City of La Crosse and Johnson Controls created a comprehensive infrastructure improvement program through a twenty-year Performance Contract, dated April 22, 2019. The program optimizes systems and equipment, improves building environments, saves energy, and has provided benefits totaling $398,860, with a performance guarantee based on both measured and non-measured savings.

The primary goals of this project were established as:

- Reduce utility usage in the buildings
- Implement City-owned Renewable Energy
- Reduce deferred capital improvements
- Reduce on-going maintenance costs within the buildings
- Improve environment for building occupants
- Create a positive impact on the environment

This report details the savings the City achieved during Year Three (February 1, 2025 through January 31, 2026) of the three-year Guarantee Term associated with the Phase 3 energy conservation and facility improvement measures.

During Year Three, the City of La Crosse saved $160,561 in utility cost and $14,303 in operational and maintenance benefits. The total savings for Year Three are $174,864. The combined energy savings, capital benefits, energy rebate benefits, and operational benefits, have resulted in **$742,593 total savings through the end of Year Three**.



When compared against the guarantee of $170,884, this project has generated excess savings of $3,980 during Year Three

Summary of Project Benefits and Results

The energy and operational savings are to be derived from the following energy conservation measures (ECM).

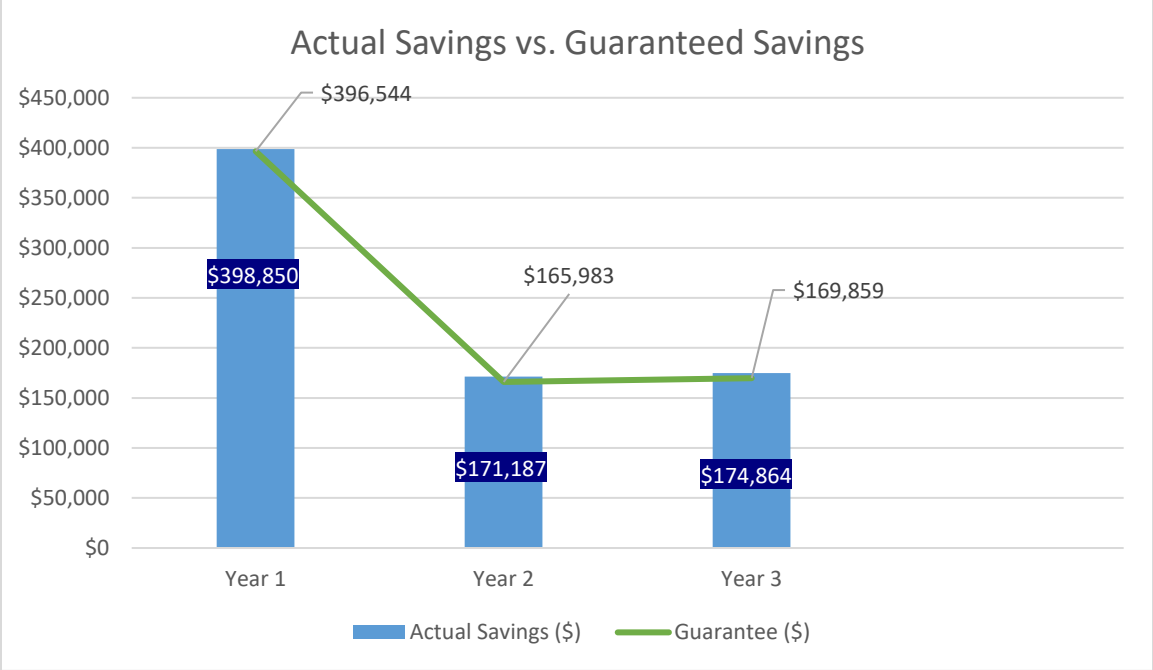
ECM #	ECM Name	Black River Beach Neighborhood Center	Myrick Park Center	Southside Neighborhood Center	Copeland Park Octoberfest Shelter	Copeland Park Enclosed Shelter	Copeland Park Tennis Courts	Copeland Park Stadium	La Crosse Fire Station #1	La Crosse Fire Station #3	North Neighborhood Library	South Neighborhood Library	Main Street Parking Ramp	City of La Crosse Street Lighting
ECM-31	Retrofit Facility Lighting to LED	X	X	X	X	X	X		X		X	X	X	
ECM-32	Retrofit Street Lighting to LED													X
ECM-33	Install New Solar PV							X	X	X				
ECM-34	Replace Existing Boilers								X		X	X		

Upon receipt of the Performance Contract, May 14, 2021, Johnson Controls mobilized to complete the scope of work. Upon completion of each measure, the City of La Crosse began to realize economic benefits.

The following are highlights during Year Three of the guarantee term

- The City of La Crosse realized $160,561 in energy savings
- Year Three benefits exceeded expectations by $3,980.
- Environmental stewardship through reduced carbon emissions by 1,001 metric tons of CO_2

The following chart shows a comparison of the guaranteed measured and non-measured energy savings versus the actual achieved savings to date.



Decarbonization Impact

This project has benefits to the City outside of reducing your expenditure on utilities and maintenance. The reduction in energy consumption by the City of La Crosse also has a positive impact on your carbon dioxide (CO_2), nitrogen oxide (NOx), sulfur dioxide (SO_2), and other environmentally harmful emissions. Through Year Three, CO_2 emissions were reduced by 1,001 metric tons.

The following graphic depicts the emission reduction equivalencies achieved by the City as a result of the improvements made, during the three year term of the Guarantee.

2,994

Metric Tons of CO_2 Emissions equates to:

GHG emissions from:	CO_2 emissions from:	Carbon sequestered by:
		
632	**307,561**	**44,695**
Passenger vehicles driven	Gallons of gasoline consumed	Tree seedlings grown for 10 years

Additional Partnership Benefits to City of La Crosse

During the Installation Period, the City of La Crosse extended the Sustainability Partnership with Johnson Controls for an additional four-year period. Johnson Controls is fully committed to continuing our long-standing partnership with the City of La Crosse.

As part of our services, we recommend continued collaboration to identify additional projects to maximize the benefits of your current systems, as well as support your future goals and long-term planning. To that end, we recommend further investigating the following technology and services:

- Microgrid solutions at various City facilities
- Community resiliency solutions at key City properties
- Water metering and distribution system efficiency solutions
- Collaboration with local commercial/industrial companies on the design and implementation of green initiatives (ie City Brewing)

Year Three Results

The City of La Crosse realized economic benefit throughout Year Three of the Guarantee Term. As a result of successful implementation, the Year Three energy savings have exceeded guarantee expectations. The table below details the energy unit performance of each Energy Conservation Measure (ECM) during the Year Three period.

		Electric Energy Savings
ECM Number	**ECM Name**	**Actual**
ECM-31	Retrofit Facility Lighting to LED	110,957
ECM-32	Retrofit Street Lighting to LED	1,210,771
ECM-33	Install New Solar PV (Adjusted)	173,792

The table below details the **energy cost performance** of each Energy Conservation Measure (ECM) during the Year Three period.

		Electric Cost Savings
ECM Number	**ECM Name**	**Actual**
ECM-31	Retrofit Facility Lighting to LED	$15,224
ECM-32	Retrofit Street Lighting to LED	$129,127
ECM-33	Install New Solar PV kWh (Adjusted)	$14,493
ECM-33	Install New Solar PV kW	$1,717
	Total:	$160,561

Utility Rates for Calculations

The “Base Utility Cost(s)” were established after extensive review of the City of La Crosse’s actual energy usage during the time period January 2017 through December 2018. These “Base Utility Cost(s)” were set forth in the Contract as the basis for all savings calculations and are to be “escalated annually by the actual utility cost escalation but such escalation shall be no less than the mutually agree ‘floor’ escalation rate of three percent (3%).” Listed below are the unit utility rates used to calculate the Year Three energy savings.

Facility	Account	Premise	Rate Code	Unit	Effective Rate
Black River Beach Neighborhood Center	52-6054173-7	304194393	B15	kwh	$0.07402
Copeland Park Enclosed Shelter	52-6054173-7	302369749	B06	kwh	$0.13258
Copeland Park Octoberfest Shelter	52-6054173-7	302672654	B06	kwh	$0.13258
Copeland Park Stadium	52-6054173-7	302937321	B15	kwh	$0.07201
La Crosse Fire Station #1 - Lighting	52-4712246-9	303092584	B15	kwh	$0.07402
La Crosse Fire Station #1 - Solar PV	52-4712246-9	303092584	B15	kwh	$0.07155
La Crosse Fire Station #3	52-4712246-9	303618390	B06	kwh	$0.12857
Main Street Parking Ramp	52-0011625805-1	303030573	B15	kwh	$0.07402
Myrick Park Center	52-6054173-7	304161237	B06	kwh	$0.07402
North Neighborhood Library	52-4892112-8	302833164	B15	kwh	$0.07402
South Neighborhood Library	52-4892112-8	303071074	B15	kwh	$0.07402
Southside Neighborhood Center	52-6054173-7	303071074	B06	kwh	$0.13258

Measurement & Verification

Overview

The performance measurement and verification (M&V) methodologies applicable to the Energy Conservation Measure (ECM) set forth below are predicated upon the International Performance Measurement & Verification Protocol (IPMVP) for the transparent, reliable and consistent reporting of savings for this project. The table below details the IPMVP M&V Option associated with each listed energy conservation measure (ECM).

Summary of M&V Options

M&V	ECM #	ECM Name	Black River Beach Neighborhood Center	Myrick Park Center	Southside Neighborhood Center	Copeland Park Octoberfest Shelter	Copeland Park Enclosed Shelter	Copeland Park Tennis Courts	Copeland Park Stadium	La Crosse Fire Station #1	La Crosse Fire Station #3	North Neighborhood Library	South Neighborhood Library	Main Street Parking Ramp	City of La Crosse Street Lighting
A	ECM-31	Retrofit Facility Lighting to LED	X	X	X	X	X	X		X		X	X	X	
NM	ECM-32	Retrofit Street Lighting to LED													X
A	ECM-33	Install New Solar PV							X	X	X				
NM	ECM-34	Replace Existing Boilers								X		X	X		

A = IPMVP Option A

NM = Non-measured

ECM-31-Retrofit Facility Lighting to LED

ECM Description

Lighting retrofits were installed at the facilities listed below. The conversion to LED lighting and reengineering of the fixtures makes it possible to have consistent light levels and matching temperature colors to better illuminate the areas. Each was assessed to provide the most cost-effective solution. The final retrofit count across all facilities was 841 fixtures.

ECM Name	Black River Beach Neighborhood Center	Myrick Park Center	Southside Neighborhood Center	Copeland Park Octoberfest Shelter	Copeland Park Enclosed Shelter	Copeland Park Tennis Courts	La Crosse Fire Station #1	North Neighborhood Library	South Neighborhood Library	Main Street Parking Ramp
Retrofit Facility Lighting to LED	X	X	X	X	X	X	X	X	X	X

M&V Activities

Contract Compliance

The savings associated with this energy conservation measure have been calculated in accordance with the provisions associated with the International Performance Measurement and Verification Protocol (IPMVP), Option A, Retrofit Isolation with Key Parameter Measurement. Measured Project Benefits have been determined by partial field measurement of the energy use of the system(s); separate from the energy use of the rest of the facility. Partial measurement means that some but not all parameters have been measured. Careful review of the design and installation of Improvement Measures is intended to demonstrate that the agreed-upon values fairly represent the probable actual values. Agreed-upon values are detailed documented and agreed upon. Engineering calculations using measurements and agreed-upon values are used to calculate Measured Project Benefits for the duration of the Guarantee Term.

Savings Methodology

Equations for Calculating Savings

The savings for this ECM are generated through a reduction in energy used by the lighting system; therefore, the measurement boundary is the lighting system itself.

Equations for Calculating Lighting Retrofit Savings (Option A)

Demand (kW)

$$\text{Connected kW Saving} = \sum_u [\ (\text{kW/Fixture}_{baseline} \times \text{Quantity}_{baseline} - \text{kW/Fixture}_{post} \times \text{Quantity}_{post})]_{t,u}$$

where:

$\text{kW/fixture}_{baseline}$ = lighting baseline demand per fixture for usage group *u*

kW/fixture_{post} = lighting demand per fixture during post-installation period for usage group

$\text{Quantity}_{baseline}$ = quantity of affected fixtures before the lighting retrofit for usage group *u*

Quantity_{post} = quantity of affected fixtures after the lighting retrofit for usage group *u*

Examples of usage groups include hallways and offices.

Energy (kWh)

$$\text{kWh Savings}_{Lighting} = \Sigma_u\ [\text{Connected kW Savings}_u \times \text{Hours of Operation}]_{t,u}$$

where:

Hours of Operation= number of operating hours during the time period *t* for the usage group *u*

The lighting system annual run hours by space type are agreed to be as summarized in the table below. The run hours are based on building operating schedules and information provided by facility staff during walk-throughs. These values are considered non-measured and agreed upon by the City.

Facility	Area	Existing Burn Hours Assigned	Proposed Burn Hours
Black River Beach Neighborhood Center	Lobby Closet	2250	2250
	Bathrooms	2250	2250
	Lobby, Birch, Cotton, Bathrooms	2250	2250
	Birchwood, Cottonwood Pendants	2250	2250
	Boiler Rm	2250	2250
	Maplewood	1500	1500
	Offices, Lobby	1500	1200
	Kitchen and Maple W Closet	2250	2250
	Entries, Lobby, Hallway	2250	2250
	Birchwood, Cottonwood Cans	1500	1500
Myrick Park Center	Bathrooms	2000	2000
	Entries	2000	2000
	Marshview, Maint, Bath, E. Office	2000	1500
	N. West Office	1500	1500
	Wis Corps	1500	1500
	Marshview	1500	1500
	Wis Corps & La Crosse Rm	1500	1200
	Discovery	2000	1600
	Wis Corps Storage	500	500
	Exterior	4300	4300
	East Entry and Hallway	2500	2500
	Rear, Side, Front Entry, Rooms	2500	2500
Southside Neighborhood Center	Computer Lab, office closet	1500	1500
	Bathrooms	2000	2000
	Hall	1500	1500
	Office, CompLab, Foundation Rm	2000	2000
	Hallway	2000	2000
	Kitchen	500	500
	Exterior Parking	4300	4300
	Hall Room	2000	2000
	Exterior Sconce	4300	4300

Facility	Area	Existing Burn Hours Assigned	Proposed Burn Hours
Copeland Park Octoberfest Shelter	Rink Canopy	4300	4300
	Rink Lights	2000	2000
Copeland Park Enclosed Shelter	Shelter Canopy	1000	1000
	Shelter	500	500
	Bathrooms	500	500
	Shelter Night Lights	8760	8760
Copeland Park Tennis Courts	Tennis Court Floods	500	500
La Crosse Fire Station #1	Front Entry, Reception	2000	2000
	Basement Hallways	2000	2000
	Basement Offices	2000	2000
	Front Sign	4300	4300
	Shop, Weight Rm	500	500
	Reception, Weight Room	2000	2000
	2nd Floor Bathroom	1000	1000
	Apparatus Floor, Basement Classroom	2000	2000
	2nd Floor (unassigned to other spaces)	750	750
	Boiler Rm, Weight Rm, SCBA Rm	500	500
	Apparatus Floor	2000	2000
	Shop	2000	2000
	Inspection Storage	500	500
North Neighborhood Library	1st Floor	2000	2000
	Front Entry Case	2000	2000
	Basement	500	500
	Bathrooms	2000	2000
	1st Floor Security Light	8760	8760
	Basement	500	500
	Front Sign	4300	4300
	Back Entrance	4300	4300

Facility	Area	Existing Burn Hours Assigned	Proposed Burn Hours
South Neighborhood Library	1st Floor	2000	2000
	Basement	2000	2000
	1st Floor/Basement	2000	2000
	Front Entrance Case	2000	2000
	Basement Storage	500	500
	1st Floor Storage	500	500
	1st Floor Security Light	8760	8760
	Front Entry Exterior Sconce	8760	8760
	Front Entry Exterior Can	4300	4300
	Front Sign	4300	4300
Main Street Parking Ramp	Ramp	4380	4380
	Ramp Security Light	8760	8760

Annual Savings

The savings for this FIM were verified through actual pre- and post-wattage measurements conducted during the installation period. The savings were calculated for each building annually in energy units, applying the associated utility rates. The following table is the result of updating the lighting calculations to include the pre-retrofit and post-retrofit wattage measurements, final quantities, fixture types, and Year Three utility rates.

Retrofit Facility Lighting to LED	Actual (kWh)
Black River Beach	15,437
Copeland Park	19,913
Fire Station #1	12,225
Main Street Ramp	30,011
Myrick Park	13,605
North Library	3,599
South Library	9,940
Southside Center	6,226
Total	110,957
kWh Savings ($):	$10,036
Demand kW Savings ($):	$5,343
Total $ Saved	$15,224

ECM-32-Retrofit Street Lighting to LED

ECM Description

This ECM included the retrofit of specified existing HID street lighting with LED sources by fixture as outline in the table below.

Fixture Type	Fixture Count	Retrofit Description	Replacement Type
150W Cobra	168	RWL2-M-50-40-U-D-X- w/out shorting	New Head
250W Cobra	147	RWL2-M-80-40-U-D-X- w/out shorting	New Head
400W Cobra	47	RWL2-M-135-40-U-D-X- w/out shorting	New Head
400W Deco Airport	13	ESL-MUR-120W-350	Retrofit
150 Acorn/Tear Drop	571	Lumecon L-Retro-T-55	Retrofit
5 Head Globe	105	KT-LED25A23-O-E26-830	Retrofit
	420	KT-LED14A21-O-E26-830	Retrofit
3 Head Globe	18	KT-LED35A25-O-E26-830	Retrofit
2 Head Globe	43	KT-LED35A25-O-E26-830	Retrofit
1 Head Globe	3	KT-LED25A23-O-E26-830	Retrofit
150W Matchstick	552	KT-LED25A23-O-E26-830	Retrofit
Shoe Box - Copeland/Badger	51	CREE PDRLX-ARE-EDR-2M-R3-04-E-UL-SV-525-40K	New Fixture & Pole

Savings Methodology

The calculated savings have been determined based upon the Utility Company's published rates as of the date of the Change Order. Existing HID street lighting had been billed under Rate Code B33 in three separate rate groups. The new LED street lighting will be metered and billed under Rate Code B36.

Annual Savings

The savings table below is based upon the City taking necessary actions with the Utility Company to facilitate the rate change from Rate Code B33 to Rate Code B36. The City and JCI agree that the savings occur once the retrofit of street lighting to LED is complete.

Existing Rate Code	Lamp Type	Wattage	Qty of Lamps	Monthly Per-Lamp Cost [Rate B33]	LED Equivalent Wattage	Annual Total Cost [Rate B33]	Annual Total Cost [Rate B36]	Savings
B33-1	HPS	100	2	$ 7.32	28	$ 176	$ 18	$ 157
B33-1	HPS	150	421	$ 9.18	55	$ 46,361	$ 7,597	$ 38,764
B33-1	HPS	250	84	$ 13.37	80	$ 13,474	$ 2,205	$ 11,269
B33-1	HPS	400	81	$ 18.04	120	$ 17,530	$ 3,189	$ 14,341
B33-1N	HPS	100	2	$ 7.32	28	$ 176	$ 18	$ 157
B33-1N	HPS	150	97	$ 9.18	55	$ 10,682	$ 1,750	$ 8,931
B33-1N	HPS	250	9	$ 13.37	80	$ 1,444	$ 236	$ 1,207
B33-2	HPS	50	179	$ 1.86	14	$ 3,988	$ 822	$ 3,166
B33-2	HPS	70	76	$ 2.49	25	$ 2,274	$ 623	$ 1,650
B33-2	HPS	100	39	$ 3.71	28	$ 1,738	$ 358	$ 1,379
B33-2	HPS	150	791	$ 5.73	55	$ 54,378	$ 14,275	$ 40,104
B33-2	HPS	250	154	$ 8.91	80	$ 16,469	$ 4,042	$ 12,426
B33-2	HPS	400	10	$ 14.11	120	$ 1,693	$ 394	$ 1,299
Per-meter Monthly Charge ($7.25 per month for 62 meters)						$ -	$ 5,723	$ (5,723)
					Total:	**$170,382**	**$ 41,245**	**$ 129,127**

ECM-33-Install New Solar Photovoltaic (PV) Array

ECM Description

Solar PV arrays were installed at Copeland Park Stadium, Fire Station #1, and Fire Station #3. The design considered the roof layout, potential shading sources and architectural constraints. The expected combined energy first year production is 140,448 kWh; following years are expected to have an annual 0.5% degradation.

Copeland Park

Fire Station #1

Fire Station #3

M&V Activities

Contract Compliance

The electrical production for this ECM will be verified using IPMVP Option A, Retrofit Isolation with Key Parameter Measurement. The electrical production for this ECM is generated through a production of electricity through the solar photovoltaic arrays; therefore, the measurement boundary is the Solar PV system itself.

Parameter	Measurement Frequency	Measurement Description
Irradiance (kWh/m2)	ongoing	The irradiance shall be the Annual Total Collector Irradiance and will be measured using a pyranometer in the plane of array. The value will be totalized, and the totalized value will be recoded on an hourly basis using the system software. One pyranometer will be installed at the same tilt and azimuth angle as the PV array. This pyranometer will be the primary, will have a rate accuracy of +/- 5%, and will be used to account for factors that increase and/or decrease the Global Horizontal Irradiance as incident on the surface of the array (e.g., array tilt and azimuth, dirt, shading, etc.). A second pyranometer will be the backup and will have a rated accuracy of +/- 2%. This pyranometer will be used to measure Global Horizontal Irradiance as a backup to the primary pyranometer.
AC Energy (kWh)	ongoing	The AC energy will be measured using revenue-grade AC meters located near the AC interconnection point of each PV system.

Savings Methodology

Equations for Calculating Savings

The estimated energy production for this ECM is based on a computer simulation performed using the HelioScope software. Below is the baseline monthly and annual solar irradiance (Global Horizontal Irradiance) for La Crosse, based on the NSRDB TMY2 weather data for La Crosse Municipal Airport. Also shown in the table below is the Year One Energy production estimate for the combined output of the PV systems.

PV Array	Baseline Global Horizontal Irradiance (kWh/m2)	Baseline Annual Total Collector Irradiance (kWh/m2)	Year One AC Energy Output (kWh)
Copeland Park Stadum PV Array	1,367	1,291	86,903
La Crosse Fire Station #1 PV Array	1,367	1,204	41,866
La Crosse Fire Station #3 PV Array	1,367	1,218	32,926

Below is the Baseline AC Energy Output for the combined PV systems, by Project Year. These numbers include degradation of 3% during the first year then 0.5% per year thereafter from the 2nd until 20th year of the manufacturer's warranty period.

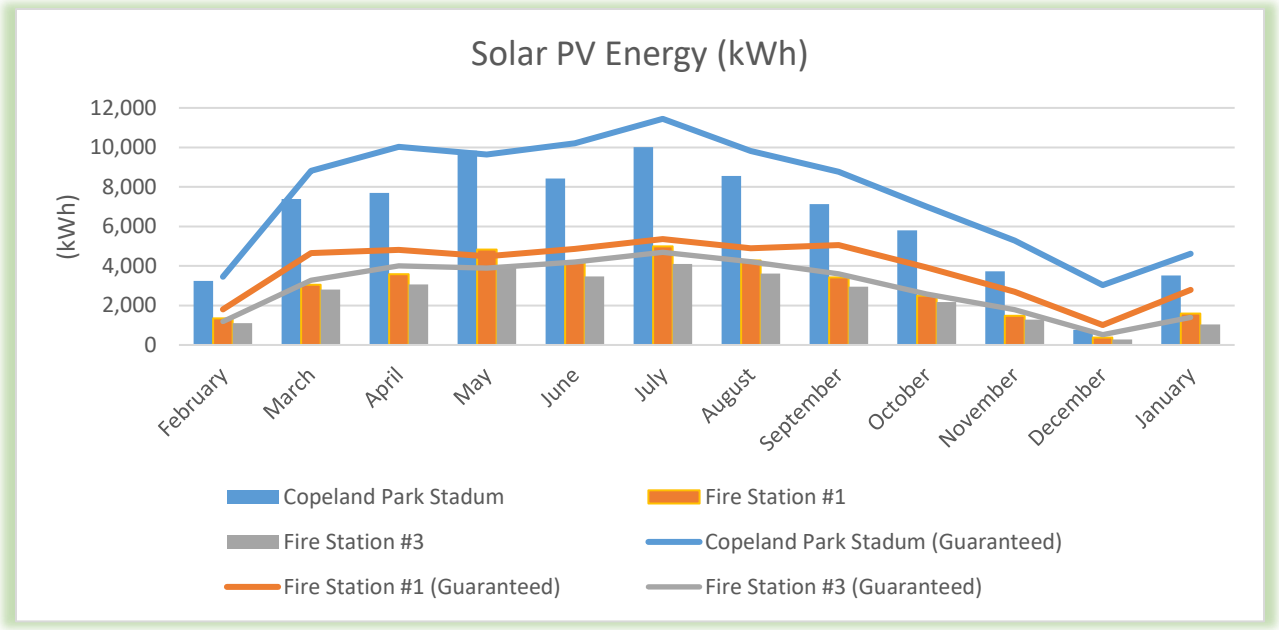
Project Year	Baseline AC Energy Output (kWh)
1	140,448
2	139,746
3	139,047
4	138,352
5	137,660
6	136,972
7	136,287
8	135,605
9	134,927
10	134,253
11	133,582
12	132,914
13	132,249
14	131,588
15	130,930
16	130,275
17	129,624
18	128,976
19	128,331
20	127,689

The energy production guarantee shall assume the monthly baseline (reference) solar irradiance as shown above. On an annual basis (recorded monthly), the total measured AC Energy output of the PV systems will be adjusted based on the actual measured plane-of-array solar irradiance compared to the baseline (reference) plane-of-array solar irradiance, as per the following formula:

$$P_{Adjusted} = (P_{Measured})\left(\frac{Q_{reference}}{Q_{actual}}\right)$$

Where P is energy measured in kWh and Q is solar irradiance measured in kWh/m2, either the actual measured or the reference as shown. If the adjusted amount of measured energy produced is less than the baseline energy for a given Project Year, the amount of kWh shortfall will be multiplied by the applicable site electricity rate ($/kWh) for that Project Year, and the result will be the PV ECM Project Benefit Shortfall for that year. If the adjusted amount of measured energy produced is greater than the baseline energy for a given Project Year, the amount of kWh surplus will be multiplied by the applicable site electricity rate ($/kWh) for that Project Year, and the result will be the PV ECM Project Benefit Surplus for that year.

The table below reflects the actual solar PV energy production (kWh) as compared to the guaranteed production when the guaranteed production is adjusted to align with the actual solar irradiance realized during this reporting period. Where the columns are greater than the lines, the systems produced more energy than expected, Based on the results, the systems performed better than expected.



Annual Savings

The following tables reflect the Year Three results and are based upon the utility rates applicable to this reporting period.

Copeland Park Stadum	Baseline Irradiance [Plain of Array] (kWh/m2)	Guaranteed Production [per Baseline Irradiance]	Actual Irradiance [Plain of Array]	Actual Production (kWh)	Adjusted Production [Actual v Baseline
February	75	2,561	70	3,247	3,452
March	131	5,537	109	7,384	8,818
April	155	7,925	119	7,696	10,031
May	161	8,133	164	9,841	9,649
June	176	8,680	146	8,428	10,209
July	197	9,554	172	10,013	11,446
August	170	8,359	148	8,550	9,820
September	142	7,161	115	7,133	8,762
October	100	5,252	83	5,799	7,003
November	67	3,179	47	3,736	5,278
December	64	2,224	16	769	3,030
January	68	1,964	52	3,521	4,617
	Total Production	**70,530**		**76,117**	**92,115**
	Cost	**$5,079**			**$6,633**
			Excess Production (kWh):		**21,584**
Electric Rate:	*$0.0720*	*per kWh*	**Excess Savings ($):**		**$1,554**

Fire Station #1	Baseline Irradiance [Plain of Array] (kWh/m2)	Guaranteed Production [per Baseline Irradiance] (kWh)	Actual Irradiance [Plain of Array] (kWh/m2)	Actual Production (kWh)	Adjusted Production [Actual v Baseline
February	72	1,131	54	1,346	1,803
March	128	3,061	84	3,042	4,645
April	154	4,745	115	3,590	4,806
May	161	4,936	173	4,827	4,494
June	177	5,309	152	4,152	4,861
July	197	5,842	184	4,994	5,360
August	170	4,998	148	4,275	4,902
September	140	4,097	95	3,422	5,049
October	97	2,876	62	2,504	3,918
November	64	1,666	35	1,483	2,689
December	61	906	22	368	1,008
January	65	786	37	1,594	2,796
	Total Production	**40,353**		**35,596**	**46,334**
	Cost	**$2,887**			**$3,315**
			Excess Production (kWh):		**5,981**
Electric Rate:	*$0.0716*	*per kWh*	**Excess Savings ($):**		**$428**

Fire Station #3	Baseline Irradiance [Plain of Array] (kWh/m2)	Guaranteed Production [per Baseline Irradiance]	Actual Irradiance [Plain of Array] (kWh/m2)	Actual Production (kWh)	Adjusted Production [Actual v Baseline
February	72	841	68	1,110	1,187
March	128	2,290	110	2,809	3,269
April	154	3,468	118	3,072	4,004
May	161	3,599	164	3,970	3,896
June	177	3,866	146	3,467	4,202
July	197	4,240	173	4,103	4,692
August	170	3,633	145	3,615	4,221
September	140	3,045	114	2,953	3,604
October	97	2,143	82	2,178	2,575
November	64	1,220	46	1,284	1,784
December	61	649	32	273	521
January	65	570	49	1,046	1,389
	Total Production	**29,565**		**29,880**	**35,344**
	Cost	**$3,801**			**$4,544**
			Excess Production (kWh):		**5,779**
Electric Rate:	*$0.1286*	*per kWh*	**Excess Savings ($):**		**$743**

ECM-34-Replace Existing Boilers

ECM Description

This ECM included the replacement of the existing boilers with new high efficiency condensing boilers at the North Neighborhood Library, South Neighborhood Library, and the La Crosse Fire Station #1.

M&V Activities

It is reasonable to conclude that the new, more efficient boilers will allow the City of La Crosse to realize economic benefit as the result of reduced natural gas consumption. However, since no savings were included in the Project Benefits, no measurement and verification activities have been, or will be, conducted.

Non-Measured Agreed Upon Engineering Calculations

Non-Measured Utility Benefits

Where the cost to validate the projected savings is determined to be potentially greater than the value of the savings, the City of La Crosse and Johnson Controls have agreed upon the engineering calculations associated with the projected savings. With reasonable effort, the City of La Crosse should expect to realize the energy savings detailed below. These Non-Measured Project Benefits were derived using engineering calculations based upon industry standards and data provided by the City of La Crosse. Details can be found in the Performance Contract.

ECM-33-Install New Solar Photovoltaic (PV) Array

ECM Description

The calculated demand savings for solar photovoltaic installations depend on peak solar generation occurring at the same time as peak building demand. Due to the unpredictability of weather and building usage patterns, these values are calculated based on historical weather data (Typical Meteorological Year, or TMY) and assumed building energy demand profiles and will not be measured. A benefit will only be realized for buildings where the electric rates charge for demand.

The monthly demand charges are calculated as follows:

$$Demand\ Charges\ (\$) = Monthly\ Distribution\ Demand\ Charges\ (\$) + Monthly\ Peak\ Demand\ Charges\ (\$)$$

$$Distribution\ Demand\ Charge\ (\$) = [Max\ (Annual\ Distribution\ Demand(kW)) * Distribution\ Demand\ Rate\ (\$/kW)]$$

$$Monthly\ Peak\ Demand\ Charge\ (\$) = Monthly\ Peak\ Demand\ (kW) * Seasonal\ Peak\ Demand\ Rate\ (\$/kW)$$

Annual Savings

The estimated energy production for this ECM is based on a computer simulation performed using the HelioScope software. Hourly simulation results from the HelioScope software were then fed into the Energy Toolbase software to determine the demand savings by comparing the estimated demand profile of the building before solar is installed to the estimated demand profile after solar is installed. Below are the Year Three monthly estimated demand charges before and after installation, and the anticipated demand savings for each site:

Copeland Park Stadium			
Typical Month	**Estimated Baseline Demand Charges**	**Estimated Future Demand Charges**	**Demand Savings Contribution**
January	$138	$125	$13
February	$138	$125	$13
March	$161	$149	$13
April	$546	$452	$90
May	$1,422	$1,351	$68
June	$2,148	$1,797	$344
July	$2,010	$1,667	$325
August	$1,528	$1,418	$104
September	$1,045	$784	$247
October	$500	$487	$13
November	$150	$137	$13
December	$150	$137	$13
Total	$9,935	$8,629	$1,307

La Crosse Fire Station #1			
Typical Month	**Estimated Baseline Demand Charges**	**Estimated Future Demand Charges**	**Demand Savings Contribution**
January	$552	$552	$-
February	$540	$533	$7
March	$458	$402	$53
April	$447	$414	$31
May	$493	$461	$30
June	$661	$610	$48
July	$661	$610	$48
August	$633	$541	$87
September	$647	$610	$35
October	$482	$461	$19
November	$517	$517	$-
December	$610	$579	$29
Total	$6,701	$6,290	$411

Operational and Capital Benefits

Non-Measured Operational and Maintenance Benefits are derived from avoided future costs. The City of La Crosse and Johnson Controls have agreed upon the engineering calculations associated with the projected savings. These Non-Measured Project Benefits were derived using engineering calculations based upon industry standards and data provided by the City of La Crosse.

Non-Measured Operational Benefits		**Year Three Benefits**
Material Savings due to lighting retrofit		
ECM-31: Retrofit Facility Lighting to LED	Black River Beach Neighborhood Center	$342
	Myrick Park Center	$358
	Southside Neighborhood Center	$212
	Copeland Park Octoberfest Shelter	$826
	Copeland Park Enclosed Shelter	
	Copeland Park Tennis Courts	
	La Crosse Fire Station #1	$448
	North Neighborhood Library	$159
	South Neighborhood Library	$213
	Main Street Parking Ramp	$894
ECM-32: Retrofit Street Lighting to LED	Typical annual streeting lighting re-lamping costs avoided due to LED lighting replacement	$10,850
	Total Non-Measured Operational Benefits:	$14,303

City of La Crosse, Wisconsin

City Hall
400 La Crosse Street
La Crosse, WI 54601

Text File

File Number: 26-0691

Agenda Date: 7/13/2026 **Version:** 1 **Status:** Agenda Ready

In Control: Climate Action Plan Steering Committee **File Type:** Report

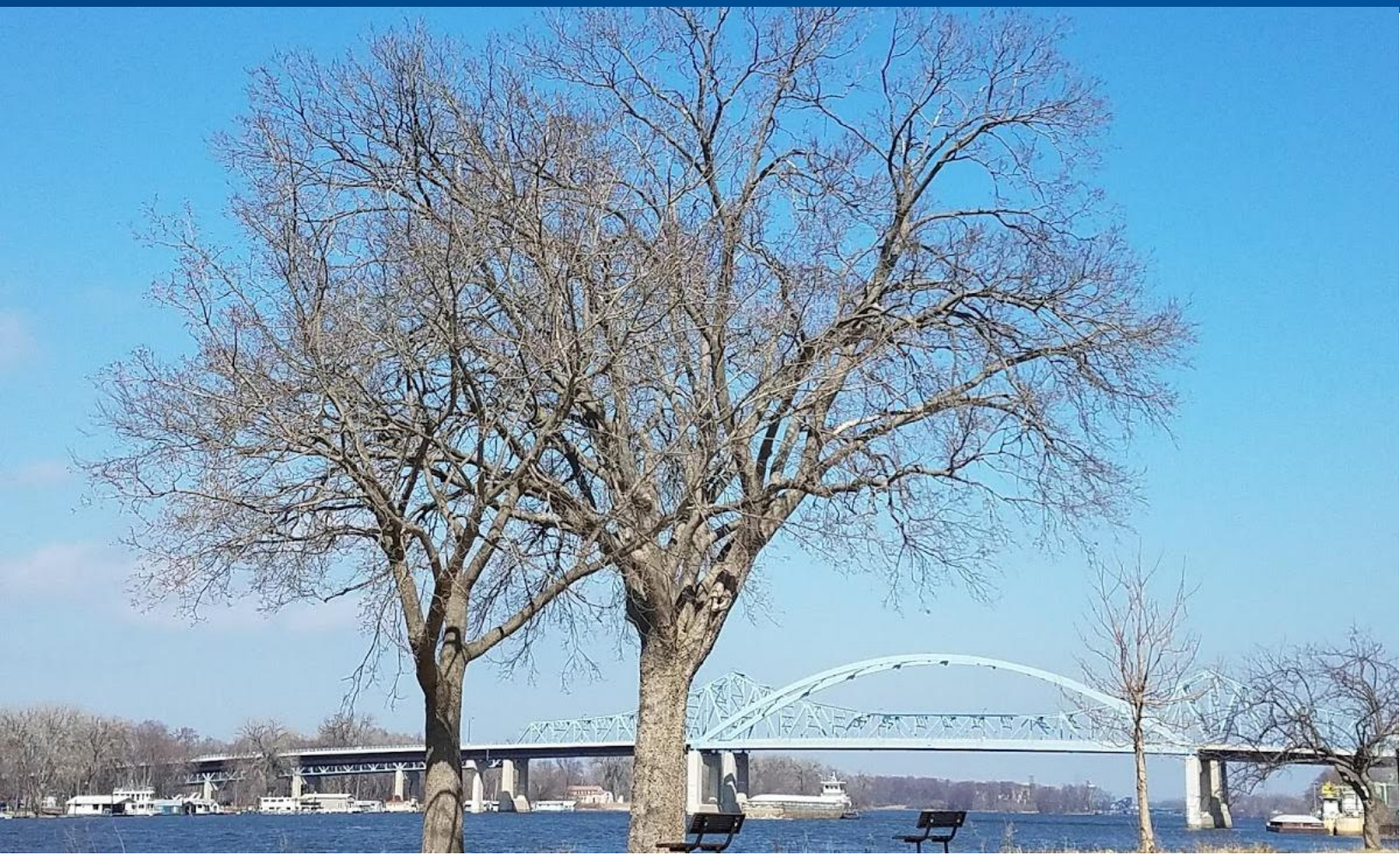
Agenda Number: 2

City of La Crosse

Facility Improvements Through Performance Contract

Phase 4: Measurement & Verification Report

Year One of One



Submitted by:
Jeff Van Ess
Douglas Carlson

May 2026

Presented to:
Lewis Kuhlman

The power behind **your mission**

Johnson Controls

May 8th, 2026

Lewis Kuhlman, AICP
Environmental Planner
400 La Crosse St.
La Crosse, WI 56401

Dear Mr. Kuhlman:

On April 22, 2019, the City of La Crosse partnered with Johnson Controls to complete an initial Performance Contract designed to reduce the City's energy consumption and associated operational cost. This report has been prepared to detail the economic benefits realized by the City of La Crosse during the first year (March 1, 2025 through February 28, 2026) of the Guarantee Term associated with the Phase 4 (Change Order No. 5) energy conservation and facility improvement measures.

Please note, this report culminates Johnson Controls reporting responsibilities associated with the Phase 4 Performance Contract and no further analysis will be conducted nor future reports provided. Johnson Controls values our relationship with the City of La Crosse, and we look forward to working in partnership with the City's personnel to continue to provide programs, services, and support to enhance a comfortable, safe, and sustainable City.

Sincerely,

Jeff Van Ess
Senior Account Executive
Sustainable Infrastructure
262-505-0842
jeff.vaness@jci.com

Douglas Carlson
Senior Customer Experience Specialist
Sustainable Infrastructure
630-804-6399
douglas.r.carlson@jci.com

Acceptance

Following review and acceptance of this report, please return a signed copy of this letter to:

Johnson Controls
Attn: Douglas Carlson
douglas.r.carlson@jci.com

The Year One of One report for the Performance Contract is accepted by the undersigned.

Signature: DocuSigned by: 6603D9B2F5504DF... Date: 6/25/2026

Title: Environmental Planner

Table of Contents

Executive Summary

The City of La Crosse's leadership team wished to deploy innovation to reduce the City's environmental footprint. In doing so, they would remain on track to reach their 2050 environmental goals, including achieving carbon neutrality and transitioning to 100% renewable energy. To reach these targets, enrich the community for generations to come, and remain fiscally responsible to constituents, the City of La Crosse partnered with Johnson Controls. Together, we have embarked on a multi-phase sustainability and modernization initiative under a performance contract.

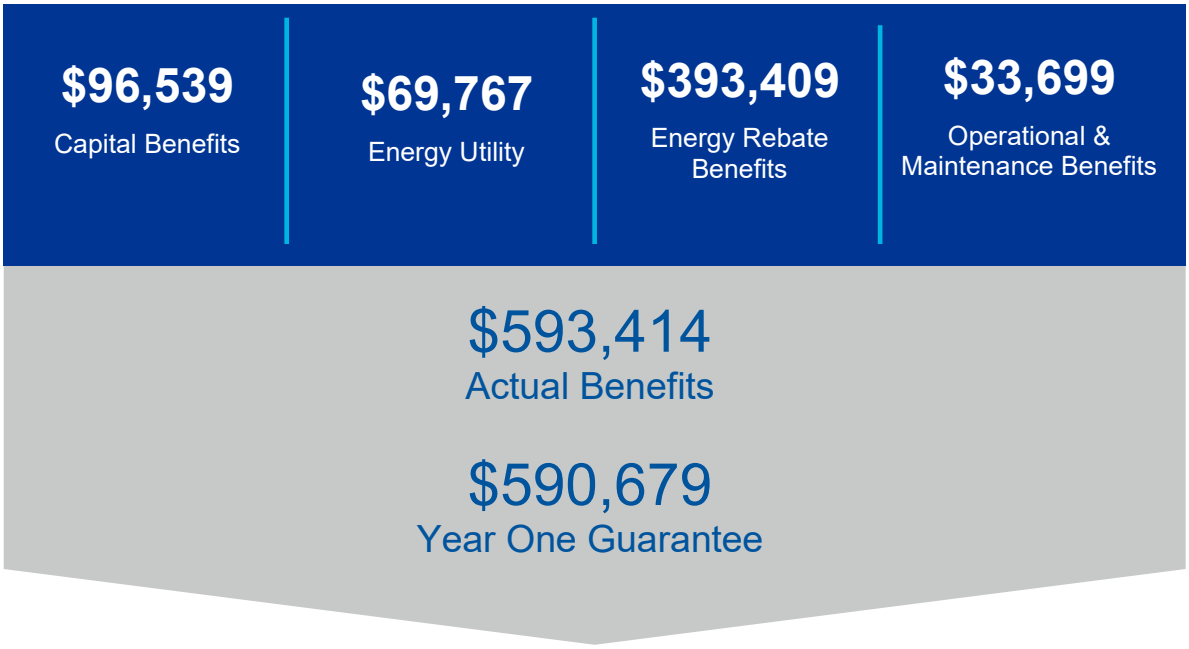
Via our partnership, the City of La Crosse and Johnson Controls created a comprehensive infrastructure improvement program through a twenty-year Performance Contract, dated April 22, 2019. The program optimizes systems and equipment, improves building environments, saves energy, and has provided benefits totaling $593,414, with a performance guarantee based on both measured and non-measured savings.

The primary goals of this project were established as:

- Reduce utility usage in the buildings
- Implement City-owned Renewable Energy
- Reduce deferred capital improvements
- Reduce on-going maintenance costs within the buildings
- Improve environment for building occupants
- Create a positive impact on the environment

This report details the savings the City achieved during Year One (March 1st, 2025 through February 28th, 2026) of the one-year Guarantee Term associated with the Phase 4 energy conservation and facility improvement measures.

During Year One, the City of La Crosse saved $69,767 in utility cost and $33,699 in operational and maintenance benefits. The combined energy savings, capital benefits, energy rebate benefits, and operational benefits, have resulted in **$593,414 total savings the first year of the guarantee term.**



When compared against the guarantee of $590,679, this project has generated excess savings of $2,735.

Summary of Project Benefits and Results

The energy and operational savings are to be derived from the following energy conservation measures (ECM).

	La Crosse Center	Fire Station 2	Fire Station 3	Fire Station 4	Erickson Pool	Northside Pool	Veterans Memorial Pool	Green Island Ice Areana
LED Lighting					X	X		X
Retrofit Building Envelope			X					
Install Solar PV	X	X		X				
Hypochlorite Generation					X	X	X	

Upon receipt of the Performance Contract, September 23rd, 2023, Johnson Controls mobilized to complete the scope of work. Upon completion of each measure, the City of La Crosse began to realize economic benefits.

The following are highlights during Year One of the guarantee term

- The City of La Crosse realized $69,767 in Utility savings
- Year One benefits exceeded expectations by $2,735.
- Environmental stewardship through reduced carbon emissions by 117 metric tons of CO_2

Decarbonization Impact

This project has benefits to the City outside of reducing your expenditure on utilities and maintenance. The reduction in energy consumption by the City of La Crosse also has a positive impact on your carbon dioxide (CO_2), nitrogen oxide (NOx), sulfur dioxide (SO_2), and other environmentally harmful emissions. Year One, CO_2 emissions were reduced by 117 metric tons.

The following graphic depicts the emission reduction equivalencies achieved by the City as a result of the improvements made, during the first year of the Guarantee.

117

Metric Tons of CO_2 Emissions equates to:

GHG emissions from:	**CO_2 emissions from:**	**Carbon sequestered by:**
		
27	**13,165**	**1,934**
Passenger vehicles driven	Gallons of gasoline consumed	Tree seedlings grown for 10 years

Additional Partnership Benefits to City of La Crosse

During the Installation Period, the City of La Crosse extended the Sustainability Partnership with Johnson Controls for an additional one-year period. Johnson Controls is fully committed to continuing our long-standing partnership with the City of La Crosse.

As part of our services, we recommend continued collaboration to identify additional projects to maximize the benefits of your current systems, as well as support your future goals and long-term planning. To that end, we recommend further investigating the following technology and services:

- Microgrid solutions at various City facilities
- Community resiliency solutions at key City properties
- Water metering and distribution system efficiency solutions
- Collaboration with local commercial/industrial companies on the design and implementation of green initiatives (ie City Brewing)

Year One Results

The City of La Crosse realized economic benefit throughout Year One of the Guarantee Term. As a result of successful implementation, the Year One energy savings have exceeded guarantee expectations. The table below details the energy unit performance of each Energy Conservation Measure (ECM) during the Year One period.

Utility Savings			
Project	**kWh**	**kW**	**Natural Gas**
Erickson Lighting	1,501		
Northside Lighting	1,081		
Fire Station #3 Building Envelope			537
Erickson Pool Hypochlorite Generation	43,461		
Northside Pool Hypochlorite Generation	15,167		
Veterans Pool Hypochlorite Generation	13,522		
Fire Station #2 Solar PV	65,281	39	
Fire Station #4 Solar PV	78,810	39	
La Crosse Center Solar PV	293,735	162	
Totals	**512,558**	**240**	**537**

The table below details the **energy cost performance** of each Energy Conservation Measure (ECM) during Year One.

Utility Cost Savings	
Project	**$ Savings**
Erickson Lighting	$99
Northside Lighting	$71
Green Island Ice Arena	$0
Fire Station #3 Building Envelope	$537
Erickson Pool Hypochlorite Generation	$6,309
Northside Pool Hypochlorite Generation	$3,660
Veterans Pool Hypochlorite Generation	$4,184
Fire Station #2 Solar PV (kWh and kW)	$8,857
Fire Station #4 Solar PV (kWh and kW)	$15,435
La Crosse Center Solar PV (kWh and kW)	$30,615
Totals	**$69,767**

Utility Rates for Calculations

The “Base Utility Cost(s)” were established after extensive review of the City of La Crosse’s actual energy usage during the time period January 2017 through December 2018. These “Base Utility Cost(s)” were set forth in the Contract as the basis for all savings calculations and are to be “escalated annually by the actual utility cost escalation but such escalation shall be no less than the mutually agree ‘floor’ escalation rate of four percent (4%) annually for the first three years and three percent (3%) for all years thereafter.” Listed below are the unit utility rates used to calculate the Year One energy savings.

Current Year $/Unit			
Facility	Natural Gas	kW	kWh
La Crosse Center		$17.66036	$0.07368
Fire Station 2		$13.68959	$0.09044
Fire Station 3	$1.12486		$0.15804
Fire Station 4		$13.68959	$0.15838
Erickson Pool	$1.13611	$13.68959	$0.08493
Northside Pool	$1.13611	$13.68959	$0.08459
Veteran Memorial Pool	$1.14736		$0.16502

Measurement & Verification

Overview

The performance measurement and verification (M&V) methodologies applicable to the Energy Conservation Measure (ECM) set forth below are predicated upon the International Performance Measurement & Verification Protocol (IPMVP) for the transparent, reliable and consistent reporting of savings for this project. The table below details the IPMVP M&V Option associated with each listed energy conservation measure (ECM).

Summary of M&V Options

M&V	ECM Name	La Crosse Center	Fire Station 2	Fire Station 3	Fire Station 4	Erickson Pool	Northside Pool	Veterans Memorial Pool	Green Island
NM	LED Lighting					X	X		X
NM	Building Envelope			X					
A	Solar PV	X	X		X				
NM	Hypochlorite Generation					X	X	X	

A = IPMVP Option A NM = Non-measured

ECM-37-Install New Solar Photovoltaic (PV) Array

ECM Description

Solar PV arrays were installed at La Crosse Center, Fire Station #2, and Fire Station #4. The design considered the roof layout, potential shading sources and architectural constraints. The expected combined energy first year production is 410,724 kWh; following years are expected to have an annual 0.5% degradation.

M&V Activities

Contract Compliance

The electrical production for this ECM will be verified using IPMVP Option A, Retrofit Isolation with Key Parameter Measurement. The electrical production for this ECM is generated through a production of electricity through the solar photovoltaic arrays; therefore, the measurement boundary is the Solar PV system itself.

Parameter	Measurement Frequency	Measurement Description
Irradiance (kWh/m2)	ongoing	The irradiance shall be the Annual Total Collector Irradiance and will be measured using a pyranometer in the plane of array. The value will be totalized, and the totalized value will be recoded on an hourly basis using the system software. One pyranometer will be installed at the same tilt and azimuth angle as the PV array. This pyranometer will be the primary, will have a rate accuracy of +/- 5%, and will be used to account for factors that increase and/or decrease the Global Horizontal Irradiance as incident on the surface of the array (e.g., array tilt and azimuth, dirt, shading, etc.). A second pyranometer will be the backup and will have a rated accuracy of +/- 2%. This pyranometer will be used to measure Global Horizontal Irradiance as a backup to the primary pyranometer.
AC Energy (kWh)	ongoing	The AC energy will be measured using revenue-grade AC meters located near the AC interconnection point of each PV system.

Savings Methodology

Equations for Calculating Savings

The estimated energy production for this ECM is based on a computer simulation performed using the HelioScope software. Below is the baseline monthly and annual solar irradiance (Global Horizontal Irradiance) for La Crosse, based on the NSRDB TMY2 weather data for La Crosse Municipal Airport. Also shown in the table below is the Year One Energy production estimate for the combined output of the PV systems.

PV Array	Baseline Global Horizontal Irradiance (kWh/m2)	Baseline Global Incident (Plane of Array) Irradiance (kWh/m^2)	Year One AC Energy Output (kWh)
La Crosse Fire Station #2 PV Array		1,332	56,968
La Crosse Fire Station #4 PV Array		1,339	73,608
La Crosse Center PV Array	1,263		280,148

Below is the Baseline AC Energy Output for the combined PV systems, by Project Year. These numbers include degradation of 3% during the first year then 0.5% per year thereafter from the 2nd until 20th year of the manufacturer's warranty period.

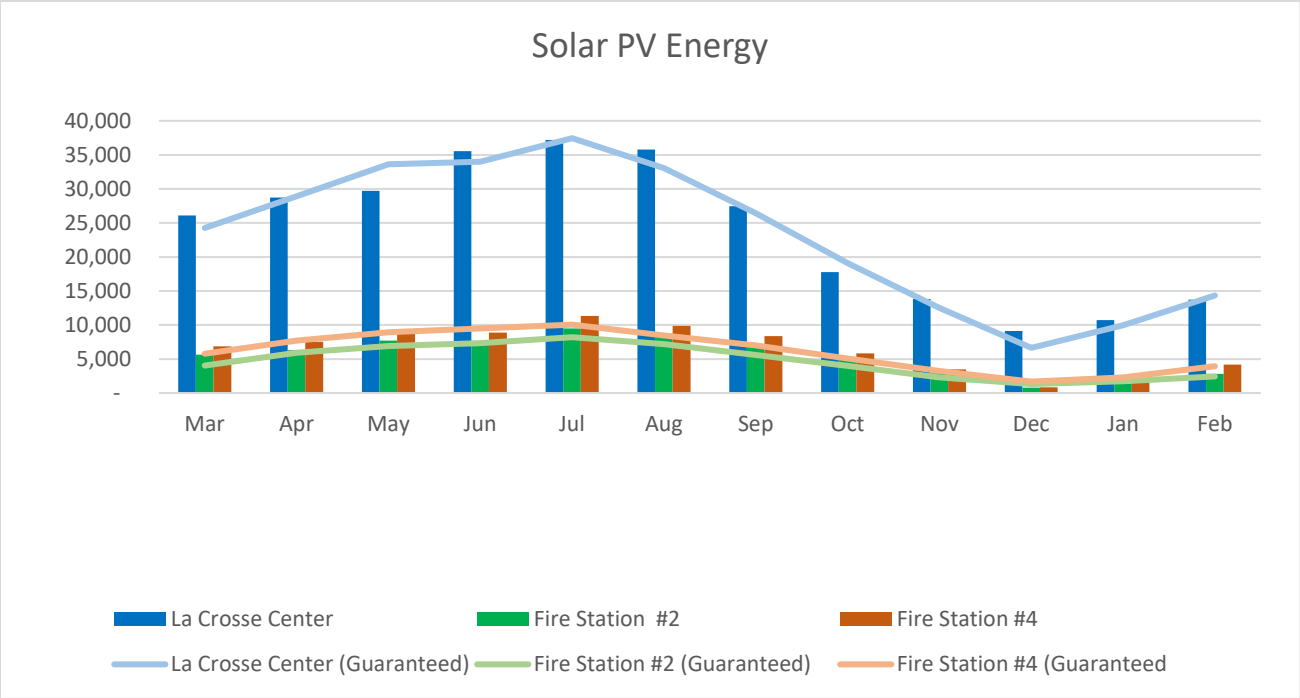
Project Year	Baseline AC Energy Output (kWh)
1	410,726
2	408,672
3	406,629
4	404,596
5	402,573
6	400,560
7	398,557
8	396,564
9	394,582
10	392,609
11	390,646
12	388,692
13	386,749
14	384,815
15	382,891
16	380,977
17	379,072
18	377,176
19	375,291
20	373,414

The energy production guarantee shall assume the monthly baseline (reference) solar irradiance as shown above. On an annual basis (recorded monthly), the total measured AC Energy output of the PV systems will be adjusted based on the actual measured plane-of-array solar irradiance compared to the baseline (reference) plane-of-array solar irradiance, as per the following formula:

$$P_{Adjusted} = (P_{Measured})\left(\frac{Q_{reference}}{Q_{actual}}\right)$$

Where P is energy measured in kWh and Q is solar irradiance measured in kWh/m2, either the actual measured or the reference as shown. If the adjusted amount of measured energy produced is less than the baseline energy for a given Project Year, the amount of kWh shortfall will be multiplied by the applicable site electricity rate ($/kWh) for that Project Year, and the result will be the PV ECM Project Benefit Shortfall for that year. If the adjusted amount of measured energy produced is greater than the baseline energy for a given Project Year, the amount of kWh surplus will be multiplied by the applicable site electricity rate ($/kWh) for that Project Year, and the result will be the PV ECM Project Benefit Surplus for that year.

The table below reflects the actual solar PV energy production (kWh) as compared to the guaranteed production when the guaranteed production is adjusted to align with the actual solar irradiance realized during this reporting period. Where the columns are greater than the lines, the systems produced more energy than expected. Based on the overall results, the systems performed better than expected.



Annual Savings

The following tables reflect the Year One results and are based upon the utility rates applicable to this reporting period.

La Crosse Center	Baseline Irradiance [Plain of Array] (kWh/m2)	Guaranteed Production [per Baseline Irradiance] (kWh)	Actual Irradiance [Plain of Array] (kWh/m2)	Actual Production (kWh)	Adjusted Production [Actual v Baseline Irradiance] (kWh)
March	143	24,261	144	26,414	26,108
April	151	28,900	152	29,024	28,749
May	177	33,611	200	33,628	29,710
June	182	33,976	175	34,113	35,555
July	203	37,447	206	37,765	37,213
August	179	33,030	169	33,752	35,761
September	140	26,419	151	27,407	25,466
October	99	19,083	112	20,115	17,779
November	69	12,520	66	13,240	13,839
December	50	6,642	22	8,330	19,104
January	66	9,946	68	11,191	10,711
February	88	14,314	98	15,289	13,740
	Total Production	**280,148**		**290,268**	**293,735**
	Cost	**$20,641**			**$21,642**
			Excess Production (kWh):		**13,587**
Electric Rate:	*$0.0737*	*per kWh*	**Excess Savings ($):**		**$1,001**

Fire Station #2	Baseline Irradiance [Plain of Array] (kWh/m2)	Guaranteed Production [per Baseline Irradiance] (kWh)	Actual Irradiance [Plain of Array] (kWh/m2)	Actual Production (kWh)	Adjusted Production [Actual v Baseline Irradiance] (kWh)
March	121.8	4,050	111	5,122	5,630
April	152.7	5,906	134	5,508	6,279
May	174.8	6,924	162	7,175	7,727
June	184.7	7,328	160	6,244	7,198
July	206.7	8,204	162	7,424	9,481
August	180.8	7,167	138	6,600	8,677
September	142.1	5,581	106	5,386	7,196
October	104.2	3,975	82	4,037	5,110
November	68.1	2,321	53	2,280	2,932
December	56.5	1,317	34	488	799
January	64.5	1,745	56	1,222	1,417
February	80.4	2,451	75	2,650	2,833
	Total Production	**56,968**		**54,136**	**65,281**
	Cost	**$5,152**			**$5,904**
			Excess Production (kWh):		**8,313**
Electric Rate:	*$0.0904*	*per kWh*	**Excess Savings ($):**		**$752**

Fire Station #4	Baseline Irradiance [Plain of Array] (kWh/m2)	Guaranteed Production [per Baseline Irradiance] (kWh)	Actual Irradiance [Plain of Array] (kWh/m2)	Actual Production (kWh)	Adjusted Production [Actual v Baseline Irradiance] (kWh)
March	127	5,796	116	6,263	6,875
April	152	7,692	140	6,920	7,524
May	177	8,940	170	8,887	9,285
June	191	9,481	167	7,782	8,870
July	204	10,049	169	9,397	11,339
August	171	8,447	144	8,280	9,877
September	139	6,996	111	6,681	8,356
October	100	5,060	86	5,018	5,827
November	70	3,234	55	2,741	3,458
December	51	1,679	36	597	839
January	61	2,299	58	2,271	2,387
February	94	3,935	79	3,499	4,172
Total Productio		**73,608**		**68,336**	**78,810**
Cost		**$11,658**			**$12,482**
			Excess Production (kWh):		**5,202**
Electric Rate	*$0.1584*	*per kWh*	**Excess Savings ($):**		**$824**

Non-Measured Agreed Upon Engineering Calculations

Non-Measured Utility Benefits

Where the cost to validate the projected savings is determined to be potentially greater than the value of the savings, the City of La Crosse and Johnson Controls have agreed upon the engineering calculations associated with the projected savings. With reasonable effort, the City of La Crosse should expect to realize the energy savings detailed below. These Non-Measured Project Benefits were derived using engineering calculations based upon industry standards and data provided by the City of La Crosse. Details can be found in the Performance Contract.

ECM-35-Retrofit Facility Lighting to LED

ECM Description

Lighting retrofits were installed at the facilities listed below. The conversion to LED lighting and reengineering of the fixtures makes it possible to have consistent light levels and matching temperature colors to better illuminate the areas. Each was assessed to provide the most cost-effective solution. The final retrofit count across all facilities was 116 fixtures.

M&V Activities

Contract Compliance

Non-Measured Project Benefits have been determined by manufacturer data and facility information gathered during the investment grade audit. Careful review of the design and installation of Improvement Measures is intended to demonstrate that the agreed-upon values fairly represent the probable actual values. Agreed-upon values are documented and agreed upon. Engineering calculations using measurements and agreed-upon values are used to calculate Measured Project Benefits for the duration of the Guarantee Term.

Savings Methodology

Equations for Calculating Savings

The savings for this ECM are generated through a reduction in energy used by the lighting system; therefore, the measurement boundary is the lighting system itself.

Equations for Calculating Lighting Retrofit Savings (Option A)

Demand (kW)

$$\text{Connected kW Saving} = \sum_u [\ (\text{kW/Fixture}_{baseline} \times \text{Quantity}_{baseline} - \text{kW/Fixture}_{post} \times \text{Quantity}_{post})]_{t,u}$$

where:

$\text{kW/fixture}_{baseline}$ = lighting baseline demand per fixture for usage group *u*

kW/fixture_{post} = lighting demand per fixture during post-installation period for usage group

$\text{Quantity}_{baseline}$ = quantity of affected fixtures before the lighting retrofit for usage group *u*

Quantity_{post} = quantity of affected fixtures after the lighting retrofit for usage group *u*

Examples of usage groups include hallways and offices.

Energy (kWh)

$$\text{kWh Savings}_{Lighting} = \Sigma_u\ [\text{Connected kW Savings}_u \times \text{Hours of Operation}]_{t,u}$$

where:

Hours of Operation= number of operating hours during the time period *t* for the usage group *u*

The lighting system annual run hours by space type are agreed to be as summarized in the table below. The run hours are based on building operating schedules and information provided by facility staff during walk-throughs. The Pre kW and Post kW information is based on manufacturer data. These values are considered non-measured and agreed upon by the City.

	Area	Hours of Operation	Fixture Count	Pre kW	Post kW	kWh Savings	Calculated $ Savings	Contractual $ Savings
Erickson Pool	Pump Room	500	6	0.058	0.024	102	$8.66	$6.00
	Main Area	500	42	0.094	0.036	1,218	$103.44	$78.00
	Ceiling Round	500	23	0.031	0.011	230	$19.53	$15.00
Northside Pool	Main Area	750	26	0.058	0.024	663	$56.08	$42.00
	Wall Scones	500	4	0.048	0.015	66	$5.58	$4.00
	Entry Canopy	4,300	1	0.085	0.030	237	$20.01	$15.00
	Entrance Pendant	500	2	0.205	0.055	150	$12.69	$10.00
					Totals	**2,666**	**$226.00**	**$170.00**

ECM-36: Building Envelope – Fire Station #3

The savings for this ECM are generated through a reduction in air leakage through the building envelope.

Air Leakage	Length (feet)	Width (inches)	Total (square feet)
Roof/Wall	160	1/32	0.42
Overhead Doors	80	3/32	0.63
Doors	39	1/8	0.41

The savings will be calculated according to:

Energy savings = (leakage x bldg "K") x (wind P factor) x (HDD x 24 x 60) x (.075) x (.243) / 100,000 x System Efficiency %

…where,

Leakage = 1.46 square feet
Bldg “K” = average air infiltration and has been calculated to be 140 liters per second
Wind P factor…based upon NOAA 30-year Climate Normal
Hours per day = 24
Minutes per hour = 60
Density of Air = 0.075 lbm/ft^3
Specific Heat of Air = 0.243 btu/lbm-F
System Efficiency = 80%

It is agreed that these are reasonable values and will not be measured.

ECM-37-Install New Solar Photovoltaic (PV) Array

ECM Description

The calculated demand savings for solar photovoltaic installations depend on peak solar generation occurring at the same time as peak building demand. Due to the unpredictability of weather and building usage patterns, these values are calculated based on historical weather data (Typical Meteorological Year, or TMY) and assumed building energy demand profiles and will not be measured. A benefit will only be realized for buildings where the electric rates charge for demand.

The monthly demand charges are calculated as follows:

$$Demand\ Charges\ (\$) = Monthly\ Distribution\ Demand\ Charges\ (\$) + Monthly\ Peak\ Demand\ Charges\ (\$)$$

$$Distribution\ Demand\ Charge\ (\$) = [Max\ (Annual\ Distribution\ Demand(kW)) * Distribution\ Demand\ Rate\ (\$/kW)]$$

$$Monthly\ Peak\ Demand\ Charge\ (\$) = Monthly\ Peak\ Demand\ (kW) * Seasonal\ Peak\ Demand\ Rate\ (\$/kW)$$

Annual Savings

The estimated energy production for this ECM is based on a computer simulation performed using the HelioScope software. Hourly simulation results from the HelioScope software were then fed into the Energy Toolbase software to determine the demand savings by comparing the estimated demand profile of the building before solar is installed to the estimated demand profile after solar is installed. Below are the Year One estimated demand and demand cost savings.

Solar Demand (kW) Savings		
Facility	**Demand (kW) Saved**	**Demand $ Cost saved**
Fire Station #2 Solar PV (Demand)	39	$2,953
Fire Station #4 Solar PV (Demand)	39	$2,953
La Crosse Center Solar PV (Demand)	162	$8,973
Total	240	$14,879

ECM-38: On-Site Sodium Hypochlorite Generation

- Erickson Pool
- Northside Pool
- Veterans Memorial Pool

The *electric savings* have been calculated according to:

Baseline Pump Energy Usage (kWh):
Max Motor Rating (kW) = HP X 0.746 kW/HP X Pump Service Factor
Current Pump Usage (kW) = Max Motor Rating (kW) X Estimated Load Factor for fixed speed pump %
Current Pump Usage (kW) X 87 Days X 24 Hours/Day

Proposed Pump System Operation (kWh):
Proposed Pump Usage (kW) = Rated Pump Head (TDH) X Design Flowrate GPM / (% Pump Eff. X 3,960 constant factor) / (NEMA Nominal Motor Efficiency) X 0.746 kW/HP
Proposed Pump Usage (kW) X 87 Days X 24 Hours/Day

Annual Energy Savings = Baseline Pump Energy Usage (kWh) – Proposed Pump System Operation (kWh)

…where,

Pool/Aquatic Specifications			
Venue:	**Northside**	**Veterans Memorial**	**Erickson**
Volume (Gallons)	230,000	268,000	250,000
Min. Required Turnover Time (Minutes)	360	360	360
Days of Operation (per year)	87	87	87
Occupied or In-Use Hours (Daily)	7	7	10
Unoccupied or Not In-Use Hours (Daily)	17	17	14
Occupied Hours (Annual)	609	609	870
Unoccupied Hours (Annual)	1,479	1,479	1,218
Filter Type	Sand	Sand	Sand
Backwash Interval (Days)	7	7	7
Pressure at Pump Effluent (PSI)	2	8	13
Vacuum at pump Influent (inHg)	10	10	10
Current Pumping TDH	15.92	29.78	41.33
Dirty Filter TDH (Est. based on filter differential at backwash)	68.00	68.00	68.00
Current Design Turnover Time	360.78	393.79	339.63
Min. Turnover Rate (GPM)	639	744	694

Current Pump System Operation

Pump ID	Northside	Veterans Memorial	Erickson
Pump Size (Horsepower)	25	25	40
Rated Pump Flow (gpm)	750	847	866
Rated Pump Head (TDH)	70	70	70
NEMA Nominal Motor Efficiency	91%	89.5%	91.7%
Pump Motor Service Factor	1.1	1.25	1.25
Pump Operation per Day (hrs)	24	24	24
Estimated Load Factor for fixed speed pump %	85.0%	80.4%	85.0%
Water Horsepower (Calculated)	13.26	14.97	15.31
Pump Brake Horsepower (Calculated)	14.57	16.73	16.69
Pump Efficiency	91%	90%	92%
Ratio	0.58	0.67	0.42
Max Motor Rating (kW)	20.52	23.31	37.30
Current Pump Usage (kW)	17.44	18.73	31.71
Current Yearly Pump Usage (kWh)	36410.02	39111.57	66200.04
Current Yearly Pump Cost	$2,736.46	$2,939.50	$4,975.39

Proposed Pump System Operation with venue in use (Bather Mode)			
Pump Model#			
Pump Size (Horsepower)	25	25	40
Rated Pump Flow (gpm)	750	847	866
Rated Pump Head (TDH)	70	70	70
NEMA Nominal Motor Efficiency	91.0%	89.5%	91.7%
Pump Motor Service Factor	1.1	1.25	1.25
Water Horsepower (Calculated)	13.26	14.97	15.31
Pump Brake Horsepower (Calculated)	14.57	16.73	16.69
Pump Efficiency	91%	90%	92%
Ratio	0.58	0.67	0.42
Max Motor Rating (kW)	20.52	23.31	37.30
Pump operation per day in Bather Mode (hrs)	24	24	24
Percentage of time in (DAY MODE)	100%	100%	100%
Design Flowrate GPM (default to Minimum Req.)	638.9	744.4	694.4
Unique based on known head	0.000124444	9.75734E-05	9.33388E-05
Average System TDH (ft)	50.80	54.07	45.01
Average System BHP	9.01	11.36	8.61
Average Motor Power (kW)	7.38	9.47	7.00
Load Factor	36%	41%	19%
Proposed Pump Usage (kW)	10.17	12.26	10.89
Yearly Pump Usage in Day Mode (kWh)	**21,242.95**	**25,589.30**	**22,738.98**

Summary			
Current Usage per Year (kWh)	**36,410.02**	**39,111.57**	**66,200.04**
Usage per Year following proposed changes (kWh)	**21,242.95**	**25,589.30**	**22,738.98**
Yearly Savings kWh	**15,167.08**	**13,522.27**	**43,461.06**

The *natural gas savings* are derived from having to heat less water as a result of a reduction in the amount of water lost due to dilution and draining. The natural gas savings have been calculated according to:

(Hot Water Gal/yr x ΔT x 8.33lb/gal) / Efficiency x 100,000 therm conversion

…where,

Water from Dilution:

Venue:	Northside	Veterans Memorial	Erickson
Hot Water (Gal/yr):	242,121	282,124	263,175
Hot Water Supply Temp (ºF):	76	82	83
Make-up Water Temp (ºF):	55	55	55
Hot Water Efficiency (%):	89%	89%	89%

Water from Draining:

Venue:	Northside	Veterans Memorial	Erickson
Hot Water (Gal/yr):	115,000	134,000	125,000
Hot Water Supply Temp (ºF):	120	120	120
Make-up Water Temp (ºF):	55	55	55
Hot Water Efficiency (%):	89%	89%	89%

The *water savings* have been calculated according to:

Pool Volume (Gallons) x 1.21% Constant x Days per Year Operation

…where,

Constant (1.21%) is the typical daily dilution percentage for pools of this size range to meet a target of 500ppm TDS.

Venue:	Northside	Veterans Memorial	Erickson
Pool Volume (Gallons):	230,000	268,000	250,000
Days/Year Operation:	87	87	87

It is agreed that these are reasonable values and will not be measured.

Operational Benefits

Non-Measured Operational and Maintenance Benefits are derived from avoided future costs. The City of La Crosse and Johnson Controls have agreed upon the projected savings. These Non-Measured Project Benefits were derived using engineering calculations based upon industry standards and data provided by the City of La Crosse.

Lighting Retrofit

- Erickson Pool – Exterior
- Green Island Ice Arena
- Northside Pool – Exterior

Customer shall see a reduction in the cost of lighting materials as a direct result of the implementation of this ECM. O&M cost avoidance for lighting materials derive from the installation of new lighting equipment which include cost avoidance from reduced expenses for lamps and ballasts realized as a result of the replacement of existing fluorescent lamps with LED lamps and the elimination of existing ballast materials. LED lamps have longer rated lives with warranties as indicated in the warranty submittal.

Operations and Maintenance Savings were calculated as follows:
Erickson Pool:
Quantity = six (6)…4' 2L T8 Strip/vaportight… ESL-T8B4-12W-F150
2 lamps per fixture X 6 Fixtures = 12 Lamps; Assuming 10% yearly replacement @~$5 per lamp = $6
1 ballast per fixture at the cost of $90 each; Assuming 10% yearly replacement = 6 X 1 X 0.1 X ~$90 = $56
Labor cost to replace ballast is to be $60 per ballast replaced: ~$60 x 6 X 1 X 0.1 = $37
Labor cost to replace lamp is to be $60 per ballast replaced: ~$60 x 6 X 1 X 0.1 = $37
Quantity = forty-two (42)…4' VT 2L 40w PLL… ESL-Ti-VP4RK-S-36W-F40
2 lamps per fixture X 42 Fixtures = 84 Lamps: Assuming 10% yearly replacement @~$12.5 per lamp = $108
Labor cost to replace lamp is to be $60 per ballast replaced: ~$60 X 2 X 42 X 0.1 X 0.5 = $260

Quantity = twenty-three…(23) 26w 4pin CFL… KT-LED94P-H-840-S
1 lamps per fixture X 23 Fixtures= 23 Lamps: Assuming 10% yearly replacement @~$4 per lamp = $10
Labor cost to replace lamp is to be $60 per ballast replaced: ~$60 X 1 X 23 X 0.1 X 0.5 = $71

Green Island Ice Arena:
Quantity = twenty-four (24)… 4' 12L T5 HO… KT-LED25T5HO-48GC-850-DX2
12 lamp per fixture X 24 Fixtures= 288 Lamps: Assuming 10% yearly replacement @~$5 per lamp X 0.5* = $74
6 ballast per fixture at the cost of $90 each: Assuming 10% yearly replacement = 24 X 6 X 0.1 X ~$100 X 0.5* = $743
Labor cost to replace ballast is to be $40 per ballast replaced: ~$40 x 24 X 6 X 0.1 X 0.5* = $297
Lift Rental = $125
*50% factor applied since facility only operated six months of the year
Northside Pool:
Quantity = twenty-six (26)…4' 2L T8 fixtures… ESL-T8B4-12W-F150

2 lamps per fixture X 26 Fixtures= 52 Lamps: Assuming 10% yearly replacement @~$5 per lamp = $27
1 ballast per fixture at the cost of $90 each: Assuming 10% yearly replacement = 26 X 1 X 0.1 X ~$90 = $242

Labor cost to replace ballast is to be $28 per ballast replaced: ~$28 x 26 X 1 X 0.1 = $74

On-site Hypochlorite Generation

- Erickson Pool
- Northside Pool
- Veterans Memorial Pool

Savings = Existing Chlorine Cost – (ChlorKing Cell Replacement + Muriatic Acid + ChlorKing Replacement Parts + Salt)

…where,

Existing Chlorine Cost (per Carrico Aquatic Resources contract)
Erickson Pool = $13,860.00
Northside Pool = $12,600.00
Veterans Memorial Pool = $15,120.00

All Pools:

ChlorKing Cell Replacement Cost (@Year 10) = $26,400 [$2,640/yr]
Muriatic Acid (1 gallon per 20 # of chlorine produced)
(($4.50/gallon x 30 gallons/day)/20 # of chlorine) x 87 days/year) = $587.25
ChlorKing Replacement Parts (average)
($750/year (Years 3 through 20)/20 years) = $318.75[(a)]
Salt (3 # of salt per 1 # of chlorine produced)
= ($0.13/# salt *3 x (30 x .65**) x 87 days/year) = $131.67[(b,c,d)]

(a) First three years under warranty
(b) 0.65 = chlorine content of existing tablets used (65%)
(c) Declining scale each of the first five years; no salt required thereafter.
(d) Assumes pool is no longer drained each year but does allow for some lowering of the water level during winter.

ECM	Year 1 Benefits
Lighting Retrofit – Erickson Pool	$586
Lighting Retrofit – Green Island Ice Arena	$1,239
Lighting Retrofit – Northside Pool	$343
On-site Hypochlorite Generation – Erickson Pool	$10,505
On-site Hypochlorite Generation – Northside Pool	$9,212
On-site Hypochlorite Generation – Veterans Memorial Pool	$11,814
Total	**$33,699**

City of La Crosse, Wisconsin

City Hall
400 La Crosse Street
La Crosse, WI 54601

Text File

File Number: 26-0692

Agenda Date: 7/13/2026 **Version:** 1 **Status:** Agenda Ready

In Control: Climate Action Plan Steering Committee **File Type:** Request

Agenda Number: 3

Overview:
The City of La Crosse is committed to supporting community members, especially youth, in launching impactful climate action projects. Over the past two years, a key initiative in this endeavor has been the Youth Climate Action Fund (YCAF), funded by Bloomberg Philanthropies. YCAF empowered youth-led teams would receive $1,000-$5,000 microgrants to develop and implement innovative projects that align with the city's climate action plan. For the 2025 grant year cycle, the City partnered with the La Crosse Area Community Foundation and the Sustainability Institute to optimize fund distribution and increase youth and community outreach and engagement. This successful partnership resulted in 19 completed youth-led projects.

While the City did not receive Bloomberg funding for the YCAF program for 2026, the Sustainability Institute is looking to build on the momentum of past YCAF success. Combining what we learned about what works (and what doesn't) from the past two YCAF cycles with the structure of a previous multi-year program we led with local businesses (Mpower), the **Sustainability Institute is in the early stages of developing a cohort-based Climate Fellows program for local college students that culminates in one or more youth-led local climate-action projects.**

As currently conceptualized, the Climate Fellows pilot program would run from September 2026 – May 2027. We would seek up to 10 participants (total) from the three institutions of higher education in La Crosse. During monthly 2-hour meetings, the cohort would engage with local sustainability leaders and design and, as a cohort, implement one or two capstone climate action projects aligned to the City's climate action plan. Opportunities could exist for public engagement with the youth team via potential public listening sessions as the team refines its capstone project and at the annual Earth Fair. Participants who successfully complete the program (as measured through attendance and participation) would receive a $500 stipend for their time and effort.

Outcomes:
- Complete of 1-2 local climate mitigation or resilience projects, aligned with the city climate action plan
- Connect local youth to climate leaders and climate/sustainability-focused organizations
- Develop future climate action leaders who are aware of how they can contribute to climate work
- Strengthen student collaboration and project management skills

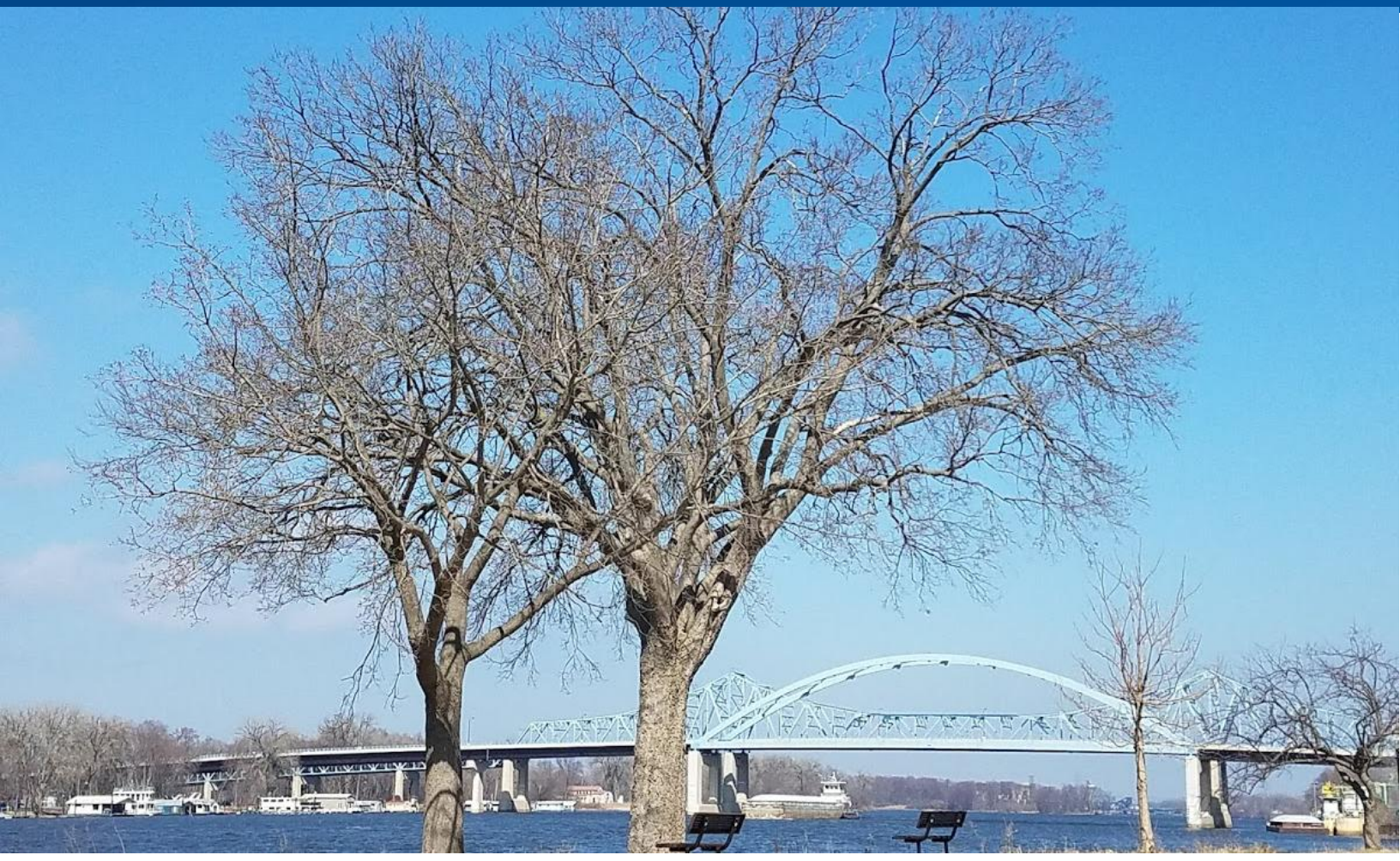
Funding request:
The Sustainability Institute is requesting $20,000 from the City of La Crosse Climate Action Plan Steering Committee funds to implement this program. These funds would help cover supplies, marketing, and administration of this program, costs for a community-based climate action project aligning with the City's climate action plan, and stipends for up to 10 participants. The Sustainability Institute is also pursuing funding from the La Crosse Area Community foundation mini-grant program (up to $7,500) and from the Wisconsin Climate Action Navigators network.

City of La Crosse

Facility Improvements Through Performance Contract

Phase 4: Measurement & Verification Report

Year One of One



Submitted by:
Jeff Van Ess
Douglas Carlson

May 2026

Presented to:
Lewis Kuhlman

The power behind **your mission**

Johnson Controls

May 8th, 2026

Lewis Kuhlman, AICP
Environmental Planner
400 La Crosse St.
La Crosse, WI 56401

Dear Mr. Kuhlman:

On April 22, 2019, the City of La Crosse partnered with Johnson Controls to complete an initial Performance Contract designed to reduce the City's energy consumption and associated operational cost. This report has been prepared to detail the economic benefits realized by the City of La Crosse during the first year (March 1, 2025 through February 28, 2026) of the Guarantee Term associated with the Phase 4 (Change Order No. 5) energy conservation and facility improvement measures.

Please note, this report culminates Johnson Controls reporting responsibilities associated with the Phase 4 Performance Contract and no further analysis will be conducted nor future reports provided. Johnson Controls values our relationship with the City of La Crosse, and we look forward to working in partnership with the City's personnel to continue to provide programs, services, and support to enhance a comfortable, safe, and sustainable City.

Sincerely,

Jeff Van Ess
Senior Account Executive
Sustainable Infrastructure
262-505-0842
jeff.vaness@jci.com

Douglas Carlson
Senior Customer Experience Specialist
Sustainable Infrastructure
630-804-6399
douglas.r.carlson@jci.com

Acceptance

Following review and acceptance of this report, please return a signed copy of this letter to:

Johnson Controls
Attn: Douglas Carlson
douglas.r.carlson@jci.com

The Year One of One report for the Performance Contract is accepted by the undersigned.

Signature: DocuSigned by: 6603D9B2F5504DF... Date: 6/25/2026

Title: Environmental Planner

Table of Contents

Executive Summary

The City of La Crosse's leadership team wished to deploy innovation to reduce the City's environmental footprint. In doing so, they would remain on track to reach their 2050 environmental goals, including achieving carbon neutrality and transitioning to 100% renewable energy. To reach these targets, enrich the community for generations to come, and remain fiscally responsible to constituents, the City of La Crosse partnered with Johnson Controls. Together, we have embarked on a multi-phase sustainability and modernization initiative under a performance contract.

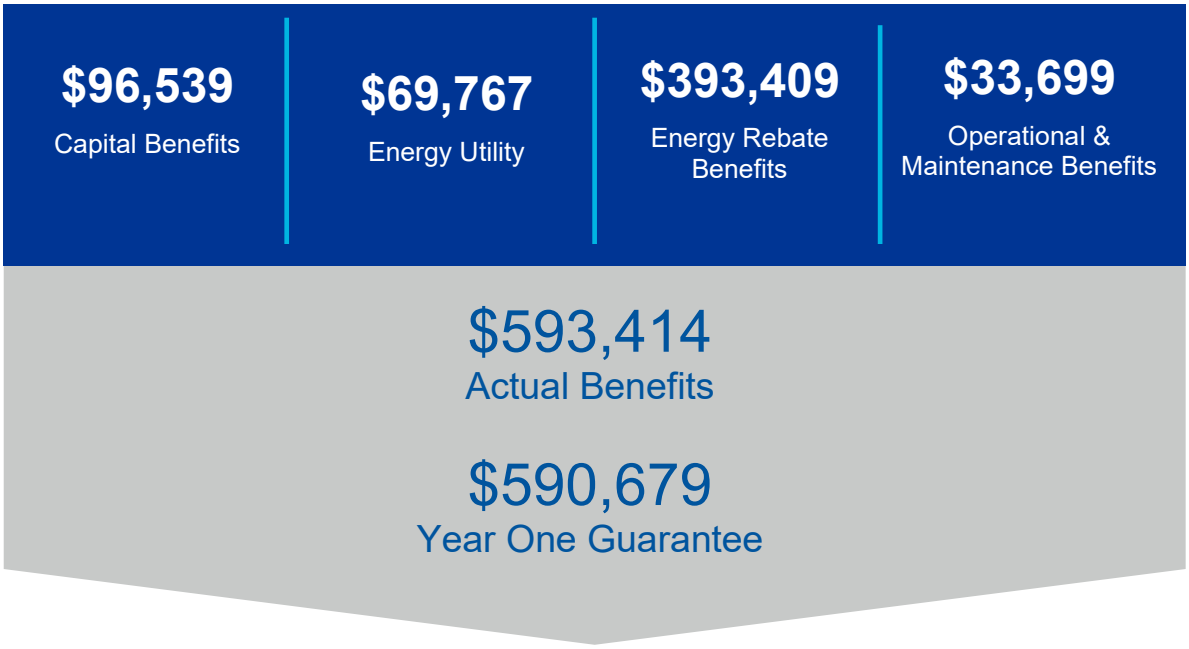
Via our partnership, the City of La Crosse and Johnson Controls created a comprehensive infrastructure improvement program through a twenty-year Performance Contract, dated April 22, 2019. The program optimizes systems and equipment, improves building environments, saves energy, and has provided benefits totaling $593,414, with a performance guarantee based on both measured and non-measured savings.

The primary goals of this project were established as:

- Reduce utility usage in the buildings
- Implement City-owned Renewable Energy
- Reduce deferred capital improvements
- Reduce on-going maintenance costs within the buildings
- Improve environment for building occupants
- Create a positive impact on the environment

This report details the savings the City achieved during Year One (March 1st, 2025 through February 28th, 2026) of the one-year Guarantee Term associated with the Phase 4 energy conservation and facility improvement measures.

During Year One, the City of La Crosse saved $69,767 in utility cost and $33,699 in operational and maintenance benefits. The combined energy savings, capital benefits, energy rebate benefits, and operational benefits, have resulted in **$593,414 total savings the first year of the guarantee term.**



When compared against the guarantee of $590,679, this project has generated excess savings of $2,735.

Summary of Project Benefits and Results

The energy and operational savings are to be derived from the following energy conservation measures (ECM).

	La Crosse Center	Fire Station 2	Fire Station 3	Fire Station 4	Erickson Pool	Northside Pool	Veterans Memorial Pool	Green Island Ice Areana
LED Lighting					X	X		X
Retrofit Building Envelope			X					
Install Solar PV	X	X		X				
Hypochlorite Generation					X	X	X	

Upon receipt of the Performance Contract, September 23rd, 2023, Johnson Controls mobilized to complete the scope of work. Upon completion of each measure, the City of La Crosse began to realize economic benefits.

The following are highlights during Year One of the guarantee term

- The City of La Crosse realized $69,767 in Utility savings
- Year One benefits exceeded expectations by $2,735.
- Environmental stewardship through reduced carbon emissions by 117 metric tons of CO_2

Decarbonization Impact

This project has benefits to the City outside of reducing your expenditure on utilities and maintenance. The reduction in energy consumption by the City of La Crosse also has a positive impact on your carbon dioxide (CO_2), nitrogen oxide (NOx), sulfur dioxide (SO_2), and other environmentally harmful emissions. Year One, CO_2 emissions were reduced by 117 metric tons.

The following graphic depicts the emission reduction equivalencies achieved by the City as a result of the improvements made, during the first year of the Guarantee.

117

Metric Tons of CO_2 Emissions equates to:

GHG emissions from:	**CO_2 emissions from:**	**Carbon sequestered by:**
		
27	**13,165**	**1,934**
Passenger vehicles driven	Gallons of gasoline consumed	Tree seedlings grown for 10 years

Additional Partnership Benefits to City of La Crosse

During the Installation Period, the City of La Crosse extended the Sustainability Partnership with Johnson Controls for an additional one-year period. Johnson Controls is fully committed to continuing our long-standing partnership with the City of La Crosse.

As part of our services, we recommend continued collaboration to identify additional projects to maximize the benefits of your current systems, as well as support your future goals and long-term planning. To that end, we recommend further investigating the following technology and services:

- Microgrid solutions at various City facilities
- Community resiliency solutions at key City properties
- Water metering and distribution system efficiency solutions
- Collaboration with local commercial/industrial companies on the design and implementation of green initiatives (ie City Brewing)

Year One Results

The City of La Crosse realized economic benefit throughout Year One of the Guarantee Term. As a result of successful implementation, the Year One energy savings have exceeded guarantee expectations. The table below details the energy unit performance of each Energy Conservation Measure (ECM) during the Year One period.

Utility Savings			
Project	**kWh**	**kW**	**Natural Gas**
Erickson Lighting	1,501		
Northside Lighting	1,081		
Fire Station #3 Building Envelope			537
Erickson Pool Hypochlorite Generation	43,461		
Northside Pool Hypochlorite Generation	15,167		
Veterans Pool Hypochlorite Generation	13,522		
Fire Station #2 Solar PV	65,281	39	
Fire Station #4 Solar PV	78,810	39	
La Crosse Center Solar PV	293,735	162	
Totals	**512,558**	**240**	**537**

The table below details the **energy cost performance** of each Energy Conservation Measure (ECM) during Year One.

Utility Cost Savings	
Project	**$ Savings**
Erickson Lighting	$99
Northside Lighting	$71
Green Island Ice Arena	$0
Fire Station #3 Building Envelope	$537
Erickson Pool Hypochlorite Generation	$6,309
Northside Pool Hypochlorite Generation	$3,660
Veterans Pool Hypochlorite Generation	$4,184
Fire Station #2 Solar PV (kWh and kW)	$8,857
Fire Station #4 Solar PV (kWh and kW)	$15,435
La Crosse Center Solar PV (kWh and kW)	$30,615
Totals	**$69,767**

Utility Rates for Calculations

The “Base Utility Cost(s)” were established after extensive review of the City of La Crosse’s actual energy usage during the time period January 2017 through December 2018. These “Base Utility Cost(s)” were set forth in the Contract as the basis for all savings calculations and are to be “escalated annually by the actual utility cost escalation but such escalation shall be no less than the mutually agree ‘floor’ escalation rate of four percent (4%) annually for the first three years and three percent (3%) for all years thereafter.” Listed below are the unit utility rates used to calculate the Year One energy savings.

Current Year $/Unit			
Facility	Natural Gas	kW	kWh
La Crosse Center		$17.66036	$0.07368
Fire Station 2		$13.68959	$0.09044
Fire Station 3	$1.12486		$0.15804
Fire Station 4		$13.68959	$0.15838
Erickson Pool	$1.13611	$13.68959	$0.08493
Northside Pool	$1.13611	$13.68959	$0.08459
Veteran Memorial Pool	$1.14736		$0.16502

Measurement & Verification

Overview

The performance measurement and verification (M&V) methodologies applicable to the Energy Conservation Measure (ECM) set forth below are predicated upon the International Performance Measurement & Verification Protocol (IPMVP) for the transparent, reliable and consistent reporting of savings for this project. The table below details the IPMVP M&V Option associated with each listed energy conservation measure (ECM).

Summary of M&V Options

M&V	ECM Name	La Crosse Center	Fire Station 2	Fire Station 3	Fire Station 4	Erickson Pool	Northside Pool	Veterans Memorial Pool	Green Island
NM	LED Lighting					X	X		X
NM	Building Envelope			X					
A	Solar PV	X	X		X				
NM	Hypochlorite Generation					X	X	X	

A = IPMVP Option A NM = Non-measured

ECM-37-Install New Solar Photovoltaic (PV) Array

ECM Description

Solar PV arrays were installed at La Crosse Center, Fire Station #2, and Fire Station #4. The design considered the roof layout, potential shading sources and architectural constraints. The expected combined energy first year production is 410,724 kWh; following years are expected to have an annual 0.5% degradation.

M&V Activities

Contract Compliance

The electrical production for this ECM will be verified using IPMVP Option A, Retrofit Isolation with Key Parameter Measurement. The electrical production for this ECM is generated through a production of electricity through the solar photovoltaic arrays; therefore, the measurement boundary is the Solar PV system itself.

Parameter	Measurement Frequency	Measurement Description
Irradiance (kWh/m2)	ongoing	The irradiance shall be the Annual Total Collector Irradiance and will be measured using a pyranometer in the plane of array. The value will be totalized, and the totalized value will be recoded on an hourly basis using the system software. One pyranometer will be installed at the same tilt and azimuth angle as the PV array. This pyranometer will be the primary, will have a rate accuracy of +/- 5%, and will be used to account for factors that increase and/or decrease the Global Horizontal Irradiance as incident on the surface of the array (e.g., array tilt and azimuth, dirt, shading, etc.). A second pyranometer will be the backup and will have a rated accuracy of +/- 2%. This pyranometer will be used to measure Global Horizontal Irradiance as a backup to the primary pyranometer.
AC Energy (kWh)	ongoing	The AC energy will be measured using revenue-grade AC meters located near the AC interconnection point of each PV system.

Savings Methodology

Equations for Calculating Savings

The estimated energy production for this ECM is based on a computer simulation performed using the HelioScope software. Below is the baseline monthly and annual solar irradiance (Global Horizontal Irradiance) for La Crosse, based on the NSRDB TMY2 weather data for La Crosse Municipal Airport. Also shown in the table below is the Year One Energy production estimate for the combined output of the PV systems.

PV Array	Baseline Global Horizontal Irradiance (kWh/m2)	Baseline Global Incident (Plane of Array) Irradiance (kWh/m^2)	Year One AC Energy Output (kWh)
La Crosse Fire Station #2 PV Array		1,332	56,968
La Crosse Fire Station #4 PV Array		1,339	73,608
La Crosse Center PV Array	1,263		280,148

Below is the Baseline AC Energy Output for the combined PV systems, by Project Year. These numbers include degradation of 3% during the first year then 0.5% per year thereafter from the 2nd until 20th year of the manufacturer's warranty period.

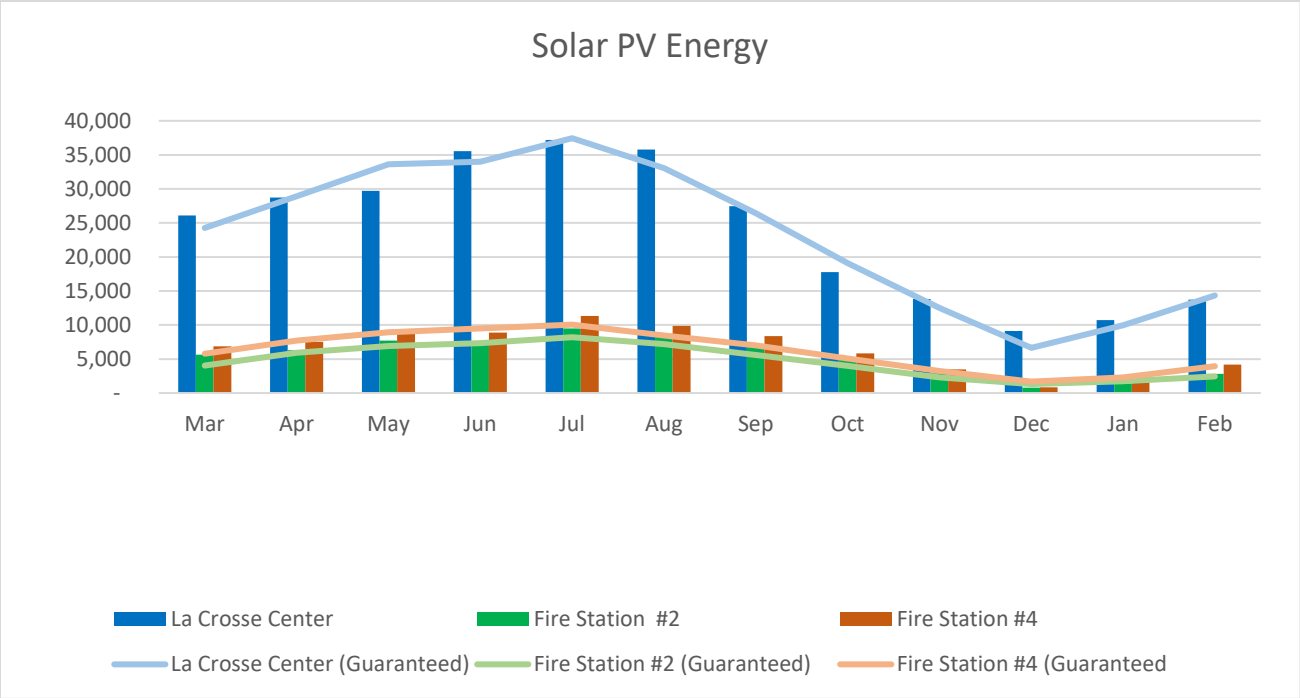
Project Year	Baseline AC Energy Output (kWh)
1	410,726
2	408,672
3	406,629
4	404,596
5	402,573
6	400,560
7	398,557
8	396,564
9	394,582
10	392,609
11	390,646
12	388,692
13	386,749
14	384,815
15	382,891
16	380,977
17	379,072
18	377,176
19	375,291
20	373,414

The energy production guarantee shall assume the monthly baseline (reference) solar irradiance as shown above. On an annual basis (recorded monthly), the total measured AC Energy output of the PV systems will be adjusted based on the actual measured plane-of-array solar irradiance compared to the baseline (reference) plane-of-array solar irradiance, as per the following formula:

$$P_{Adjusted} = (P_{Measured})\left(\frac{Q_{reference}}{Q_{actual}}\right)$$

Where P is energy measured in kWh and Q is solar irradiance measured in kWh/m2, either the actual measured or the reference as shown. If the adjusted amount of measured energy produced is less than the baseline energy for a given Project Year, the amount of kWh shortfall will be multiplied by the applicable site electricity rate ($/kWh) for that Project Year, and the result will be the PV ECM Project Benefit Shortfall for that year. If the adjusted amount of measured energy produced is greater than the baseline energy for a given Project Year, the amount of kWh surplus will be multiplied by the applicable site electricity rate ($/kWh) for that Project Year, and the result will be the PV ECM Project Benefit Surplus for that year.

The table below reflects the actual solar PV energy production (kWh) as compared to the guaranteed production when the guaranteed production is adjusted to align with the actual solar irradiance realized during this reporting period. Where the columns are greater than the lines, the systems produced more energy than expected. Based on the overall results, the systems performed better than expected.



Annual Savings

The following tables reflect the Year One results and are based upon the utility rates applicable to this reporting period.

La Crosse Center	Baseline Irradiance [Plain of Array] (kWh/m2)	Guaranteed Production [per Baseline Irradiance] (kWh)	Actual Irradiance [Plain of Array] (kWh/m2)	Actual Production (kWh)	Adjusted Production [Actual v Baseline Irradiance] (kWh)
March	143	24,261	144	26,414	26,108
April	151	28,900	152	29,024	28,749
May	177	33,611	200	33,628	29,710
June	182	33,976	175	34,113	35,555
July	203	37,447	206	37,765	37,213
August	179	33,030	169	33,752	35,761
September	140	26,419	151	27,407	25,466
October	99	19,083	112	20,115	17,779
November	69	12,520	66	13,240	13,839
December	50	6,642	22	8,330	19,104
January	66	9,946	68	11,191	10,711
February	88	14,314	98	15,289	13,740
	Total Production	**280,148**		**290,268**	**293,735**
	Cost	**$20,641**			**$21,642**
			Excess Production (kWh):		**13,587**
Electric Rate:	*$0.0737*	*per kWh*	**Excess Savings ($):**		**$1,001**

Fire Station #2	Baseline Irradiance [Plain of Array] (kWh/m2)	Guaranteed Production [per Baseline Irradiance] (kWh)	Actual Irradiance [Plain of Array] (kWh/m2)	Actual Production (kWh)	Adjusted Production [Actual v Baseline Irradiance] (kWh)
March	121.8	4,050	111	5,122	5,630
April	152.7	5,906	134	5,508	6,279
May	174.8	6,924	162	7,175	7,727
June	184.7	7,328	160	6,244	7,198
July	206.7	8,204	162	7,424	9,481
August	180.8	7,167	138	6,600	8,677
September	142.1	5,581	106	5,386	7,196
October	104.2	3,975	82	4,037	5,110
November	68.1	2,321	53	2,280	2,932
December	56.5	1,317	34	488	799
January	64.5	1,745	56	1,222	1,417
February	80.4	2,451	75	2,650	2,833
	Total Production	**56,968**		**54,136**	**65,281**
	Cost	**$5,152**			**$5,904**
			Excess Production (kWh):		**8,313**
Electric Rate:	*$0.0904*	*per kWh*	**Excess Savings ($):**		**$752**

Fire Station #4	Baseline Irradiance [Plain of Array] (kWh/m2)	Guaranteed Production [per Baseline Irradiance] (kWh)	Actual Irradiance [Plain of Array] (kWh/m2)	Actual Production (kWh)	Adjusted Production [Actual v Baseline Irradiance] (kWh)
March	127	5,796	116	6,263	6,875
April	152	7,692	140	6,920	7,524
May	177	8,940	170	8,887	9,285
June	191	9,481	167	7,782	8,870
July	204	10,049	169	9,397	11,339
August	171	8,447	144	8,280	9,877
September	139	6,996	111	6,681	8,356
October	100	5,060	86	5,018	5,827
November	70	3,234	55	2,741	3,458
December	51	1,679	36	597	839
January	61	2,299	58	2,271	2,387
February	94	3,935	79	3,499	4,172
Total Productio		**73,608**		**68,336**	**78,810**
Cost		**$11,658**			**$12,482**
			Excess Production (kWh):		**5,202**
Electric Rate	*$0.1584*	*per kWh*	**Excess Savings ($):**		**$824**

Non-Measured Agreed Upon Engineering Calculations

Non-Measured Utility Benefits

Where the cost to validate the projected savings is determined to be potentially greater than the value of the savings, the City of La Crosse and Johnson Controls have agreed upon the engineering calculations associated with the projected savings. With reasonable effort, the City of La Crosse should expect to realize the energy savings detailed below. These Non-Measured Project Benefits were derived using engineering calculations based upon industry standards and data provided by the City of La Crosse. Details can be found in the Performance Contract.

ECM-35-Retrofit Facility Lighting to LED

ECM Description

Lighting retrofits were installed at the facilities listed below. The conversion to LED lighting and reengineering of the fixtures makes it possible to have consistent light levels and matching temperature colors to better illuminate the areas. Each was assessed to provide the most cost-effective solution. The final retrofit count across all facilities was 116 fixtures.

M&V Activities

Contract Compliance

Non-Measured Project Benefits have been determined by manufacturer data and facility information gathered during the investment grade audit. Careful review of the design and installation of Improvement Measures is intended to demonstrate that the agreed-upon values fairly represent the probable actual values. Agreed-upon values are documented and agreed upon. Engineering calculations using measurements and agreed-upon values are used to calculate Measured Project Benefits for the duration of the Guarantee Term.

Savings Methodology

Equations for Calculating Savings

The savings for this ECM are generated through a reduction in energy used by the lighting system; therefore, the measurement boundary is the lighting system itself.

Equations for Calculating Lighting Retrofit Savings (Option A)

Demand (kW)

$$\text{Connected kW Saving} = \sum_u [\ (\text{kW/Fixture}_{baseline} \times \text{Quantity}_{baseline} - \text{kW/Fixture}_{post} \times \text{Quantity}_{post})]_{t,u}$$

where:

$\text{kW/fixture}_{baseline}$ = lighting baseline demand per fixture for usage group *u*

kW/fixture_{post} = lighting demand per fixture during post-installation period for usage group

$\text{Quantity}_{baseline}$ = quantity of affected fixtures before the lighting retrofit for usage group *u*

Quantity_{post} = quantity of affected fixtures after the lighting retrofit for usage group *u*

Examples of usage groups include hallways and offices.

Energy (kWh)

$$\text{kWh Savings}_{Lighting} = \Sigma_u\ [\text{Connected kW Savings}_u \times \text{Hours of Operation}]_{t,u}$$

where:

Hours of Operation= number of operating hours during the time period *t* for the usage group *u*

The lighting system annual run hours by space type are agreed to be as summarized in the table below. The run hours are based on building operating schedules and information provided by facility staff during walk-throughs. The Pre kW and Post kW information is based on manufacturer data. These values are considered non-measured and agreed upon by the City.

	Area	Hours of Operation	Fixture Count	Pre kW	Post kW	kWh Savings	Calculated $ Savings	Contractual $ Savings
Erickson Pool	Pump Room	500	6	0.058	0.024	102	$8.66	$6.00
	Main Area	500	42	0.094	0.036	1,218	$103.44	$78.00
	Ceiling Round	500	23	0.031	0.011	230	$19.53	$15.00
Northside Pool	Main Area	750	26	0.058	0.024	663	$56.08	$42.00
	Wall Scones	500	4	0.048	0.015	66	$5.58	$4.00
	Entry Canopy	4,300	1	0.085	0.030	237	$20.01	$15.00
	Entrance Pendant	500	2	0.205	0.055	150	$12.69	$10.00
					Totals	**2,666**	**$226.00**	**$170.00**

ECM-36: Building Envelope – Fire Station #3

The savings for this ECM are generated through a reduction in air leakage through the building envelope.

Air Leakage	Length (feet)	Width (inches)	Total (square feet)
Roof/Wall	160	1/32	0.42
Overhead Doors	80	3/32	0.63
Doors	39	1/8	0.41

The savings will be calculated according to:

Energy savings = (leakage x bldg "K") x (wind P factor) x (HDD x 24 x 60) x (.075) x (.243) / 100,000 x System Efficiency %

…where,

Leakage = 1.46 square feet
Bldg “K” = average air infiltration and has been calculated to be 140 liters per second
Wind P factor…based upon NOAA 30-year Climate Normal
Hours per day = 24
Minutes per hour = 60
Density of Air = 0.075 lbm/ft^3
Specific Heat of Air = 0.243 btu/lbm-F
System Efficiency = 80%

It is agreed that these are reasonable values and will not be measured.

ECM-37-Install New Solar Photovoltaic (PV) Array

ECM Description

The calculated demand savings for solar photovoltaic installations depend on peak solar generation occurring at the same time as peak building demand. Due to the unpredictability of weather and building usage patterns, these values are calculated based on historical weather data (Typical Meteorological Year, or TMY) and assumed building energy demand profiles and will not be measured. A benefit will only be realized for buildings where the electric rates charge for demand.

The monthly demand charges are calculated as follows:

$$Demand\ Charges\ (\$) = Monthly\ Distribution\ Demand\ Charges\ (\$) + Monthly\ Peak\ Demand\ Charges\ (\$)$$

$$Distribution\ Demand\ Charge\ (\$) = [Max\ (Annual\ Distribution\ Demand(kW)) * Distribution\ Demand\ Rate\ (\$/kW)]$$

$$Monthly\ Peak\ Demand\ Charge\ (\$) = Monthly\ Peak\ Demand\ (kW) * Seasonal\ Peak\ Demand\ Rate\ (\$/kW)$$

Annual Savings

The estimated energy production for this ECM is based on a computer simulation performed using the HelioScope software. Hourly simulation results from the HelioScope software were then fed into the Energy Toolbase software to determine the demand savings by comparing the estimated demand profile of the building before solar is installed to the estimated demand profile after solar is installed. Below are the Year One estimated demand and demand cost savings.

Solar Demand (kW) Savings		
Facility	**Demand (kW) Saved**	**Demand $ Cost saved**
Fire Station #2 Solar PV (Demand)	39	$2,953
Fire Station #4 Solar PV (Demand)	39	$2,953
La Crosse Center Solar PV (Demand)	162	$8,973
Total	240	$14,879

ECM-38: On-Site Sodium Hypochlorite Generation

- Erickson Pool
- Northside Pool
- Veterans Memorial Pool

The *electric savings* have been calculated according to:

Baseline Pump Energy Usage (kWh):
Max Motor Rating (kW) = HP X 0.746 kW/HP X Pump Service Factor
Current Pump Usage (kW) = Max Motor Rating (kW) X Estimated Load Factor for fixed speed pump %
Current Pump Usage (kW) X 87 Days X 24 Hours/Day

Proposed Pump System Operation (kWh):
Proposed Pump Usage (kW) = Rated Pump Head (TDH) X Design Flowrate GPM / (% Pump Eff. X 3,960 constant factor) / (NEMA Nominal Motor Efficiency) X 0.746 kW/HP
Proposed Pump Usage (kW) X 87 Days X 24 Hours/Day

Annual Energy Savings = Baseline Pump Energy Usage (kWh) – Proposed Pump System Operation (kWh)

…where,

Pool/Aquatic Specifications			
Venue:	**Northside**	**Veterans Memorial**	**Erickson**
Volume (Gallons)	230,000	268,000	250,000
Min. Required Turnover Time (Minutes)	360	360	360
Days of Operation (per year)	87	87	87
Occupied or In-Use Hours (Daily)	7	7	10
Unoccupied or Not In-Use Hours (Daily)	17	17	14
Occupied Hours (Annual)	609	609	870
Unoccupied Hours (Annual)	1,479	1,479	1,218
Filter Type	Sand	Sand	Sand
Backwash Interval (Days)	7	7	7
Pressure at Pump Effluent (PSI)	2	8	13
Vacuum at pump Influent (inHg)	10	10	10
Current Pumping TDH	15.92	29.78	41.33
Dirty Filter TDH (Est. based on filter differential at backwash)	68.00	68.00	68.00
Current Design Turnover Time	360.78	393.79	339.63
Min. Turnover Rate (GPM)	639	744	694

Current Pump System Operation

Pump ID	Northside	Veterans Memorial	Erickson
Pump Size (Horsepower)	25	25	40
Rated Pump Flow (gpm)	750	847	866
Rated Pump Head (TDH)	70	70	70
NEMA Nominal Motor Efficiency	91%	89.5%	91.7%
Pump Motor Service Factor	1.1	1.25	1.25
Pump Operation per Day (hrs)	24	24	24
Estimated Load Factor for fixed speed pump %	85.0%	80.4%	85.0%
Water Horsepower (Calculated)	13.26	14.97	15.31
Pump Brake Horsepower (Calculated)	14.57	16.73	16.69
Pump Efficiency	91%	90%	92%
Ratio	0.58	0.67	0.42
Max Motor Rating (kW)	20.52	23.31	37.30
Current Pump Usage (kW)	17.44	18.73	31.71
Current Yearly Pump Usage (kWh)	36410.02	39111.57	66200.04
Current Yearly Pump Cost	$2,736.46	$2,939.50	$4,975.39

Proposed Pump System Operation with venue in use (Bather Mode)			
Pump Model#			
Pump Size (Horsepower)	25	25	40
Rated Pump Flow (gpm)	750	847	866
Rated Pump Head (TDH)	70	70	70
NEMA Nominal Motor Efficiency	91.0%	89.5%	91.7%
Pump Motor Service Factor	1.1	1.25	1.25
Water Horsepower (Calculated)	13.26	14.97	15.31
Pump Brake Horsepower (Calculated)	14.57	16.73	16.69
Pump Efficiency	91%	90%	92%
Ratio	0.58	0.67	0.42
Max Motor Rating (kW)	20.52	23.31	37.30
Pump operation per day in Bather Mode (hrs)	24	24	24
Percentage of time in (DAY MODE)	100%	100%	100%
Design Flowrate GPM (default to Minimum Req.)	638.9	744.4	694.4
Unique based on known head	0.000124444	9.75734E-05	9.33388E-05
Average System TDH (ft)	50.80	54.07	45.01
Average System BHP	9.01	11.36	8.61
Average Motor Power (kW)	7.38	9.47	7.00
Load Factor	36%	41%	19%
Proposed Pump Usage (kW)	10.17	12.26	10.89
Yearly Pump Usage in Day Mode (kWh)	**21,242.95**	**25,589.30**	**22,738.98**

Summary			
Current Usage per Year (kWh)	**36,410.02**	**39,111.57**	**66,200.04**
Usage per Year following proposed changes (kWh)	**21,242.95**	**25,589.30**	**22,738.98**
Yearly Savings kWh	**15,167.08**	**13,522.27**	**43,461.06**

The *natural gas savings* are derived from having to heat less water as a result of a reduction in the amount of water lost due to dilution and draining. The natural gas savings have been calculated according to:

(Hot Water Gal/yr x ΔT x 8.33lb/gal) / Efficiency x 100,000 therm conversion

…where,

Water from Dilution:

Venue:	Northside	Veterans Memorial	Erickson
Hot Water (Gal/yr):	242,121	282,124	263,175
Hot Water Supply Temp (ºF):	76	82	83
Make-up Water Temp (ºF):	55	55	55
Hot Water Efficiency (%):	89%	89%	89%

Water from Draining:

Venue:	Northside	Veterans Memorial	Erickson
Hot Water (Gal/yr):	115,000	134,000	125,000
Hot Water Supply Temp (ºF):	120	120	120
Make-up Water Temp (ºF):	55	55	55
Hot Water Efficiency (%):	89%	89%	89%

The *water savings* have been calculated according to:

Pool Volume (Gallons) x 1.21% Constant x Days per Year Operation

…where,

Constant (1.21%) is the typical daily dilution percentage for pools of this size range to meet a target of 500ppm TDS.

Venue:	Northside	Veterans Memorial	Erickson
Pool Volume (Gallons):	230,000	268,000	250,000
Days/Year Operation:	87	87	87

It is agreed that these are reasonable values and will not be measured.

Operational Benefits

Non-Measured Operational and Maintenance Benefits are derived from avoided future costs. The City of La Crosse and Johnson Controls have agreed upon the projected savings. These Non-Measured Project Benefits were derived using engineering calculations based upon industry standards and data provided by the City of La Crosse.

Lighting Retrofit

- Erickson Pool – Exterior
- Green Island Ice Arena
- Northside Pool – Exterior

Customer shall see a reduction in the cost of lighting materials as a direct result of the implementation of this ECM. O&M cost avoidance for lighting materials derive from the installation of new lighting equipment which include cost avoidance from reduced expenses for lamps and ballasts realized as a result of the replacement of existing fluorescent lamps with LED lamps and the elimination of existing ballast materials. LED lamps have longer rated lives with warranties as indicated in the warranty submittal.

Operations and Maintenance Savings were calculated as follows:
Erickson Pool:
Quantity = six (6)…4' 2L T8 Strip/vaportight… ESL-T8B4-12W-F150
2 lamps per fixture X 6 Fixtures = 12 Lamps; Assuming 10% yearly replacement @~$5 per lamp = $6
1 ballast per fixture at the cost of $90 each; Assuming 10% yearly replacement = 6 X 1 X 0.1 X ~$90 = $56
Labor cost to replace ballast is to be $60 per ballast replaced: ~$60 x 6 X 1 X 0.1 = $37
Labor cost to replace lamp is to be $60 per ballast replaced: ~$60 x 6 X 1 X 0.1 = $37
Quantity = forty-two (42)…4' VT 2L 40w PLL… ESL-Ti-VP4RK-S-36W-F40
2 lamps per fixture X 42 Fixtures = 84 Lamps: Assuming 10% yearly replacement @~$12.5 per lamp = $108
Labor cost to replace lamp is to be $60 per ballast replaced: ~$60 X 2 X 42 X 0.1 X 0.5 = $260

Quantity = twenty-three…(23) 26w 4pin CFL… KT-LED94P-H-840-S
1 lamps per fixture X 23 Fixtures= 23 Lamps: Assuming 10% yearly replacement @~$4 per lamp = $10
Labor cost to replace lamp is to be $60 per ballast replaced: ~$60 X 1 X 23 X 0.1 X 0.5 = $71

Green Island Ice Arena:
Quantity = twenty-four (24)… 4' 12L T5 HO… KT-LED25T5HO-48GC-850-DX2
12 lamp per fixture X 24 Fixtures= 288 Lamps: Assuming 10% yearly replacement @~$5 per lamp X 0.5* = $74
6 ballast per fixture at the cost of $90 each: Assuming 10% yearly replacement = 24 X 6 X 0.1 X ~$100 X 0.5* = $743
Labor cost to replace ballast is to be $40 per ballast replaced: ~$40 x 24 X 6 X 0.1 X 0.5* = $297
Lift Rental = $125
*50% factor applied since facility only operated six months of the year
Northside Pool:
Quantity = twenty-six (26)…4' 2L T8 fixtures… ESL-T8B4-12W-F150

2 lamps per fixture X 26 Fixtures= 52 Lamps: Assuming 10% yearly replacement @~$5 per lamp = $27
1 ballast per fixture at the cost of $90 each: Assuming 10% yearly replacement = 26 X 1 X 0.1 X ~$90 = $242

Labor cost to replace ballast is to be $28 per ballast replaced: ~$28 x 26 X 1 X 0.1 = $74

On-site Hypochlorite Generation

- Erickson Pool
- Northside Pool
- Veterans Memorial Pool

Savings = Existing Chlorine Cost – (ChlorKing Cell Replacement + Muriatic Acid + ChlorKing Replacement Parts + Salt)

…where,

Existing Chlorine Cost (per Carrico Aquatic Resources contract)
Erickson Pool = $13,860.00
Northside Pool = $12,600.00
Veterans Memorial Pool = $15,120.00

All Pools:

ChlorKing Cell Replacement Cost (@Year 10) = $26,400 [$2,640/yr]
Muriatic Acid (1 gallon per 20 # of chlorine produced)
(($4.50/gallon x 30 gallons/day)/20 # of chlorine) x 87 days/year) = $587.25
ChlorKing Replacement Parts (average)
($750/year (Years 3 through 20)/20 years) = $318.75[(a)]
Salt (3 # of salt per 1 # of chlorine produced)
= ($0.13/# salt *3 x (30 x .65**) x 87 days/year) = $131.67[(b,c,d)]

(a) First three years under warranty
(b) 0.65 = chlorine content of existing tablets used (65%)
(c) Declining scale each of the first five years; no salt required thereafter.
(d) Assumes pool is no longer drained each year but does allow for some lowering of the water level during winter.

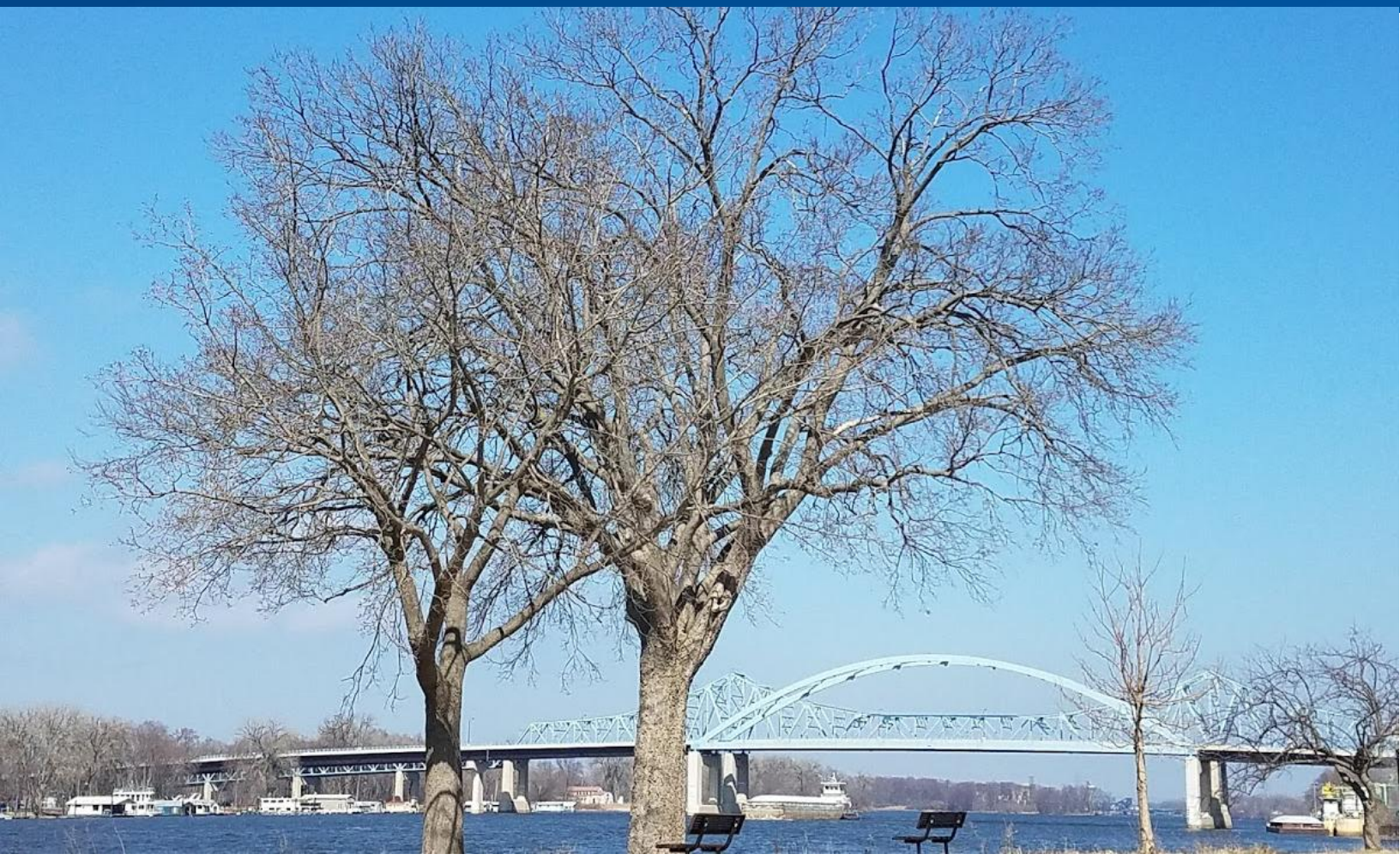
ECM	Year 1 Benefits
Lighting Retrofit – Erickson Pool	$586
Lighting Retrofit – Green Island Ice Arena	$1,239
Lighting Retrofit – Northside Pool	$343
On-site Hypochlorite Generation – Erickson Pool	$10,505
On-site Hypochlorite Generation – Northside Pool	$9,212
On-site Hypochlorite Generation – Veterans Memorial Pool	$11,814
Total	**$33,699**

City of La Crosse

Facility Improvements Through Performance Contract

Phase 3: Measurement & Verification Report

Year Three of Three



Submitted by:
Jeff Van Ess
Douglas Carlson

April 2026

Presented to:
Lewis Kuhlman

The power behind **your mission**

Johnson Controls

May 8th, 2026

Lewis Kuhlman, AICP
Environmental Planner
400 La Crosse St.
La Crosse, WI 56401

Dear Mr. Kuhlman:

On April 22, 2019, the City of La Crosse partnered with Johnson Controls to complete an initial Performance Contract designed to reduce the City's energy consumption and associated operational cost. As a result of the success of the first two phases, on May 14, 2021, the City of La Crosse and Johnson Controls embarked on a third phase to reduce energy consumption and provide solar photovoltaic (PV) energy to additional facilities throughout La Crosse. This report has been prepared to detail the economic benefits realized by the City of La Crosse during Year Three (February 1, 2025 through January 31, 2026) of the three-year Guarantee Term associated with the Phase 3 energy conservation and facility improvement measures.

Please note, this Year Three report culminates Johnson Controls reporting responsibilities associated with the Phase 3 Performance Contract and no further analysis will be conducted nor future reports provided. Johnson Controls values our relationship with the City of La Crosse, and we look forward to working in partnership with the City's personnel to continue to provide programs, services, and support to enhance a comfortable, safe, and sustainable City.

Sincerely,

Jeff Van Ess
Senior Account Executive
Sustainable Infrastructure
262-505-0842
jeff.vaness@jci.com

Douglas Carlson
Senior Customer Experience Specialist
Sustainable Infrastructure
630-804-6399
douglas.r.carlson@jci.com

Acceptance

Following review and acceptance of this report, please return a signed copy of this letter to:

Johnson Controls
Attn: Douglas Carlson
douglas.r.carlson@jci.com

The Year Three report for the Performance Contract is accepted by the undersigned.

Signature: DocuSigned by: 6603D9B2F5504DF... Date: 6/25/2026

Title: Environmental Planner

Table of Contents

Executive Summary

The City of La Crosse's leadership team wished to deploy innovation to reduce the City's environmental footprint. In doing so, they would remain on track to reach their 2050 environmental goals, including achieving carbon neutrality and transitioning to 100% renewable energy. To reach these targets, enrich the community for generations to come and remain fiscally responsible to constituents, the City of La Crosse partnered with Johnson Controls. Together, we have embarked on a multi-phase sustainability and modernization initiative under a performance contract.

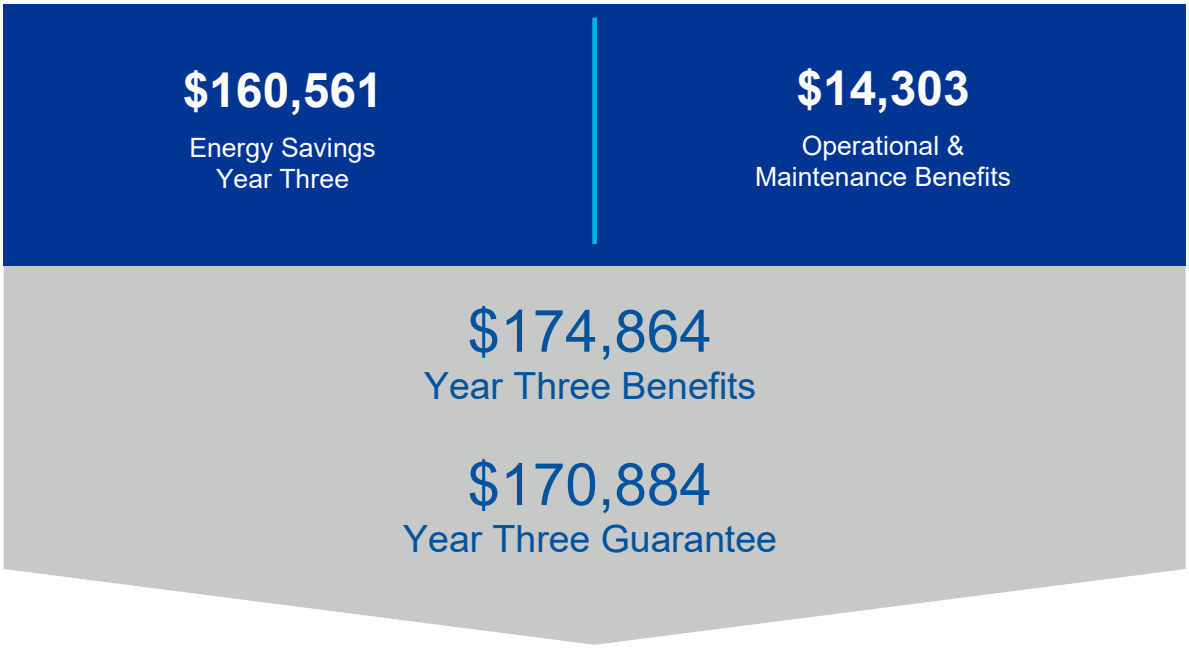
Via our partnership, the City of La Crosse and Johnson Controls created a comprehensive infrastructure improvement program through a twenty-year Performance Contract, dated April 22, 2019. The program optimizes systems and equipment, improves building environments, saves energy, and has provided benefits totaling $398,860, with a performance guarantee based on both measured and non-measured savings.

The primary goals of this project were established as:

- Reduce utility usage in the buildings
- Implement City-owned Renewable Energy
- Reduce deferred capital improvements
- Reduce on-going maintenance costs within the buildings
- Improve environment for building occupants
- Create a positive impact on the environment

This report details the savings the City achieved during Year Three (February 1, 2025 through January 31, 2026) of the three-year Guarantee Term associated with the Phase 3 energy conservation and facility improvement measures.

During Year Three, the City of La Crosse saved $160,561 in utility cost and $14,303 in operational and maintenance benefits. The total savings for Year Three are $174,864. The combined energy savings, capital benefits, energy rebate benefits, and operational benefits, have resulted in **$742,593 total savings through the end of Year Three**.



When compared against the guarantee of $170,884, this project has generated excess savings of $3,980 during Year Three

Summary of Project Benefits and Results

The energy and operational savings are to be derived from the following energy conservation measures (ECM).

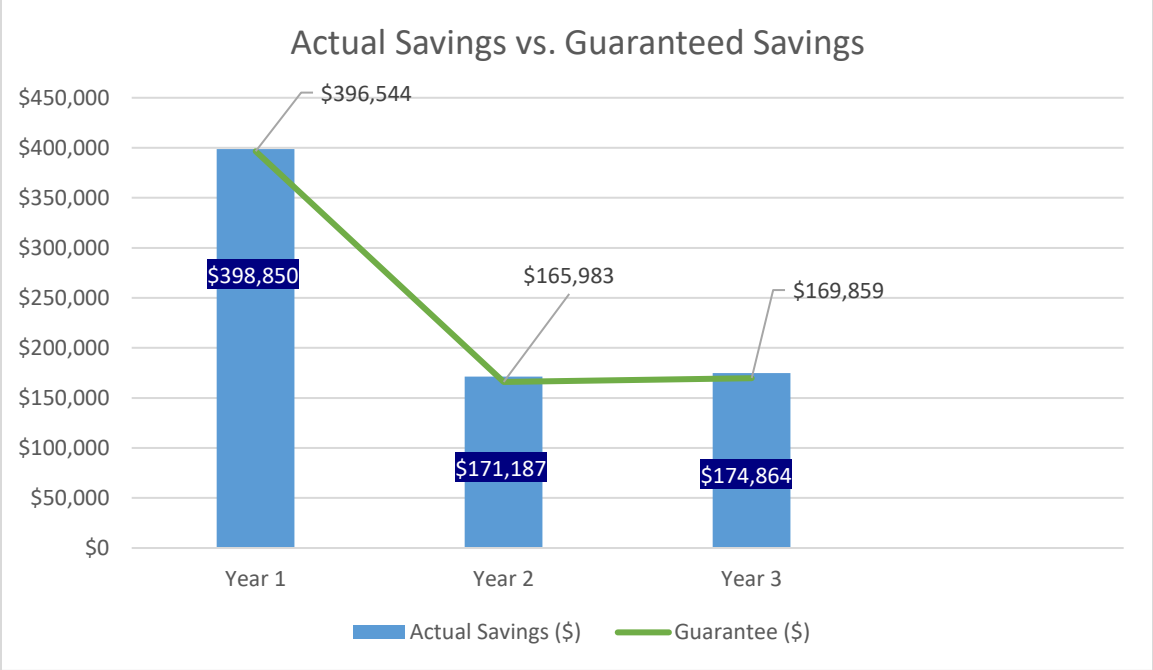
ECM #	ECM Name	Black River Beach Neighborhood Center	Myrick Park Center	Southside Neighborhood Center	Copeland Park Octoberfest Shelter	Copeland Park Enclosed Shelter	Copeland Park Tennis Courts	Copeland Park Stadium	La Crosse Fire Station #1	La Crosse Fire Station #3	North Neighborhood Library	South Neighborhood Library	Main Street Parking Ramp	City of La Crosse Street Lighting
ECM-31	Retrofit Facility Lighting to LED	X	X	X	X	X	X		X		X	X	X	
ECM-32	Retrofit Street Lighting to LED													X
ECM-33	Install New Solar PV							X	X	X				
ECM-34	Replace Existing Boilers								X		X	X		

Upon receipt of the Performance Contract, May 14, 2021, Johnson Controls mobilized to complete the scope of work. Upon completion of each measure, the City of La Crosse began to realize economic benefits.

The following are highlights during Year Three of the guarantee term

- The City of La Crosse realized $160,561 in energy savings
- Year Three benefits exceeded expectations by $3,980.
- Environmental stewardship through reduced carbon emissions by 1,001 metric tons of CO_2

The following chart shows a comparison of the guaranteed measured and non-measured energy savings versus the actual achieved savings to date.



Decarbonization Impact

This project has benefits to the City outside of reducing your expenditure on utilities and maintenance. The reduction in energy consumption by the City of La Crosse also has a positive impact on your carbon dioxide (CO_2), nitrogen oxide (NOx), sulfur dioxide (SO_2), and other environmentally harmful emissions. Through Year Three, CO_2 emissions were reduced by 1,001 metric tons.

The following graphic depicts the emission reduction equivalencies achieved by the City as a result of the improvements made, during the three year term of the Guarantee.

2,994

Metric Tons of CO_2 Emissions equates to:

GHG emissions from:	CO_2 emissions from:	Carbon sequestered by:
		
632	**307,561**	**44,695**
Passenger vehicles driven	Gallons of gasoline consumed	Tree seedlings grown for 10 years

Additional Partnership Benefits to City of La Crosse

During the Installation Period, the City of La Crosse extended the Sustainability Partnership with Johnson Controls for an additional four-year period. Johnson Controls is fully committed to continuing our long-standing partnership with the City of La Crosse.

As part of our services, we recommend continued collaboration to identify additional projects to maximize the benefits of your current systems, as well as support your future goals and long-term planning. To that end, we recommend further investigating the following technology and services:

- Microgrid solutions at various City facilities
- Community resiliency solutions at key City properties
- Water metering and distribution system efficiency solutions
- Collaboration with local commercial/industrial companies on the design and implementation of green initiatives (ie City Brewing)

Year Three Results

The City of La Crosse realized economic benefit throughout Year Three of the Guarantee Term. As a result of successful implementation, the Year Three energy savings have exceeded guarantee expectations. The table below details the energy unit performance of each Energy Conservation Measure (ECM) during the Year Three period.

		Electric Energy Savings
ECM Number	**ECM Name**	**Actual**
ECM-31	Retrofit Facility Lighting to LED	110,957
ECM-32	Retrofit Street Lighting to LED	1,210,771
ECM-33	Install New Solar PV (Adjusted)	173,792

The table below details the **energy cost performance** of each Energy Conservation Measure (ECM) during the Year Three period.

		Electric Cost Savings
ECM Number	**ECM Name**	**Actual**
ECM-31	Retrofit Facility Lighting to LED	$15,224
ECM-32	Retrofit Street Lighting to LED	$129,127
ECM-33	Install New Solar PV kWh (Adjusted)	$14,493
ECM-33	Install New Solar PV kW	$1,717
	Total:	$160,561

Utility Rates for Calculations

The “Base Utility Cost(s)” were established after extensive review of the City of La Crosse’s actual energy usage during the time period January 2017 through December 2018. These “Base Utility Cost(s)” were set forth in the Contract as the basis for all savings calculations and are to be “escalated annually by the actual utility cost escalation but such escalation shall be no less than the mutually agree ‘floor’ escalation rate of three percent (3%).” Listed below are the unit utility rates used to calculate the Year Three energy savings.

Facility	Account	Premise	Rate Code	Unit	Effective Rate
Black River Beach Neighborhood Center	52-6054173-7	304194393	B15	kwh	$0.07402
Copeland Park Enclosed Shelter	52-6054173-7	302369749	B06	kwh	$0.13258
Copeland Park Octoberfest Shelter	52-6054173-7	302672654	B06	kwh	$0.13258
Copeland Park Stadium	52-6054173-7	302937321	B15	kwh	$0.07201
La Crosse Fire Station #1 - Lighting	52-4712246-9	303092584	B15	kwh	$0.07402
La Crosse Fire Station #1 - Solar PV	52-4712246-9	303092584	B15	kwh	$0.07155
La Crosse Fire Station #3	52-4712246-9	303618390	B06	kwh	$0.12857
Main Street Parking Ramp	52-0011625805-1	303030573	B15	kwh	$0.07402
Myrick Park Center	52-6054173-7	304161237	B06	kwh	$0.07402
North Neighborhood Library	52-4892112-8	302833164	B15	kwh	$0.07402
South Neighborhood Library	52-4892112-8	303071074	B15	kwh	$0.07402
Southside Neighborhood Center	52-6054173-7	303071074	B06	kwh	$0.13258

Measurement & Verification

Overview

The performance measurement and verification (M&V) methodologies applicable to the Energy Conservation Measure (ECM) set forth below are predicated upon the International Performance Measurement & Verification Protocol (IPMVP) for the transparent, reliable and consistent reporting of savings for this project. The table below details the IPMVP M&V Option associated with each listed energy conservation measure (ECM).

Summary of M&V Options

M&V	ECM #	ECM Name	Black River Beach Neighborhood Center	Myrick Park Center	Southside Neighborhood Center	Copeland Park Octoberfest Shelter	Copeland Park Enclosed Shelter	Copeland Park Tennis Courts	Copeland Park Stadium	La Crosse Fire Station #1	La Crosse Fire Station #3	North Neighborhood Library	South Neighborhood Library	Main Street Parking Ramp	City of La Crosse Street Lighting
A	ECM-31	Retrofit Facility Lighting to LED	X	X	X	X	X	X		X		X	X	X	
NM	ECM-32	Retrofit Street Lighting to LED													X
A	ECM-33	Install New Solar PV							X	X	X				
NM	ECM-34	Replace Existing Boilers								X		X	X		

A = IPMVP Option A

NM = Non-measured

ECM-31-Retrofit Facility Lighting to LED

ECM Description

Lighting retrofits were installed at the facilities listed below. The conversion to LED lighting and reengineering of the fixtures makes it possible to have consistent light levels and matching temperature colors to better illuminate the areas. Each was assessed to provide the most cost-effective solution. The final retrofit count across all facilities was 841 fixtures.

ECM Name	Black River Beach Neighborhood Center	Myrick Park Center	Southside Neighborhood Center	Copeland Park Octoberfest Shelter	Copeland Park Enclosed Shelter	Copeland Park Tennis Courts	La Crosse Fire Station #1	North Neighborhood Library	South Neighborhood Library	Main Street Parking Ramp
Retrofit Facility Lighting to LED	X	X	X	X	X	X	X	X	X	X

M&V Activities

Contract Compliance

The savings associated with this energy conservation measure have been calculated in accordance with the provisions associated with the International Performance Measurement and Verification Protocol (IPMVP), Option A, Retrofit Isolation with Key Parameter Measurement. Measured Project Benefits have been determined by partial field measurement of the energy use of the system(s); separate from the energy use of the rest of the facility. Partial measurement means that some but not all parameters have been measured. Careful review of the design and installation of Improvement Measures is intended to demonstrate that the agreed-upon values fairly represent the probable actual values. Agreed-upon values are detailed documented and agreed upon. Engineering calculations using measurements and agreed-upon values are used to calculate Measured Project Benefits for the duration of the Guarantee Term.

Savings Methodology

Equations for Calculating Savings

The savings for this ECM are generated through a reduction in energy used by the lighting system; therefore, the measurement boundary is the lighting system itself.

Equations for Calculating Lighting Retrofit Savings (Option A)

Demand (kW)

$$\text{Connected kW Saving} = \sum_u [\ (\text{kW/Fixture}_{baseline} \times \text{Quantity}_{baseline} - \text{kW/Fixture}_{post} \times \text{Quantity}_{post})]_{t,u}$$

where:

$\text{kW/fixture}_{baseline}$ = lighting baseline demand per fixture for usage group *u*

kW/fixture_{post} = lighting demand per fixture during post-installation period for usage group

$\text{Quantity}_{baseline}$ = quantity of affected fixtures before the lighting retrofit for usage group *u*

Quantity_{post} = quantity of affected fixtures after the lighting retrofit for usage group *u*

Examples of usage groups include hallways and offices.

Energy (kWh)

$$\text{kWh Savings}_{Lighting} = \Sigma_u\ [\text{Connected kW Savings}_u \times \text{Hours of Operation}]_{t,u}$$

where:

Hours of Operation= number of operating hours during the time period *t* for the usage group *u*

The lighting system annual run hours by space type are agreed to be as summarized in the table below. The run hours are based on building operating schedules and information provided by facility staff during walk-throughs. These values are considered non-measured and agreed upon by the City.

Facility	Area	Existing Burn Hours Assigned	Proposed Burn Hours
Black River Beach Neighborhood Center	Lobby Closet	2250	2250
	Bathrooms	2250	2250
	Lobby, Birch, Cotton, Bathrooms	2250	2250
	Birchwood, Cottonwood Pendants	2250	2250
	Boiler Rm	2250	2250
	Maplewood	1500	1500
	Offices, Lobby	1500	1200
	Kitchen and Maple W Closet	2250	2250
	Entries, Lobby, Hallway	2250	2250
	Birchwood, Cottonwood Cans	1500	1500
Myrick Park Center	Bathrooms	2000	2000
	Entries	2000	2000
	Marshview, Maint, Bath, E. Office	2000	1500
	N. West Office	1500	1500
	Wis Corps	1500	1500
	Marshview	1500	1500
	Wis Corps & La Crosse Rm	1500	1200
	Discovery	2000	1600
	Wis Corps Storage	500	500
	Exterior	4300	4300
	East Entry and Hallway	2500	2500
	Rear, Side, Front Entry, Rooms	2500	2500
Southside Neighborhood Center	Computer Lab, office closet	1500	1500
	Bathrooms	2000	2000
	Hall	1500	1500
	Office, CompLab, Foundation Rm	2000	2000
	Hallway	2000	2000
	Kitchen	500	500
	Exterior Parking	4300	4300
	Hall Room	2000	2000
	Exterior Sconce	4300	4300

Facility	Area	Existing Burn Hours Assigned	Proposed Burn Hours
Copeland Park Octoberfest Shelter	Rink Canopy	4300	4300
	Rink Lights	2000	2000
Copeland Park Enclosed Shelter	Shelter Canopy	1000	1000
	Shelter	500	500
	Bathrooms	500	500
	Shelter Night Lights	8760	8760
Copeland Park Tennis Courts	Tennis Court Floods	500	500
La Crosse Fire Station #1	Front Entry, Reception	2000	2000
	Basement Hallways	2000	2000
	Basement Offices	2000	2000
	Front Sign	4300	4300
	Shop, Weight Rm	500	500
	Reception, Weight Room	2000	2000
	2nd Floor Bathroom	1000	1000
	Apparatus Floor, Basement Classroom	2000	2000
	2nd Floor (unassigned to other spaces)	750	750
	Boiler Rm, Weight Rm, SCBA Rm	500	500
	Apparatus Floor	2000	2000
	Shop	2000	2000
	Inspection Storage	500	500
North Neighborhood Library	1st Floor	2000	2000
	Front Entry Case	2000	2000
	Basement	500	500
	Bathrooms	2000	2000
	1st Floor Security Light	8760	8760
	Basement	500	500
	Front Sign	4300	4300
	Back Entrance	4300	4300

Facility	Area	Existing Burn Hours Assigned	Proposed Burn Hours
South Neighborhood Library	1st Floor	2000	2000
	Basement	2000	2000
	1st Floor/Basement	2000	2000
	Front Entrance Case	2000	2000
	Basement Storage	500	500
	1st Floor Storage	500	500
	1st Floor Security Light	8760	8760
	Front Entry Exterior Sconce	8760	8760
	Front Entry Exterior Can	4300	4300
	Front Sign	4300	4300
Main Street Parking Ramp	Ramp	4380	4380
	Ramp Security Light	8760	8760

Annual Savings

The savings for this FIM were verified through actual pre- and post-wattage measurements conducted during the installation period. The savings were calculated for each building annually in energy units, applying the associated utility rates. The following table is the result of updating the lighting calculations to include the pre-retrofit and post-retrofit wattage measurements, final quantities, fixture types, and Year Three utility rates.

Retrofit Facility Lighting to LED	Actual (kWh)
Black River Beach	15,437
Copeland Park	19,913
Fire Station #1	12,225
Main Street Ramp	30,011
Myrick Park	13,605
North Library	3,599
South Library	9,940
Southside Center	6,226
Total	110,957
kWh Savings ($):	$10,036
Demand kW Savings ($):	$5,343
Total $ Saved	$15,224

ECM-32-Retrofit Street Lighting to LED

ECM Description

This ECM included the retrofit of specified existing HID street lighting with LED sources by fixture as outline in the table below.

Fixture Type	Fixture Count	Retrofit Description	Replacement Type
150W Cobra	168	RWL2-M-50-40-U-D-X- w/out shorting	New Head
250W Cobra	147	RWL2-M-80-40-U-D-X- w/out shorting	New Head
400W Cobra	47	RWL2-M-135-40-U-D-X- w/out shorting	New Head
400W Deco Airport	13	ESL-MUR-120W-350	Retrofit
150 Acorn/Tear Drop	571	Lumecon L-Retro-T-55	Retrofit
5 Head Globe	105	KT-LED25A23-O-E26-830	Retrofit
	420	KT-LED14A21-O-E26-830	Retrofit
3 Head Globe	18	KT-LED35A25-O-E26-830	Retrofit
2 Head Globe	43	KT-LED35A25-O-E26-830	Retrofit
1 Head Globe	3	KT-LED25A23-O-E26-830	Retrofit
150W Matchstick	552	KT-LED25A23-O-E26-830	Retrofit
Shoe Box - Copeland/Badger	51	CREE PDRLX-ARE-EDR-2M-R3-04-E-UL-SV-525-40K	New Fixture & Pole

Savings Methodology

The calculated savings have been determined based upon the Utility Company's published rates as of the date of the Change Order. Existing HID street lighting had been billed under Rate Code B33 in three separate rate groups. The new LED street lighting will be metered and billed under Rate Code B36.

Annual Savings

The savings table below is based upon the City taking necessary actions with the Utility Company to facilitate the rate change from Rate Code B33 to Rate Code B36. The City and JCI agree that the savings occur once the retrofit of street lighting to LED is complete.

Existing Rate Code	Lamp Type	Wattage	Qty of Lamps	Monthly Per-Lamp Cost [Rate B33]	LED Equivalent Wattage	Annual Total Cost [Rate B33]	Annual Total Cost [Rate B36]	Savings
B33-1	HPS	100	2	$ 7.32	28	$ 176	$ 18	$ 157
B33-1	HPS	150	421	$ 9.18	55	$ 46,361	$ 7,597	$ 38,764
B33-1	HPS	250	84	$ 13.37	80	$ 13,474	$ 2,205	$ 11,269
B33-1	HPS	400	81	$ 18.04	120	$ 17,530	$ 3,189	$ 14,341
B33-1N	HPS	100	2	$ 7.32	28	$ 176	$ 18	$ 157
B33-1N	HPS	150	97	$ 9.18	55	$ 10,682	$ 1,750	$ 8,931
B33-1N	HPS	250	9	$ 13.37	80	$ 1,444	$ 236	$ 1,207
B33-2	HPS	50	179	$ 1.86	14	$ 3,988	$ 822	$ 3,166
B33-2	HPS	70	76	$ 2.49	25	$ 2,274	$ 623	$ 1,650
B33-2	HPS	100	39	$ 3.71	28	$ 1,738	$ 358	$ 1,379
B33-2	HPS	150	791	$ 5.73	55	$ 54,378	$ 14,275	$ 40,104
B33-2	HPS	250	154	$ 8.91	80	$ 16,469	$ 4,042	$ 12,426
B33-2	HPS	400	10	$ 14.11	120	$ 1,693	$ 394	$ 1,299
Per-meter Monthly Charge ($7.25 per month for 62 meters)						$ -	$ 5,723	$ (5,723)
					Total:	**$170,382**	**$ 41,245**	**$ 129,127**

ECM-33-Install New Solar Photovoltaic (PV) Array

ECM Description

Solar PV arrays were installed at Copeland Park Stadium, Fire Station #1, and Fire Station #3. The design considered the roof layout, potential shading sources and architectural constraints. The expected combined energy first year production is 140,448 kWh; following years are expected to have an annual 0.5% degradation.

Copeland Park

Fire Station #1

Fire Station #3

M&V Activities

Contract Compliance

The electrical production for this ECM will be verified using IPMVP Option A, Retrofit Isolation with Key Parameter Measurement. The electrical production for this ECM is generated through a production of electricity through the solar photovoltaic arrays; therefore, the measurement boundary is the Solar PV system itself.

Parameter	Measurement Frequency	Measurement Description
Irradiance (kWh/m2)	ongoing	The irradiance shall be the Annual Total Collector Irradiance and will be measured using a pyranometer in the plane of array. The value will be totalized, and the totalized value will be recoded on an hourly basis using the system software. One pyranometer will be installed at the same tilt and azimuth angle as the PV array. This pyranometer will be the primary, will have a rate accuracy of +/- 5%, and will be used to account for factors that increase and/or decrease the Global Horizontal Irradiance as incident on the surface of the array (e.g., array tilt and azimuth, dirt, shading, etc.). A second pyranometer will be the backup and will have a rated accuracy of +/- 2%. This pyranometer will be used to measure Global Horizontal Irradiance as a backup to the primary pyranometer.
AC Energy (kWh)	ongoing	The AC energy will be measured using revenue-grade AC meters located near the AC interconnection point of each PV system.

Savings Methodology

Equations for Calculating Savings

The estimated energy production for this ECM is based on a computer simulation performed using the HelioScope software. Below is the baseline monthly and annual solar irradiance (Global Horizontal Irradiance) for La Crosse, based on the NSRDB TMY2 weather data for La Crosse Municipal Airport. Also shown in the table below is the Year One Energy production estimate for the combined output of the PV systems.

PV Array	Baseline Global Horizontal Irradiance (kWh/m2)	Baseline Annual Total Collector Irradiance (kWh/m2)	Year One AC Energy Output (kWh)
Copeland Park Stadum PV Array	1,367	1,291	86,903
La Crosse Fire Station #1 PV Array	1,367	1,204	41,866
La Crosse Fire Station #3 PV Array	1,367	1,218	32,926

Below is the Baseline AC Energy Output for the combined PV systems, by Project Year. These numbers include degradation of 3% during the first year then 0.5% per year thereafter from the 2nd until 20th year of the manufacturer's warranty period.

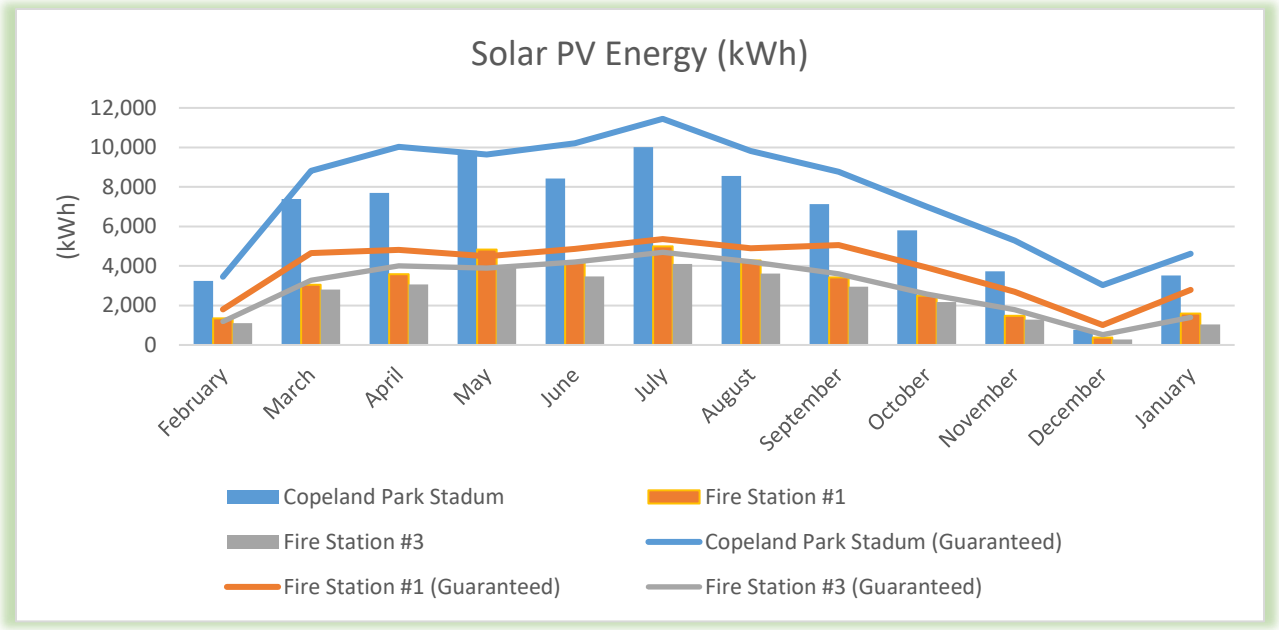
Project Year	Baseline AC Energy Output (kWh)
1	140,448
2	139,746
3	139,047
4	138,352
5	137,660
6	136,972
7	136,287
8	135,605
9	134,927
10	134,253
11	133,582
12	132,914
13	132,249
14	131,588
15	130,930
16	130,275
17	129,624
18	128,976
19	128,331
20	127,689

The energy production guarantee shall assume the monthly baseline (reference) solar irradiance as shown above. On an annual basis (recorded monthly), the total measured AC Energy output of the PV systems will be adjusted based on the actual measured plane-of-array solar irradiance compared to the baseline (reference) plane-of-array solar irradiance, as per the following formula:

$$P_{Adjusted} = (P_{Measured})\left(\frac{Q_{reference}}{Q_{actual}}\right)$$

Where P is energy measured in kWh and Q is solar irradiance measured in kWh/m2, either the actual measured or the reference as shown. If the adjusted amount of measured energy produced is less than the baseline energy for a given Project Year, the amount of kWh shortfall will be multiplied by the applicable site electricity rate ($/kWh) for that Project Year, and the result will be the PV ECM Project Benefit Shortfall for that year. If the adjusted amount of measured energy produced is greater than the baseline energy for a given Project Year, the amount of kWh surplus will be multiplied by the applicable site electricity rate ($/kWh) for that Project Year, and the result will be the PV ECM Project Benefit Surplus for that year.

The table below reflects the actual solar PV energy production (kWh) as compared to the guaranteed production when the guaranteed production is adjusted to align with the actual solar irradiance realized during this reporting period. Where the columns are greater than the lines, the systems produced more energy than expected, Based on the results, the systems performed better than expected.



Annual Savings

The following tables reflect the Year Three results and are based upon the utility rates applicable to this reporting period.

Copeland Park Stadum	Baseline Irradiance [Plain of Array] (kWh/m2)	Guaranteed Production [per Baseline Irradiance]	Actual Irradiance [Plain of Array]	Actual Production (kWh)	Adjusted Production [Actual v Baseline
February	75	2,561	70	3,247	3,452
March	131	5,537	109	7,384	8,818
April	155	7,925	119	7,696	10,031
May	161	8,133	164	9,841	9,649
June	176	8,680	146	8,428	10,209
July	197	9,554	172	10,013	11,446
August	170	8,359	148	8,550	9,820
September	142	7,161	115	7,133	8,762
October	100	5,252	83	5,799	7,003
November	67	3,179	47	3,736	5,278
December	64	2,224	16	769	3,030
January	68	1,964	52	3,521	4,617
	Total Production	**70,530**		**76,117**	**92,115**
	Cost	**$5,079**			**$6,633**
			Excess Production (kWh):		**21,584**
Electric Rate:	*$0.0720*	*per kWh*	**Excess Savings ($):**		**$1,554**

Fire Station #1	Baseline Irradiance [Plain of Array] (kWh/m2)	Guaranteed Production [per Baseline Irradiance] (kWh)	Actual Irradiance [Plain of Array] (kWh/m2)	Actual Production (kWh)	Adjusted Production [Actual v Baseline
February	72	1,131	54	1,346	1,803
March	128	3,061	84	3,042	4,645
April	154	4,745	115	3,590	4,806
May	161	4,936	173	4,827	4,494
June	177	5,309	152	4,152	4,861
July	197	5,842	184	4,994	5,360
August	170	4,998	148	4,275	4,902
September	140	4,097	95	3,422	5,049
October	97	2,876	62	2,504	3,918
November	64	1,666	35	1,483	2,689
December	61	906	22	368	1,008
January	65	786	37	1,594	2,796
	Total Production	**40,353**		**35,596**	**46,334**
	Cost	**$2,887**			**$3,315**
			Excess Production (kWh):		**5,981**
Electric Rate:	*$0.0716*	*per kWh*	**Excess Savings ($):**		**$428**

Fire Station #3	Baseline Irradiance [Plain of Array] (kWh/m2)	Guaranteed Production [per Baseline Irradiance]	Actual Irradiance [Plain of Array] (kWh/m2)	Actual Production (kWh)	Adjusted Production [Actual v Baseline
February	72	841	68	1,110	1,187
March	128	2,290	110	2,809	3,269
April	154	3,468	118	3,072	4,004
May	161	3,599	164	3,970	3,896
June	177	3,866	146	3,467	4,202
July	197	4,240	173	4,103	4,692
August	170	3,633	145	3,615	4,221
September	140	3,045	114	2,953	3,604
October	97	2,143	82	2,178	2,575
November	64	1,220	46	1,284	1,784
December	61	649	32	273	521
January	65	570	49	1,046	1,389
	Total Production	**29,565**		**29,880**	**35,344**
	Cost	**$3,801**			**$4,544**
			Excess Production (kWh):		**5,779**
Electric Rate:	*$0.1286*	*per kWh*	**Excess Savings ($):**		**$743**

ECM-34-Replace Existing Boilers

ECM Description

This ECM included the replacement of the existing boilers with new high efficiency condensing boilers at the North Neighborhood Library, South Neighborhood Library, and the La Crosse Fire Station #1.

M&V Activities

It is reasonable to conclude that the new, more efficient boilers will allow the City of La Crosse to realize economic benefit as the result of reduced natural gas consumption. However, since no savings were included in the Project Benefits, no measurement and verification activities have been, or will be, conducted.

Non-Measured Agreed Upon Engineering Calculations

Non-Measured Utility Benefits

Where the cost to validate the projected savings is determined to be potentially greater than the value of the savings, the City of La Crosse and Johnson Controls have agreed upon the engineering calculations associated with the projected savings. With reasonable effort, the City of La Crosse should expect to realize the energy savings detailed below. These Non-Measured Project Benefits were derived using engineering calculations based upon industry standards and data provided by the City of La Crosse. Details can be found in the Performance Contract.

ECM-33-Install New Solar Photovoltaic (PV) Array

ECM Description

The calculated demand savings for solar photovoltaic installations depend on peak solar generation occurring at the same time as peak building demand. Due to the unpredictability of weather and building usage patterns, these values are calculated based on historical weather data (Typical Meteorological Year, or TMY) and assumed building energy demand profiles and will not be measured. A benefit will only be realized for buildings where the electric rates charge for demand.

The monthly demand charges are calculated as follows:

$$Demand\ Charges\ (\$) = Monthly\ Distribution\ Demand\ Charges\ (\$) + Monthly\ Peak\ Demand\ Charges\ (\$)$$

$$Distribution\ Demand\ Charge\ (\$) = [Max\ (Annual\ Distribution\ Demand(kW)) * Distribution\ Demand\ Rate\ (\$/kW)]$$

$$Monthly\ Peak\ Demand\ Charge\ (\$) = Monthly\ Peak\ Demand\ (kW) * Seasonal\ Peak\ Demand\ Rate\ (\$/kW)$$

Annual Savings

The estimated energy production for this ECM is based on a computer simulation performed using the HelioScope software. Hourly simulation results from the HelioScope software were then fed into the Energy Toolbase software to determine the demand savings by comparing the estimated demand profile of the building before solar is installed to the estimated demand profile after solar is installed. Below are the Year Three monthly estimated demand charges before and after installation, and the anticipated demand savings for each site:

Copeland Park Stadium			
Typical Month	**Estimated Baseline Demand Charges**	**Estimated Future Demand Charges**	**Demand Savings Contribution**
January	$138	$125	$13
February	$138	$125	$13
March	$161	$149	$13
April	$546	$452	$90
May	$1,422	$1,351	$68
June	$2,148	$1,797	$344
July	$2,010	$1,667	$325
August	$1,528	$1,418	$104
September	$1,045	$784	$247
October	$500	$487	$13
November	$150	$137	$13
December	$150	$137	$13
Total	$9,935	$8,629	$1,307

La Crosse Fire Station #1			
Typical Month	**Estimated Baseline Demand Charges**	**Estimated Future Demand Charges**	**Demand Savings Contribution**
January	$552	$552	$-
February	$540	$533	$7
March	$458	$402	$53
April	$447	$414	$31
May	$493	$461	$30
June	$661	$610	$48
July	$661	$610	$48
August	$633	$541	$87
September	$647	$610	$35
October	$482	$461	$19
November	$517	$517	$-
December	$610	$579	$29
Total	$6,701	$6,290	$411

Operational and Capital Benefits

Non-Measured Operational and Maintenance Benefits are derived from avoided future costs. The City of La Crosse and Johnson Controls have agreed upon the engineering calculations associated with the projected savings. These Non-Measured Project Benefits were derived using engineering calculations based upon industry standards and data provided by the City of La Crosse.

Non-Measured Operational Benefits		**Year Three Benefits**
Material Savings due to lighting retrofit		
ECM-31: Retrofit Facility Lighting to LED	Black River Beach Neighborhood Center	$342
	Myrick Park Center	$358
	Southside Neighborhood Center	$212
	Copeland Park Octoberfest Shelter	$826
	Copeland Park Enclosed Shelter	
	Copeland Park Tennis Courts	
	La Crosse Fire Station #1	$448
	North Neighborhood Library	$159
	South Neighborhood Library	$213
	Main Street Parking Ramp	$894
ECM-32: Retrofit Street Lighting to LED	Typical annual streeting lighting re-lamping costs avoided due to LED lighting replacement	$10,850
	Total Non-Measured Operational Benefits:	$14,303