City of La Crosse, Wisconsin

City Hall
400 La Crosse Street
La Crosse, WI 54601

Meeting Agenda

Climate Action Plan Steering Committee

Monday, November 11, 2024 **4:30 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

Updates on grants, LEED for Cities, and Renew the Block

Agenda Items:

24-1460 Request for Funding Assistance for Lighting Retrofits at Black River Beach Neighborhood Center - Jim Flottmeyer

Attachments: Cost Estimate

24-1456 Presentation on Johnson Controls' Phase 3 Year 1 Measurement and Verification Report - Doug Carlson & Jim Wolf

Attachments: Report

24-1457 Request to fund annual ICLEI - Local Governments for Sustainability membership - Staff

Attachments: Invoice

Why join ICLEI? webpage

24-1458 Discuss/brainstorm how to collaborate and work better together - Heneghan

Determine whether or not to use Google Docs; clarify directives, priorities, and assignments; match priorities with reasonable/realistic expectations; and assess skills or expertise of each committee member

24-1459 Discuss meeting in a smaller room at City Hall that may be more convenient to working together - Heneghan

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

City Hall
400 La Crosse Street
La Crosse, WI 54601

Text File

File Number: 24-1460

Agenda Date: 11/11/2024 **Version:** 1 **Status:** Agenda Ready

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

KISH & SONS ELECTRIC, INC.

RESIDENTIAL • COMMERCIAL • INDUSTRIAL

2135 Enterprise Ave P.O. BOX 543 LA CROSSE, WI 54602-0543 (608) 785-0207 Fax (608) 782-5599

10/17/2024
Jim Flottmeyer
Parks, Forestry, Building and Grounds
Facilities and Marine Operations Manager
La Crosse, WI 54601

RE: Black River Beach Center Outdoor Lighting

Jim,

We are pleased to submit a price for the above-mentioned project. Our price of **$4,476.00** is based on my walk in the park. We would like to offer the following clarifications to our price.

1. Provide and install (2) of the same RAB LED light fixtures at the entrance that were not working in the same location
2. Provide and install (4) LED wall packs in the existing locations.
3. Provide and install (6) 8" can lights in the existing location.
4. Provide and install (9) 6" can lights in the existing location.
5. Provide and install (2) LED pendant light fixtures in the existing location.
6. Price includes installing new photo-eyes where needed.
7. To add a wall pack on the south east corner up high, as discussed, **please add $688.00**
8. Price does not include electrical permit and inspection fees; city projects are free.
9. Price does not include Sales and Use Tax.

Thank you for allowing us to be of service to you. If you have any questions feel free to call.

Sincerely,

Art Herbst
Project Manager/Estimator

"Your friend in the business."

City of La Crosse, Wisconsin

City Hall
400 La Crosse Street
La Crosse, WI 54601

Text File

File Number: 24-1456

Agenda Date: 11/11/2024 **Version:** 1 **Status:** Agenda Ready

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

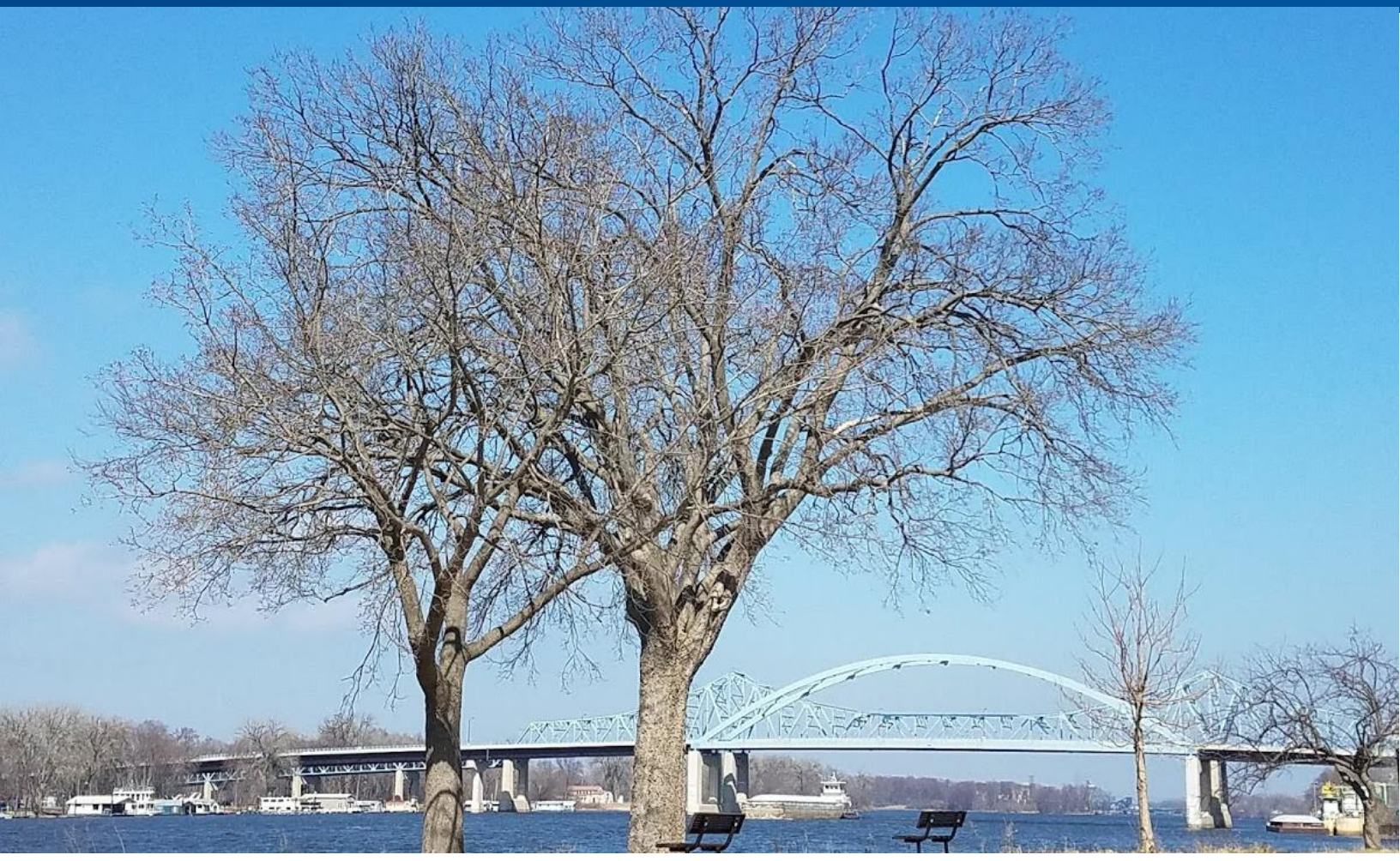
Agenda Number:

City of La Crosse

Facility Improvements Through Performance Contract

Phase 3: Measurement & Verification Report

Year One



Submitted by:
Jeff Van Ess
Jim Wolf

July 13, 2024

Presented to:
Lewis Kuhlman

July 13, 2024

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. Based upon the success of the initial Performance Contract, a second scope of work was implemented later that same year. 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 One (February 1, 2023 through January 31, 2024) of the three-year Guarantee Term associated with the Phase 3 energy conservation and facility improvement measures.

Please know that 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

Jim Wolf
Customer Experience Manager
Sustainable Infrastructure
630-917-4225
james.g.wolf@jci.com

Acceptance

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

Johnson Controls
Attn: Jim Wolf
james.g.wolf@jci.com

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

Signature: DocuSigned by: 6603D9B2F5504DF... Date: 9/16/2024

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 May 14, 2021. 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 One (February 1, 2023 through January 31, 2024) of the three-year Guarantee Term associated with the Phase 3 energy conservation and facility improvement measures.

The combined energy savings, capital benefits, energy rebate benefits, and operational benefits, have resulted in $398,860 total savings through the end of Year One. As can be noted below, the aggregate results indicate this project has exceeded guarantee expectations.

$133,935	$150,057	$101,386	$13,482
Capital Benefits	Energy Savings [Year One]	Energy Rebate Benefits	Operational & Maintenance Benefits

$398,860
Actual Benefits to Date

$396,544
Year One Guarantee

When compared against the Year One guarantee of $396,544, this project has generated excess savings for Year One of $2,316.

$2,316
Excess Savings

Summary of Project Benefits and Results

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

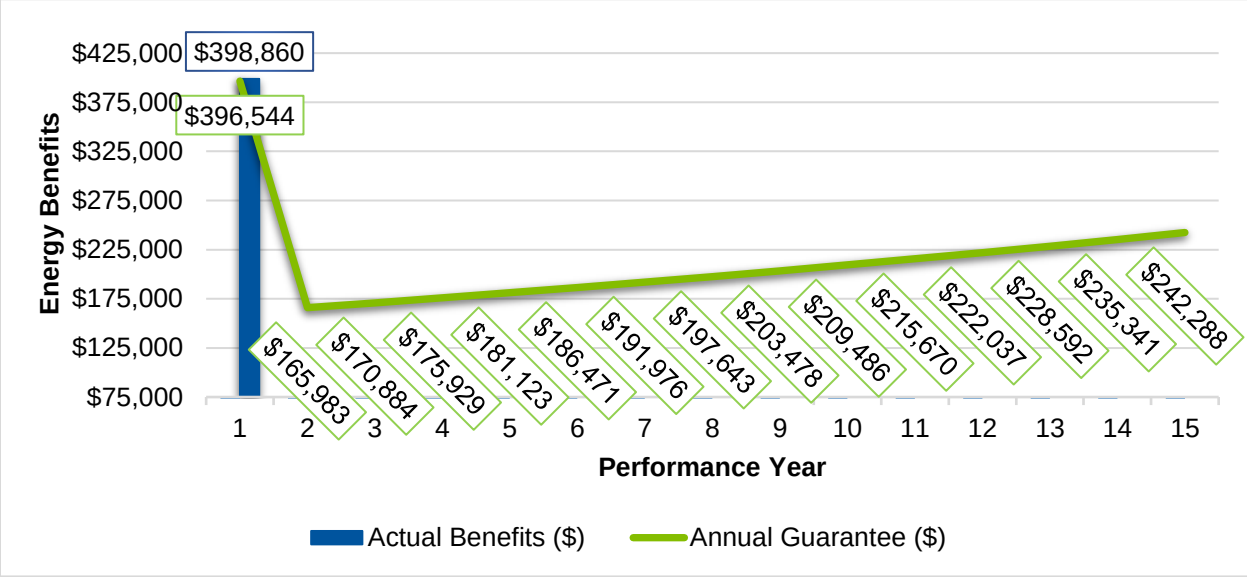
ECM #	ECM Name	Black River Beach Neighborhood Center	Myrick Park Center	Southside Neighborhood Center	Copeland Park Octoberfest Shelter	Copeland Park Enclosed Shelter	Copeland Park Tennis Courts	Copeland Park Stadium	La Crosse Fire Station #1	La Crosse Fire Station #3	North Neighborhood Library	South 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 through the end of Year One:

- The City of La Crosse realized $150,057 in energy savings
- Utility incentive (energy rebate) benefits totaled $101,386
- Year One benefits exceeded expectations by $2,316
- Avoided future capital expenditure of $133,935
- Environmental stewardship through reduced carbon emissions by 993 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 One, CO_2 emissions were reduced by 993 metric tons.

The following graphic depicts the emission reduction equivalencies achieved by the City as a result of the improvements made during the Installation Period through the end of Year One of the Guarantee Term.

993

Metric Tons of CO_2 Emissions equates to:

GHG emissions from:	**CO_2 emissions from:**	**Carbon sequestered by:**
		
236	**111,749**	**16,421**
Passenger vehicles driven for one year	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 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.

		Electric Savings	
		Energy (kWh)	
ECM Number	ECM Name	Guaranteed	Actual
ECM-31	Retrofit Facility Lighting to LED	109,793	110,957
ECM-32	Retrofit Street Lighting to LED	1,210,771	1,210,771
ECM-33	Install New Solar PV (Adjusted)	140,448	149,708

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

		Electric Savings	
		Energy (kWh)	
ECM Number	ECM Name	Guaranteed	Actual
ECM-31	Retrofit Facility Lighting to LED	$ 8,647	$ 9,185
ECM-32	Retrofit Street Lighting to LED	$ 121,717	$ 121,717
ECM-33	Install New Solar PV (Adjusted)	$ 6,435	$ 8,213
	Total:	**$ 136,799**	**$ 139,115**
		Excess Savings:	**$ 2,316**

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 One energy savings.

Facility	Account	Premise	Rate Code	Unit	Effective Rate
Black River Beach Neighborhood Center	52-6054173-7	304194393	B15	kwh	$0.06977
Copeland Park Enclosed Shelter	52-6054173-7	302369749	B06	kwh	$0.12497
Copeland Park Octoberfest Shelter	52-6054173-7	302672654	B06	kwh	$0.12497
Copeland Park Stadium	52-6054173-7	302937321	B15	kwh	$0.06788
La Crosse Fire Station #1 - Lighting	52-4712246-9	303092584	B15	kwh	$0.06977
La Crosse Fire Station #1 - Solar PV	52-4712246-9	303092584	B15	kwh	$0.06744
La Crosse Fire Station #3	52-4712246-9	303618390	B06	kwh	$0.12119
Main Street Parking Ramp	52-0011625805-1	303030573	B15	kwh	$0.06977
Myrick Park Center	52-6054173-7	304161237	B06	kwh	$0.06977
North Neighborhood Library	52-4892112-8	302833164	B15	kwh	$0.06977
South Neighborhood Library	52-4892112-8	303071074	B15	kwh	$0.06977
Southside Neighborhood Center	52-6054173-7	303071074	B06	kwh	$0.12497

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 One utility rates.

Retrofit Facility Lighting to LED	Guaranteed (kWh)	Actual (kWh)
Black River Beach	15,097	15,437
Copeland Park	21,421	19,913
Fire Station #1	11,614	12,225
Main Street Ramp	28,510	30,011
Myrick Park	14,373	13,605
North Library	3,419	3,599
South Library	9,443	9,940
Southside Center	5,915	6,226
Total	109,793	110,957
Savings ($):	$8,647	$9,185
	Excess Savings:	**$538**

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	$ 6.90	28	$ 166	$ 17	$ 148
B33-1	HPS	150	421	$ 8.65	55	$ 43,700	$ 7,161	$ 36,538
B33-1	HPS	250	84	$ 12.60	80	$ 12,701	$ 2,078	$ 10,622
B33-1	HPS	400	81	$ 17.00	120	$ 16,524	$ 3,006	$ 13,518
B33-1N	HPS	100	2	$ 6.90	28	$ 166	$ 17	$ 148
B33-1N	HPS	150	97	$ 8.65	55	$ 10,069	$ 1,650	$ 8,419
B33-1N	HPS	250	9	$ 12.60	80	$ 1,361	$ 223	$ 1,138
B33-2	HPS	50	179	$ 1.75	14	$ 3,759	$ 775	$ 2,984
B33-2	HPS	70	76	$ 2.35	25	$ 2,143	$ 588	$ 1,556
B33-2	HPS	100	39	$ 3.50	28	$ 1,638	$ 338	$ 1,300
B33-2	HPS	150	791	$ 5.40	55	$ 51,257	$ 13,455	$ 37,802
B33-2	HPS	250	154	$ 8.40	80	$ 15,523	$ 3,810	$ 11,713
B33-2	HPS	400	10	$ 13.30	120	$ 1,596	$ 371	$ 1,225
Per-meter Monthly Charge ($7.25 per month for 62 meters)						$ -	$ 5,394	$ (5,394)
					Total:	**$ 160,601**	**$ 38,884**	**$ 121,717**

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 combined energy expected 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 1 AC Energy Output (kWh)
Copeland Park Stadum PV Array	1,367	1,291	70,266
La Crosse Fire Station #1 PV Array	1,367	1,204	40,504
La Crosse Fire Station #3 PV Array	1,367	1,218	29,678

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.

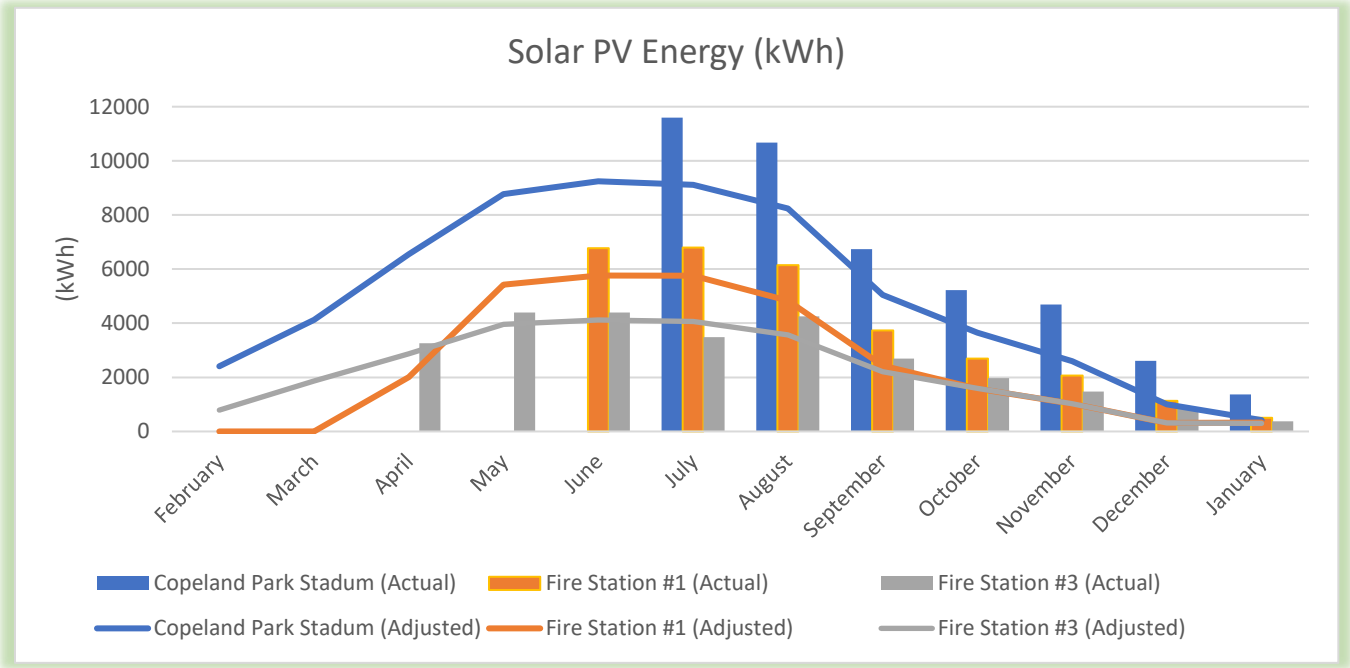
Project Year	Baseline AC Energy Energy Output (kWh)
1	140,448
2	139,746
3	139,047
4	138,352
5	137,660
6	136,972
7	136,287
8	135,605
9	134,927
10	134,253
11	133,582
12	132,914
13	132,249
14	131,588
15	130,930
16	130,275
17	129,624
18	128,976
19	128,331
20	127,689

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. Although the Guarantee Term commenced effective February 1, 2023, the solar PV production values were not recorded until July 2023 [Copeland Park Stadium], June 2023 [Fire Station #1], and April 2023 [Fire Station #3]. Based upon the available data, 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.

Copeland Park Stadum	Baseline Irradiance [Plain of Array] (kWh/m2)	Guaranteed Production [per Baseline Irradiance] (kWh)	Actual Irradiance [Plain of Array] (kWh/m2)	Adjusted Production [Actual v Baseline Irradiance] (kWh)	Actual Production (kWh)
February	75	2,561	70	2,404	
March	131	5,537	97	4,119	
April	155	7,925	128	6,549	
May	161	8,133	174	8,776	
June	176	8,680	188	9,244	
July	**197**	**9,554**	**188**	**9,112**	**11,591**
August	**170**	**8,359**	**168**	**8,235**	**10,674**
September	**142**	**7,161**	**100**	**5,050**	**6,734**
October	**100**	**5,252**	**70**	**3,655**	**5,226**
November	**67**	**3,179**	**54**	**2,592**	**4,689**
December	**64**	**2,224**	**29**	**1,001**	**2,606**
January	**68**	**1,964**	**14**	**418**	**1,368**
		70,530		**30,065**	**42,889**
				Excess Production (kWh):	**12,824**
Electric Rate:	*$0.0679*	*per kWh*		**Excess Savings ($):**	**$870**

Fire Station #1	Baseline Irradiance [Plain of Array] (kWh/m2)	Guaranteed Production [per Baseline Irradiance] (kWh)	Actual Irradiance [Plain of Array] (kWh/m2)	Adjusted Production [Actual v Baseline Irradiance] (kWh)	Actual Production (kWh)
February	72	1,131	0	0	
March	128	3,061	0	0	
April	154	4,745	65	2,006	
May	**161**	**4,936**	**177**	**5,425**	
June	**177**	**5,309**	**193**	**5,762**	**6,768**
July	**197**	**5,842**	**194**	**5,754**	**6,797**
August	**170**	**4,998**	**164**	**4,828**	**6,140**
September	**140**	**4,097**	**83**	**2,429**	**3,733**
October	**97**	**2,876**	**53**	**1,579**	**2,697**
November	**64**	**1,666**	**39**	**1,021**	**2,062**
December	**61**	**906**	**21**	**312**	**1,126**
January	**65**	**786**	**27**	**326**	**501**
		40,353		**22,011**	**29,824**
				Excess Production (kWh):	**7,813**
Electric Rate:	*$0.0674*	*per kWh*		**Excess Savings ($):**	**$527**

Fire Station #3	Baseline Irradiance [Plain of Array] (kWh/m2)	Guaranteed Production [per Baseline Irradiance] (kWh)	Actual Irradiance [Plain of Array] (kWh/m2)	Adjusted Production [Actual v Baseline Irradiance] (kWh)	Actual Production (kWh)
February	72	841	67	784	
March	128	2,290	104	1,867	
April	154	3,468	127	**2,871**	**3,265**
May	161	3,599	177	**3,956**	**4,393**
June	177	3,866	189	**4,119**	**4,396**
July	197	4,240	189	**4,058**	**3,482**
August	170	3,633	167	**3,572**	**4,250**
September	140	3,045	101	**2,210**	**2,689**
October	97	2,143	72	**1,589**	**1,970**
November	64	1,220	54	**1,025**	**1,470**
December	61	649	29	**313**	**860**
January	65	570	34	**297**	**378**
		29,565		**24,010**	**27,154**
				Excess Production (kWh):	**3,144**
Electric Rate:	*$0.1212*	*per kWh*		**Excess Savings ($):**	**$381**

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 baseline 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	$ 130	$ 118	$ 13
February	$ 130	$ 118	$ 13
March	$ 152	$ 140	$ 13
April	$ 515	$ 426	$ 90
May	$ 1,340	$ 1,273	$ 68
June	$ 2,025	$ 1,681	$ 344
July	$ 1,895	$ 1,571	$ 325
August	$ 1,440	$ 1,337	$ 104
September	$ 985	$ 739	$ 247
October	$ 471	$ 459	$ 13
November	$ 141	$ 129	$ 13
December	$ 141	$ 129	$ 13
Total	**$ 9,365**	**$ 8,115**	**$ 1,251**

La Crosse Fire Station #1			
Typical Month	**Estimated Baseline Demand Charges**	**Estimated Future Demand Charges**	**Demand Savings Contribution**
January	$ 520	$ 520	$ -
February	$ 509	$ 502	$ 7
March	$ 432	$ 379	$ 53
April	$ 421	$ 390	$ 31
May	$ 465	$ 435	$ 30
June	$ 623	$ 575	$ 48
July	$ 623	$ 575	$ 48
August	$ 597	$ 510	$ 87
September	$ 610	$ 575	$ 35
October	$ 454	$ 435	$ 19
November	$ 487	$ 487	$ -
December	$ 575	$ 546	$ 29
Total	**$ 6,316**	**$ 5,929**	**$ 387**

Non-Measured Utility Rebate Benefits

Johnson Controls assisted the City in applying for rebates with Focus on Energy and Xcel Energy. Each rebate was submitted upon completion of the energy improvement with the required forms, inspections, and documentation. The following table lists the anticipated rebate amounts by energy improvement type. Upon completion of the project, the City was eligible to realize $101,386 in rebate reimbursement. These are one-time benefits and will not reoccur.

Utility Incentive Benefits		Year 1 Benefits
ECM-31: Retrofit Facility Lighting to LED	Focus on Energy	$ 9,514
	Xcel Energy	$ 4,756
ECM-32: Retrofit Street Lighting to LED	Focus on Energy	$ 45,394
	Xcel Energy	$ 22,697
ECM-33: Install New Solar PV	Focus on Energy	$ 19,025
Total Non-Measured Utility Incentive Benefits:		**$ 101,386**

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 1 Benefits**
Material Savings due to lighting retrofit		
ECM-31: Retrofit Facility Lighting to LED	Black River Beach Neighborhood Center	$ 315
	Myrick Park Center	$ 330
	Southside Neighborhood Center	$ 196
	Copeland Park Octoberfest Shelter	$ 762
	Copeland Park Enclosed Shelter	
	Copeland Park Tennis Courts	
	La Crosse Fire Station #1	$ 413
	North Neighborhood Library	$ 146
	South Neighborhood Library	$ 196
	Main Street Parking Ramp	$ 824
ECM-32: Retrofit Street Lighting to LED	Typical annual streeting lighting re-lamping costs avoided due to LED lighting replacement	$ 10,000
	Total Non-Measured Operational Benefits:	**$ 13,182**

City of La Crosse, Wisconsin

City Hall
400 La Crosse Street
La Crosse, WI 54601

Text File

File Number: 24-1457

Agenda Date: 11/11/2024 **Version:** 1 **Status:** Agenda Ready

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

Agenda Number:

Invoice

1536 Wynkoop Street #901
Denver, CO 80202
+17204807739
iclei-usa@iclei.org
www.icleiusa.org

BILL TO
La Crosse, WI 400 La Crosse Street La Crosse, WI 54601

INVOICE #	DATE	TOTAL DUE	DUE DATE		ENCLOSED
3956	09/05/2024	$1,200.00	11/30/2024		

MEMBER PERIOD
12/01/2024 - 11/30/2025

DESCRIPTION	ITEM	AMOUNT
Annual Membership dues for population under 100,000	**Dues - pop. under 100,000**	1,200.00

Choose your payment option above or send paper checks to:
ICLEI - Local Governments for Sustainability,USA
1536 Wynkoop St. Suite 901 Denver, CO 80202

BALANCE DUE **$1,200.00**

City of La Crosse, Wisconsin

City Hall
400 La Crosse Street
La Crosse, WI 54601

Text File

File Number: 24-1458

Agenda Date: 11/11/2024 **Version:** 1 **Status:** Agenda Ready

In Control: Climate Action Plan Steering Committee **File Type:** General Item

Agenda Number:

City of La Crosse, Wisconsin

City Hall
400 La Crosse Street
La Crosse, WI 54601

Text File

File Number: 24-1459

Agenda Date: 11/11/2024 **Version:** 1 **Status:** Agenda Ready

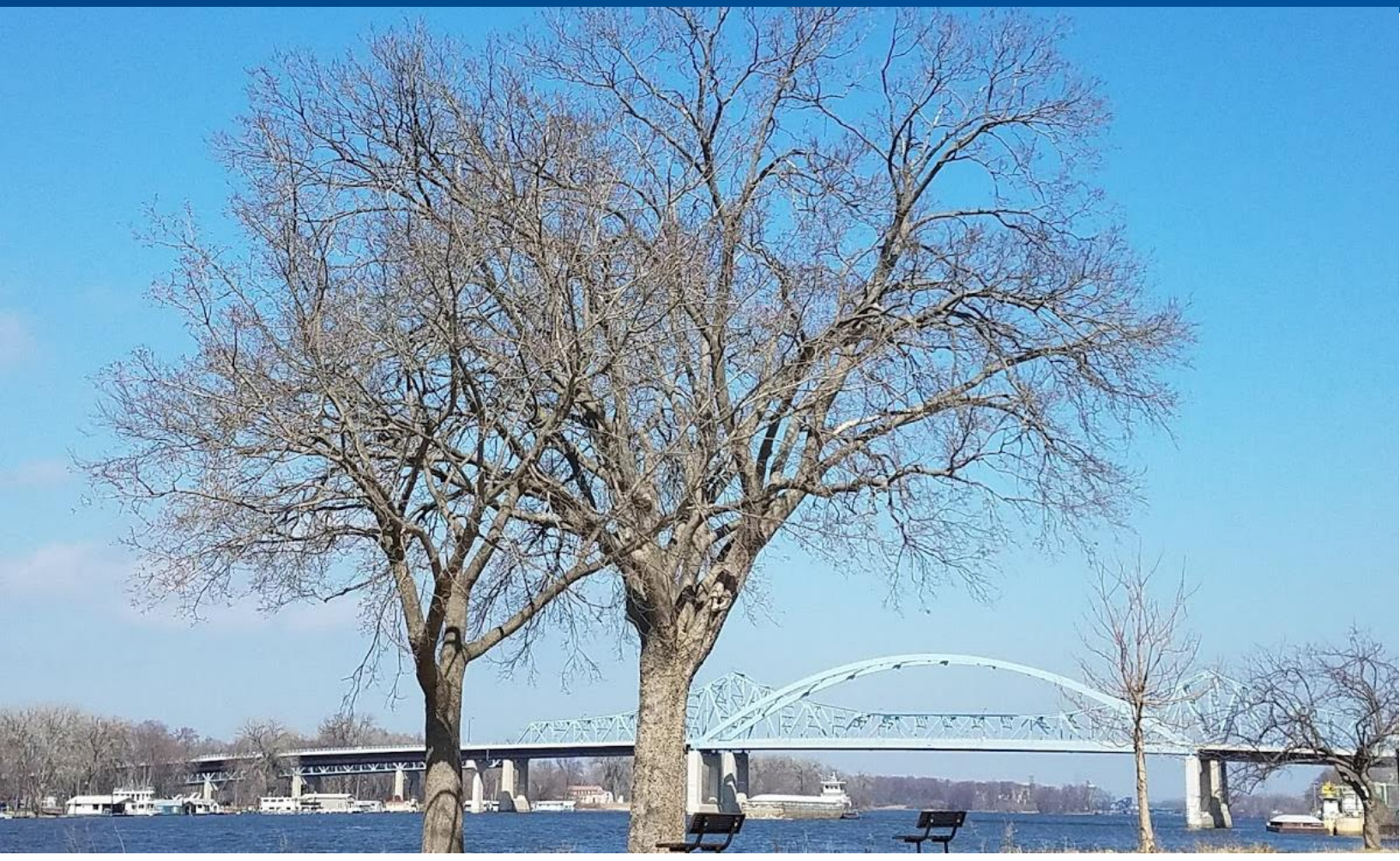
In Control: Planning & Development **File Type:** Resolution

City of La Crosse

Facility Improvements Through Performance Contract

Phase 3: Measurement & Verification Report

Year One



Submitted by:
Jeff Van Ess
Jim Wolf

July 13, 2024

Presented to:
Lewis Kuhlman

July 13, 2024

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. Based upon the success of the initial Performance Contract, a second scope of work was implemented later that same year. 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 One (February 1, 2023 through January 31, 2024) of the three-year Guarantee Term associated with the Phase 3 energy conservation and facility improvement measures.

Please know that 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

Jim Wolf
Customer Experience Manager
Sustainable Infrastructure
630-917-4225
james.g.wolf@jci.com

Acceptance

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

Johnson Controls
Attn: Jim Wolf
james.g.wolf@jci.com

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

Signature: DocuSigned by: 6603D9B2F5504DF... Date: 9/16/2024

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 May 14, 2021. 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 One (February 1, 2023 through January 31, 2024) of the three-year Guarantee Term associated with the Phase 3 energy conservation and facility improvement measures.

The combined energy savings, capital benefits, energy rebate benefits, and operational benefits, have resulted in $398,860 total savings through the end of Year One. As can be noted below, the aggregate results indicate this project has exceeded guarantee expectations.

$133,935	$150,057	$101,386	$13,482
Capital Benefits	Energy Savings [Year One]	Energy Rebate Benefits	Operational & Maintenance Benefits

$398,860
Actual Benefits to Date

$396,544
Year One Guarantee

When compared against the Year One guarantee of $396,544, this project has generated excess savings for Year One of $2,316.

$2,316
Excess Savings

Summary of Project Benefits and Results

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

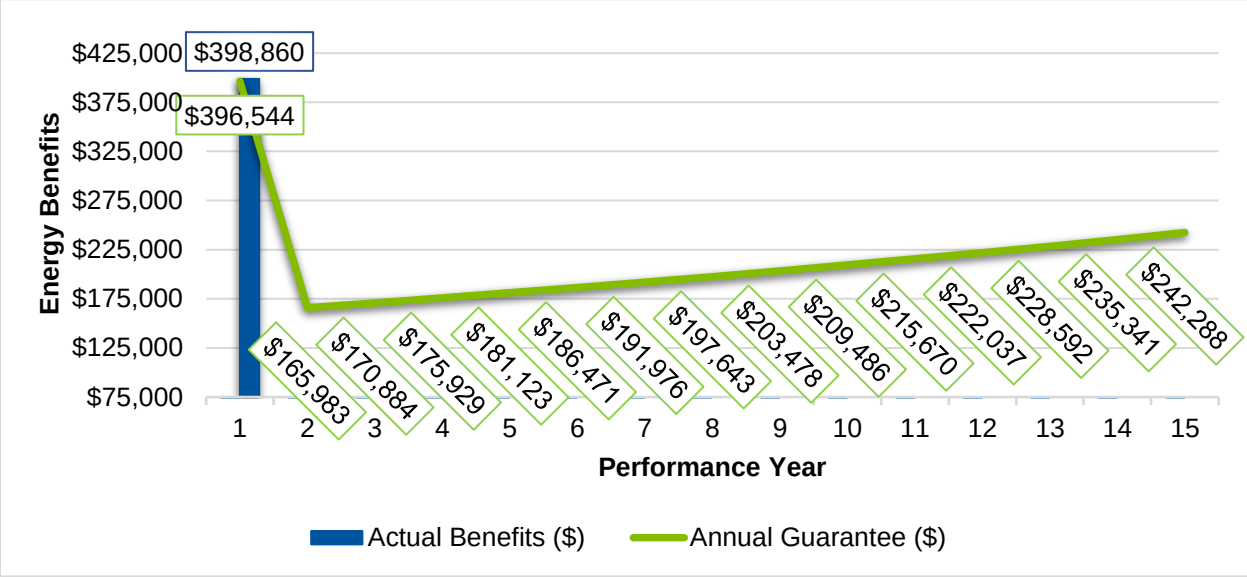
ECM #	ECM Name	Black River Beach Neighborhood Center	Myrick Park Center	Southside Neighborhood Center	Copeland Park Octoberfest Shelter	Copeland Park Enclosed Shelter	Copeland Park Tennis Courts	Copeland Park Stadium	La Crosse Fire Station #1	La Crosse Fire Station #3	North Neighborhood Library	South 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 through the end of Year One:

- The City of La Crosse realized $150,057 in energy savings
- Utility incentive (energy rebate) benefits totaled $101,386
- Year One benefits exceeded expectations by $2,316
- Avoided future capital expenditure of $133,935
- Environmental stewardship through reduced carbon emissions by 993 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 One, CO_2 emissions were reduced by 993 metric tons.

The following graphic depicts the emission reduction equivalencies achieved by the City as a result of the improvements made during the Installation Period through the end of Year One of the Guarantee Term.

993

Metric Tons of CO_2 Emissions equates to:

GHG emissions from:	**CO_2 emissions from:**	**Carbon sequestered by:**
		
236	**111,749**	**16,421**
Passenger vehicles driven for one year	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 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.

		Electric Savings	
		Energy (kWh)	
ECM Number	ECM Name	Guaranteed	Actual
ECM-31	Retrofit Facility Lighting to LED	109,793	110,957
ECM-32	Retrofit Street Lighting to LED	1,210,771	1,210,771
ECM-33	Install New Solar PV (Adjusted)	140,448	149,708

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

		Electric Savings	
		Energy (kWh)	
ECM Number	ECM Name	Guaranteed	Actual
ECM-31	Retrofit Facility Lighting to LED	$ 8,647	$ 9,185
ECM-32	Retrofit Street Lighting to LED	$ 121,717	$ 121,717
ECM-33	Install New Solar PV (Adjusted)	$ 6,435	$ 8,213
	Total:	**$ 136,799**	**$ 139,115**
		Excess Savings:	**$ 2,316**

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 One energy savings.

Facility	Account	Premise	Rate Code	Unit	Effective Rate
Black River Beach Neighborhood Center	52-6054173-7	304194393	B15	kwh	$0.06977
Copeland Park Enclosed Shelter	52-6054173-7	302369749	B06	kwh	$0.12497
Copeland Park Octoberfest Shelter	52-6054173-7	302672654	B06	kwh	$0.12497
Copeland Park Stadium	52-6054173-7	302937321	B15	kwh	$0.06788
La Crosse Fire Station #1 - Lighting	52-4712246-9	303092584	B15	kwh	$0.06977
La Crosse Fire Station #1 - Solar PV	52-4712246-9	303092584	B15	kwh	$0.06744
La Crosse Fire Station #3	52-4712246-9	303618390	B06	kwh	$0.12119
Main Street Parking Ramp	52-0011625805-1	303030573	B15	kwh	$0.06977
Myrick Park Center	52-6054173-7	304161237	B06	kwh	$0.06977
North Neighborhood Library	52-4892112-8	302833164	B15	kwh	$0.06977
South Neighborhood Library	52-4892112-8	303071074	B15	kwh	$0.06977
Southside Neighborhood Center	52-6054173-7	303071074	B06	kwh	$0.12497

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 One utility rates.

Retrofit Facility Lighting to LED	Guaranteed (kWh)	Actual (kWh)
Black River Beach	15,097	15,437
Copeland Park	21,421	19,913
Fire Station #1	11,614	12,225
Main Street Ramp	28,510	30,011
Myrick Park	14,373	13,605
North Library	3,419	3,599
South Library	9,443	9,940
Southside Center	5,915	6,226
Total	109,793	110,957
Savings ($):	$8,647	$9,185
	Excess Savings:	**$538**

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	$ 6.90	28	$ 166	$ 17	$ 148
B33-1	HPS	150	421	$ 8.65	55	$ 43,700	$ 7,161	$ 36,538
B33-1	HPS	250	84	$ 12.60	80	$ 12,701	$ 2,078	$ 10,622
B33-1	HPS	400	81	$ 17.00	120	$ 16,524	$ 3,006	$ 13,518
B33-1N	HPS	100	2	$ 6.90	28	$ 166	$ 17	$ 148
B33-1N	HPS	150	97	$ 8.65	55	$ 10,069	$ 1,650	$ 8,419
B33-1N	HPS	250	9	$ 12.60	80	$ 1,361	$ 223	$ 1,138
B33-2	HPS	50	179	$ 1.75	14	$ 3,759	$ 775	$ 2,984
B33-2	HPS	70	76	$ 2.35	25	$ 2,143	$ 588	$ 1,556
B33-2	HPS	100	39	$ 3.50	28	$ 1,638	$ 338	$ 1,300
B33-2	HPS	150	791	$ 5.40	55	$ 51,257	$ 13,455	$ 37,802
B33-2	HPS	250	154	$ 8.40	80	$ 15,523	$ 3,810	$ 11,713
B33-2	HPS	400	10	$ 13.30	120	$ 1,596	$ 371	$ 1,225
Per-meter Monthly Charge ($7.25 per month for 62 meters)						$ -	$ 5,394	$ (5,394)
					Total:	**$ 160,601**	**$ 38,884**	**$ 121,717**

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 combined energy expected 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 1 AC Energy Output (kWh)
Copeland Park Stadum PV Array	1,367	1,291	70,266
La Crosse Fire Station #1 PV Array	1,367	1,204	40,504
La Crosse Fire Station #3 PV Array	1,367	1,218	29,678

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.

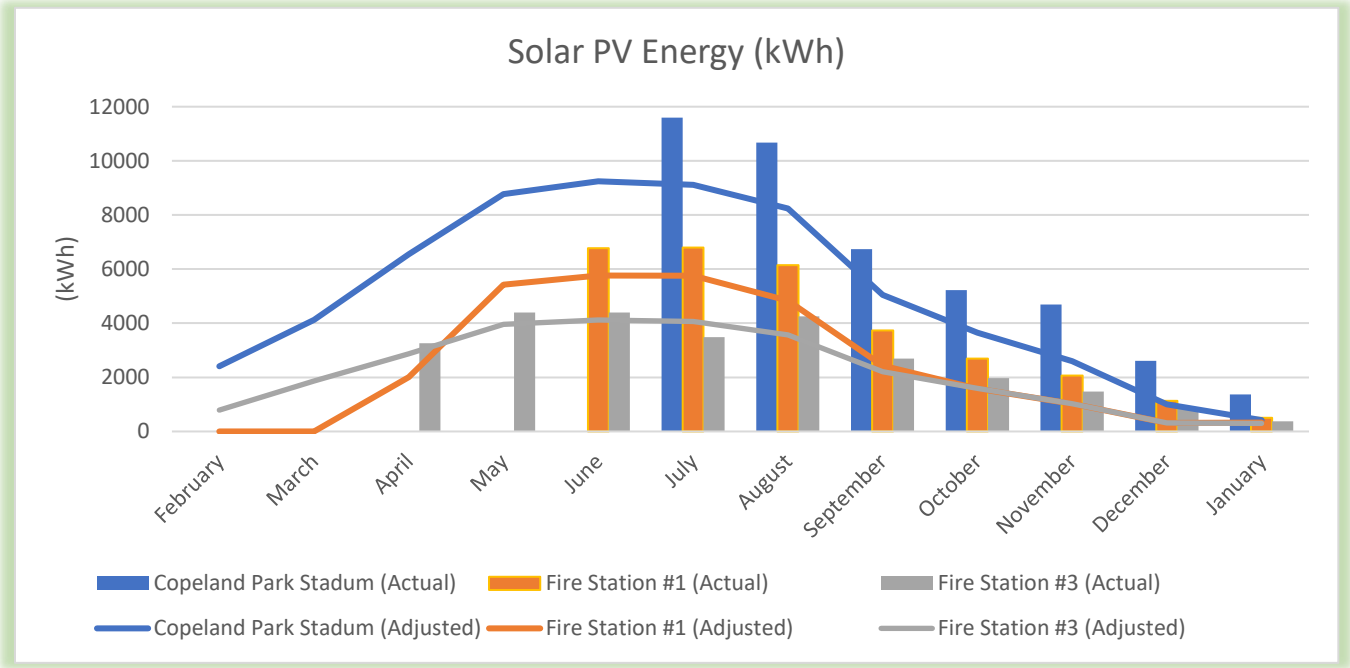
Project Year	Baseline AC Energy Energy Output (kWh)
1	140,448
2	139,746
3	139,047
4	138,352
5	137,660
6	136,972
7	136,287
8	135,605
9	134,927
10	134,253
11	133,582
12	132,914
13	132,249
14	131,588
15	130,930
16	130,275
17	129,624
18	128,976
19	128,331
20	127,689

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. Although the Guarantee Term commenced effective February 1, 2023, the solar PV production values were not recorded until July 2023 [Copeland Park Stadium], June 2023 [Fire Station #1], and April 2023 [Fire Station #3]. Based upon the available data, 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.

Copeland Park Stadum	Baseline Irradiance [Plain of Array] (kWh/m2)	Guaranteed Production [per Baseline Irradiance] (kWh)	Actual Irradiance [Plain of Array] (kWh/m2)	Adjusted Production [Actual v Baseline Irradiance] (kWh)	Actual Production (kWh)
February	75	2,561	70	2,404	
March	131	5,537	97	4,119	
April	155	7,925	128	6,549	
May	161	8,133	174	8,776	
June	176	8,680	188	9,244	
July	**197**	**9,554**	**188**	**9,112**	**11,591**
August	**170**	**8,359**	**168**	**8,235**	**10,674**
September	**142**	**7,161**	**100**	**5,050**	**6,734**
October	**100**	**5,252**	**70**	**3,655**	**5,226**
November	**67**	**3,179**	**54**	**2,592**	**4,689**
December	**64**	**2,224**	**29**	**1,001**	**2,606**
January	**68**	**1,964**	**14**	**418**	**1,368**
		70,530		**30,065**	**42,889**
				Excess Production (kWh):	**12,824**
Electric Rate:	*$0.0679*	*per kWh*		**Excess Savings ($):**	**$870**

Fire Station #1	Baseline Irradiance [Plain of Array] (kWh/m2)	Guaranteed Production [per Baseline Irradiance] (kWh)	Actual Irradiance [Plain of Array] (kWh/m2)	Adjusted Production [Actual v Baseline Irradiance] (kWh)	Actual Production (kWh)
February	72	1,131	0	0	
March	128	3,061	0	0	
April	154	4,745	65	2,006	
May	**161**	**4,936**	**177**	**5,425**	
June	**177**	**5,309**	**193**	**5,762**	**6,768**
July	**197**	**5,842**	**194**	**5,754**	**6,797**
August	**170**	**4,998**	**164**	**4,828**	**6,140**
September	**140**	**4,097**	**83**	**2,429**	**3,733**
October	**97**	**2,876**	**53**	**1,579**	**2,697**
November	**64**	**1,666**	**39**	**1,021**	**2,062**
December	**61**	**906**	**21**	**312**	**1,126**
January	**65**	**786**	**27**	**326**	**501**
		40,353		**22,011**	**29,824**
				Excess Production (kWh):	**7,813**
Electric Rate:	*$0.0674*	*per kWh*		**Excess Savings ($):**	**$527**

Fire Station #3	Baseline Irradiance [Plain of Array] (kWh/m2)	Guaranteed Production [per Baseline Irradiance] (kWh)	Actual Irradiance [Plain of Array] (kWh/m2)	Adjusted Production [Actual v Baseline Irradiance] (kWh)	Actual Production (kWh)
February	72	841	67	784	
March	128	2,290	104	1,867	
April	154	3,468	127	**2,871**	**3,265**
May	161	3,599	177	**3,956**	**4,393**
June	177	3,866	189	**4,119**	**4,396**
July	197	4,240	189	**4,058**	**3,482**
August	170	3,633	167	**3,572**	**4,250**
September	140	3,045	101	**2,210**	**2,689**
October	97	2,143	72	**1,589**	**1,970**
November	64	1,220	54	**1,025**	**1,470**
December	61	649	29	**313**	**860**
January	65	570	34	**297**	**378**
		29,565		**24,010**	**27,154**
				Excess Production (kWh):	**3,144**
Electric Rate:	*$0.1212*	*per kWh*		**Excess Savings ($):**	**$381**

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 baseline 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	$ 130	$ 118	$ 13
February	$ 130	$ 118	$ 13
March	$ 152	$ 140	$ 13
April	$ 515	$ 426	$ 90
May	$ 1,340	$ 1,273	$ 68
June	$ 2,025	$ 1,681	$ 344
July	$ 1,895	$ 1,571	$ 325
August	$ 1,440	$ 1,337	$ 104
September	$ 985	$ 739	$ 247
October	$ 471	$ 459	$ 13
November	$ 141	$ 129	$ 13
December	$ 141	$ 129	$ 13
Total	**$ 9,365**	**$ 8,115**	**$ 1,251**

La Crosse Fire Station #1			
Typical Month	**Estimated Baseline Demand Charges**	**Estimated Future Demand Charges**	**Demand Savings Contribution**
January	$ 520	$ 520	$ -
February	$ 509	$ 502	$ 7
March	$ 432	$ 379	$ 53
April	$ 421	$ 390	$ 31
May	$ 465	$ 435	$ 30
June	$ 623	$ 575	$ 48
July	$ 623	$ 575	$ 48
August	$ 597	$ 510	$ 87
September	$ 610	$ 575	$ 35
October	$ 454	$ 435	$ 19
November	$ 487	$ 487	$ -
December	$ 575	$ 546	$ 29
Total	**$ 6,316**	**$ 5,929**	**$ 387**

Non-Measured Utility Rebate Benefits

Johnson Controls assisted the City in applying for rebates with Focus on Energy and Xcel Energy. Each rebate was submitted upon completion of the energy improvement with the required forms, inspections, and documentation. The following table lists the anticipated rebate amounts by energy improvement type. Upon completion of the project, the City was eligible to realize $101,386 in rebate reimbursement. These are one-time benefits and will not reoccur.

Utility Incentive Benefits		Year 1 Benefits
ECM-31: Retrofit Facility Lighting to LED	Focus on Energy	$ 9,514
	Xcel Energy	$ 4,756
ECM-32: Retrofit Street Lighting to LED	Focus on Energy	$ 45,394
	Xcel Energy	$ 22,697
ECM-33: Install New Solar PV	Focus on Energy	$ 19,025
Total Non-Measured Utility Incentive Benefits:		**$ 101,386**

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 1 Benefits**
Material Savings due to lighting retrofit		
ECM-31: Retrofit Facility Lighting to LED	Black River Beach Neighborhood Center	$ 315
	Myrick Park Center	$ 330
	Southside Neighborhood Center	$ 196
	Copeland Park Octoberfest Shelter	$ 762
	Copeland Park Enclosed Shelter	
	Copeland Park Tennis Courts	
	La Crosse Fire Station #1	$ 413
	North Neighborhood Library	$ 146
	South Neighborhood Library	$ 196
	Main Street Parking Ramp	$ 824
ECM-32: Retrofit Street Lighting to LED	Typical annual streeting lighting re-lamping costs avoided due to LED lighting replacement	$ 10,000
	Total Non-Measured Operational Benefits:	**$ 13,182**