

**MILWAUKEE COUNTY
INTER-OFFICE COMMUNICATION**

Date: August 16, 2024
To: Marcelia Nicholson, Chairwoman, Milwaukee County Board of Supervisors
From: Grant Helle, Interim Sustainability Director, Department of Administrative Services, Facilities Management Division
Subject: County-wide Comprehensive Solar Energy Strategy
File Type: Informational Report

REVISED REPORT (Submitted August 23, 2024)

REQUEST

This report provides a recommendation on the expansion of solar energy production to offset 100 percent of the electricity consumption at the new Marcia P. Coggs Health and Human Services Center, as well as presents a comprehensive solar energy strategy for Milwaukee County to drive progress towards carbon neutrality.

POLICY

File No. 21-389 commits Milwaukee County to become carbon neutral by 2050 and requests the Sustainability Director to develop and administer a strategic plan to achieve carbon neutrality in Milwaukee County facilities and operations by 2050.

File No. 23-1039 requested an assessment of the feasibility of installing solar photovoltaic system(s) at the new Marcia P. Coggs Health and Human Services Center parking lots for the generation of electricity.

File No. 24-337 provided an informational report regarding new Coggs parking lot solar photovoltaic system(s) feasibility study.

File No. 24-566 resolved support for the expansion of solar energy production at the new Marcia P. Coggs Health and Human Services Center parking lots to fully offset its electricity usage and requested the Department of Administrative Services-Facilities Management Division to develop a comprehensive solar energy strategy for Milwaukee County.

MARCIA P. COGGS SOLAR ENERGY ASSESSMENT

BACKGROUND

Design Considerations:

As previously reported, the following is the preliminary building rooftop and parking lot canopy solar energy systems design information developed by the new Coggs building design consultants.

1. The new building will have a gross floor square footage of 60,072 square feet and is designed to be energy efficient. According to the estimated design energy, the building will utilize 671.12 MWh (megawatt hours) of grid electricity.
2. Included in the design for the new facility are plans for rooftop solar PV. It is estimated that roughly 3,800 square feet of roof space can support PV panels. This could generate 12 percent of the building's electrical energy needs, reducing the generation requirements for the canopy system to 632 MWh.
3. Parking for the new facility includes three surface parking lots that, combined, have 161 parking spaces and approximately 71,000 square feet available for solar PV canopy installation.
4. The two lots located south of West Cherry Street¹ are being considered for canopy solar PV. These lots represent a large, widely open space that allows for adequate sun exposure. The lot located at 1515/1519 North 13th Street is not being considered for parking lot solar generation, due to its limited size and shading constraints.

Building Construction Progress:

As of early August 2024, the building exterior façade and interior walls are being installed. Site work adjacent to the building and in the associated parking lots will be started in fall of 2024 and completed in 2025. Substantial completion for the building is anticipated to be in February 2025, with final completion and occupancy in Q2 of 2025.

Decisions on the possible addition of solar energy systems are pending, but is also important to note that no current funding source for the parking lot solar exists as it was not within the original scope of the project as approved by the Board. This analysis is provided at the additional request of the Board along with assessment of other solar energy opportunities at the county. We look forward to working with the Board to identify the best opportunities for solar energy investments and securing required funding.

¹ In March 2024, DAS-FMD shared a Parking Site Plan with the County Board – see [File No. 24-337](#).

ANALYSIS

1. Estimated Costs of Solar PV Systems at Coggs

Preliminary cost projections ranged from \$2.2 to \$3.3 million, including design, equipment, and installation, for both rooftop and parking canopy installation. Bid documents for parking lot solar PV material and installation were released to the market in June 2024 with a re-bid launched in August. With bids now in hand the projected costs for the solar PV systems are \$170,252 for rooftop, and \$2,399,170 for parking lot canopy, for a total estimated project cost of \$2.57M, within the range of the preliminary projection.

2. Incentives

Focus on Energy (FoE) offers rebates of up to \$25,000 for commercial solar PV installations in Wisconsin. The combined FoE incentive for the Coggs solar installations is estimated at \$25,000.

With the federal Inflation Reduction Act (IRA) of 2022, tax-exempt and governmental entities including Milwaukee County are now eligible to receive tax credits for clean energy investments. These '[Direct Pay](#)' tax credits can offset the costs of solar PV installations. Incentives for the Coggs solar installations assume 25.5% Inflation Reduction Act 'Direct Pay' incentive plus applicable Focus on Energy incentives. The base Direct Pay incentive may increase up to 30% if sources of funds other than bonds are used for at least 30% of the project. Additionally, there may be a Low-Income 10% bonus credit available for this location, but it is conservatively not included in the financial calculations since that is a competitive grant.

Under the Office of Strategy, Budget & Performance (SBP), Milwaukee County's Project Management Office (PMO) has developed an internal process for supporting departments in identifying Direct Pay-eligible projects and applying for the tax credit incentives. It should be noted that the incentives via the IRA are available through end of 2032, and consultants have recommended that Milwaukee County employ a tax advisor to take full advantage of the available incentives. (See below additional information on the incentives via the IRA.)

3. Payback Period

Using an updated estimated costs of \$2.57 million, with applicable incentives and tax credits, the projected payback for the proposed rooftop and parking lot solar PV systems are 20 and 25 years, respectively. The below (*Tables 1. and 2.*) show payback calculations before and after incentives and tax credits. Incentives via the IRA have a significant impact on the project performance metrics like simple payback period and return on investment because they are paid in lump sum amounts in Year 1 of system production and because they offset more than a quarter of the project cost for each system.

Table 1. Coggs Rooftop Solar Payback

System Type	System Capacity (kW)	System Cost	Simple Payback Period (Years)	Return on Investment	Cumulative Net Cash Flow
Rooftop Solar (without ANY incentives – FoE or IRA)	39	\$170,252	25	28%	\$212,402
Rooftop Solar (With Incentives)	39	\$126,838	20	77%	\$258,542

Table 2. Coggs Carport Canopy Solar Payback

System Type	System Capacity (kW)	System Cost	Simple Payback Period (Years)	Return on Investment	Cumulative Net Cash Flow
Carport Canopy Solar (without ANY incentives – FoE or IRA)	579	\$2,399,170	34	-7%	\$2.2M
Carport Canopy Solar (With Incentives)	579	\$1,787,382	25	66%	\$2.8M

Analysis calculations courtesy of McKinstry.
 Incentives scenarios assume 25.5% IRA incentive plus applicable Focus on Energy incentives.
 Annual Electricity Production based on a cost of \$0.14052 per kWh.
 Assumes 30-year life with 0.5% production degradation each year and 3% utility rate cost escalation each year.
 Calculations include first three years of O&M costs and inverter replacements at year 10-15.
 The industry standard for most solar panels' lifespans is 30+ years with performance warranties through years 25-30.

SUMMARY

1. Installation of solar photovoltaic electrical power generation and connection to the new Coggs facility is technically feasible and achievable.
2. Sufficient parking lot area exists to install a solar PV canopy system capable of meeting nearly 100% of the facility's electrical energy requirements.

3. The initial project economics are not overly attractive. While both systems have a net positive cash flow, the simple payback (with incentives) on the rooftop installation would be about 20 years and the carport canopy would be 25 years.
4. Financial incentives reduce both the cost and payback period and significantly improve the ROI.
5. As requested in File 24-566, we have worked to identify potential sources of funds for this installation. There are not sufficient funds within the New Coggs building capital project WY045606 to complete both the rooftop and parking lot solar PV installations. Sufficient funds exist in the project for the rooftop portion only. We are working with the Strategy, Budget and Performance department to identify alternative fund sources for the parking lot canopy system, but do not have a recommendation at this time.
6. As further requested in File 24-566, DAS-FMD has continued to evaluate system options that will deliver the best value for the County, as well as working with all county departments to evaluate additional opportunities for solar installations that may provide the best value to the county. See below report on the County-wide Solar Assessment.
7. Installation of this renewable energy system aligns with and supports the County's policy and goal to achieve net zero emissions by 2050.

COUNTY-WIDE SOLAR ASSESSMENT

BACKGROUND

Per File 24-566, the Department of Administrative Services (DAS), is requested to work in conjunction with other departments and stakeholders, to develop a comprehensive solar energy strategy for Milwaukee County to help position Milwaukee County as a leader in sustainable energy, driving significant progress toward a carbon-neutral future. This strategy shall:

1. Identify locations and methodologies for potential solar energy projects, either as part of new construction, a major renovation, or facility energy retrofit.
2. Develop a detailed and consistent return on investment (ROI) analysis/framework that can be applied to any potential solar project.
3. Compare solar opportunities based on environmental impact, cost-effectiveness, and available incentives which align with Milwaukee County's goal of achieving carbon neutrality by 2050.

For context, in 2023 Milwaukee County consumed 104,165,055 kWh of grid electricity. The resulting cost associated with this was \$11,941,565. We Energies' electric rates have increased twice in the past two years, i.e., 11.68% in 2023 and 1.93% again in 2024, and they have proposed another 5.53% increase for 2025. On-site renewable energy generation could provide a hedge against future electric rate increases, helping Milwaukee County to drive down electricity costs. With utility costs making up nearly 20% of operating budgets at some county facilities, holding the line on utilities inflation will be increasingly important every year.

RESULTS

1. Introduction

Over the past several months, the Office of Sustainability has engaged county departments and consultants in taking a broad look at county facilities and properties, to assess the potential for solar energy installations and draw comparisons for decision makers on the relative value at each location. This analysis is considered preliminary but has the benefit of an equalized assessment to compare each potential project to other opportunities across the county.

This review started with all county facilities and available properties, and has narrowed the potential for solar installations down to a core list of 17 locations (26 potential projects). The goals of this effort included:

- a) Assess carbon emissions reductions using solar energy, in line with the county climate action policy to achieve net zero emissions by 2050.
- b) Ensure fiscal due diligence by evaluating all potential sites using a consistent financial evaluation methodology.
- c) Obtain a prioritized list of potential solar projects for short and long-term planning.
- d) Consider the types of solar projects feasible at each site (e.g. rooftop, carport, ground-mounted).
- e) Begin partnering with We Energies to understand the regulatory framework for solar energy, explore flagship projects, and consider alternatives to maximize fiscal and carbon reduction benefits.
- f) Understand how to maximize available incentives from local (Focus on Energy) and federal (Inflation Reduction Act) sources.
- g) Gain a high-level understanding of potential investments year-over-year, while at the same time evaluating current proposals (e.g. New Coggs and Fleet Garage) on a comparative basis.

The big questions we are attempting to answer include:

1. What county properties offer the best sites for onsite solar development?
2. How do we balance sustainability, equity and economic priorities of the county?
3. What is a realistic phased implementation to achieve project goals?
4. To what extent will feasible onsite solar photovoltaic installations achieve emissions reductions in line with our goal of net zero by 2050, and be part of the county Climate Action Plan?

2. Screening Process and Criteria

The screening process started with the entire list of county properties (over 900 facilities and 13M sq ft) and available land sites, and with the assistance of county departments was reduced by the Office of Sustainability to a list of 38 locations for additional analysis. (See *Table 3.*)

Table 3. Office of Sustainability Initial Solar Screening List

Community Reintegration Center	8885 S 68 th St
Facility Management Shop and Office	10930 W Lapham St
Fleet Garage and MCDOT Headquarters	10320 W Watertown Plank Rd
Hillside Complex – Maintenance and Admin Bldgs.	1942 N 17 th St
Kosciuszko Community Center	2201 S 7 th St
Milwaukee County Zoo	10001 W Blue Mound Rd
Milwaukee Mitchell Intl. Airport	5300 S Howell Ave
Mitchell Park (incl. Domes and Greenhouse)	524 S Layton Blvd
New Cogg, DHHS Building	1230 W. Cherry St
Noyes Park	8235 W Good Hope Rd
Sports Complex	6000 W Ryan Rd
Vel R. Phillips Youth and Family Justice Center	10201 W Watertown Plank Rd
Wilson Park	4001 S 20 th St
Wilson Park Senior Center	2601 W Howard Ave
Washington Park Service Yard	1859 N 40 th St
North Shop	6270 N. Hopkins St
Sheriff Department Training Academy	9225 S 68 th St
King Community Center	1531 W Vliet St
Kinnickinnic Transit Complex	1710 S Kinnickinnic Ave
Fond Du Lac Transit Complex	3203 W Fond Du Lac Ave
Boerner Botanical Gardens	5879 S 92 nd St
Brown Deer Park	7835 N Green Bay Rd
Clinton Rose Senior Center	3045 N Martin Luther King Dr
Courthouse Complex	901 N 9 th St
Grant Park	215 S Lake Dr
Greenfield Outdoor Pool	2100 S 124 St
Lincoln Park	1000 W Hampton Ave
Marcus Center for Performing Arts	929 N Water St
Mary Ryan Boys & Girls Club	3000 N Sherman Blvd
McKinley Marina	1750 N Lincoln Memorial Dr
Milwaukee Public Museum	800 W Wells St
Milwaukee County Parks Admin Building	9480 W Watertown Rd
Parks Maintenance	1150 N 68 th St
Pulaski Park	2677 S 16 th St
Red Arrow Park	1000 N Water St
South Shore Park	2900 S Shore Dr
Timmerman Field	9305 W Appleton Ave
Washington Park Senior Center	4420 W Vliet St

This list is shown in no particular order, and includes existing facilities and sites, as well as new construction projects.

In the next phase of work, the consultants then screened all these sites to categorize them according to feasibility, using criteria that included:

- Usage and electrical demands
- Age and condition of roofs/planned replacements

- Carbon offset potential
- Type of installation (roof, ground, carport)
- Complexity of installation
- Opportunity for incentives

In the final phase, site visits were conducted at sites deemed most feasible, and technical and financial models were constructed for each feasible site.

The financial model determined the Cumulative Net Cashflow, considered the ‘total lifetime financial benefit’, for each feasible project over the 30-year useful life of the equipment. This model was applied consistently across all solar opportunities, and the results were normalized to the size of each project to determine a lifetime average \$/kWh (AKA – Value of Solar) generated. The return on investment value (ROI) was also determined for each project.

It is important to note that each kWh of generated renewable energy production is not monetized equally. Under current utility rate tariffs, offsetting the cost of purchased electricity is almost always more valuable than what can be sold back to the grid. Seasonal and time-of-day variations in rates, variation in solar energy production, and variations in building electricity demand all add to the complexity of determining the optimal system size. The optimal size may not be the total roof area – increasing the size of the system significantly above what the building can use results in what may appear to be greater revenue from sold surplus power, but with diminishing returns on investment.

The financial models developed for this study started with 15-minute interval data to profile the building energy use. All factors noted above were then included in a solar production and financial return model to determine the preliminary optimal system size for each feasible site.

In addition, each site was assessed based on the environmental benefits of the project, namely carbon emissions reduction. This measure determines the carbon dioxide emissions offset per dollar invested. This normalizes the benefit to the project size by investment cost and allows us to compare feasible projects based on environmental benefit.

Finally, the financial and environmental scores are blended to develop a prioritized list of sites based on the combination of these benefits.

3. Utility Tariffs Analysis

Utility tariffs are the regulations and rates that apply to the county’s facilities currently and any potential solar PV installation. Understanding the intricacies of these tariffs is critical to the assessment of solar PV feasibility.

The County's current electric accounts fall mostly between the following two rate structures for electricity consumed on site:

CP-1 – GENERAL PRIMARY SERVICE – TIME OF USE

CG-3 – GENERAL SECONDARY SERVICE – DEMAND/TIME OF USE

Both rate structures are based on the energy time of use, utilizing on-peak and off-peak time periods, where energy consumed during on-peak time periods is more costly compared to off-peak periods. Solar energy production aligns well with the on-peak time periods when we have our highest energy consumption for most facilities. This enables the solar PV system to offset the more expensive energy that is being consumed as well as reduce the peaks in demand in each of the County's buildings to save money on utility bills.

When solar PV systems are installed, We Energies has two primary different tariffs for the county applications depending on the size and intended purpose of the solar array:

CUSTOMER GENERATING SYSTEMS – CUSTOMER USE (CGS – CU)

CUSTOMER GENERATING SYSTEMS – NON-PURCHASE (CGS – NP)

CGS – CU applies to systems less than 1MWac that are intended to both use and export solar energy to the grid, sometimes referred to as 'net metering'. This tariff provides two separate credits, an avoided energy credit and an avoided capacity credit, that will appear on customer utility bills for any energy that is exported to the utility.

The avoided energy credit is intended to provide payment back to Milwaukee County for any energy sent to We Energies, on a \$/kWh basis. It is important to note that this credit (which varies on and off-peak, and seasonally) pays customers only about 50-66% of their normal cost of electricity. It's equally important to note that exporting solar energy to the grid, while good for the utility and the State, does nothing to reduce county operational emissions and does not move us toward net zero.

The avoided capacity credit is intended to give credit back to Milwaukee County for grid capacity that the utility would otherwise need to provide and is based on the quantity of energy sent to We Energies. Depending on the size and setup of the solar installation, the avoided capacity credit can be quite significant.

For systems set up to both use and export solar energy, the combination of credits for exported energy could be considered a revenue source for the department hosting the installation. The value of the credits reflected on the utility bill may in some installations meet or exceed the remainder costs of electricity when the solar array is not productive (i.e. night time). Our financial analysis and comparison takes these credits into account, but does not provide comparative 'value' of this revenue to any particular department.

The CGS-NP tariff structure is set up for large installations where all solar energy produced is used on site. Avoided energy credit would be at a rate equal to the current facility rate structure. There is no avoided capacity credit in this rate structure.

Except for the proposed systems at the airport and the Community Reintegration Center carport, all feasible location options are modeled under the CGS-CU tariff structure.

4. Information on Available Incentives Under the IRA and FoE

Considering once-in-a-generation funding for renewable energy made possible by the Federal Inflation Reduction Act (IRA), investment in renewable energy systems has never been more fiscally advantageous for local government entities. The IRA made available tax benefits once reserved only for tax-paying entities, now extended to public entities in the form of the Elective Tax Credit, also known as the 'Direct Pay' Program.

Direct Pay is a dollar-for-dollar direct investment tax credit (ITC) payment to tax-exempt entities for projects that meet criteria established within the IRA and guidelines that are being set up by the IRS. The following important points must be noted about the Direct Pay program:

- a) Solar PV projects are eligible to receive a 30% Direct Pay base credit payment at the end of the project. Claiming the Direct Pay tax credit can happen once the project has been placed in service (in a state of readiness to perform its designed function).
- b) At this time the incentives for solar PV systems in the IRA will be in place through 2032. This means that new installations must be designed, built and operational by the end of 2032 to take advantage of the credit.
- c) Projects over 1MWac (airport only) would be required to meet certain labor requirements (prevailing wages and apprentice programs) to receive the 30% Direct Pay payment at the end of the project.
- d) There are several 'bonus credits' available under the Direct Pay program:
 - Energy Community Bonus of 10% for sites located in eligible areas
 - Low Income Bonus of 10% for sites located in eligible areas
 - Domestic Content Bonus of 10% for projects using domestic content products.
- e) The Low-Income bonus is a limited, competitive allocation. This bonus must be applied for prior to project completion. As a tax-exempt entity, Milwaukee County may receive priority for this bonus, but unlike the other bonus credits, it is not guaranteed. (The Low-Income bonus eligible areas in Milwaukee County have been identified by the consultants, but due to their non-guaranteed nature are not used in the financial calculations.)
- f) If tax-exempt financing (such as G.O. bonds) are used to fund projects, the aggregate Direct Pay payment is reduced by 15%, but only to the extent that bond funds exceed the cost of the project less incentives. (For the purposes of

this study, consultants have assumed all projects use 100% bond financing and reduced incentives within their financial models.)

- g) Eligible technologies under the Direct Pay program include the solar PV and battery energy storage systems which are the object of this study, but also include thermal energy storage, geothermal, waste energy recovery, biogas, combined heat and power, and fuel cells.
- h) The Direct Pay program is administered by the Internal Revenue System (IRS) who released final regulations at the end of April 2024, and update guidelines weekly. A licensed tax advisor is recommended to fully assess the incentives calculation and follow all the steps set by the IRS for claiming the Direct Pay election on the county annual tax return.

The Wisconsin Focus on Energy (FoE) program provides additional incentives/rebates for eligible projects. These are dependent on the size of the installed solar PV system, up to a maximum of \$25,000 per project.

Direct Pay, Energy Communities Bonus and Focus on Energy incentives were evaluated and included in the financial modeling of all feasible projects.

5. Summary of Findings

- a) Overall, of the list of 38 projects/sites that were evaluated, 26 potential projects at 17 sites are determined feasible and have positive cumulative net cash flow over the life of the project. (Note that Fleet Garage rooftop is shown with 4 different sizing options.)
- b) The environmental benefits of the projects ranged from 5 to 11 MTCO_{2e}/\$, with a median value of 7 MTCO_{2e}/\$. (See Figure 1.)
- c) The financial benefits of the projects ranged from \$0.02 to \$0.11 \$/kWh, with a median value of \$0.09 \$/kWh. See Figure 2. Additionally, the return on investment (ROI) for the projects averaged 70%. In fact, the feasible list of solar PV projects combined could have a positive cumulative net financial benefit for the county of \$25M.
- d) Combined environmental and financial scores ranged from 0.16 to 1.17, with a median value of 0.61.

These sites and their comparative outcomes are shown in (*Figures 1, 2 and 3*) below:

Results clearly show that not all solar PV projects are equal. The spread in environmental benefits and ROI are considerable. Projects that are most attractive financially don't always produce the best environmental outcome, and vice versa. Ultimately a balanced decision process will be needed to identify the best investments for the county. These data should help inform decision-makers about where to prioritize county investments in solar infrastructure.

Figure 1. Feasible Solar Sites – Top Environmental Performers

Figure 2. Feasible Solar Sites- Top Financial Performers

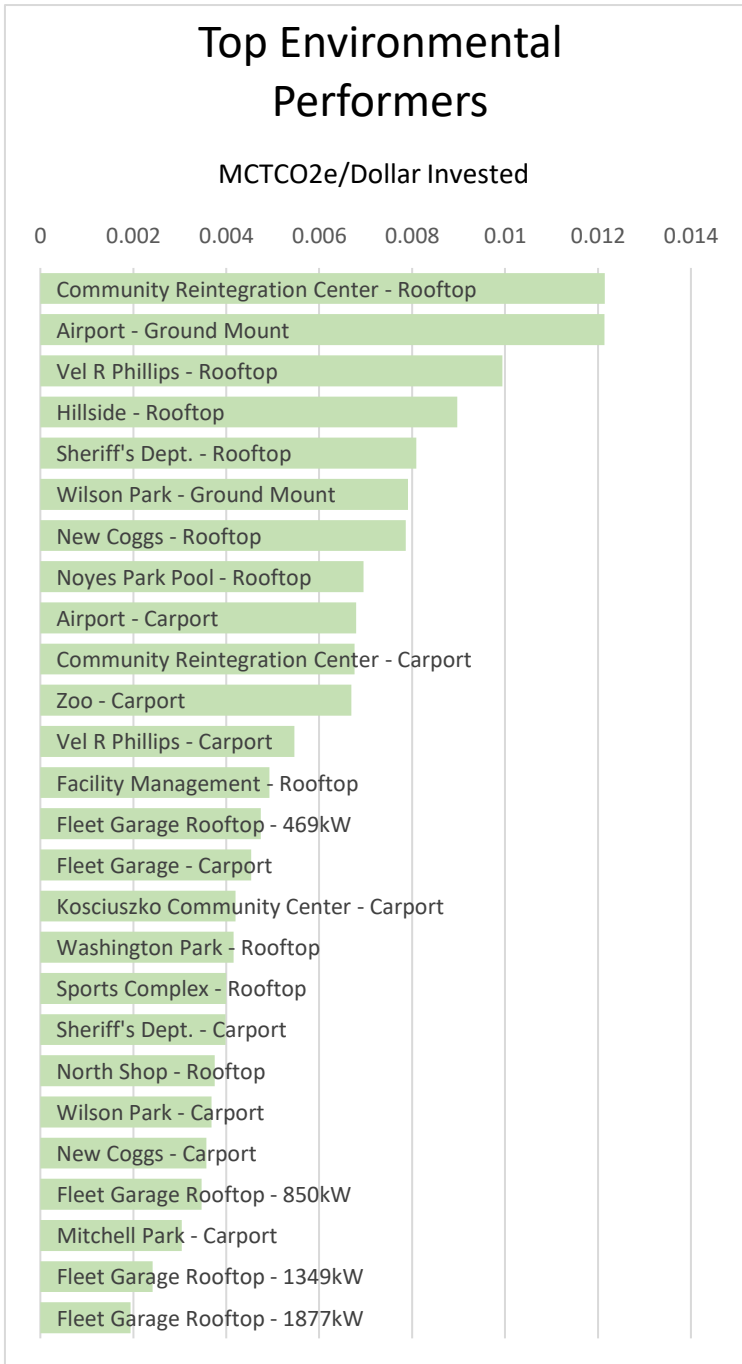
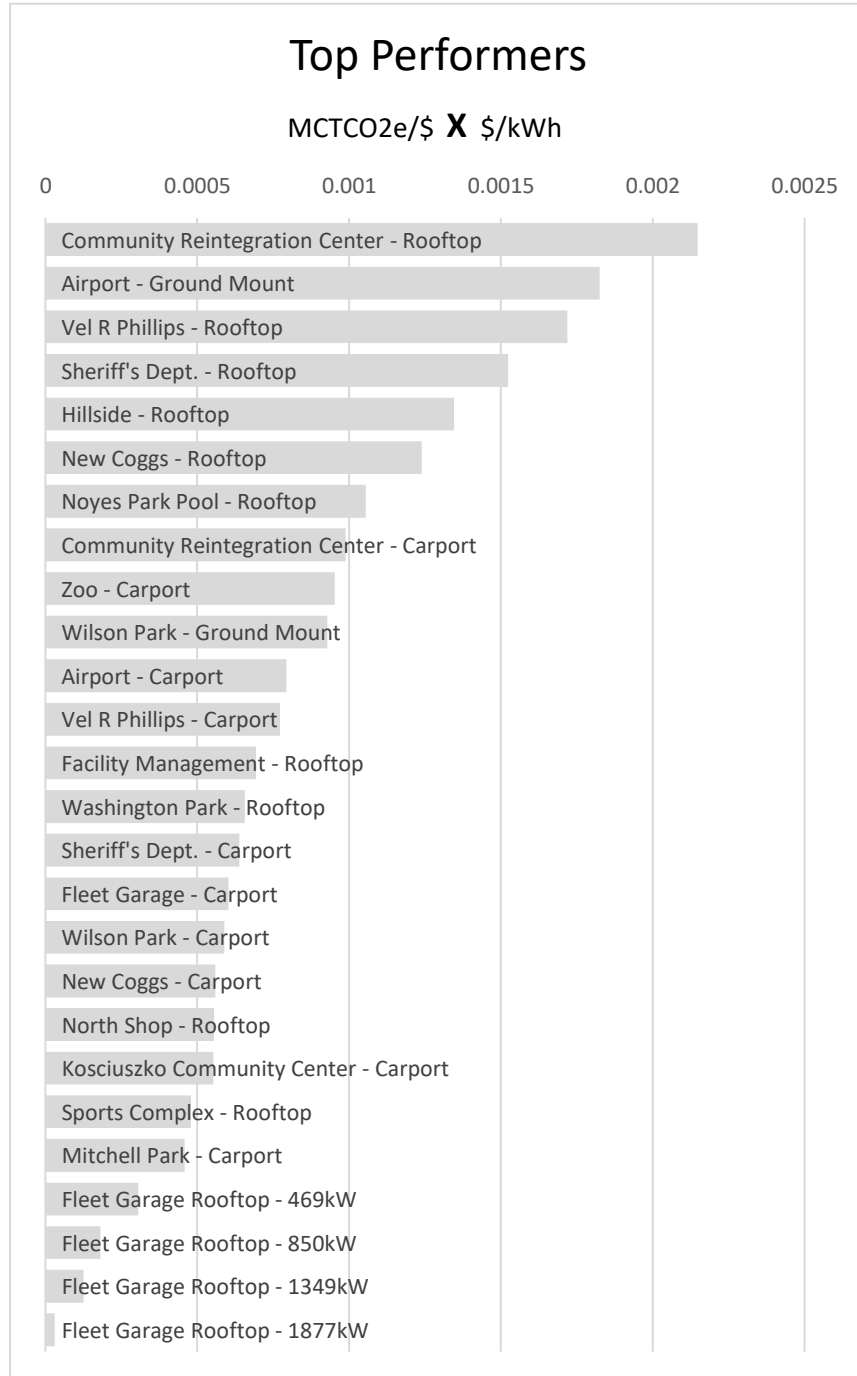


Figure 3. Feasible Solar Sites – Top Overall Performers



*This blended ranking is determined through a calculation of the product of metric tons of carbon reduced per dollar invested (MTCO2e/\$) and the value of solar (\$/kWh). This is represented as (MTCO2e/\$ * \$/kWh).

County-wide Comprehensive Solar Energy Strategy
August 16, 2024
Page 15 of 23

Table 4. Key System Performance Metrics

Site	Type	Proposed System Size (DC)	Estimated Project Cost	Estimated IRA Impact ²	Estimated FoE Incentive	Cumulative Net Cashflow (30-Years)	Return on Investment (ROI)	% County Carbon Offset ³
Milwaukee Mitchel International Airport	Carport	2046.7	\$9,005,524	\$2,296,409	\$25,000	\$8,297,202	24%	1.39%
Milwaukee Mitchel International Airport	Ground Mount	1019.5	\$2,952,701	\$752,939	\$25,000	\$5,605,764	158%	0.81%
Sports Complex	Rooftop	272.6	\$1,022,175	\$260,655	\$13,629	\$1,122,950	50%	0.09%
Kosciuszko Community Center	Carport	254.3	\$1,335,023	\$340,431	\$12,715	\$1,125,369	15%	0.13%
Wilson Park Senior Center	Carport	240.7	\$1,263,780	\$322,264	\$12,036	\$1,356,433	46%	0.10%
Milwaukee County Zoo - Zoofari Building	Carport	171.1	\$650,180	\$221,061	\$8,555	\$843,572	101%	0.09%
Facility Management Shop and Office	Rooftop	129.2	\$503,919	\$128,499	\$6,461	\$632,945	72%	0.06%
Noyes Park	Rooftop	96.8	\$396,716	\$101,163	\$4,838	\$497,385	71%	0.06%
North Shop	Rooftop	49.6	\$203,196	\$51,815	\$2,478	\$248,018	67%	0.02%
Washington Park Service Yard	Rooftop	33.6	\$142,928	\$36,447	\$1,682	\$183,612	75%	0.01%
Community Reintegration Center	Carport	1474.4	\$6,634,845	\$1,691,885	\$25,000	\$7,147,274	45%	1.02%
Community Reintegration Center	Rooftop	479.7	\$1,319,093	\$336,369	\$23,984	\$2,913,147	204%	0.36%
Hillside Complex	Rooftop	1071.4	\$2,732,172	\$696,704	\$25,000	\$5,536,958	175%	0.55%
Vel R Phillips Juvenile Justice Center	Carport	778.8	\$3,543,540	\$1,204,804	\$25,000	\$3,650,744	58%	0.39%
Vel R Phillips Juvenile Justice Center	Rooftop	275.5	\$1,033,238	\$351,301	\$13,777	\$1,640,698	146%	0.20%
Wilson Park	Ground Mount	771.7	\$2,430,918	\$619,884	\$25,000	\$3,655,225	105%	0.43%
Fleet Garage & MCDOT Headquarters	Carport	636	\$2,893,891	\$983,923	\$25,000	\$2,910,699	54%	0.26%
New Cogg & DHHS Building	Carport	579.4	\$2,723,086	\$694,387	\$25,000	\$3,171,381	58%	0.22%
New Cogg & DHHS Building	Rooftop	38.9	\$165,495	\$42,201	\$1,947	\$212,371	75%	0.03%
Sheriff's Department Training Academy	Carport	314.5	\$1,635,244	\$416,987	\$15,724	\$1,668,674	39%	0.15%
Sheriff's Department Training Academy	Rooftop	98.5	\$403,973	\$103,013	\$4,927	\$651,780	120%	0.07%
Mitchell Park	Carport	363.4	\$1,908,060	\$486,555	\$18,172	\$1,892,733	35%	0.13%
Fleet Garage & MCDOT Headquarters	Rooftop	469	\$2,260,800	\$768,672	\$23,455	\$2,108,292	44%	0.24%
Fleet Garage & MCDOT Headquarters	Rooftop	850	\$3,823,200	\$1,299,888	\$25,000	\$3,153,250	26%	0.28%
Fleet Garage & MCDOT Headquarters	Rooftop	1,349	\$5,664,708	\$1,926,001	\$25,000	\$5,204,219	40%	0.30%
Fleet Garage & MCDOT Headquarters	Rooftop	1,877	\$7,507,160	\$2,552,434	\$25,000	\$2,003,740	-59%	0.32%

² Calculation assumes bond financing and excludes IRA competitive bonuses.

³ % county carbon offset in year 1 of proposed system's operation. Calculation is offset of 2022 CO2 data.

e) New Marcia P. Coggs DHHS Facility

The Coggs rooftop and carport solar PV installations were included in the financial modeling, to offer a comparative view along with the other county feasible projects. As can be seen in the above figures, the financial value of these solar projects (separately modeled) are both positive over their useful life and within the top 10 financial performers. Considering both environmental and financial performance, the rooftop system outperforms the carport, as illustrated in Figure 3.

If it is determined to proceed with either of these projects, as with any solar energy project, review of the proposed design is recommended to assure that sufficient infrastructure is included to facilitate the most beneficial tariff and that risk factors are mitigated. As stated earlier, sources of funds for the carport solar would also need to be identified.

f) Fleet Headquarters

Based on an earlier consultant evaluation and report on the feasibility and cost of installing solar PV on the rooftop of the Fleet main garage facility (10320 W Watertown Plank Rd), MCDOT has requested funds to proceed with the project in their 2025 capital request. **This project is one of the few feasible sites where reinforcement of the roof structure is known to be required to support a solar array based on analysis conducted to-date.** The preliminary estimated added cost of \$500,000 for this reinforcement has been included in the financial model. An additional \$150,000 of known electrical system upgrades would also be needed and is included in the financial model as well (\$650,000 total). The outcome of comparative financial modeling shows this project to be sensitive to these building upgrades, as well as the size of the system installed. While covering the entire rooftop with a solar array is feasible, the size of that system would push it into a tariff structure whereby no value is received for exporting surplus energy. The most financially attractive system size is actually that which matches building electricity use. Growing the system beyond that has diminishing economic returns.

The Fleet Garage is a particularly interesting application in that the solar energy system will interact with likely future fleet electrification and EV charging systems. The value of solar at this location will likely increase as the transportation infrastructure is electrified. If this location is selected for solar PV in the near-term, it could be designed for current building loads, but would have to thoughtfully include future expansion opportunities in the design.

g) Of the list of 38 potential sites, 21 locations were considered 'secondary' or 'unfeasible'. Reasons for this included:

- i. Complex system design and installation (such as expensive roof structural reinforcement, dated/insufficient electrical infrastructure) makes the project financially unattractive.

- ii. Real estate on the roof or ground is unavailable or complicated by obstructions.
- iii. Maximum size of installation below the threshold for positive financial return, as well as low carbon emissions reduction potential.
- iv. Rooftop installation timing complicated by the current age of the roof. (This can be revisited at future dates.)

6. Battery Energy Storage

Battery energy storage systems (BESS) are a technology designed to allow users to store energy for use at times of the day that create economic benefit (utility bill savings) and/or to provide for resiliency for critical infrastructure assets when utility power is disrupted. When solar PV and BESS are integrated with the existing utility service, they can create a microgrid, a localized and self-contained energy system that can operate independently from the utility.

While this current assessment of solar feasibility does not include BESS in the model, BESS can add compelling and significant impacts to solar energy projects. At certain sites, BESS installations may improve overall project financials while at the same time add resiliency infrastructure. These sites have been flagged for further evaluation.

7. Risks Associated with Solar Energy Projects

Large scale solar photovoltaic systems may appear simple on the surface but are actually complicated projects with a long list of technical and financial risks. The consultant's high-level investigation of our sites worked to identify some of the most obvious risks and high-cost factors including insufficient roof load capacity and highly complex installations. Each project under consideration must run a gauntlet of additional screening against a wide range of risks:

a) Technical Risks

- Sub-surface geotechnical conditions for ground-mount and carport installations
- Age and condition of roof for rooftop installations
- Expensive roof reinforcement
- Building electrical equipment capacity and condition
- Utility-side electrical service capacity and condition

b) Regulatory/Legal Risks

- Zoning
- Easements
- Municipal design review
- Utility interconnection agreements
- Community acceptance

c) Financial Risks

- Cost of capital
- Over-estimated cost savings
- Materials and labor cost escalation
- Utility interconnection costs
- Incentive program potential sunset
- Investment Tax Credit claim rejection post-project installation

Risk factors must be sufficiently understood prior to commitment to any particular solar energy project.

8. Alternative Programs from We Energies

As part of the Scope of Work, consultants held several discussions with We Energies to understand how various utility regulation, rate and renewable energy programs could affect the risks and decision-making process of the County related to this study. One alternative program that was discussed was the Renewable Pathway program. Renewable Pathway is a program that offers the County access to purchase renewable energy generated from solar farms (Badger Hollow and others) operated by We Energies. Under this program, the County would be able to commit to purchase units of energy over a 1 or 5-year term and assigns the renewable energy credits (RECs) to the County. The first such application of this program was announced by We Energies and Molson-Coors earlier this year⁴.

Renewable Pathway is under consideration by the City of Milwaukee and other county municipalities. It is used as a basis for regional climate action planning by the Southeast Wisconsin Regional Planning Commission (SEWRPC), and the recent cooperative CPRG grant application led by the City of Milwaukee and joined by Milwaukee County. While this grant has been denied by the EPA due to the program being oversubscribed, Renewable Pathway may still be a viable and valuable consideration for Milwaukee County in its climate action plan and an opportunity to collaborate with local municipalities facing similar challenges. There are many factors to consider within these programs - further investigation is recommended.

9. Conclusions of County-Wide Solar Study

This study and its findings have driven out answers to some of our pressing questions on the applicability of solar energy installations at Milwaukee County:

1. What county properties offer the best sites for onsite solar development?

⁴ Renewable Pathways by We Energies and Molson Coors- see [ARTICLE](#).

The 17 locations determined to be most feasible for solar PV installations (sorted by the department paying its electric bills) include:

Department	Location
CRC	<ul style="list-style-type: none"> • Community Integration Center
MCDOT – Fleet & Highway	<ul style="list-style-type: none"> • new North Shop • Fleet Main Garage
MCDOT – Transit	<ul style="list-style-type: none"> • Hillside Complex
MCDOT – Airports	<ul style="list-style-type: none"> • Mitchell International Airport
Parks	<ul style="list-style-type: none"> • Wilson Park • new Washington Park Service Facility • Noyes Park • Sports Complex • Mitchell Park • Kosciuszko Community Center
DAS	<ul style="list-style-type: none"> • Vel R Phillips Youth and Family Justice Center • new Marcia P. Coggins DHHS facility • Facilities West/Lapham • Wilson Park Senior Center
Sheriff	<ul style="list-style-type: none"> • Sheriff Training Academy
Zoo	<ul style="list-style-type: none"> • Zoofari Center

Please note that this list has not yet been fully vetted with county departments, which will no doubt have opinions on how these locations align with their strategic priorities.

2. How do we balance sustainability, equity and economic priorities of the county?

Solar PV investments pay out over time, but they do require investment. Financial metrics for identified projects are positive and comparative. Likewise, the environmental benefits in emissions reduction have been quantified and compared.

Solar PV projects can also address equity issues. We can target locations where the Low-Income bonus incentives apply. More importantly, we can and should provide community economic benefits through workforce development programs (training, apprenticeships, and green jobs) for each project to be implemented. These equity issues can be factored into the locations which are prioritized, to balance environmental, financial and equity goals of the county. In fact, certain aspects of the ‘Direct Pay’ program through the IRA provide both inducement (via financial incentives) and eligibility requirements that spur adoption of local, apprenticeship labor and livable wages.

3. What is a realistic phased implementation to achieve project goals?

A phased approach to implementation is recommended below. In the near-term, decision-makers need to balance the desire to harvest excellent current incentives against the long list of county capital requirements.

For the long-term, it is important to note that the future of solar technology will make projects even more financially attractive. Over the past decade, the cost of solar has fallen dramatically. New technologies promise to increase efficiency and lower costs further. Solar energy will soon be unbeatable compared to fossil fuels, and the financial picture for Milwaukee County will need to be updated regularly as part a phased climate action approach.

4. To what extent will feasible onsite solar photovoltaic installations achieve emissions reductions in line with our goal of net zero by 2050, and be part of the county Climate Action Plan?

If the county were to implement 100% of the recommended systems from this assessment (excluding fleet garage rooftop systems), year 1 carbon avoided portfolio-wide would be 7,682 MTCO_{2e} and lifetime would be 214,519 MTCO_{2e}. The county's baseline carbon emissions from 2022 (116,226 MTCO_{2e}) would be reduced by 8% in year one of the systems' production.

On-site renewable energy generation could provide a hedge against future electric rate increases, helping Milwaukee County to drive down electricity costs. But even if we implement all identified feasible solar PV projects, we still have a long way to go in getting to net zero. Renewable energy is a solid component of our climate action plan, but must be implemented in concert with energy efficiency and fossil fuel replacement programs to meet our overall objective.

RECOMMENDATIONS – OVERALL COUNTY SOLAR STRATEGY

1. Solar PV is an important CA50 planning strategy, but not a panacea. Full-scale implementation of all 22 identified feasible projects will offset only a portion of our operational emissions. The County will need to consider the full range of climate action programs and initiatives to achieve the 2050 goal of net zero.
2. While Federal incentives for solar PV projects are currently at an unprecedented level, the county has limited capital resources to drive these installations and needs to consider a phased approach to implementation, such as:
 - a. Authorize the new Coggs facility rooftop project to take advantage of the current IRA incentive program. Funds are available in the new building project and the project team stands ready to implement.

- b. Authorize one additional high-priority project within the near-term to take advantage of the current IRA incentive program. This pilot will help the organization develop the procedures and expertise to implement large-scale solar energy projects and harvest incentives.
 - c. Consider one or more additional projects prior to the expiration of the IRA incentives in 2032 as county resources may allow.
 - d. Plan additional implementation of solar energy for the out years, within the parameters to be defined in climate action planning, with full-scale implementation by 2050.
3. Leaders of county departments should be consulted on location priorities identified in this report, to align any location preferences with department strategic plans.
4. Continue to collaborate with the City of Milwaukee and other municipalities on the Renewable Pathway program, to determine its fit within the overall County climate action plan.
5. To further align solar PV projects with the county climate action plan, each project should include communications and workforce development objectives. The economic benefits of these investments should accrue not just to county operations, but to the community at large.
6. This assessment of the solar energy financial picture for Milwaukee County will need to be updated regularly as part a phased climate action approach.

ALIGNMENT TO STRATEGIC PLAN

The new Marcia P. Coggs Health and Human Services Center is located in a Milwaukee neighborhood that the federal government is targeting for climate and clean infrastructure investments. Solar energy generation reduces carbon emissions and operating costs, helping to ensure fiscal sustainability and aligning with Milwaukee County's strategy to 'Invest in Equity.' A comprehensive solar energy strategy and plan supports Milwaukee County's policy to reduce operational emissions at least 50% by 2030 and achieve net zero by 2050.

Furthermore, through intentional inclusion, we can improve economic equity and environmental justice by creating green training and apprentice programs that lead to family- supporting jobs for underserved communities.

FISCAL EFFECT

The report is informational only and there is no fiscal impact.

VIRTUAL MEETING INVITES

Stuart Carron, Director of Facilities Management – Department of Administrative Services – Facilities Management Division
Peter Nilles, Director of Facilities Planning and Development – Department of Administrative Services – Facilities Management Division
Grant Helle, Interim Director, Office of Sustainability – Department of Administrative Services – Facilities Management Division
Rachael Schaser, Grant & Project Analyst, Office of Strategy, Budget & Performance – Project Management Office
Sam Bluemer-Garibay, McKinstry, samanthab@mckinstry.com
Sean Currie, McKinstry, seancu@mckinstry.com
Kate Pearson, McKinstry, kathryns@mckinstry.com
Eric Rehm, McKinstry, ericre@mckinstry.com

PREPARED BY

Grant Helle, Interim Sustainability Director, Facilities Management Division, Department of Administrative Services

APPROVED BY

Stuart Carron

Stuart Carron, Director, Department of Administrative Services, Facilities Management Division

ATTACHMENTS

1. McKinstry County-wide Solar Assessment

cc: Kelly Bablitch, Chief of Staff, Milwaukee County Board of Supervisors
Janelle M. Jensen, Legislative Services Division Manager, Office of the County Clerk
Shakita LaGrant-McClain, Director, Department of Health and Human Services
David Muhammad, Deputy Director, Department of Health and Human Services
Aaron Hertzberg, Director, Department of Administrative Services
Steve Delgado, Director of Operations and Maintenance, Department of Administrative Services, Facilities Management Division
Peter Nilles, Director, Facilities Planning, DAS-FMD
Brian Dranzik, Director, Milwaukee Mitchell Intl. Airport
Donna Brown-Martin, Executive Director, Milwaukee County Department of Transportation
John Rodgers, Deputy Director, Milwaukee County Department of Transportation

County-wide Comprehensive Solar Energy Strategy

August 16, 2024

Page **23** of **23**

John Blonien, Director, Fleet, Milwaukee County Department of Transportation

Chantell Jewell, Superintendent, Community Reintegration Center

Amos Morris, Executive Director, Milwaukee County Zoo

Guy Smith, Executive Director, Milwaukee County Parks