

Milwaukee County Climate Action 2050 Plan

APRIL 2025



Message from Milwaukee County Leadership



On Earth Day 2021, Milwaukee County committed to achieving Carbon-Neutral Operations by 2050 through the adoption of File No. 21-389.

As of Earth Week 2025, we are very pleased to announce the formal adoption of the Climate Action 2050 (CA50) Plan, a strategic roadmap that will guide us toward this goal while advancing equity, justice, and resilience throughout our community.

We recognize that reducing carbon emissions is critical to lessening the impacts of climate change. Milwaukee County is already experiencing the local effects of climate change, including increased heat waves, urban flooding, and acute air quality hazards. In order to mitigate these effects and increase climate resilience, Milwaukee County must take action.

We are proud to say that since 2005, Milwaukee County has reduced greenhouse gas emissions by 46%. Through the CA50 Plan, we will be on track to reach 50% reduction by 2030, and carbon neutrality by 2050.

Through a collaborative planning effort with community and county stakeholders, the Milwaukee County Office of Sustainability has led CA50 Plan development. The adopted CA50 Plan outlines clear, measurable steps to reduce emissions and increase resilience—while advancing racial equity, public health, and fiscal sustainability.

Through this plan, Milwaukee County is leading the way; investing in a healthier, more equitable, and climateresilient future.

Respectfully,

David Crowley Milwaukee County Executive

Maralia Nichalson

Marcelia Nicholson Chairwoman, Milwaukee County Board of Supervisors

Stant Helle

Grant Helle Director, Office of Sustainability

BOARD OF SUPERVISORS

The Milwaukee County Board of Supervisors recognize the reduction of carbon emissions is critical to preventing the continued effects of climate change in our communities. This Climate Action 2050 Plan supports Milwaukee County's commitment to lead the way in planning for carbon neutrality.

Chairwoman Marcelia Nicholson, 10th District Steven Shea, 8th District (1st Vice-Chair) **Priscilla E. Coggs-Jones**, 13th District (2nd Vice-Chair) Anne O-Connor, 1st District Willie Johnson, Jr., 2nd District Sheldon A. Wasserman, 3rd District Jack Eckblad, 4th District Sequanna Taylor, 5th District Shawn Rolland, 6th District Felesia A. Martin, 7th District Patti Logsdon, 9th District Kathleen Vincent, 11th District Juan Miguel Martinez, 12th District Caroline Gómez-Tom, 14th District Sky Z. Capriolo, 15th District Justin Bielinski, 16th District Steve F. Taylor, 17th District

File No. 21-389

File No. 25-262

THIS CLIMATE ACTION PLAN WAS APPROVED BY THE BOARD OF SUPERVISORS ON APRIL 24, 2025.

Contents



1	Executive	Executive Summary				
2	Project B	Project Background				
3	Approach	n to Decarboni				
4	Project D	levelopment P				
5	County-V	Vide GHG Base				
6	County-V	Vide GHG Redu				
7	Departm	ent-Specific G				
	MCDOT MCTS DAS PARKS ZOO CRC DHHS OEM OOE SBP	DEPARTMENT C TRANSIT SYSTE DEPARTMENT C PARKS DEPART MILWAUKEE CO COMMUNITY RE DEPARTMENT C OFFICE OF EME OFFICE OF EQU				
8	Path Forv	ward				

A Appendix

ization

- rocess
- eline
- uction Plan
- HG Reduction Plans
- OF TRANSPORTATION
- ΕM
- OF ADMINISTRATIVE SERVICES
- MENT
- OUNTY ZOO
- EINTEGRATION CENTER
- OF HEALTH AND HUMAN SERVICES
- ERGENCY MANAGEMENT
- IITΥ
- ATEGY, BUDGET & PERFORMANCE



EXECUTIVE SUMMARY



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1 EXECUTIVE SUMMARY

The goal – a climate positive Milwaukee County

On March 31st, 2021, Milwaukee County (the County) adopted a sustainability resolution, committing to achieve a 50% reduction in carbon by 2030 and carbon neutrality by 2050 (File 21-389). This ambitious goal makes the County a leader in the State of Wisconsin and signals the desire to take action against climate change. However, it will also require significant effort and investment over the next 25 years to accomplish.

This Climate Action 2050 Plan outlines a pathway to achieving the County's carbon reduction goal, which consists of U.S. EPA Scope 1 & 2 emissions from owned County facilities and operations.



2030= 50% REDUCTION IN CARBON _____ 2050= CARBON NEUTRALITY

Both prior to the resolution and in the years following, the County has made significant strides towards achieving this goal, both in performing carbonreducing projects and creating organizational and community buy-in on the importance of eliminating greenhouse gas emissions.

Total emissions in 2023 were reduced by 46% compared to the 2005 baseline year, putting the County on track to achieve the 50% reduction in carbon by 2030 target.

Emissions reduction to-date can be attributed to a wide variety of factors, including right-sizing and decommissioning facilities, energy efficiency initiatives in buildings and transportation fleets, and reduced carbon intensity of the electric supply by the utility.

DEPARTMENTS.

This approach takes a lofty goal across a large organization and breaks it down into more manageable sub-plans. Individual CA50 Plans were developed for the following departments, making up the County-Wide CA50 Plan.



















*2005 serves as the baseline for Milwaukee County's Carbon Reduction Goal. Emissions values for years 2005 & 2016-2022 are provided from the County's ICLEI ClearPath inventories.

**Modeled using 2023 county emissions data, except vehicle fleet emissions, which reference 2022 data.

THE CA50 PLAN WAS DEVELOPED THROUGH **COLLABORATION WITH TEN COUNTY**

1 EXECUTIVE SUMMARY

Striking the Right Balance

Despite significant progress, there is still substantial work to be done to reach carbon neutrality. This Climate Action 2050 (CA50) Plan attempts to balance the desire to reach zero carbon emissions while acknowledging the difficulty in eliminating emissions in certain sectors. In order for the CA50 Plan to be successful, the County must balance the demands of fiscal responsibility, equity, resiliency, and operational needs with the level of ambition and investment needed to achieve carbon neutrality.

In addition to technical solutions, the County will need to re-evaluate some processes to better position the CA50 Plan for success, such as aligning decarbonization investments with capital planning, ensuring sufficient staffing and expertise to maintain new equipment, and commitment from departments and staff to uphold strategic decarbonization activities.

The approach laid out in the CA50 Plan follows industry best practices to maximize impact while minimizing cost.

Listed from highest priority to lowest, the CA50 Plan prioritizes avoiding new emissions sources, reducing emissions from existing assets through optimization and efficiency upgrades, substituting high-emission fuels and equipment with low- or zero-emission alternatives, and, finally, purchasing carbon offsets.

This approach focuses on first minimizing energy demand, followed by replacing fossil fuels with carbon-free energy (CFE) alternatives such as renewable fuels, on-site solar, purchased off-site CFE, and carbon offsets (as required).

The figures at the right show the emissions reduction potential of each strategy and the anticipated emissions from 2025 through 2050 by source.

Emissions Reduction by Project Type



Emissions Reduction Over Time



Carbon Reduction Strategies

The seven strategies at right are key to cutting carbon emissions from County operations, highlighting estimated carbon savings, utility cost reductions, implementation costs and payback.

It should be noted that some strategies are financially attractive with the ability to self-fund wholly or in-part using cost savings. However, in order to reach carbon neutrality, investments will be required that do not have a positive financial return on investment.

Being proactive in pursuing grant, state, and federal funding will improve project finances, but significant investment will still be required. However, considerations beyond financial should also be given when evaluating the best path forward, as noted in the co-benefits section of this CA50 Plan found on page 13.

This CA50 Plan provides project recommendations and a pathway to achieve carbon neutrality by 2050, but many different potential pathways exist. Progress towards the goal should be evaluated on an annual basis; updates and modifications to the CA50 Plan should be made based on current trajectory and future technological advancements.

S	Emissions Reduction Potential		Resiliency Impact	Savings	Cost	Payback (yrs)
RETRO-COMMISSIONING	MTC02e 4,400	% 4 %	ł	(\$/yr) \$787,000	\$3,580,000	4.5
ENERGY EFFICIENCY UPGRADES	19,500	17 %	t	\$3,463,400	\$54,140,000	15.6
BUILDING ELECTRIFICATION	10,100	9 %		-\$342,500	\$111,700,000	-
FLEET ELECTRIFICATION AND FUEL SWITCHING	24,100	21 %	=	\$7,293,510	\$220,200,000	30.2
ON-SITE SOLAR	6,600	6 %	ł	\$1,768,300	\$51,810,000	29.3
OFF-SITE CARBON-FREE ENERGY	44,200	39 %		\$0	\$0	-
CARBON OFFSETS	4,300	4 %		-\$86,000	\$0	-

E PROJECTO BACKGROUND



Source: Visit Milwaukee

Climate Action History

Milwaukee County has a long history of leadership in sustainability. Since 2006, the County has launched several initiatives to address climate change, including the following¹.





In 2021, the Milwaukee County Board committed the County to achieve 50% carbon reduction from County operations by 2030 and carbon neutrality by 2050 (File No. 21-389).

Since that time, the Office of Sustainability has formed a Sustainability Task Force (STF), engaged the local community, and worked with all County operating departments to develop the Milwaukee County Climate Action Strategic Plan.

This Strategic Plan was based on the Climate Action 2050 (CA50) Framework and Guiding Principles established by the STF in 2021 and is aligned with the Milwaukee County Vision and strategic focus areas.

Establishing a **Property Assessed Clean Energy** (PACE) program that enables commercial property owners in Milwaukee County to obtain affordable, long-term loans for energy efficiency, renewable energy and water conservation improvements at no cost to taxpayers.

NOV 2023

ͰĿΒ 2025

Reconstituted the City-County partnership as the City-County Advisory Board on Climate and Economic Equality to continue advisory of City and County progress toward climate goals (File No. 25-119).

County Strategic Focus Areas

The Milwaukee County Sustainability Task Force (STF) has identified 3 Strategic Focus Areas through its CA50 Framework: 1. Create Intentional Inclusion, 2. Bridge the Gap and 3. Invest in Equity¹. These focus areas serve as the foundation for resulting CA50 Plan project recommendations. Each focus area is accompanied by specific guiding principles that align future actions with the CA50 Plan's intent. These principles are designed to foster consistency, direction, and accountability in project planning and execution.

Adhering to these principles ensures all initiatives contribute meaningfully to the County's sustainability vision and supports long-term environmental, social, and economic success.





¹ Climate Action 2050 Plan Updates, Sept 16, 2024

Community Engagement Strategy

The CA50 Plan aims to achieve net zero carbon emissions from County operations while advancing equity, justice, and community resilience. As a result, the County's Sustainability Task Force (STF) developed the Community Engagement Strategy (CES) in 2021, outlining how the County would conduct comprehensive and meaningful outreach throughout the development and implementation of its climate planning efforts.

FRAMEWORK AND METHODOLOGY

The CES is guided by the "Community Engagement to Ownership" framework, which progresses from early informative efforts to empowered decision-making. This framework ensures mutual learning between community members and the County and its project developers.



COMMITMENT TO EOUITY

The County prioritizes racial, ethnic, cultural, and economic respect and aims to empower disenfranchised communities, such as engaging non-English-speaking communities, communities with disabilities, BIPOC communities, communities experiencing poverty, and LGBTQ+ communities.

THREE-POINT STRATEGY

The CES encompasses three focus areas:

Digital Engagement Informing residents about the CA50 Plan and gathering input through established digital communication channels.

Surveys and Community Feedback Collecting qualitative data representative of residents' lived experiences and public comments on draft deliverables.

In-Person Engagement

Increasing visibility of the CA50 Plan, building trust with residents, and reaching additional communities through project-specific events and informal interviews.



Highlights

VULNERABILITY ASSESSMENT SURVEY

This survey included an impressive **755 participants** with good age distribution and nearequal gender representation. It asked residents about their experiences with, perceptions of, and concerns about climate change and extreme weather events, including how to best prepare vulnerable communities for the impacts of climate change.

Residents shared their personal experiences with extreme weather events, highlighting the increasing frequency and severity of such events. Many expressed concerns about the long-term impacts of climate change on their communities, including health risks, property damage, and economic challenges.

Residents provided valuable advice on how to better prepare vulnerable communities for climate change impacts.

Key recommendations included:

Increasing public awareness and education about climate change and its effects.

Enhancing infrastructure to withstand extreme weather events.

Providing financial assistance and resources to help communities recover from climate-related damages.

Ensuring that **emergency response plans are inclusive and accessible** to all residents, particularly those with disabilities or language barriers.



CA50 Planning Process

The next step in the process was to further develop the County's CA50 Plan into aroadmap for carbon neutrality by 2050. This plan includes specific project recommendations, complete with costs, emissions reductions, and return on investment (ROI), which flow out of each department's strategy.

This plan defines individual roadmaps clearly defining each department's role in eliminating carbon emissions from County operations. This deeply collaborative process required significant coordination with each department to understand their unique needs and opportunities in order to develop relevant decarbonization projects.

THE CA50 PLAN DEVELOPMENT PROCESS WAS BROKEN DOWN INTO FIVE KEY TASKS.

Data Collection and Analysis

Review and synthesize a wide variety of County information, including utility and fleet data, capital improvement plans, resiliency assessments, <u>emissions inventories</u>, etc.

Project Development

Collaborate with each County department to develop a highlevel list of projects, with the goal to drive action towards carbon emission reduction.

nent Community Engagement

Hold a series of meetings with various community stakeholders to collect feedback and inform the planning effort.



Deliver a final report, consisting of ten individual CA50 Plans for each department and an overall CA50 Plan that synthesizes findings into a single document.



Department of Administrative

Services

Department of

Transportation



Parks Department







Transit System



Community Reintegration Center



Department of Health and Human Services



Office of Emergency Management



Office of Equity



Office of Strategy, Budget & Performance



Report to Leadership

Present findings to County leadership for approval and adoption.

Key Co-Benefits

While the County is taking responsibility for its carbon footprint, it isn't in the business of decarbonization – its core function is to provide governmental services to its residents and visitors.

Recognizing this, the CA50 Plan seeks to look broadly at the process of decarbonization and identify additional benefits beyond drawing down carbon and avoiding costs, also known as co-benefits.



LOCAL JOB CREATION The proposed decarbonization elements will support the local economy with construction and related field work, including relationships with Targeted Business Enterprises (TBE). Decarbonization projects can include youth apprenticeships and other training programs, such as those commonly observed in all solar photovoltaic installation and weatherization projects.



COMMUNITY WELL-BEING Transitioning to clean energy improves overall quality of life by reducing noise pollution, improving indoor and outdoor air quality, and creating safer, more comfortable living and working environments for residents and employees.



URBAN HEAT ISLAND REDUCTION The Urban Heat Island effect is a prominent increase in temperature in urban areas compared to their rural counterparts, strongly correlated with heat absorption, paving materials, and shade cover. The shade from proposed solar canopies can help reduce urban heat.



ENERGY INDEPENDENCE Decarbonizing buildings reduces reliance on external energy sources, fostering energy independence and insulating the County from geopolitical tensions or supply disruptions that could drive up costs or compromise security and resiliency.



COMMUNITY DECARBONIZATION EDUCATION AND LEADERSHIP The CA50 Plan serves as a way to lead, inspire, and educate its residents and employers to take similar actions in their own lives and workplaces.

AVOIDED EMPLOYEE TURNOVER The cost of employee turnover (training, lost knowledge, etc.) is significant in any organization. Employees take pride in working for organizations that have integrity in reflecting their values and work towards improving the workplace and community environments.



AVOIDED CARBON EMISSION PENALTIES As climate change becomes an increasingly current (rather than future) reality, carbon emission penalties are starting to be applied to governing bodies as part of regulatory mandates in some parts of the Country. Decarbonization reduces the future risk of such penalties being applied to the County.



FUTURE ELECTRIC EMERGENCY BACKUP POWER Installing onsite solar as proposed for overall renewable power for the County has the added benefit of being combinable with battery energy storage systems (BESS) to provide emergency backup power.



TOURISM: GREEN DESTINATION Embracing sustainability and clean energy initiatives enhances the area's appeal as a tourist destination, attracting visitors who prioritize eco-friendly travel options, boosting local business and revenue.

Resiliency

In the fight against climate change, we often turn to "Sustainability" - creating a system that can preserve resources without compromising core functions. But how can organizations account for changes in external conditions?

While sustainability is defined as building an efficient system, resiliency is focused on building a system that doesn't break - that is, existing systems working through diverse conditions. A resilient system would proactively prepare for threats, continually adapt to change, comfortably absorb impacts, and responsively recover from disruptions.

A WIDELY RECOGNIZED FRAMEWORK FOR RESILIENCY FOCUSES ON THE 4R'S.

Robustness Ability to operate under varying load sizes in stress or demand.

Redundancy

Ability to substitute key factors in the case of maintenance or failure to allow continued consistent performance.

Rapidity

Ability to respond quickly to failure: reducing loss potential and minimizing degradation due to failure.

Resourcefulness

Ability to leverage and organize resources in the event of disruption.

A resilient system is prepared with a variety of responses to a varying range of potential threats. Some volatile factors to consider in resiliency include the environment, the economy, aging infrastructure, and social inequities.

Preparing to insulate against these factors may include energy source and distribution safeguards, coordination and redirection plans for imports/flow of materials, alternative support systems to continue offering critical public services, and cross-departmental and cross-community communication strategies and tools.

Milwaukee County has already begun to outline initiatives for some departments and will continue to hold resiliency as a pillar of future projects.

An example of an existing initiative that has been listed by the Office of Emergency Management (OEM) and the Department of Transportation (DOT):

"In the face of extreme weather events & power outages all critical infrastructure should have renewable energy sources."

In this statement, **Robustness** is seen in the scale of total coverage.

Redundancy in reflected by drawing energy from several energy sources to avoid sole resource dependency.

Rapidity is considered in redundancy, having backup options in place to reduce response time.

Resourcefulness is having the foresight to create options for energy service regardless of disruptive events.

All future projects should hold resiliency as a key tenant of project development, not separate from efforts to decarbonize County operations.

APPROACH TO DECARBONIZATION



Source: <u>Visit Milwaukee</u>

3 | APPROACH TO DECARBONIZATION

Project Criteria



IMPACTFUL

The carbon neutrality goal exists to address the harmful impacts of climate change. Therefore, the County should prioritize solutions that have the greatest mitigation of climate impacts. As noted in the emission reduction hierarchy on the next page, this means starting with avoiding new sources of emissions first and relying on purchased carbon offsets as a last option.



ACTIONABLE

Instead of relying on future undeveloped technologies to achieve decarbonization, it is better to develop a plan that is based on the "state of the shelf," meaning technologies and solutions that are currently available. New technologies should be evaluated and incorporated into the CA50 Plan where appropriate, but these uncertain solutions should not be the foundation for the County's efforts.

PRAGMATIC

A plan that cannot be implemented has no impact. Therefore, it is critical to find solutions that minimize initial cost and maximize cost savings while addressing other County needs. One key strategy to minimize initial cost is to align decarbonization upgrades with end-oflife equipment replacements. In addition to maximizing the useful life of existing investments, this approach minimizes the cost premium of decarbonization to the incremental cost increase beyond like-forlike replacements.



There is a strong need to consider equity throughout climate action planning given the disproportionate effects felt by vulnerable communities. Equity is prioritized through various elements of the CA50 Plan by incorporating the Office of Equity (OOE) and community groups in project planning. As the CA50 Plan is set in motion, incorporation of targeted business enterprises and apprenticeships in project implementation promotes environmental justice through participation. As projects are considered for implementation, an emphasis should be placed on considering place-based equity.





3 APPROACH TO DECARBONIZATION

Project Prioritization Hierarchy

The project criteria outlined on the previous page helps to guide the development of the CA50 Plan. However, when it comes to implementing decarbonization projects, there are many different pathways available to achieve the same goal.

The "Hierarchy of Decarbonization Impact" graphic at right details how projects should be prioritized, with the most impactful projects being performed first.

Examples

AVOID

- Where appropriate, renovate existing buildings instead of constructing new and consolidate buildings to reduce overall footprint.
- Follow the County's Sustainable Design Guidelines during construction and renovation projects to ensure updated buildings are high efficiency and low carbon-emitting.
- Maximize utilization of existing vehicle and transit fleet to minimize purchasing of new vehicles.

SUBSTITUTE

- **Space and Domestic Hot Water Heating** Replace gas-fired systems with electric heat pumps.
- **Cooking** Retrofit natural gas-fueled cooking systems with electric induction alternatives.
- Vehicles Replace gasoline or diesel-fueled vehicles with clean alternatives, such as vehicles fueled by electricity, renewable natural gas, or green hydrogen.
- **Electricity Supply** Reduce electricity generation from fossil-fuel sources, such as natural gas or coal, by switching to carbon-free alternatives such as solar, wind, hydro, or nuclear. This can be either on-site renewable energy or carbon-free energy purchased offsite.



REDUCE

- High efficiency building envelopes to minimize heat gain/loss.
- cooling, ventilation, and lighting.
- Efficient vehicles with high fuel efficiency or hybrid technology.

COMPENSATE

- remote generation sources.
- more, to the purchaser.

Avoid new sources of emissions. Strategically decarbonize future activities.

Reduce existing emissions by implementing efficiency practices.

Substitute fuel sources for lower carbon

Compensate for impossible-to-abate emissions by purchasing credible carbon offsets (RECs).

High performing equipment and optimized operation of building systems, such as heating,

Renewable Energy Credits (RECs) - Certificates that assign the environmental attributes of renewable energy generation to the purchaser. RECs can be purchased from regional or

Carbon Offsets - Certificates that allow the purchaser to claim carbon reduction impacts for a wide range of activities, such as planting trees, protecting natural areas, reducing waste, and

3 APPROACH TO DECARBONIZATION

Organizational Success Factors

Decarbonization requires organizational support and efforts that may not always be the most visible but are essential for achieving long-term sustainability.







PLANNING

While working towards decarbonization goals, it is important to note that the County will maintain its broader commitment to serving the public and fulfilling its primary responsibilities. Climate action planning will be integrated into ongoing County efforts, ensuring that it complements and enhances areas such as land development, planning, zoning, and future forecasting. This approach allows the County to balance its climate goals with the continued delivery of essential services and responsibilities.



DEPARTMENT OBJECTIVES AND TRACKING

Department level goals and objectives turn a lofty goal into a manageable effort. By creating accountability for staff and departments and developing methods to track progress along the way, decarbonization remains within reach and top of mind. Progress checkpoints provide a window into how a department is performing in line with their long-term goals.

MAINTENANCE STAFFING AND PLANNING

A central element of decarbonization requires changes to existing building systems and fleet vehicles, including adoption of new technologies. Upgrading equipment can prove challenging if the new equipment will require additional training or staffing. Ensuring that maintenance staff receives the proper training and support throughout transition periods will ease growing pains and enable maintenance staff to feel confident in their handling of new systems.

FUNDING

Obtaining sufficient funding is likely to be a key hurdle in achieving carbon neutrality. Some projects have positive financial return on investment, but other key projects may be more to funding due to high cost or lesser financial return. Many avenues can be explored for funding decarbonization efforts, such as internal funding, performance contracting, bond issuances, public-private partnerships, grants, and state or federal funding. There are many competing priorities for funding within the County, however, if the County does not prioritize decarbonization investments, it may be difficult to achieve these goals.





MM

Source: Visit Milwaukee

Decarbonization projects were developed through a combination of detailed energy and building data analysis and cross-county collaboration. The development process considered which decarbonization projects were best suited to each department's strategic objectives and services and building portfolio. Projects were then aligned with specific buildings or building types and placed on a timeline for completion related to the CA50 Plan goals.

The analysis included a thorough review of energy and emissions data, energy benchmarking against industry standards, the latest Facility Condition Assessment Program (FCAP) reports, and department-level sustainability plans, where available.

Departmental discussions addressed insights regarding past sustainability efforts, potential future projects, and cross-departmental engagement opportunities. Additionally, each department reviewed and provided feedback on decarbonization projects and interim goals and milestones prior to finalizing recommendations.



COST ESTIMATING

budgeting efforts.

For capital intensive projects and equipment replacements, project costs only include the incremental cost of decarbonization. This is the additional cost beyond installing a like-for-like replacement, as these capital replacements should already be budgeted for as part of the County's capital planning process. For instance, the cost to replace a hot water boiler with a heat pump would include the incremental cost increase of the heat pump over the boiler, plus any additional work required such as an electrical upgrade.

All costs are presented in 2025 US dollars. Expect projects completed in the future to be higher cost due to inflation.

Refer to Appendix A for more detail.



An important part of developing the CA50 Plan is providing estimated implementation costs for recommended projects. The County worked with local construction professionals to gather relavant market data to ensure accurate cost figures. Given the wide scope of the CA50 Plan, covering hundreds of buildings and vehicles, cost estimates were kept at a conceptual design level of detail that should be further refined as projects are developed. The goal is to provide order of magnitude figures that can inform future planning and

Decarbonization Project Descriptions

Example project charters for many of the following project types can be found in Appendix A.



FLEET RIGHT-SIZING - Match the size of the fleet to the needs of the users and the size of the operations being supported, generally through attrition as vehicles age out of the fleet.



FLEET EFFICIENCY - Ensure all appropriate vehicles are operated with costeffective measures to improve efficiency, such as idle reduction systems, driver training, tire pressure monitoring systems, and other measures.



LIGHTING - Replace fluorescent tubes with ballast bypass LED tubes to maximize energy and operational efficiency.



RETRO-COMMISSIONING – Over time, building use can change and systems may experience maintenance issues. Retro-commissioning is the process of optimizing existing building systems to ensure they are operating as efficiently as during initial construction or to meet the current needs of the building.



CONTROLS UPGRADES – Modern digital control systems allow for enhanced operational strategies, such as scheduling, temperature setbacks, and demandbased operation, saving energy and reducing carbon emissions.



BUILDING ENVELOPE/DUCT SEALING – Reduce heat loss and air leakage by applying strategies such as replacing windows, increasing roof/wall insulation, weatherstripping doors and windows, and sealing HVAC ductwork leaks.







BUILDING ELECTRIFICATION – Provide both heating and cooling with all-electric heat pumps. These systems can reach efficiencies exceeding 400% and can be carbon-free when powered with renewable electricity. Where feasible, geothermal heat pump systems are preferred due to their high efficiency and carbon-free nature.



FLEET FUEL AND TECHNOLOGY CONVERSION - Replace existing internal combustion engine vehicles with low or zero emission alternatives. These include electric vehicles, or vehicles powered by alternative liquid fuels including renewable natural gas or green hydrogen.



ON-SITE SOLAR - Install photovoltaic (PV) panels on building roofs, carports, or land to provide renewable energy. These can be coupled with battery systems to increase flexibility and add resiliency. A comprehensive solar feasibility study was completed in 2024, which is outlined in the figure above (File No. 24-769).



OFF-SITE CARBON-FREE ELECTRICITY - Purchase carbon-free electricity to eliminate carbon emissions associated with County electrical consumption. This can be accomplished through a variety of sources, such as power purchase agreements (PPAs), renewable energy certificates (RECs), carbon offsets, or utility-provided electricity.

Other Sustainability Initiatives

The recommended projects listed above are tailored to addressing greenhouse gas emissions that are categorized as Scope 1 and Scope 2, which indicates they are sources owned or controlled by the County².

These recommendations will directly aide in reducing the County's carbon emissions to meet the 2050 goal.

There are many other initiatives that will benefit the County, potentially through Scope 3 emissions reduction, or through overall sustainable practice improvements. However, they are excluded from the CA50 Plan analysis since they do not directly contribute towards meeting the carbon neutrality goal. These types of projects include, but are not limited to:

Waste Diversion & Recycling

Tree Planting, Carbon-Sequestering Lanscape

Water Efficiency

Pollution Reduction

Sustainable Urban Planning

In addition to the specific emissions reduction projects listed above, the County has also developed Sustainable Design Standards.

This will be a critical resource to ensure new construction and renovation projects align with the County's decarbonization goals.





²https://www.epa.gov/greeningepa/greenhouse-gases-epa 23

Greening of the Grid

OVERVIEW

The County has active accounts with two utility providers. These providers are We Energies (of WEC Energy Group) and the State of Wisconsin Gas Supply. We Energies accounted for approximately 96% of the County's 2023 utility costs.

COUNTY UTILITY INDEPENDENCE AND GOALS

In 2023, electricity accounted for 36% of County emissions. As utility suppliers continues to invest in renewable energy and phase out fossil fuels, the County has a path to renewables of their own that has been supported by a 2024 county-wide solar feasibility study.



REDUCTION GOALS



Utility Providers by % of County Utility Cost 2023





WEC ENERGY GROUP EMISSIONS GOALS

WEC Energy Group shares the goal of carbon neutrality by 2050 and has been taking steps to achieve this goal.

"Targeted capital investments already have led [WEC Energy Group] to achieve a 45% reduction compared to 2005, even as ... business has grown." ³

Since 2005, WEC Energy Group has acquired a utility scale, wind-powered electric generating facility. Additionally, WEC Energy Group has gained partial ownership in two solar-battery parks, which are targeted to produce over 350 MW of solar generation and over 200 MW of battery storage. WEC Energy Group is also involved with 3 additional solar-battery parks, all targeted to enter production by the end of 2025.

Electrifying the County's buildings and fleet vehicles creates the opportunity to take full advantage of this greening of the grid.

³WEC Energy Group Pathway to a Clean Energy Future 2022 Climate Report.

COUNTY-WIDE GHG BASELINE



5 COUNTY-WIDE GHG BASELINE

Emissions Reduction Progress to Date

The County has made substantial progress in reducing emissions since 2005, the County's adopted baseline year.

The 2023 emissions inventory showed a 46% overall reduction in GHG emissions compared to 2005. Based on this data, the County is well on track to achieve 50% reduction in carbon emissions by 2030.





*2005 serves as the baseline for Milwaukee County's Emissions Reduction Goal. Emissions values for years 2005 & 2016-2022 are provided from the County's ICLEI ClearPath inventories. **2023 Vehicle Fleet data not currently available. Modeled using 2022 Vehicle Fleet data.

5 | COUNTY-WIDE GHG BASELINE

Emissions Reduction Progress to Date

The County has made a concerted effort to reduce emissions over the past 20 years. These sustainability projects have been wide-ranging and involve a variety of departments and project types. Examples of some recent projects are listed below.

FACILITY RIGHT-SIZING AND DECOMMISSIONING

DAS has reduced total building area by approximately one million square feet in the last ten years.

Parks has shared excess building space with other departments to increase building utilization and reduce the need for new facilities.

Mitchell Airport (MCDOT) has consolidated from three concourses to two to improve efficiency.

TRANSIT BUS FLEET

MCTS has acquired 15 battery electric buses and associated charging infrastructure.

MCTS continues to incorporate new Clean Diesel technologies to improve fleet fuel economy and reduce particulate emissions.

DOT FLEET

150 hybrid sedans to improve fleet efficiency.

Anti-idling controls and cabin heaters to minimize fuel use of stationary vehicles.

Electric Vehicles are being tested by the Sheriff's Office to evaluate potential for more widespread adoption.

LED LIGHTING UPGRADES

Across the County lighting has been converted to LED, both in exterior and interior light fixtures. These upgrades have been a combination of facility-wide projects and fixtureby-fixture replacements as old lighting fails. A recent lighting project at the County Senior Centers reduced annual emissions by nearly 200 MTCO2e.



ENERGY EFFICIENCY

Mitchell Airport has installed high efficiency heating and cooling equipment and installed variable speed drives on motors, among other projects.

Zoo has installed high efficiency heating systems and water reclamation systems from animal enclosures.

CRC eliminated coal use from the heating system and implemented various water reduction projects.

Parks has implemented building envelope improvements, upgrades to HVAC systems, and occupancy-based control systems to reduce unoccupied energy use.

DOT headquarters has installed high efficiency HVAC systems, high performance building envelope, and advanced building controls.

GREENING OF THE GRID

As noted in the Greening of the Grid section on page 23, the primary utility supplier for the County has reduced their electricity carbon intensity by 54% since 2005. This means that a kWh of electricity produced more than twice as many emissions in the County's baseline year than today. As the grid continues to incorporate more renewables and phase out fossil fuel generation, the carbon impact of electricity use will continue to decline.

5 COUNTY-WIDE GHG BASELINE

Approach to Transportation Decarbonization

The County operates more than 1,500 on-road and off-road vehicle assets across all departments. These include a wide range of asset types ranging from Transit Buses to Compact SUVs to Bobcat Excavators to Arrowboards. For each one of these asset types, equipment manufacturers and fuel providers offer a different technical readiness level. Each asset type also comes with its own cost to own and operate, which may vary based on the details of use. In order to simplify the approach to transportation decarbonization, consider the graphic below.



MILWAUKEE COUNTY | Climate Action 2050 Plan





LONG-DURATION OPERATIONS

5 | COUNTY-WIDE GHG BASELINE

Data Breakdown



2023 Vehicle Fleet data not currently available. 2022 Vehicle Fleet data included as placeholder value. The following departments are omitted from the graph because they do not have any emissions specifically attributed to their operations: OEM, SBP, OOE





Overview of Recommended Projects

Based on the detailed data analysis and collaboration with County staff, a variety of decarbonization strategies are recommended. These recommendations, developed for each department based on their unique needs and opportunities, were consolidated to form a single, County-wide emissions reduction plan.

Key cross-department themes, depicted in Appendix A, were established by departments during the strategic alignment process. These themes align with best practices and were interwoven into the CA50 Plan recommendations.

A summary of key projects is shown below. Refer to the individual department-level CA50 Plans for more details on recommended projects.

AVOID

Sustainable Design Standards: During project management and design development, utilize newly developed guidelines to ensure sustainability features are incorporated.

Sustainable Procurement: During project management efforts, utilize sustainable procurement methods to improve the energy efficiency and environmental attributes of purchases.

Footprint Reduction: New Marcia P. Coggs Health and Human Services Center will occupy a smaller footprint, reducing energy and carbon emissions.

SUBSTITUTE

Building Electrification: Eliminate fossil fuel use and replace equipment with electric alternatives. Consider geothermal systems where appropriate.

Transit Electrification: Expand electric transit bus fleet in the future when technology and reliability has improved.

Fleet Alternatives: Replace light-duty vehicles with electric vehicles. Monitor replacement options for heavy-duty vehicles.

On-Site Solar: Install PV panels to generate clean electricity. Implement top candidates from solar PV feasibility study.

Off-Site Carbon-Free Energy: Purchase clean electricity from the local utility or other thirdparty providers. Monitor carbon reduction progress of utilities.

REDUCE

New Construction: Replace Marcia P. Coggs Building (DHHS) and Public Safety Building (DAS) with high-efficiency new construction.

Retro-commissioning: Optimize energy performance of existing building systems. This is underway at the courthouse complex (DAS) and should be expanded to all large county buildings with building automation systems.

Lighting Upgrades: Continue with existing efforts to upgrade all facility and exterior lighting to LED.

Controls Upgrades: Continue to provide web-based building automation systems (BAS) on all large facilities. Modernize older BAS and upgrade pneumatic controls to digital.

Energy Efficiency: Continue surveying and replacing leaky steam traps, improve condensate return, upgrade HVAC, improve building envelope.

Fleet Efficiency: Where carbon-free alternatives are not feasible, continue to purchase high efficiency and hybrid vehicles to reduce fuel consumption.

COMPENSATE

Carbon Offsets: Purchase to eliminate any difficult or impossible to decarbonize emissions.



By implementing the projects outlined on the previous page, the County can achieve its carbon neutrality goal by 2050. The graphs below depict how these projects contribute to the emissions reduction and anticipated emissions from now to 2050.



The Emissions Reduction Over Time graph shows overall department emissions from 2025 through 2050, including the contribution of each fuel type.

The Emissions Reduction by Project Type waterfall graph depicts the emissions reduction impact of various strategies, listed in order of priority. This order follows the "Impact Hierarchy of Decarbonization" graphic introduced in the "Project Background" section of this report.





Energy Use Over Time

The Energy Use Over Time graph shows forecasted energy consumption by fuel type, as well as expected production of on-site solar. The goal is first to minimize total energy demand, and secondly to eliminate fossil fuel consumption and source remaining electric with on-site solar, purchased CFE and carbon offsets (as required).

2028 2030



2030

2027



2035 onsite solar

Progress Milestones

ENERGY EFFICIENCY

RCx most buildings over 15k sq. ft.

Nearly all lighting converted to LED

2030-2035

Achieve a department energy reduction of 10% by 2030 and 20% by 2035

FLEET UPGRADES

Develop a year-by-year decarbonization plan for individual fleet vehicles

Convert at least 65 vehicles to electric

ON-SITE SOLAR

Provide 10% of electric demand through

Project Financials

The table below summarizes the seven overall strategies for reducing County emissions, including estimates for emissions reduction, utility cost savings, implementation cost, and return on investment (ROI). It should be noted that some strategies are financially attractive and could potentially be funded through cost savings. However, in order to reach full carbon neutrality, some investments will be required that do not have a positive return on investment. Being advantageous in pursuing grant, state, and federal funding will improve the project finances, but significant investment will still be required. However, considerations beyond finances should also be considered when evaluating the best path forward, as noted in the Key Co-Benefits section on page 13.

STRATEGY	EMISSIONS REDUCTION Potential		COST Savings³	COST ¹	PAYBACK	RESILIENCY
	MTCO2e	%	(\$/YR)		(YRS)	IMPACT
Retro-commissioning	4,400	4%	\$787,000	\$3,580,000	4.5	↑
Energy Efficiency Upgrades	19,500	17%	\$3,463,400	\$54,140,000	15.6	↑
Building Electrification	10,100	9%	-\$342,500	\$111,700,000	-	=
Fleet Upgrades	24,100	21%	\$7,293,510	\$220,200,000	30.2	=
On-Site Solar	6,600	6%	\$1,768,300	\$51,810,000	29.3	≜
Off-Site Carbon-Free Energy ²	44,200	39%	\$0	\$0	-	=
Carbon Offsets	4,300	4%	-\$86,000	\$0	_	=
TOTAL	113,200	100%	\$12,883,710	\$441,430,000	34.3	

¹Cost estimates are for cost premium for decarbonization beyond BAU; excludes grants and incentives; refer to Appendix A for more details ²Cost of CFE is shown as \$0 based on the assumption that the utility provider meets their sustainability targets by 2050

NOTES
All buildings over 10k sq. ft.
Required to decarbonize heating
Includes conversion to EV and renewable fuels
Annual expense to cover remaining emissions

DEPARTMENT SPECIFIC GHG REDUCTION PLANS



7 DEPARTMENT-SPECIFIC GHG REDUCTION PLANS

Milwaukee County Department of Transportation

The Milwaukee County Department of Transportation (MCDOT) develops and maintains Milwaukee County's infrastructure needs based on the diverse talent and qualifications of its staff. There are six divisions: Airport, Highway Maintenance, Fleet Management, Transit/ Paratransit System, Transportation Services and Director's Office. The Director and Deputy Director of Transportation oversee the day-to-day function of the department⁸.

The MCDOT provides fleet services to other departments within Milwaukee County, including Health and Human Services, the Airport, the Sheriff's Office, and others.

FACILITIES OVERVIEW

MCDOT operates 4 energy-consuming facilities, totaling 5,256,982 sq. ft. throughout the County. This includes Milwaukee Mitchell International Airport (MMIA) and Timmerman Field. For MMIA and Timmerman Field, the utility data provided included total utility values for the entire site, rather than on a per-building basis.

BUILDING TYPE	# OF Buildings	TOTAL SQ. FT.	BUILDING GROUP Average Eui	ASHRAE 100 Eui goal	
Airport	2	4,947,613	35.2	-	
Mixed-use Office	1	301,626	45.1	35	
Vehicle Service	1	34,499	75.4	57	





FLEET OVERVIEW



The MCDOT manages more than 1,100 active on-road and off-road assets that traveled more than 4 million miles in 2024. The on-road assets consist of 14% passenger vehicles, 39% SUVs and pickup trucks, 19% heavy trucks, 18% off-road construction equipment, and 9% off-road agricultural and other equipment.

Vehicles average 20 miles per day of distance traveled, which makes electrification a good fit for a large portion of user needs. Passenger vehicles are candidates for immediate and cost-effective electrification, as are a large share of the SUVs and pickup trucks. There are only a handful of suitable options for electrification of Heavy Trucks and Off-Road Equipment.

DEPARTMENT OF TRANSPORTATION

23%

MCDOT

TOTAL COUNTY EMISSIONS

⁸https://county.milwaukee.gov/EN/Our-County/Departments--Divisions/All-Departments
DEPARTMENT GHG INFORMATION

The Department of Transportation makes up 23% of the overall County emissions. Airport operations consist of 15% of the County's overall emissions and MCDOT Fleet & Highway division make up 8%. Note that below breakdown uses the 2022 vehicle fleet emissions value as 2023 data was not available.

Recent Sustainability Initiatives

MCDOT has completed several successful sustainability initiatives to decrease their emissions and increase energy efficiency and resiliency.

AIRPORT 🚔

Passenger Shuttles: Shuttle buses operate using compressed natural gas, which offers more efficient operation than gas or diesel shuttles.

Consolidation: Revised operations from three concourses to two to reduce energy and streamline operations.

Sustainable Materials: Used recycled concrete for recent runway rehabilitation.

Water Efficiency: Low flow fixtures in bathrooms and bottle filling stations.

LED Lighting: Majority of outdoor and indoor lighting are LED.

Efficient HVAC: Systems are on a centralized control system and have efficient control sequences.

FLEET & HIGHWAY

Anti-Idling Controls: Many fleet vehicles are equipped with technology to minimize idling while still providing necessary comfort levels for occupants, reducing fuel consumption when vehicles are parked.

Hybrid Vehicles: Throughout all fleet segments, MCDOT has worked with departmental teams to deploy approximately 150 hybrid sedans with higher fuel efficiency compared to traditional drivetrain vehicles.

Electric Vehicle Pilot: Commenced testing the first battery electric vehicles in the fleet, including a vehicle in use with the Sheriff's Office.

High Performance Buildings: Headquarters building is a high-performance building with LED lighting, energy efficient envelope and HVAC systems, and digital building controls.



Project Development Considerations

Decarbonization projects were developed through a combination of detailed energy and building data analysis as well as collaboration with department staff. The analysis included review of data for utilities (energy), emissions, the latest Facility Condition Assessment Program (FCAP), and MMIA's 2018 Sustainability Management Plan and 2024 Plan Update. Department staff provided further insights regarding past sustainability efforts, potential projects, and cross-departmental engagement opportunities. Additionally, the staff had the opportunity to review and provide feedback on recommended projects and progress milestones.

Note that project types, phasing, savings, and costs are based on the best information currently available. Periodic updates are recommended to keep that plan current and relevant as technology and department operations evolve.

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Overview of Recommended Projects

BUILDINGS: AIRPORT



RETRO-COMMISSIONING: Optimize energy performance of existing building systems (planned throughout airport from 2025-29).

ENERGY EFFICIENCY: Continue to update HVAC and control systems to minimize facility energy use.

BUILDING ELECTRIFICATION: Eliminate fossil fuel use and replace equipment with electric alternatives. Consider geothermal systems where appropriate.

ON-SITE SOLAR: Install PV panels to generate clean electricity. Two sites with a combined size of 2,400 kW were identified during the solar feasibility study. Consider battery storage systems to create a microgrid for increased resiliency.

BUILDINGS: FLEET & HIGHWAY DEPARTMENT

RETRO-COMMISSIONING: Optimize energy performance of existing building systems.

ENERGY EFFICIENCY: Despite efficient facilities, continue to upgrade systems with latest technology during replacement. New windows are planned for installation in the maintenance shop.

BUILDING ELECTRIFICATION: Eliminate fossil fuel use and replace equipment with electric alternatives. Consider geothermal systems where appropriate.

ON-SITE SOLAR: Install PV panels to generate clean electricity. Two sites with a combined size of 500 kW were identified during the solar feasibility study.







Overview of Recommended Projects

ON-ROAD VEHICLE FLEET

FLEET RIGHT-SIZING: On an annual basis, each department should work with the DOT team to consider opportunities to reduce the number of vehicles supporting their departmental mission. This may be through a shared vehicle model where a motor pool supports a departmental function instead of each user having their own vehicle.

VEHICLE RIGHT-SIZING: The Milwaukee County fleet has a substantial quantity of large SUVs (i.e. Chevrolet Tahoe, Dodge Durango) and ³/₄-Ton pickup trucks (i.e. Chevrolet Silverado 2500, Ford F250) which are not available in hybrid or electric models. Where possible, these vehicles should be evaluated for down-sizing to a mid-sized or compact SUV or sedan; or a 1/4-ton or 1/2-ton pickup truck. Smaller vehicle sizes are inherently less energy intensive and are more likely to be available with a hybrid or battery electric drivetrain.

FLEET ELECTRIFICATION PILOTS: MCDOT is beginning its first light duty electric vehicle pilots in 2025 which is commendable. However, the scale and timeline of the pilots is relatively delayed and modest in proportion to the size of the fleet and the emissions reduction ambitions of the department. Sedans and Compact SUVs have a high technology readiness level and generally modest charging needs to support the mileage requirements of most fleet vehicles. MCDOT should find opportunities to aggressively scale the use of electric vehicles in these vehicle classes while taking a more cautious approach to piloting vehicle classes where available electric drivetrain vehicles have a lower technology readiness level (i.e. Police Pursuit Vehicles, Street Sweepers, Heavy Trucks, etc.).

FLEET ELECTRIFICATION PLANNING: MCDOT should partner with departmental stakeholders and external consultants as necessary to plan the electrification of the fleet on a decade-long horizon, and update this plan every 2-3 years. Electric vehicles present the opportunity to mitigate emissions and also reduce operating costs for an increasing number of vehicle classes and use cases. However, electric vehicle charging infrastructure requires a multi-year planning timeline to allow for design and construction, potentially including upgrades to electrical services and fire suppression systems where vehicles park indoors. Because the timeline to deploy electric vehicle charging infrastructure is longer than the timeline to procure an electric vehicle, any ambition to deploy electric vehicles without a multi-year plan for charging infrastructure to match is destined to fail.

ELECTRIC VEHICLE CHARGING INFRASTRUCTURE: As determined by the Fleet Electrification Planning work, MCDOT may pursue the installation of cost-effective overnight charging where possible, as well as transitory charging throughout the county to support on-route charging needs of municipal vehicles.

FLEET ELECTRIFICATION: Built on a robust piloting program and a multi-year plan, electrification of MCDOT's light-duty vehicle fleet is the biggest and most actionable approach to reducing emissions of the vehicle fleet. MCDOT should aggressively pursue this strategy while waiting for other technologies (i.e. low emissions hydrogen, low emissions natural gas) to reach a greater level of maturity and cost competitiveness.



Overview of Recommended Projects

AIRPORT 官学

– OFF-ROAD VEHICLE & EQUIPMENT FLEET 💑

ELECTRIFICATION OF MOWERS: Zero Turn mowers are readily available from several manufacturers in battery electric format. MCDOT should evaluate if the multi-hour mowing capabilities of these units can support the requirements of MCDOT teams.

ELECTRIFICATION OF LIGHT-DUTY CONSTRUCTION EQUIPMENT: The MCDOT maintains dozens of UTVs, Skid Loaders, Light Towers, and other small construction equipment for which battery electric drivetrain options are readily available from several reputable OEMs. MCDOT should begin piloting these technologies where the duty cycle allows in order to evaluate expansion potential.

ALTERNATIVE FUELS FOR MOWING TRACTORS AND LOADERS: The use requirements of a highway mowing tractor or heavy loader used for snow removal are not suitable for replacement with a battery electric drivetrain. However, the emissions of this equipment can be mitigated through the use of R99 drop-in diesel fuel replacement for a portion of the equipment fleet.

ALTERNATIVE VEGETATION APPROACHES: While not scalable to every roadway and greenspace, MCDOT may reduce total tractor and mower fuel use and emissions by pursuing alternative vegetation options that do not require regular mowing.

STRATEGY		REDUCTION Intial	COST SAVINGS	COST ¹	PAYBACK RESILIENCY	PRIORITY	NOTES	
CHALLOI	MTCO2e	%	(\$/YR)	0001	(YRS)	IMPACT	BUILDING(S)	
Retro-commissioning	350	2%	\$80,600	\$1,230,000	15.3	ł	Central HVAC Plant (Airport)	All buildings over 10k sq. ft.
Energy Efficiency Upgrades	1,390	8%	\$315,800	\$3,930,000	12.4	ł	Parking Structure (Airport)	
Building Electrification	1,630	9%	-\$117,900	\$20,590,000	_	=	Parking Structure (Airport)	Required to decarbonize heating.
On-Site Solar	1,620	9%	\$433,400	\$11,960,000	27.6	↑	Milwaukee Mitchell International Airport (Ground Mount- Fixed)	
Off-Site Carbon-Free Energy ²	12,100	68%	\$0	\$0	_	=	N/A	
Carbon Offsets	630	4%	-\$12,600	\$0	_	=	N/A	Annual expense to cover remaining emissions
TOTAL	17,720	100%	\$699,300	\$37,710,000	53.9			

¹Cost estimates are for cost premium for decarbonization beyond BAU; excludes grants and incentives; refer to Appendix A for more details ²Cost of CFE is shown as \$0 based on the assumption that the utility provider meets their sustainability targets by 2050

STRATEGY	EMISSIONS REDUCTION Potential		COST SAVINGS	COST ¹	PAYBACK	RESILIENCY	PRIORITY
	MTC02e	%	(\$/YR)		(YRS)	IMPACT	BUILDING(S)
Retro-commissioning	50	1%	\$8,700	\$168,000	19.3	ł	Fleet Garage & MCDOT HQ
Energy Efficiency Upgrades	140	2%	\$25,200	\$930,000	36.9	≜	Highway Shop-North
Building Electrification	210	2%	-\$15,300	\$5,510,000	_	=	Highway Shop-North
Fleet Upgrades	4,400	52%	\$472,479	\$13,900,000	29.4	≜	Light Duty Vehicles
On-Site Solar	350	4%	\$94,300	\$3,100,000	32.9	≜	Fleet Garage & MCDOT HQ (Carport)
Off-Site Carbon-Free Energy ²	2,320	27%	\$0	\$0	_	=	N/A
Carbon Offsets	1,060	12%	-\$21,200	\$0	_	=	N/A
TOTAL	8,530	100%	\$564,179	\$23,608,000	41.8		

¹Cost estimates are for cost premium for decarbonization beyond BAU; excludes grants and incentives; refer to Appendix A for more details ²Cost of CFE is shown as \$0 based on the assumption that the utility provider meets their sustainability targets by 2050



MILWAUKEE COUNTY | Climate Action 2050 Plan

	NOTES
	All buildings over 10k sq. ft.
	Required to decarbonize heating.
	Includes conversion to EV and renewable fuels
)	
	Annual expense to cover remaining emissions

PATHWAY TO 2050 GOAL

The following figures represent a proposed pathway to achieving decarbonization for MCDOT by 2050.

Emissions Reduction Over Time



Overall department emissions from 2025 through 2050, including the contribution of each fuel type.

The emissions reduction impact various strategies, listing in order of priority according to the "Impact Hierarchy of Decarbonization" in the "Project Background" section.

Emissions Reduction By Project Type



PATHWAY TO 2050 GOAL

The following figures represent a proposed pathway to achieving decarbonization for MCDOT by 2050.

Energy Use Over Time



Forecasted energy consumption by fuel type, as well as expected production of on-site solar. The goal is first to minimize total energy demand, and secondly to eliminate fossil fuel consumption and source remaining electric with on-site solar, purchased CFE, and carbon offsets (as required).

Progress Milestones AIRPORT ENERGY EFFICIENCY 2028 - RCx buildings over 10k

sq.ft.

2030 - All lighting converted to LED

2035 - Achieve a department energy reduction of 10% by 2035



BUILDING **ELECTRIFICATION**

2028 - Develop long-term plans for electrification of the central HVAC plant.



ON-SITE SOLAR

2035 - Provide 5% of department electric demand through onsite solar



Milwaukee County Transit System

The Milwaukee County Transit System (MCTS) is innovating the way people across southeast Wisconsin get to work, school, medical appointments, entertainment and anywhere else they need to go. With a dedicated team of 1,000 drivers, mechanics and administrative staff, MCTS provides 17 million rides each year and generates a massive economic impact for the region.

Known around the world for the award-winning MCTS Excellence program, MCTS is proud to offer outstanding customer service and state-of-the-art features including clean-diesel buses and Real-Time tracking information⁷.

FACILITIES OVERVIEW

Milwaukee County Transit System operates 5 energy-consuming facilities, totaling 787,739 sq. ft. throughout the County.

BUILDING TYPE	# OF Buildings	TOTAL SQ. FT.	BUILDING GROUP Average Eui	ASHRAE 100 Eui goal
Vehicle Service	2	470,905	100.8	57
Vehicle Storage	2	316,770	64.0	43
Other Service	1	64	385.3	62





FLEET OVERVIEW



The MCTS fleet includes 387 transit buses, including 15 battery electric buses and the remainder diesel. In 2023, the bus fleet used 3.19 million gallons of fuel to travel 17.7 million miles. Buses are housed at and operate from two bus garages, Fond du Lac Garage and Kinnickinnic (KK) Garage. The KK Garage has been fitted with charging infrastructure for the electric buses.

The MCTS also operates 57 non-revenue vehicles that include a mix of compact SUVs, vans, pickup trucks, and medium duty trucks. The non-revenue fleet supports route supervision, vehicle service, bus shelter maintenance, security, snow removal and other functions. In 2023, MCTS non-revenue vehicles used 26K gallons of fuel to travel approximately 430K miles.

MILWAUKEE COUNTY TRANSIT SYSTEM

33%

MCTS

TOTAL COUNTY EMISSIONS

DEPARTMENT GHG INFORMATION

The Transit System makes up 33% of the overall County emissions.



Recent Sustainability Initiatives

MCTS has completed several successful sustainability initiatives to decrease their emissions and increase energy efficiency and resiliency.

Electric Bus Deployment: MCTS purchased and continues to operate 15 electric transit buses, supported by charging infrastructure at the Kinnickinnic Garage site. Initial rollout of battery electric buses has faced challenges, primarily related to the reliability of the buses, paired with service and support issues from the bus manufacturer who has since withdrawn from the US market.

Clean Diesel Buses: Diesel buses operate on ultra-low sulfur diesel fuel as required by EPA standards.

Light Duty Hybrid Vehicles in Non-Revenue Fleet: MCTS has operated one hybrid electric vehicle since 2010 for Route Supervision.

Lighting Upgrades: Maintenance buildings are mostly high efficiency LED lighting.

Building Automation: Centralized building control systems installed.

High-speed Doors: Some garage overhead doors upgraded to minimize heating loss.

Project Development Considerations

Decarbonization projects were developed through a combination of detailed energy and building data analysis as well as collaboration with department staff. The analysis included review of data for utilities (energy), emissions, and the latest Facility Condition Assessment Program (FCAP). Department staff provided further insights regarding past sustainability efforts, potential projects, and cross-departmental engagement opportunities. Additionally, the staff had the opportunity to review and provide feedback on recommended projects and progress milestones.

Note that project types, phasing, savings, and costs are based on the best information currently available. Periodic updates are recommended to keep that plan current and relevant as technology and department operations evolve.



Overview of Recommended Projects

TRANSIT FLEET



ELECTRIFICATION OF NON-REVENUE FLEET: The Non-Revenue fleet includes 40 vehicles with battery electric vehicle replacement options that have an equal or lower MSRP than gasoline alternatives and a lower total cost of ownership than gasoline alternatives. Any cargo van, SUV, or minivan that is replaced should be replaced with an electric vehicle. This strategy must be executed in conjunction with a multi-year plan for installation of electric vehicle charging at overnight vehicle storage locations, as well as transitory charging at publicly-accessible charging networks or municipal-owned fast charging facilities. MCTS should work closely with MCDOT on electrification of their Non-Revenue fleet, taking advantage of similarities in vehicle types and program needs.

ELECTRIFICATION OF BUS FLEET: In spite of the challenges with the initial rollout, battery electric drivetrains remain the most economical and best long-term option to eliminate emissions in the Transit bus fleet. Clean Diesel and Hybrid Electric drivetrain buses can offer improvements in fuel economy and modest reductions in emissions, but do not provide a path to near-zero emissions for MCTS. Demand for battery electric buses remains robust in the US, driven by decarbonization goals of leading transit agencies like MCTS, as well as Federal GHG Emissions Standards for Heavy Duty Vehicles regulations (aka Clean Diesel) regulations and complementary federal incentives. However, the available supply of battery electric buses is limited to just two established OEMs (New Flyer and Gillig) and two start-up OEMs (BYD/Ride and Phoenix/Proterra). As the market for battery electric buses mature, and as other transit agencies continue to operate and provide feedback to OEMs, best practices to improve product quality and manufacturer support are expected to significantly throughout the 2020's. MCTS and the County Board should revisit the electric transit bus market annually to identify the right time to expand their electric bus fleet without expanding service issues or risks related to product quality.

FLEET ELECTRIFICATION PLANNING: Recognizing the continued evaluation of electric bus options that will take place over the coming years before expanding electric bus use further, MCTS should partner with departmental stakeholders and external consultants as necessary to update the plan for electrification of the Bus and Non-Revenue fleet on a decade-long horizon, every 2-3 years. Electric vehicles present the opportunity to mitigate emissions and also reduce operating costs for an increasing number of vehicle classes and use cases. However, electric vehicle charging infrastructure requires a multi-year planning timeline to allow for design and construction, potentially including upgrades to electrical services and fire suppression systems where vehicles park indoors. Because the timeline to deploy electric vehicle charging infrastructure is longer than the timeline to procure an electric vehicle, any ambition to deploy electric vehicles without a multi-year plan for charging infrastructure to match is destined to fail.

ELECTRIC VEHICLE CHARGING INFRASTRUCTURE: As determined by the Fleet Electrification Planning work, MCTS should pursue the installation of cost-effective overnight charging where possible, as well as transitory charging throughout the county to support on-route charging needs of Transit Buses and Non-Revenue vehicles.

FUEL SWITCHING FOR REMAINDER OF BUS FLEET: For those buses that are reliability spares, or whose route dynamics make the use of battery electric buses challenging, MCTS should pursue the use of drop-in replacement fuel R99 in order to mitigate the emission of these vehicles. It is possible that within the next two decades there will be a reliable and cost-effective hydrogen-fueled hybrid electric bus.



Overview of Recommended Projects

- FACILITIES

LIGHTING UPGRADES: Convert all facility and transit stop lighting to LED.

RETRO-COMMISSIONING: Optimize energy performance of existing building systems.

BUILDING ELECTRIFICATION: Eliminate fossil fuel use and replace equipment with electric alternatives. Consider geothermal systems where appropriate.

ON-SITE SOLAR: Install PV panels to generate clean electricity.

ENERGY EFFICIENCY: Upgrade facilities to be more efficient. Include additional high-speed overhead doors, HVAC upgrades, and other envelope upgrades.

STRATEGY	EMISSIONS REDUCTION Potential		COST SAVINGS	COST ¹	PAYBACK	RESILIENCY	PRIORITY	
	MTC02e	%	(\$/YR)		(YRS)	IMPACT	BUILDING(S)	
Retro-commissioning	350	1%	\$68,200	\$346,000	5.1	ł	Hillside Complex Fond Du Lac Complex KK Transit Complex	All buildings ov
Energy Efficiency Upgrades	1,230	3%	\$240,800	\$3,960,000	16.4	≜	Hillside Complex	Prioritize lightir
Building Electrification	520	1%	-\$38,000	\$8,980,000	_	=	Hillside Complex	Required to dec
Fleet Upgrades	19,670	53%	\$6,821,031	\$206,300,000	30.2	=	Light Duty Vehicles	Includes conve
On-Site Solar	550	1%	\$147,300	\$2,730,000	18.5	↑	Hillside Complex	
Off-Site Carbon-Free Energy ²	14,790	40%	\$0	\$0	_	=	N/A	
Carbon Offsets	220	1%	-\$4,400	\$0	_	=	N/A	Annual expense

Buildings indicated in orange are located in census tracts where over 20% of the population is living below the federal poverty line.

¹Cost estimates are for cost premium for decarbonization beyond BAU; excludes grants and incentives; refer to Appendix A for more details ²Cost of CFE is shown as \$0 based on the assumption that the utility provider meets their sustainability targets by 2050

NOTES
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PATHWAY TO 2050 GOAL

The following figures represent a proposed pathway to achieving decarbonization for MCTS by 2050.





Emissions Reduction By Project Type

The emissions reduction impact various strategies, listing in order of priority according to the "Impact Hierarchy of Decarbonization" in the "Project Background" section.

Overall department emissions from 2025 through 2050, including the contribution of each fuel type.



PATHWAY TO 2050 GOAL

The following figures represent a proposed pathway to achieving decarbonization for MCTS by 2050.



Energy Use Over Time







to electric



ON-SITE SOLAR

Forecasted energy consumption by fuel type, as well as expected production of on-site solar. The goal is first to minimize total energy demand, and secondly to eliminate fossil fuel consumption and source remaining electric with on-site solar, purchased CFE, and carbon offsets (as required).

MILWAUKEE COUNTY TRANSIT SYSTEM

Progress Milestones

ENERGY EFFICIENCY

2028 - RCx buildings over 10k sq. ft.

2030 - All lighting converted to LED

2030-2035 - Achieve a department energy reduction of 10% by 2030 and 20% by 2035

FLEET UPGRADES

2027 - Develop a year-by-year decarbonization plan for individual fleet vehicles

2030 - Convert at least 15 non-revenue vehicles

2032 - Re-evaluate electric transit buses in 2030, EV bus pilot

2035 - Provide 15% of department electric demand through onsite solar

Department of Administrative Services

The Milwaukee County Department of Administrative Services (DAS) serves a wide variety of functions for the County, ranging from facility and infrastructure management to economic development. DAS encompasses several subdivisions¹⁰:

- Facilities Management
- Information Management Services
- Central Business Office
- Office of Economic Inclusion

- Economic Development
- Procurement
- Risk Management

FACILITIES OVERVIEW

DAS operates 11 energy-consuming facilities, totaling 2,076,020 square feet throughout the County. Facility use types range from Senior Centers to the Milwaukee County Courthouse Complex, reflecting the wide range of DAS operations.

BUILDING TYPE	# OF Buildings	TOTAL SQ. FT.	BUILDING GROUP Average Eui	ASHRAE 100 Eui goal
Courthouse/Probation Office	4	1,844,713	105.7	72
Recreation	5	126,949	95.5	41
Laboratory	1	53,000	161.5	125
Government Office	1	51,358	86.9	45







DEPARTMENT OF ADMINISTRATIVE SERVICES

79%

21%

DAS

TOTAL COUNTY EMISSIONS

¹⁰https://county.milwaukee.gov/EN/Administrative-Services

DEPARTMENT OF ADMINISTRATIVE SERVICES

DEPARTMENT GHG INFORMATION

DAS makes up 21% of overall County emissions. Over half of these emissions come from the use of district steam at the County Courthouse Complex.



Recent Sustainability Initiatives

DAS has completed several successful sustainability initiatives to decrease their emissions and increase energy efficiency and resiliency.

LED Upgrades: Upgrading lighting at facilities to high-efficiency LED fixtures.

Footprint Reduction: Energy and emissions reduction from decommissioning buildings and rightsizing facilities.

Building Controls: Digital building automation systems are installed at major facilities, improving HVAC performance.

Steam Distribution Improvements: Performed steam trap audits and replaced leaky traps.

Courthouse Complex Project

The Milwaukee County Courthouse Complex makes up nearly 1.6 million square feet of the total DAS footprint and includes three main facilities: the Historic Courthouse, the Public Safety Building, and the Criminal Justice Facility. The Medical Examiner is also located at this complex and is planned to be transitioned to the state in 2026. Considering the advanced age of these facilities and the unique building needs a courthouse has, the County is developing a long-term plan for the complex, including a new criminal courthouse in place of the existing Safety Building. The design phase is expected to continue through 2027.

As the County works to revitalize the Courthouse Complex, sustainability and energy efficiency are key considerations. A retro-commissioning study is planned for the complex to evaluate energy saving opportunities and is already in the works. The design aims to eliminate fossil fuel use at the complex by 2050 and different avenues are being explored to achieve this goal. New construction related to the complex will adhere to the published Sustainability Design Standards, ensuring that new facilities are built with emissions avoidance in mind.

Project Development Considerations

Decarbonization projects were developed through a combination of detailed energy and building data analysis as well as collaboration with department staff. The analysis included review of data for utilities (energy), emissions, and the latest Facility Condition Assessment Program (FCAP). Department staff provided further insights regarding past sustainability efforts, potential projects, and cross-departmental engagement opportunities. Additionally, the staff had the opportunity to review and provide feedback on recommended projects and progress milestones.

Note that project types, phasing, savings, and costs are based on the best information currently available. Periodic updates are recommended to keep that plan current and relevant as technology and department operations evolve.



Overview of Recommended Projects

SUSTAINABLE DESIGN STANDARDS: During project management and design development, utilize newly developed design guidelines to ensure sustainability features are incorporated.

SUSTAINABLE PROCUREMENT: During project management efforts, utilize sustainable procurement methods to improve the energy efficiency and environmental attributes of purchases.

NEW CONSTRUCTION: Upgrade old, inefficient Safety Building with new high-performance building.

FOOTPRINT REDUCTION: Medical Examiner's Office will be no longer be County-owned starting in 2026. LIGHTING UPGRADES: Continue to upgrade all facility lighting to LED. Incorporate daylight harvesting and vacancy sensors where appropriate.

RETRO-COMMISSIONING: Optimize energy performance of existing building systems. This is underway at the courthouse complex and expected to be completed in 2026.

ENERGY EFFICIENCY: Upgrade facilities to be more efficient. Replace remainder of leaky steam traps, improve condensate return, upgrade controls (senior centers in 2025 budget), HVAC upgrades, and other envelope upgrades.

BUILDING ELECTRIFICATION: Eliminate fossil fuel use and replace equipment with electric alternatives. Consider geothermal systems where appropriate.

ON-SITE SOLAR: Install PV panels to generate clean electricity

OFF-SITE CARBON-FREE ENERGY: Purchase clean electricity from the local utility or other thirdparty providers

CARBON OFFSETS: Purchase to eliminate any difficult or impossible to decarbonize emissions

STRATEGY	EMISSIONS REDUCTION Potential		COST SAVINGS	COST ¹	PAYBACK	RESILIENCY	PRIORITY	
	MTC02e	%	(\$/YR)		(YRS)	IMPACT	BUILDING(S)	
Retro-commissioning	1,720	7%	\$263,900	\$804,000	3.0		Courthouse Complex	All buildings ove
Energy Efficiency Upgrades	8,470	36%	\$1,321,400	\$20,110,000	15.2		Safety Building	Prioritize steam replacement an
Building Electrification	4,880	20%	\$37,000	\$30,990,000	_	=	Courthouse Complex	Required to dec
On-Site Solar	930	4%	\$248,300	\$8,380,000	33.7		Vel R. Phillips Center	
Off-Site Carbon-Free Energy ²	6,860	29%	\$0	\$0	_	=	N/A	
Carbon Offsets	950	4%	-\$19,000	\$0	_	=	N/A	Annual expense
TOTAL	23,810	100%	\$1,851,600	\$60,284,000	32.6			

²Cost of CFE is shown as \$0 based on the assumption that the utility provider meets their sustainability targets by 2050

Buildings indicated in orange are located in census tracts where over 20% of the population is living below the federal poverty line. ¹Cost estimates are for cost premium for decarbonization beyond BAU; excludes grants and incentives; refer to Appendix A for more details

DEPARTMENT OF ADMINISTRATIVE SERVICES

NOTES

ver 10k sg. ft., exclude safety building

am distribution & lighting. Includes Safety Building and Medical Examiner decommissioning

ecarbonize heating

se to cover remaining emissions

PATHWAY TO 2050 GOAL

The following figures represent a proposed pathway to achieving decarbonization for DAS by 2050.



Overall department emissions from 2025 through 2050, including the contribution of each fuel type.

The emissions reduction impact various strategies, listing in order of priority according to the "Impact Hierarchy of Decarbonization" in the "Project Background" section.

DEPARTMENT OF ADMINISTRATIVE SERVICES

PATHWAY TO 2050 GOAL

The following figures represent a proposed pathway to achieving decarbonization for DAS by 2050.

Energy Use Over Time



Forecasted energy consumption by fuel type, as well as expected production of on-site solar. The goal is first to minimize total energy demand, and secondly to eliminate fossil fuel consumption and source remaining electric with on-site solar, purchased CFE, and carbon offsets (as required).









ON-SITE SOLAR 2035 - Provide 7.5% of department electric demand through onsite solar

DEPARTMENT OF ADMINISTRATIVE SERVICES

ENERGY EFFICIENCY

2028 - RCx buildings over 10k sq. ft.

2030 - All lighting converted to LED

2030-2035 - Achieve a department energy reduction of 10% by 2030 and 20% by 2035

BUILDING ELECTRIFICATION

2030-2035 - Eliminate fossil fuel use in 1 building by 2030 and 3 buildings by 2035

Parks Department

The Parks Department (Parks) operates over 150 parks, miles of scenic trails, golf courses, beer gardens, dog parks, beaches, community centers, botanical gardens, and nature trails¹¹. Subdivisions of Parks include the Cultural, Artistic & Musical Programming Advisory Council, The Planning and Development Section, and the Conservation Section. These departments provide a wide range of services to the County.

FACILITIES OVERVIEW

Parks operates 98 energy-consuming facilities, totaling 1,332,167 sq. ft. throughout the County. Leased facilities, including the Milwaukee Public Museum, are excluded from the County's emissions study.

BUILDING TYPE	# OF Buildings	TOTAL SQ. FT.	BUILDING GROUP Average Eui	ASHRAE 100 Eui goal
Recreation	92	1,114,783	104.9	41
Social/Meeting	4	149,393	90.1	38
Vehicle Storage/ Maintenance	1	40,860	121.9	43
Government Office	1	27,131	90.1	45

OTHER DEPARTMENTS





PARKS DEPARTMENT

90%

10% PARKS

TOTAL COUNTY EMISSIONS

¹¹https://county.milwaukee.gov/EN/Parks

DEPARTMENT GHG INFORMATION

The Parks Department makes up 10% of the overall County emissions.



Recent Sustainability Initiatives

Parks has completed several successful sustainability initiatives to decrease their emissions and increase energy efficiency and resiliency.

Rolling upgrades to LED over past 10 years, including 8 parkway conversions and several walkway, pathway, and pool deck conversions.

Doubled the number of building occupancy control systems in the last two years, which are used to winterize facilities through automated temperature setbacks.

Reduced mowing by moving away from turf grass to native plantings and seasonal grasses.

Promote building sharing by having other departments use extra parks buildings.

Demolition of buildings that are decommissioned.

Other Noteworthy Initiatives

In addition to efforts that reduce Scope 1 and Scope 2 emissions as outlined in the "Project Development" Section, Parks has undertaken several sustainability initiatives that impact Scope 3 emissions or have an otherwise net-positive environmental impact. These indirect emissions efforts contribute to resiliency and have many co-benefits. These initiatives should be considered for future tracking as the CA50 Plan evolves.

Reforestation – Parks has partnered with the City of Milwaukee and the DNR to aide in reforestation efforts to increase the canopy, reduce the Urban Heat Island effect, and provide carbon sequestration.

Biochar – Parks is pursuing biochar as a method for managing wood waste. Biochar prevents additional CO2 from being released.

Roadway to Trail Conversions – As part of the trail master plan, parks is working to convert portions of roadway into hike/bike trails. This means not only less cars driving on this roadway, but also less plowing and salting.

Project Development Considerations

Decarbonization projects were developed through a combination of detailed energy and building data analysis as well as collaboration with department staff. The analysis included review of data for utilities (energy), emissions, and the latest Facility Condition Assessment Program (FCAP). Department staff provided further insights regarding past sustainability efforts, potential projects, and cross-departmental engagement opportunities. Additionally, the staff had the opportunity to review and provide feedback on recommended projects and progress milestones.

Note that project types, phasing, savings, and costs are based on the best information currently available. Periodic updates are recommended to keep that plan current and relevant as technology and department operations evolve.

PARKS DEPARTMENT



Overview of Recommended Projects

SUSTAINABLE DESIGN STANDARDS: During project management and design development, utilize newly developed design guidelines to ensure sustainability features are incorporated.

SUSTAINABLE PROCUREMENT: During project management efforts, utilize sustainable procurement methods to improve the energy efficiency and environmental attributes of purchases.

FOOTPRINT REDUCTION: 12 building have recently been demolished or are planned for demolition.

RETRO-COMMISSIONING: Optimize energy performance of existing building systems.

LIGHTING UPGRADES: Continue to upgrade all facility and parkway lighting to LED and incorporate daylight harvesting and vacancy sensors where appropriate.

CONTROLS UPGRADE: eliminate old pneumatic controls and replace with direct digital controls (DDC) for improved performance and visibility. Continue to pursue building occupancy control systems.

ENERGY EFFICIENCY: Upgrade facilities to be more efficient. Implement HVAC and envelope upgrades including addressing single paned windows at several Parks facilities.

BUILDING ELECTRIFICATION: Eliminate fossil fuel use and replace equipment with electric alternatives. Consider geothermal systems where appropriate.

ON-SITE SOLAR: Install PV panels to generate clean electricity at Noyes Park and Wilson Park.

OFF-SITE CARBON-FREE ENERGY: Purchase clean electricity from the local utility or other thirdparty providers.

STRATEGY		REDUCTION NTIAL	COST SAVINGS	COST ¹	PAYBACK	RESILIENCY	PRIORITY	NOTES
	MTCO2e	%	(\$/YR)		(YRS)	IMPACT	BUILDING(S)	
Retro-commissioning	960	9%	\$174,200	\$536,000	3.1	↑	Botanical Gardens Visitors and Education, Kosciuszko Community Center, King Community Center	All buildings over 10k sq. ft.
Energy Efficiency Upgrades	3,790	33%	\$694,400	\$12,910,000	18.6	ł	Mitchell Park, Central Maintenance - Wauwatosa, Wilson Recreation	Prioritize lighting. Note: includes planned demolition.
Building Electrification	1,430	11%	-\$102,800	\$19,490,000	_	=	Sports Complex Kosciuszko Community Center	Required to decarbonize heating
On-Site Solar	980	9%	\$264,000	\$7,240,000	27.4	↑	Noyes Park (Rooftop) Wilson Park (Ground Mount)	Coordinate with roof replacements
Off-Site Carbon-Free Energy ²	3,800	36%	\$0	\$0	_	≜	N/A	
Carbon Offsets	280	2%	-\$5,600	\$0	_	=	N/A	Annual expense to cover remaining emissions
TOTAL	11,240	100%	\$1,024,200	\$40,176,000	39.2			

Buildings indicated in orange are located in census tracts where over 20% of the population is living below the federal poverty line. ¹Cost estimates are for cost premium for decarbonization beyond BAU; excludes grants and incentives; refer to Appendix A for more details ²Cost of CFE is shown as \$0 based on the assumption that the utility provider meets their sustainability targets by 2050

PARKS DEPARTMENT

PATHWAY TO 2050 GOAL

The following figures represent a proposed pathway to achieving decarbonization for Parks by 2050.



Overall department emissions from 2025 through 2050, including the contribution of each fuel type.

The emissions reduction impact various strategies, listing in order of priority according to the "Impact Hierarchy of Decarbonization" in the "Project Background" section.

PARKS DEPARTMENT

PATHWAY TO 2050 GOAL

The following figures represent a proposed pathway to achieving decarbonization for Parks by 2050.



Energy Use Over Time

Progress Milestones



ENERGY EFFICIENCY 2035



BUILDING ELECTRIFICATION 2030-2035 - Eliminate fossil fuel use in 100k sq. ft. of building footprint by 2030 and 200k sq. ft. buildings by 2035



ON-SITE SOLAR

Forecasted energy consumption by fuel type, as well as expected production of on-site solar. The goal is first to minimize total energy demand, and secondly to eliminate fossil fuel consumption and source remaining electric with on-site solar, purchased CFE, and carbon offsets (as required).

PARKS DEPARTMENT

2030-2035 - Achieve a department energy reduction of 10% by 2030 and 20% by

2035 - Provide 15% of department electric demand through onsite solar

Milwaukee County Zoo

The Milwaukee County Zoo (Zoo) aims to inspire public understanding, support, and participation in global conservation of animal species and their environment by creating a unifying bond between our visitors and the living earth¹².

FACILITIES OVERVIEW

The Milwaukee County Zoo operates 32 energy-consuming facilities, totaling 452,889 sq. ft.

BUILDING TYPE	# OF Buildings	TOTAL SQ. FT.	BUILDING GROUP Average Eui	ASHRAE 100 Eui goal
Other Public Assembly	32	452,889	217.5	45





OTHER DEPARTMENTS

MILWAUKEE COUNTY ZOO

93%

TOTAL COUNTY EMISSIONS

Z00

¹²https://milwaukeezoo.org/about-us/

DEPARTMENT GHG INFORMATION

Milwaukee County Zoo makes up 7% of the overall County emissions.



Recent Sustainability Initiatives

The Zoo has completed several successful sustainability initiatives to decrease their emissions and increase energy efficiency and resiliency.

Water Conservation: Upgraded filtration in the hippo habitat allows for reuse of water and reduced energy consumption.

Third Party Accreditation: Accredited by the Association of Zoos and Aquariums which includes significant conservation requirements.

Energy Efficiency Upgrades: New high efficiency boilers installed and building automation systems installed at half of buildings.

Lighting Upgrades: LED lighting replacement projects ongoing in several buildings.

Solar PV: Solar sculpture and solar panels installed.

Project Development Considerations

Decarbonization projects were developed through a combination of detailed energy and building data analysis as well as collaboration with department staff. The analysis included review of data for utilities (energy), emissions, the latest Facility Condition Assessment Program (FCAP), and the 2016 Milwaukee County Zoo Clean Energy Plan¹³. Department staff provided further insights regarding past sustainability efforts, potential projects, and cross-departmental engagement opportunities. Additionally, the staff had the opportunity to review and provide feedback on recommended projects and progress milestones.

Note that project types, phasing, savings, and costs are based on the best information currently available. Periodic updates are recommended to keep that plan current and relevant as technology and department operations evolve.



MILWAUKEE COUNTY ZOO

¹³https://milwaukeezoo.org/conservation/sustainability/

Overview of Recommended Projects

SUSTAINABLE DESIGN STANDARDS: During project management and design development, utilize newly developed design guidelines to ensure sustainability features are incorporated.

SUSTAINABLE PROCUREMENT: During project management efforts, utilize sustainable procurement methods to improve the energy efficiency and environmental attributes of purchases.

LIGHTING UPGRADES: Continue to upgrade all facility lighting to LED. Incorporate daylight harvesting and vacancy sensors where appropriate.

RETRO-COMMISSIONING: Optimize energy performance of existing building systems.

ENERGY EFFICIENCY: Upgrade facilities to be more efficient. Upgrade controls, HVAC upgrades, and other envelope upgrades.

BUILDING ELECTRIFICATION: Eliminate fossil fuel use and replace equipment with electric alternatives. Consider geothermal systems where appropriate.

ON-SITE SOLAR: Install PV panels to generate clean electricity.

OFF-SITE CARBON-FREE ENERGY: Purchase clean electricity from the local utility or other third-party providers.

STRATEGY		REDUCTION	COST SAVINGS	COST ¹	PAYBACK	RESILIENCY	PRIORITY	NOTES
	MTCO2e	%	(\$/YR)		(YRS)	IMPACT	BUILDING(S)	
Retro-commissioning	400	7%	\$78,900	\$201,000	2.5	ł	Zoofari Conference Center and Maintenance Shop, Adventure Africa Elephant Care Center, Apes of Africa Building, Aquatic and Reptile Center, Pachyderm Building	All buildings over 10k sq. ft.
Energy Efficiency Upgrades	1,680	28%	\$336,000	\$5,960,000	17.7	ł	Zoofari Conference Center and Maintenance Shop	Prioritize lighting & specialty animal habitat projects
Building Electrification	630	9%	-\$45,900	\$5,220,000	_	Ш	Zoofari Conference Center and Maintenance Shop	Required to decarbonize heating. Assumes 50% of animal facility SF cannot be electrified
On-Site Solar	850	11%	\$228,000	\$7,410,000	32.5	▲	Zoofari Building	
Off-Site Carbon-Free Energy ²	2,880	41%	\$0	\$0	_	=	N/A	
Carbon Offsets	960	4%	-\$19,200	\$0	_	Ш	N/A	Annual expense to cover remaining emissions
TOTAL	7,400	100%	\$577,800	\$18,791,000	32.5			

¹Cost estimates are for cost premium for decarbonization beyond BAU; excludes grants and incentives; refer to Appendix A for more details ²Cost of CFE is shown as \$0 based on the assumption that the utility provider meets their sustainability targets by 2050

MILWAUKEE COUNTY ZOO

PATHWAY TO 2050 GOAL

The following figures represent a proposed pathway to achieving decarbonization for the Zoo by 2050.



Overall department emissions from 2025 through 2050, including the contribution of each fuel type.

The emissions reduction impact various strategies, listing in order of priority according to the "Impact Hierarchy of Decarbonization" in the "Project Background" section.

MILWAUKEE COUNTY ZOO

PATHWAY TO 2050 GOAL

The following figures represent a proposed pathway to achieving decarbonization for the Zoo by 2050.

Energy Use Over Time 120,000 100,000 80,000 MMBtu 60,000 40,000 20,000 0 2025 2030 2035 2040 2045 2050 ■ On-Site Solar ■ Electric ■ Nat Gas ■ Steam ■ Gasoline ■ Diesel ■ Renewable Fuel

Progress Milestones



ENERGY EFFICIENCY

animal enclosures)

2030-2035 - Achieve a department energy intensity (kbtu/sq. ft.) reduction of 7.5% by 2030 and 15% by 2035

2035 - RCx buildings over 15k sq. ft.



ft. of building footprint



ON-SITE SOLAR

Forecasted energy consumption by fuel type, as well as expected production of on-site solar. The goal is first to minimize total energy demand, and secondly to eliminate fossil fuel consumption and source remaining electric with on-site solar, purchased CFE, and carbon offsets (as required).

MILWAUKEE COUNTY ZOO

2030 - All lighting converted to LED (excluding

BUILDING ELECTRIFICATION

2035 - Eliminate fossil fuel use in 150k sq.

2035 - Provide 5% of department electric demand through onsite solar

Community Reintegration Center

The Community Reintegration Center (CRC) operates as a secure facility for adult men and women and is the largest county correctional facility in the state. The CRC provides evidence-based programming that reduces recidivism and prepares residents for their return to the community¹⁴.

FACILITIES OVERVIEW

The CRC is comprised of several energy-consuming facilities totaling 451,750 sq. ft. These facilities vary from Dormitories to Truck Storage, with a variety of building types in between. The data sourced from EnergyCAP provides total utility values for the entire site, rather than on a per-building basis.

BUILDING TYPE	# OF Buildings	TOTAL SQ. FT.	BUILDING GROUP Average Eui	ASHRAE 100 Eui goal
Other Public Order and Safety	1*	451,750	217.5	45

* The CRC complex consists of multiple buildings, but all facilities are combined for utility metering.

OTHER DEPARTMENTS





COMMUNITY REINTEGRATION CENTER

95%

TOTAL COUNTY EMISSIONS

¹⁴https://county.milwaukee.gov/EN/Community-Reintegration-Center

CRC

DEPARTMENT GHG INFORMATION

The Community Reintegration Center makes up 5% of the overall County emissions.



Recent Sustainability Initiatives

The CRC has completed several successful sustainability initiatives to decrease their emissions and increase energy efficiency and resiliency.

Heating Upgrades: Converted central heating plant from coal to natural gas. **Lighting Upgrades:** Replaced roughly half of fixtures with high efficiency LEDs. Building Controls: Centralized building automation system (BAS) to improve. Hybrid Vehicles: Some CRC vehicles upgraded to fuel-efficient hybrid alternatives. Water Efficiency: Installed low-flow fixtures and improved shower controls.

Project Development Considerations

Decarbonization projects were developed through a combination of detailed energy and building data analysis as well as collaboration with department staff. The analysis included review of data for utilities (energy), emissions, and the latest Facility Condition Assessment Program (FCAP). Department staff provided further insights regarding past sustainability efforts, potential projects, and cross-departmental engagement opportunities. Additionally, the staff had the opportunity to review and provide feedback on recommended projects and progress milestones.

Note that project types, phasing, savings, and costs are based on the best information currently available. Periodic updates are recommended to keep that plan current and relevant as technology and department operations evolve.



COMMUNITY REINTEGRATION CENTER

Overview of Recommended Projects

SUSTAINABLE DESIGN STANDARDS: During project management and design development, utilize newly developed design guidelines to ensure sustainability features are incorporated.

SUSTAINABLE PROCUREMENT: During project management efforts, utilize sustainable procurement methods to improve the energy efficiency and environmental attributes of purchases.

LIGHTING UPGRADES: Continue to upgrade all facility lighting to LED and incorporate daylight harvesting and vacancy sensors where appropriate.

RETRO-COMMISSIONING: Optimize energy performance of existing building systems.

CONTROLS UPGRADE: eliminate old pneumatic controls and replace with direct digital controls (DDC) for improved performance and visibility.

ENERGY EFFICIENCY: Upgrade facilities to be more efficient. Convert north building from constant volume to variable air volume (VAV) control, investigate heat recovery opportunities, and other HVAC and envelope upgrades (ex: new windows planned for Powerhouse).

WATER EFFICIENCY: Continue to install low flow fixtures and water reduction controls to reduce pump power and hot water heating.

BUILDING ELECTRIFICATION: Eliminate fossil fuel use and replace equipment with electric alternatives. Consider geothermal systems where appropriate.

ON-SITE SOLAR: Install PV panels to generate clean electricity.

OFF-SITE CARBON-FREE ENERGY: Purchase clean electricity from the local utility or other third-party providers.

STRATEGY	EMISSIONS REDUCTION Potential		COST SAVINGS	COST ¹	PAYBACK	RESILIENCY	PRIORITY	
	MTC02e	%	(\$/YR)		(YRS)	IMPACT	BUILDING(S)	
Retro-commissioning	600	10%	\$108,800	\$226,000	2.1	↑	Admin 600 and 400 Bed Dormitory	All b
Energy Efficiency Upgrades	2,170	36%	\$391,800	\$5,420,000	13.8	≜	Admin 600 and 400 Bed Dormitory	Prio
Building Electrification	760	13%	-\$55,000	\$14,760,000	_	=	Dormitory Building Boiler House	Req
On-Site Solar	970	16%	\$260,900	\$7,950,000	30.5	↑	Admin 600 and 400 Bed Dormitory	
Off-Site Carbon-Free Energy ²	1,340	22%	\$0	\$0	_	=	N/A	
Carbon Offsets	190	3%	-\$3,800	\$0	_	=	N/A	Ann
TOTAL	6,030	100%	\$706,500	\$28,356,000	40.1			

¹Cost estimates are for cost premium for decarbonization beyond BAU; excludes grants and incentives; refer to Appendix A for more details ²Cost of CFE is shown as \$0 based on the assumption that the utility provider meets their sustainability targets by 2050

COMMUNITY REINTEGRATION CENTER

NOTES
All buildings over 10k SF
Prioritize lighting, steam distribution
Required to decarbonize heating.
Annual expense to cover remaining emissions

PATHWAY TO 2050 GOAL

6,000

5,000

4,000

3,000

2,000

1,000

0

2025

2030

MTC02e

The following figures represent a proposed pathway to achieving decarbonization for CRC by 2050.







Overall department emissions from 2025 through 2050, including the contribution of each fuel type.

■ Electric ■ Nat Gas ■ Steam ■ Gasoline ■ Diesel

2035

2040

2045

2050

The emissions reduction impact various strategies, listing in order of priority according to the "Impact Hierarchy of Decarbonization" in the "Project Background" section.



COMMUNITY REINTEGRATION CENTER

PATHWAY TO 2050 GOAL

The following figures represent a proposed pathway to achieving decarbonization for CRC by 2050.







Forecasted energy consumption by fuel type, as well as expected production of on-site solar. The goal is first to minimize total energy demand, and secondly to eliminate fossil fuel consumption and source remaining electric with on-site solar, purchased CFE, and carbon offsets (as required).



COMMUNITY REINTEGRATION CENTER

Progress Milestones

ENERGY EFFICIENCY

2028 - Complete RCx

2030 - All lighting converted to LED

2030-2035 - Achieve a department energy reduction of 10% by 2030 and 25% by

BUILDING ELECTRIFICATION

2030 - Develop detailed plan and budget for electrification of central boiler house

2035 - Provide 10% of department electric demand through onsite solar

Department of Health and Human Services

The Department of Health and Human Services (DHHS) supports individuals across all stages of life, from young children to adults and elderly citizens. The department offers services in key areas such as behavioral health, housing assistance, disability support, and veteranrelated services.

FACILITIES OVERVIEW

DHHS operates 4 energy-consuming facilities, totaling 229,030 square feet throughout the County.

BUILDING TYPE	# OF Buildings	TOTAL SQ. FT.	BUILDING GROUP Average Eui	ASHRAE 100 Eui goal
Government Office	1	206,300	57.9	45
Social/Meeting	3	22,730	65.8	38

DHHS recently acquired the Hillview Housing Building. Since the facility was not County owned during 2023, it is excluded from the facilities list and emissions calculations but will contribute to the County's overall emissions moving forward.









DEPARTMENT OF HEALTH AND HUMAN SERVICES

99%

TOTAL COUNTY EMISSIONS

DHHS

¹⁴https://county.milwaukee.gov/EN/Community-Reintegration-Center

DEPARTMENT OF HEALTH AND HUMAN SERVICES

DEPARTMENT GHG INFORMATION

The Department of Health and Human Services makes up 1% of the overall County emissions.



Recent Sustainability Initiatives

DHHS has completed several successful sustainability initiatives to decrease their emissions and increase energy efficiency and resiliency.

Former behavioral health hospital **removed** from County portfolio in 2022.

Construction of **high-performance** Marcia P. Coggs Health and Human Services Center in progress.

Assisted in the planning and implementation of cooling and warming centers.

Project Development Considerations

Decarbonization projects were developed through a combination of detailed energy and building data analysis as well as collaboration with department staff. The analysis included review of data for utilities (energy), emissions, and the latest Facility Condition Assessment Program (FCAP). Department staff provided further insights regarding past sustainability efforts, potential projects, and cross-departmental engagement opportunities. Additionally, the staff had the opportunity to review and provide feedback on recommended projects and progress milestones.

Note that project types, phasing, savings, and costs are based on the best information currently available. Periodic updates are recommended to keep that plan current and relevant as technology and department operations evolve.



Overview of Recommended Projects

STRATEGY

Retro-commissioning

Energy Efficiency Upgrades

Building Electrification

On-Site Solar

SUSTAINABLE DESIGN STANDARDS: During project management and design development, utilize newly developed design guidelines to ensure sustainability features are incorporated.

SUSTAINABLE PROCUREMENT: During project management efforts, utilize sustainable procurement methods to improve the energy efficiency and environmental attributes of purchases.

LIGHTING UPGRADES: Continue to upgrade all facility lighting to LED, prioritizing Wil-o-Way Underwood. Incorporate daylight harvesting and vacancy sensors where appropriate.

EMISSIONS REDUCTION

POTENTIAL

%

2%

58%

6%

32%

RETRO-COMMISSIONING: Optimize energy performance of existing building systems.

MTC02e

20

630

60

340

ENERGY EFFICIENCY: Upgrade facilities to be more efficient. Upgrade controls, HVAC upgrades, and other envelope upgrades.

BUILDING ELECTRIFICATION: Eliminate fossil fuel use and replace equipment with electric alternatives. Consider geothermal systems where appropriate.

ON-SITE SOLAR: Install PV panels to generate clean electricity. A 67-kW rooftop solar array for the Coggs center was noted during the solar feasibility study.

OFF-SITE CARBON-FREE ENERGY: Purchase clean electricity from the local utility or other third-party providers.

Off-Site Carbon-Free Energy ²	0	0%	\$0	\$0	-	=	N/A
Carbon Offsets	20	2%	-\$400	\$0	_	=	N/A
TOTAL	1,070	100%	\$229,100	\$7,577,000	33.1		
				-	-		ensus tracts where over 20%

COST SAVINGS

(\$/YR)

\$3,700

\$137,900

-\$4,700

\$92,200

PAYBACK

(YRS)

7.3

6.6

_

33.0

COST¹

\$27,000

\$910,000

\$3,600,000

\$3,040,000

RESILIENCY

IMPACT

4

Idings indicated in orange are located in census tracts where over 20% of the population is living below the federal poverty line. es are for cost premium for decarbonization beyond BAU; excludes grants and incentives; refer to Appendix A for more details ²Cost of CFE is shown as \$0 based on the assumption that the utility provider meets their sustainability targets by 2050

PRIORITY

BUILDING(S)

Wil-o-way Grant

Wil-o-way Underwood Hillview Housing Building

Wil-o-Way Underwood

None

New Marcia P. Coggs Health

and Human Services Center

DEPARTMENT OF HEALTH AND HUMAN SERVICES

NOTES
Includes reduction from new Coggs building, increase from
new Hillview Housing Building
Required to decarbonize heating.
Annual expense to cover remaining emissions
PATHWAY TO 2050 GOAL

450

400

350

300

250

200

150

100

50

0

2025

MTC02e

The following figures represent a proposed pathway to achieving decarbonization for DHHS by 2050.







Overall department emissions from 2025 through 2050, including the contribution of each fuel type.

2035

■ Electric ■ Nat Gas ■ Steam ■ Gasoline

2040

2045

Diesel

2050

The emissions reduction impact various strategies, listing in order of priority according to the "Impact Hierarchy of Decarbonization" in the "Project Background" section.

MILWAUKEE COUNTY | Climate Action 2050 Plan

2030

DEPARTMENT OF HEALTH AND HUMAN SERVICES

DEPARTMENT OF HEALTH AND HUMAN SERVICES

PATHWAY TO 2050 GOAL

The following figures represent a proposed pathway to achieving decarbonization for DHHS by 2050.

7,000 6,000 5,000 MMBtu 000'2 4,000 2,000 1,000 0 2035 2025 2030 2040 2045 2050 ■ On-Site Solar ■ Electric ■ Nat Gas ■ Steam ■ Gasoline ■ Diesel ■ Renewable Fuel

Energy Use Over Time

MILWAUKEE COUNTY | Climate Action 2050 Plan







Forecasted energy consumption by fuel type, as well as expected production of on-site solar. The goal is first to minimize total energy demand, and secondly to eliminate fossil fuel consumption and source remaining electric with on-site solar, purchased CFE, and carbon offsets (as required).

Ensure new New Marcia P. Coggs Health and Human Services Center and solar array are properly commissioned and operated to meet energy targets of 46 kbtu/sq. ft./yr

Progress Milestones

ENERGY EFFICIENCY

2028 - RCx buildings over 10k sq. ft.

2030 - All lighting converted to LED

BUILDING ELECTRIFICATION

2035 - Eliminate fossil fuel use in 1 building

ON-SITE SOLAR

2035 - Provide 15% of department electric demand through onsite solar

Office of Emergency Management

The Office of Emergency Management (OEM) is comprised of 4 subdivisions:

- Radio Services Division
- 911 Communications Division •
- **Emergency Medical Services Division** •
- Emergency Management Division •

These four subdivisions provide a variety of services to the County community, including preparing and warning the public about disasters, work within the community through local emergency planning committee meetings, and other outreach and preparedness programs¹⁵. OEM has a strong need to be "zero fail" as a provider of emergency services.

OEM operates 5 Radio facilities in various locations throughout the County. These radio facilities have minimal physical footprint.

Aside from the Radio facilities, OEM occupies a small portion of the Clark building with plans to move into the Center for Forensic Science and Protective Medicine (CFSPM) building when construction is completed in 2026.





¹⁵ https://county.milwaukee.gov/EN/Office-of-Emergency-Management/How-Does-0EM#Workwithcommunities

OFFICE OF EMERGENCY MANAGEMENT

DEPARTMENT ROLE IN CLIMATE ACTION PLANNING

The Office of Emergency Management makes up 0.076% of the overall County emissions. This is due to a very small building footprint, and a small fleet of vehicles that is supported by MCDOT (These emissions are accounted for in the MCDOT emissions breakout).

As OEM has the need to be "zero-fail," current technology does not allow for decarbonization of the key OEM assets. However, these emissions should be re-evaluated in the future as new technologies are introduced.





Ensuring County Resiliency

OEMs climate action plan involvement centers around ensuring resiliency for the County and providing services that aide the public in dealing with possible climate impacts. These services include:

Establishing Warming and Cooling Centers in extreme cold and hot weather respectively

Often coordinated with the City of Milwaukee, but occasionally utilizes County facilities such as the Marcia P. Coggs Health and Human Services Center.

Coordinating with the Milwaukee Metropolitan Sewer District (MMSD) to track urban flooding

Improve community Resiliency through tracking events and impacts that may not be reported through government channels.

Continuing to prepare and assist the community during severe weather events, which will increase in severity and occurrence as climate change occurs¹⁶.

As climate-induced emergencies become more prevalent, OEM will continue to work with the community to understand and prepare for these emergencies. Expanding emergency medical services in conjunction with community level engagement will aid the County in their efforts to support the community during these climate events.

MILWAUKEE COUNTY | Climate Action 2050 Plan

OFFICE OF EMERGENCY MANAGEMENT

¹⁶ https://www.epa.gov/climate-indicators/weather-climate

Office of Equity

The Milwaukee County Office of Equity (OOE), formerly the Office on African American Affairs, brings a higher level of leadership, expertise and accountability to advance the County's strategic goals of creating intentional inclusion, bridging the gap and investing in equity to help fulfill this vision. The OOE is comprised of four subdivisions:

- Health & Racial Equality
- Community Resilience
- Research & Policy
- African American Affairs



DEPARTMENT ROLE IN CLIMATE ACTION PLANNING

OOE currently has no direct emissions, as they do not operate a fleet or own any buildings. Rather than focusing on emissions reduction as other departments may, OOE is focusing on three facets of climate action: Education, Community Engagement, and Internal Coordination.

OOE is focusing on equitable implementation of these Climate Action Strategies. Through collaboration with other County departments, OOE will be able to assist in the implementation of these projects through education and coordination.

Environmental Justice

Environmental Justice is a key aspect of climate action planning, as groups may be disproportionally affected by climate impacts. Race, income, age, and other various metrics can leave people exposed to harms such as extreme heat and cold, air quality issues such as asthma, and severe weather events such as flooding or fire. Mitigating environmental injustices begins with prioritizing disadvantaged communities as the County enacts their climate action plan.

When identifying priority buildings for each department's initial projects, county-wide census tract data was leveraged to understand where projects could have greater impact on impoverished communities in the County. Facilities such as the Hillview Housing Building, the Kosciuszko Community Center, and the King Community Center are listed as the priority building for various project types; all are located in census tracts where over 33% of the population is living below the federal poverty line¹⁵. Investing in building improvements in these communities helps move the needle on environmental justice.

OOE is dedicated to increasing community involvement and input as projects are generated by climate action planning. As outlined in their aligned climate action strategies (found in Appendix A), external partnerships and high participation are two methods through which OOE is looking to ensure equity is present throughout these projects.

Office of Strategy, Budget and Performance

The Office of Strategy, Budget and Performance (SBP) was created to further align strategic planning and budgeting efforts to enable Milwaukee County to achieve a brighter, healthier future. SBP works to strengthen county business practices and strategically align critical resources that advance the mission and improve Milwaukee County's fiscal health¹⁸. There are three service areas that SBP provides across the organization:

- Strategy
- Budget
- Project Management Office

DEPARTMENT ROLE IN CLIMATE ACTION PLANNING

SBP currently has no direct emissions, as they do not operate a fleet or own any **buildings.** SBP's involvement in the County Climate Action Planning effort will be tailored towards project development and implementation. SBP will serve as a partner to other departments as they work to implement their CA50 Plans.



Sustainability Scoring Criteria

As part of the County's annual capital request process, a scoring matrix is used based on prioritized goals and shared County values. In early 2025, climate action reduction criteria was incorporated as part of this matrix. These sustainability scoring criteria help keep climate impact at the top of mind when projects are being deliberated. Projects are ranked as follows:

- 0 Does not reduce county emissions OR improve climate resiliency
- flooding, or other climate hazards
- 3 Reduces county emissions & improves climate resiliency

These scoring criteria enable SBP to better understand climate and resiliency impacts as capital requests come to them. In addition to these criteria, SBP is also committed to helping fill the gaps that other departments may encounter in efforts to enact their climate plan. Through assistance with grant procurement, external funding pursuits, and communicating initiatives, SBP plans to stay involved with each department's climate plan.

In the future, SBP may want to consider additional criteria to evaluate the benefits of sustainability projects. Initiatives that reduce carbon emissions and pollution have many benefits that extend beyond project financials, as noted in the Co-Benefits section of this report. Some organizations have incorporated metrics such as Social Cost of Carbon or Internal Cost of Carbon in order to assign a financial value to those benefits. This increases the competitiveness of sustainability projects during capital planning evaluations.

OFFICE OF STRATEGY, BUDGET AND PERFORMANCE

1- Increases preparedness of the County and residents for extreme heating,

2 - Reduces greenhouse gas emissions generated by County Government operations

PATH FORWARD





8 | PATH FORWARD

While this CA50 Plan sets a clear direction for reducing emissions and working towards carbon neutrality by 2050, it is only one step in a long-term process. Achieving the ambitious goal of carbon neutrality will require continuous effort, periodic assessment, and a willingness to adapt as new challenges and opportunities arise.

This plan will evolve in future years to reflect the dynamic nature of climate action and the changing landscape of county operations.

As we move forward, it will be essential to remain flexible and proactive, engaging stakeholders and leveraging the latest technologies to ensure sustained progress towards our goal.

Actions for Sustained Progress

ENGAGING THE SUSTAINABILITY TASK FORCE

The task force will play a crucial role in pushing forward the implementation of emissions reduction projects. With continued participation from all County operating departments, the STF will develop tracking systems to measure progress against established goals, ensuring that key initiatives are effectively reducing emissions and meeting milestones. In addition, this group will work with the operating departments to further develop project implementation strategies.

REGULAR CHECK-INS ON PROGRESS MILESTONES

To maintain momentum, regular check-ins with stakeholder groups will be conducted yearly, at minimum, to assess progress toward the County-wide and department-specific Progress Milestones. These check-ins will help identify challenges and ensure that adjustments can be made to stay on track for achieving carbon neutrality by 2050.



ONGOING COMMUNITY ENGAGEMENT AND FEEDBACK

Engaging the local communities will continue to be a key aspect of the plan's success. Regular outreach and feedback mechanisms will allow residents, businesses, and organizations to stay informed about progress and provide input on how the plan is being implemented. This engagement will foster transparency, build support, and encourage collective action.

PLAN UPDATES TO REFLECT CHANGES IN COUNTY OPERATIONS AND NEW TECHNOLOGIES

As County operations evolve and new technologies become available, the CA50 Plan will be updated accordingly. This ensures that the plan remains aligned with the latest best practices, advances in renewable energy, and other innovations that can accelerate progress toward carbon neutrality.

8 | PATH FORWARD

Conclusion

This Climate Action 2050 Plan marks an important milestone on the journey to carbon neutral County operations, but it is by no means the final destination. The steps outlined in this section will ensure the County remains on course and continues to build momentum towards our goal.

In future years, the County must remain flexible and proactive, ready to adapt our strategies as needed to reflect new technologies, evolving community needs, and changing circumstances. This plan is just the beginning—the ongoing commitment to a sustainable future will guide the County every step of the way.

Together, we can create a resilient, carbon-neutral community for generations to come.







Acknowledgements

COUNTY EXECUTIVE AND DIRECTOR TEAM

David Crowley, County Executive	Amos
Aaron Hertzberg, Executive Director, DAS	Chant
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Brian Dranzik, Airport Director, MKE	Cassa
Julie Esch, Managing Director, MCTS	Sumai
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Sean Hayes, Director, FMD	

COUNTY SUSTAINABILITY TASK FORCE (2025)

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s Morris, Executive Director, Zoo tell Jewell, Superintendent, CRC ita LaGrant, Executive Director, DHHS andra Libal, Director, OEM aiyah Clark, Chief Equity Officer, OOE Lamers, Director, SBP

Carron, Former Director, FMD (retired) **Bennett**, Former Director, Office of Sustainability

> Kari Williams Matthew Haseman





This Climate Action Plan was prepared by McKinstry, a national firm specializing in cost-effective decarbonization, efficiency and green energy solutions.

Appendix A

- Definitions and/or References......1
- Cost Estimating Methodology......2
- Fleet Upgrade Inputs & Assumptions...... 4
- Cross-Department Themes & Strategic Alignment...... 5

Project Charters......12

Definitions and/or References

CARBON FREE ELECTRICITY (CFE)

Electricity that's generated without producing carbon emissions. It can come from a variety of sources, including solar, wind, nuclear, and hydroelectric power. This designation is similar to "renewable energy" but it is more inclusive of other technologies.

ENERGY USE INTENSITY (EUI)

EUI expresses a building's energy use as a function of its size or other characteristics. EUI is calculated by dividing the total energy consumed by the building in one year (measured in kBtu or GJ) by the total gross floor area of the building (measured in square feet or square meters). Building EUI calculated within this report was calculated using a 2-year average whenever possible.

EnergyStar: https://www.energystar.gov/buildings/benchmark/understand-metrics/what-eui

ASHRAE 100 EUIs: Link

ASHRAE (American Society of Heating Refrigeration and Air Conditioning Engineers) 100 is a building performance standard reflecting EUIs of Energy Efficient buildings that have had efforts in decarbonization (have updated functions to reduce energy consumption and carbon emissions.) This standard benchmarks buildings with high energy efficiency goals/ decarb efforts.

CARBON DIOXIDE EQUIVALENT (CO²E)

A unit of measurement that can be used to compare the emissions of various greenhouse gases based on how long they stay in the atmosphere and how much heat they can trap. For example, over a period of 100 years, 1 pound of methane will trap as much heat as 21 pounds of carbon dioxide. Thus, 1 pound of methane is equal to 21 pounds of carbon dioxide equivalents.

US EPA:

<u>https://sor.epa.gov/sor_internet/registry/termreg/searchandretrieve/termsandacronyms/search.do?search=&term=carbon</u> <u>%20dioxide%20equivalent&matchCriteria=Contains&checkedAcronym=true&checkedTerm=true&hasDefinitions=false</u>

FACILITY CONDITION INDEX (FCI)

Facility Condition Index is a metric used to understand the relative condition of a building based on outstanding capital needs. It is determined by dividing the sum of the known deferred maintenance and upcoming capital costs by the cost to replace the building in its entirety. A lower score indicates relatively good condition while a higher score indicates that a major renovation, replacement or other capital investment is needed to maintain operations at the facility. The FCI values used for the CA50 Plan were taken from Milwaukee County's Facility Condition Assessment Program data.

RETRO- COMMISSIONING (RCx)

The process of optimizing existing building systems (typically HVAC, Plumbing, and Electrical), to ensure they are operating as efficiently as during initial construction. These projects typical involve finding equipment repairs and controls modifications that provide low/no cost energy savings projects.

Cost Estimating Methodology

An important part of developing the CA50 Plan is providing estimated implementation costs for the recommended projects. McKinstry has performed sustainable design and construction for decades, and the McKinstry team was able to lean on this experience to provide reasonable project cost estimates. Given the wide scope of the CA50 Plan, covering hundreds of buildings and vehicles, the *cost estimates are at a conceptual design level of detail*.

This level of detail would be considered an American Association of Cost Engineers (AACE) Class 5 estimate, defined as "longrange estimates that are based on minimal scope definition¹." The goal is to provide order of magnitude costs that can inform future planning and budgeting efforts. As specific projects are pusued, they will move further into the project development process, where scope will be further defined and cost estimates will become more precise.



¹ https://library.aacei.org/pgd01/pgd01.shtml

Cost Estimating Methodology

Some projects, such as retro-comissioning, have less uncertainty and more accurate pricing as a result. Others, such as building electrification or fleet decarbonization, are still fairly uncertain and the pricing could vary significantly from the initial estimate.

The following methods were used for each project type:

- **Retro-commissioning**: \$/sq. ft. estimates based on industry standards and McKinstry's experience.
- Energy Efficiency Upgrades: \$/sq. ft. estimates based on industry standards and McKinstry's experience.
- **Building Electrification:** The building heating systems were grouped into different categories (rooftop units, hydronic boiler plants, and full steam systems). Based on the system type and expected electrification technology, a \$/sq. ft. estimate was applied based on McKinstry's experience in electrification projects.
- Fleet Decarbonization: Fleet vehicles were categorized based on type and use, which determined the decarbonization methodology. Vehicle procurement, fueling, and operating costs are based on publicly available information. Charging system costs are based on McKinstry's experience and vary based on charger type.
- **On-Site Solar:** Pricing came from the 2024 solar feasibility study.
- Off-Site CFE: Based on the sustainabiliy goals of the utility supplier, obtaining carbon-free electricity is anticipated to be cost neutral in 2050.
- Carbon Offsets: Estimated at \$20 per ton, per BloombergNEF Global Carbon Market Outlook 2024².

When considering projects that include equipment replacements, *project costs only include the incremental cost of decarbonization*. This the additional cost beyond installing a like-for-like replacement, as that should already be budgeted for as part of a traditional capital planning process.

For instance, the cost to replace a hot water boiler with a heat pump would include the incremental cost increase of the heat pump over the boiler, plus any additional work required such as an electrical upgrade. Similarly, rooftop solar installation would exclude the cost to replace a roof, as that would be part of standard building maintenance.



Costs represent "turn key" projects, including design, permits, materials, labor, commissioning, etc. Grants and incentives are excluded from project pricing due to uncertainty of future funding programs. All costs are presented in 2025 US dollars; expect projects completed in the future to be higher cost due to inflation.

² https://about.bnef.com/blog/global-carbon-market-outlook-2024/

Fleet Upgrade Inputs & Assumptions

Fleet vehicle decarbonization strategies were developed through a detailed process that evaluated the existing fleet inventory and fuel usage. Based on current vehicle types and operational profiles, the vehicles were grouped into one of three categories: suitable for cost-effective conversion to electric, transition to low carbon intensity liquid fuels (such as R99 renewable diesel, or potentially hydrogen sourced from a low carbon intensity production pathway), or continue using conventional fossil-sourced gasoline or diesel fuels.

The County can and should achieve improvements in fuel consumption and fleet emissions through the use of hybrid vehicles or clean diesel technology. Vehicle manufacturers will be motivated to produce heavy duty vehicles with hybrid, clean diesel, fuel cell, and electric drivetrains in increasing numbers as part of the EPA's *Greenhouse Gas Emissions Standards for Heavy Duty Vehicles* - Phase 3 regulations, helping to close a gap in the availability of these vehicles that exists today. However, hybrid and clean diesel drivetrains provide only a marginal emissions reduction and are not a viable path to meet the County's zero emissions goal by 2050. Therefore, it is recommended to pursue the use of battery electric vehicles where feasible as a first and highest priority, and pair hybrid and clean diesel drivetrains with the use low or zero carbon intensity liquid fuels where electrification is not viable. Any emissions from remaining fossil fuels will need to be eliminated through purchasing carbon offsets. Based on the specific makeup of the County fleets, the table below indicates the expected fuel usage in 2050.

	BASELINE FUEL*			2050 FUEL (ESTIMATED)	
DEPARTMENT	Gasoline (gal)	Diesel (gal)	Gasoline (gal)	Diesel (gal)	Electric (kWh)	R99 (gal)
MCDOT	380,401	313,905	110,316	0	2,905,455	285,654
MCTS	23,498	3,197,339	8,224	0	31,746,060	319,734

*2022 data for MCDOT and 2023 data for MCTS

As noted in the Cost Estimating Methodology section above, fleet decarbonization costs were calculated based on the incremental costs of the upgrades. For fleet upgrades, this means the additional cost of electric vehicles beyond a like-for-like replacement, the cost of charging infrastructure, and the additional annual cost of renewable fuels over traditional fuels. Level II charging infrastructure was assumed for light and medium duty vehicles and level III chargers are assumed for heavy duty vehicles and buses. Additional planning and design will be required to determine the optimal strategy and location for vehicle charging, but the cost estimates provide an order of magnitude cost for future planning purposes, regardless of chosen strategy and whether the infrastructure is deployed through substantial modifications of an existing facility, or through acquisition and up-fit of a new facility. The table below provides more detail on the expected costs of fleet decarbonization.

DEPARTMENT	Vehicle Fuel Type	% Conversion to EV	EV Cost Premium	Charging Cost	Total Cost
мсдот	Gasoline	71%	\$9,771,000	\$3,229,000	\$13,000,000
MCDOT	Diesel	9%	\$595,000	\$305,000	\$900,000
MCTS	Gasoline	65%	\$900,000	\$430,000	\$1,330,000
1010	Diesel	90%	\$169,670,000	\$35,300,000	\$204,970,000

Key cross-department themes, depicted in the below figures, were established by departments during the strategic alignment development process from May through August 2024. These themes align with best practices and were interwoven into the CA50 Plan recommendations.

County-Wide



Department Specific

Department of Transportation- Fleet/Transit/Highway

Department Strategic Principles	Climate Action Principle		Aligned Climate Action Strategy
Workforce, Safety, Fiscal Health, Connectivity			
Maintain fiscal health and achieve sustainable funding to maintain essential services.	3a: Achieve net zero County operations carbon emissions by 2050 with sustainable and fiscally		Support long-term MCDOT facilities master planning as a climate action imperative.
Increase efficiency/reduce operating costs of facilities.	responsible solutions that align with County core functions, missions and priorities.		Support long-term MCDOT fleet master planning as a climate action imperative, including route optimization of fleet vehicles.
Increase access and promote connectivity among roadway users.			
Address roadway safety with measurable reductions in reckless driving, fatal crashes and serious injuries.	2a: Identify health disparities caused by climate change and prioritize projects that will positively impact health outcomes.	-+	Develop a strategic long-term capital plan to optimize footprint, increase energy efficiency, and eliminate fossil fuel use in fleet and at facilities. This should include micro-transit, multi-modal transit and last mile.
Right-size and prepare for eventual non-fossil fuel fleet.	3b: Prioritize projects that will provide green education and jobs		Include MCDOT in overall county solar energy strategy.
Increase transit availability to vulnerable communities.	for vulnerable/underserved communities as co-benefits.		Incubate workforce training programs within climate action projects.
Develop solar electrification plan			

Department of Transportation – MMIA

Department Strategic Principles	Climate Action Principle	Aligned Climate Action Strategy
Financial Stability and Growth	1a: Identify and involve Stakeholders and Partners in each phase of the project	Engage MKE Sustainability Team to implement strategies to be recommended in 2024 update of MKE Sustainability Management Plan.
Compliance	(Research, Planning and Implementation)	Explore opportunity to partner with 128 th Air Refueling Wing on large-scale solar generation and development of a micro-grid.
	3a: Achieve net zero County operations carbon emissions by 2050 with sustainable and fiscally	Conduct study to explore non-fossil fuel alternatives for micro-grid development.
Modernization	responsible solutions that align with County core functions, missions and priorities.	Vehicle electrification/alternative fuel. Shuttle buses, light duty fleet, GSE.
Resiliency in the face of extreme	3c: Improve ability of vulnerable/underserved	Develop framework for ESG reporting that includes climate action principles.
weather events & power outages is critically important	communities to adapt to climate change.	Develop a strategic long-term capital plan to right-size footprint, increase energy efficiency, and eliminate fossil fuel use in fleet and at facilities.

Department Strategic Principles	Climate Action Principle	Aligned Climate Action Strategy
Best practices in project and asset management ensure that our		Institute Sustainable Design Standards.
facilities and infrastructure are planned, designed, constructed, operated, and maintained to be best in class and sustainable.	3a: Achieve net zero County operations carbon emissions by 2050 with sustainable and	Invest in Preventive Maintenance as a best practice to control energy costs and extend useful life of equipment.
Fossil-fueled HVAC/plumbing systems have limited lifespan and	fiscally responsible solutions that align with County core functions, missions and priorities.	Include real-time Energy and Building Management Systems in all major facilities a any facilities with renewable energy system
require strategic capital planning for replacement.	priorites.	Develop a strategic long-term capital plan the includes plans to reduce footprint and elimin fossil fuel use at facilities.
Divestments and investments needed in buildings and staff to meet long-term sustainability	3b: Prioritize projects that will	Complete a 'net zero' pilot project for one our community buildings.
goals. Provide career paths and professional development for employees.	provide green education and jobs for vulnerable/underserved communities as co-benefits.	Develop a strategic plan to maximize solar at facilities. Determine opportunities for oth renewables on a facility or project basis. Include staff and apprentices in projects fo training.
Federal/State TMDL requirements	3c: Improve ability of vulnerable communities to adapt to climate	Prioritize TMDL investments which also impr resiliency - flood and heat island mitigation
will drive Best Mgmt Practices and green infrastructure.	change.	Secure regular funding stream for maintena of green infrastructure.
Ν	1ilwaukee County	v Parks
Department Strategic Principles	1ilwaukee County Climate Action Principle	Parks
Department Strategic Principles	Climate Action Principle 3a: Achieve net zero County	
Department Strategic Principles Equitably Balance the Parks System to be Fiscally and Environmentally Sustainable.	Climate Action Principle 3a: Achieve net zero County operations carbon emissions by 2050 with sustainable and fiscally responsible solutions that align with County core	Aligned Climate Action Strategy Support long-term Parks planning as a
Department Strategic Principles Equitably Balance the Parks System to be Fiscally and Environmentally	Climate Action Principle 3a: Achieve net zero County operations carbon emissions by 2050 with sustainable and fiscally responsible solutions	Aligned Climate Action Strategy Support long-term Parks planning as a climate action imperative. Develop a strategic long-term capital plan that includes plans to reduce footprint , increase energy efficiency, and eliminate
Department Strategic Principles Equitably Balance the Parks System to be Fiscally and Environmentally Sustainable. Reduce Footprint and Operating Costs to Maintain Fiscal	Climate Action Principle 3a: Achieve net zero County operations carbon emissions by 2050 with sustainable and fiscally responsible solutions that align with County core functions, missions and priorities. 2a: Identify health disparities caused by climate change and prioritize projects that will	Aligned Climate Action Strategy Support long-term Parks planning as a climate action imperative. Develop a strategic long-term capital plan that includes plans to reduce footprint, increase energy efficiency, and eliminate fossil fuel use at facilities. Identify measurable amount of annual cost of MTCO2e savings.
Department Strategic Principles Equitably Balance the Parks System to be Fiscally and Environmentally Sustainable. Reduce Footprint and Operating Costs to Maintain Fiscal Sustainability.	Climate Action Principle 3a: Achieve net zero County operations carbon emissions by 2050 with sustainable and fiscally responsible solutions that align with County core functions, missions and priorities. 2a: Identify health disparities caused by climate change and prioritize projects that will positively impact health outcomes. 3c: Improve ability of vulnerable communities to adapt to climate	Aligned Climate Action Strategy Support long-term Parks planning as a climate action imperative. Develop a strategic long-term capital plan that includes plans to reduce footprint , increase energy efficiency, and eliminate fossil fuel use at facilities. Identify measurable amount of annual cost of MTCO2e savings. Plant 'climate ready' shade trees near community centers and in urban parks to reduce heat island effects. Create measurable goals. Convert Parks equipment fleet to all electri
Department Strategic Principles quitably Balance the Parks System to be Fiscally and Environmentally Sustainable. Reduce Footprint and Operating Costs to Maintain Fiscal Sustainability. dvance Reforestation and Naturalize Underused Areas. Reduce Central City Heat Island Effect to Invigorate Community Health and Wellness.	Climate Action Principle 3a: Achieve net zero County operations carbon emissions by 2050 with sustainable and fiscally responsible solutions that align with County core functions, missions and priorities. 2a: Identify health disparities caused by climate change and prioritize projects that will positively impact health outcomes. 3c: Improve ability of vulnerable communities to adapt to climate change. 1a: Identify and involve	Aligned Climate Action Strategy Support long-term Parks planning as a climate action imperative. Develop a strategic long-term capital plan that includes plans to reduce footprint , increase energy efficiency, and eliminate fossil fuel use at facilities. Identify measurable amount of annual cost of MTCO2e savings. Plant 'climate ready' shade trees near community centers and in urban parks to reduce heat island effects. Create measurable goals. Convert Parks equipment fleet to all electri by 2050, starting in vulnerable community areas.
Department Strategic Principles quitably Balance the Parks System o be Fiscally and Environmentally Sustainable. Reduce Footprint and Operating Costs to Maintain Fiscal Sustainability. vance Reforestation and Naturalize Underused Areas.	Climate Action Principle 3a: Achieve net zero County operations carbon emissions by 2050 with sustainable and fiscally responsible solutions that align with County core functions, missions and priorities. 2a: Identify health disparities caused by climate change and prioritize projects that will positively impact health outcomes. 3c: Improve ability of vulnerable communities to adapt to climate change.	Aligned Climate Action Strategy Support long-term Parks planning as a climate action imperative. Develop a strategic long-term capital plan that includes plans to reduce footprint , increase energy efficiency, and eliminate fossil fuel use at facilities. Identify measurable amount of annual cost of MTCO2e savings. Plant 'climate ready' shade trees near community centers and in urban parks to reduce heat island effects. Create measurable goals. Convert Parks equipment fleet to all electri by 2050, starting in vulnerable community areas. Complete a climate action pilot project for one of our Parks with community



Community Reintegration Center (CRC)

Department Strategic Principles	Climate Action Principle	(Aligned Climate Action Strategy
CRC is moving from corrections to reintegration, meeting residents where they are and addressing	3b: Prioritize projects that will provide green education and jobs for vulnerable/underserved		Incubate workforce training programs within climate action projects, and align with the Empowerment Center and other CRC programs.
their needs for education, training and employment upon release.	communities as co-benefits.		Develop a climate action communications, education and engagement plan specific to CRC.
Expand work release program with	1a: Identify and involve		
community partners.	Stakeholders and Partners in each phase of the project.		Fold climate action planning into the long- term CRC facilities master planning work.
Sustainable and engaged workforce.			
	3a: Achieve net zero County operations carbon emissions by 2050 with sustainable and fiscally responsible solutions that align		Develop a strategic long-term capital plan to reduce footprint, increase energy efficiency, and eliminate fossil fuel use at facilities.
Sustainable operations.	with County core functions, missions and priorities.	$\langle \rangle$	
			Include CRC in overall county solar energy

strategy.

Department of Health and Human Services (DHHS) (1) Department Strategic Principles Climate Action Principle Aligned Climate Action Strategy THEME #6: Talent is Hired from 1b: Increase involvement of Effected Communities, Creates Pipeline to Recruit & Retain minority and women-owned businesses in implementation of action plans. Include Senior Centers in overall county solar energy strategy. Diverse Staff. Develop a strategic long-term capital plan to THEME #4: Savings from right-size footprint, increase energy Efficiencies Reinvested. Invest in operations by 2050 with sustainable and fiscally responsible solutions that align efficiency, and eliminate fossil fuel use in Upstream Support. fleet and at facilities. with County core functions, Include Youth Apprenticeships and other THEME #9: Build Capacity of Staff, Contracted Staff, Community missions and priorities. training programs in all County solar photovoltaic installation and weatherization Members. projects. 3b: Prioritize projects that will provide green education and jobs for vulnerable/underserved communities as co-benefits. Develop external partnerships that will identify and promote green education and of Individuals, Including Employment. Greater Accessibility jobs. Cooperate to evaluate all climate action projects for opportunities. for Vulnerable Residents. 3c: Improve ability of Establish/improve community centers as THEME #5: Services at Locations Where Vulnerable Populations cooling shelters. communities to adapt to climate Seek Help. change.

Department of Health and Human Services (DHHS) (2)

Department Strategic Principle	5	Climate Action Principle) (Aligned Climate Action Strategy
THEME #8: Develop Trust and Intentional Inclusion.		1a: Identify and involve Stakeholders and Partners in each phase of the project.	Γ.	Develop a climate action communications,
THEME #3: Elevate Community Voice/Systems Goal Setting & Planning. Invest in Health Promotion.		(Research, Planning and Implementation) 2a: Identify health disparities		education and engagement plan specific to DHHS. Partner with TBE/DBE firms to retrofit
THEME #7: Emphasize the Importance of Addressing Underlying Needs & Root Causes.		caused by climate change and prioritize projects that will positively impact health outcomes.		emergency response centers and shelters with energy efficient equipment, lighting and other building technologies/systems.
THEME #2: Contractors Reflect Diversity. Physical Environments		1b: Increase involvement of minority and women-owned businesses in implementation of action plans.		Studies identified asthma and heat-related health vulnerabilities driven by climate change. Score climate action projects by weighting these impacts.

Support Staff Well-Being.

Emergency Management (OEM)



Strategy, Budget & Performance	(SBP)
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Department Strategic Principles	Climate Action Principle	Aligned Climate Action Strategy
Lead Milwaukee County's Strategic Plan.	2a. Identify health disparities caused by climate change and prioritize projects that will positively impact health outcomes.	Studies identified asthma and heat-related health vulnerabilities driven by climate change. Score climate action projects by weighting these impacts.
Utilize an equitable lens for budgeting.	3a. Achieve net zero County operations carbon emissions by 2050 with sustainable and fiscally responsible solutions that align	Develop a strategic plan to maximize renewable energy generation at County facilities. Include youth apprenticeships, workforce development groups and other training programs in all installations.
Improve Milwaukee County's fiscal health.	with County core functions, missions and priorities.	Develop a strategic long-term capital plan that includes plans to reduce footprint, increase energy efficiency, and eliminate fossil fuel use at facilities.
Improve Milwaukee County operations and innovative practices.	3b. Prioritize projects that will provide green education and jobs for vulnerable/underserved communities as co-benefits.	Develop a specific process to track, evaluate and apply for funding opportunities that can support climate action projects.
Increase engagement of the workforce.	1b. Increase involvement of minority and women-owned businesses in implementation of action plan.	Assist with the development of county-wide internal communications to educate staff on climate vulnerabilities and climate action strategies.

Sample charters for various project types are listed below.

	RETRO-COMMISSIONING	
Project Description	Retro-commissioning is the process of optimizing existing building systems to ensure they are operating as efficiently as during initial construction. This involves equipment testing and detailed review of building control systems to identify energy conservation measures.	
Why Required	Building systems performance tends to "drift" over time due to changes in space use, operator overrides, and mechanical component failures, causing them to operate inefficiently with excess energy use and cost.	
Scope	 Project consists of completing a retro-commissioning study at [BUILDING NAME]. Scope items include: Review and physical testing of key mechanical systems including major heating, cooling, and ventilation equipment. Including, but not limited to: Air Handlers, Rooftop Units, Variable Air Volume Boxes (representative sample), Central Heating Plant, Central Cooling Plant Review of Building Automation System and interview maintenance staff to understand current operation and areas for improvement. Develop and implement Energy Conservation Measures (ECMs) to improve building efficiency. 	
Success Criteria	Improved building energy efficiency and extended equipment life.	
Co Benefits	Identification of operations and maintenance improvement opportunities, improved indoor air quality, increased occupant comfort.	
Expected Outcomes	The expected outcome of retro-commissioning is reduced energy usage, which leads to lower energy costs and reduced greenhouse gas emissions, and improved system performance.	

CONTROLS UPGRADES	
Project Description	Modern digital control systems allow for enhanced control strategies, such as scheduling, temperature setbacks, and demand-based operation, saving energy and reducing carbon emissions. Upgrading or installing building controls may involve installation of hardware, software, or network infrastructure.
Why Required	A controls upgrade can reduce energy consumption and improve building efficiency.
	Project consists of completing a controls upgrade or installation, dependent on existing system at [BUILDING NAME].
Scope	 Scope items include: Assess existing building controls and determine deficiencies and needs. Identify the new controls system. Determine equipment and infrastructure needed to upgrade controls. Work with controls contractor to install new system. Perform commissioning on new system. Training of facility staff on new system.
Success Criteria	Increased building efficiency and automation.
Co Benefits	Improved maintenance and issue response times, improved indoor air quality, increased occupant comfort, increased control over systems including remote monitoring.
Expected Outcomes	The expected outcome of controls upgrades is reduced energy usage and more proactive and efficient maintenance. Additionally, the building will have increased automation and monitoring capabilities.

BUILDING ELECTRIFICATION	
Project Description	Replace fossil-fuel based heating system with an electric alternative, such as heat pumps or variable refrigerant flow (VRF). These systems are capable of providing both heating and cooling and can reach efficiencies exceeding 400%. When powered by carbon-free energy, they emit zero greenhouse gas emissions. Where feasible, geothermal heat pump systems are preferred due to their very high efficiency.
Why Required	Building electrification is required in order to decarbonize [BUILDING NAME]. Converting to all-electric system is a key step to eliminating fossil fuel usage.
Scope	 Project consists of removal of current heating and cooling systems and the installation of all-electric or geothermal alternatives. Scope items include: Demolition of current heating and cooling systems, such as boilers or chillers. Installation of all-electric system. If feasible, evaluation and installation of geothermal heat pump system. First Steps Move into the initial stages of system design with an architect and/or engineer. Establish feasibility of all-electric alternatives and identify ideal replacement system. Analyze electrical capacity of existing system Develop more precise project financials, including impact to utilities, maintenance, and carbon.
Success Criteria	Improved building efficiency and decarbonization of building heating system.
Co Benefits	Modernization of HVAC equipment, resiliency, improved indoor air equality.
Expected Outcomes	Elimination of fossil fuel for heating, modern equipment installed, significant reduction of greenhouse gas emissions.

BUILDING ENVELOPE/DUCT SEALING	
Project Description	Reduce heat loss and air leakage by applying strategies such as replacing windows, increasing roof/wall insulation, weatherstripping doors and windows, and sealing HVAC ductwork leaks.
Why Required	Building envelope and duct sealing are measures that reduce heating and cooling losses caused by escaping conditioned air. By improving building and duct seals systems will become more energy efficient.
Scope	 Project consists of repairing building envelope or ductwork at [BUILDING NAME]. Scope items include: Evaluation of building envelope for air exfiltration/infiltration and thermal losses. Evaluation of building ductwork for air leakage. Repair or replacement of relevant building systems. This includes, but is not limited to windows, doors, insulation, roofing, ductwork.
Success Criteria	Reduced air infiltration/exfiltration and increased system efficiency.
Co Benefits	Improved indoor air quality and increased occupant comfort.
Expected Outcomes	Building will be more energy efficient by reducing heating, cooling, and airflow losses.

HVAC UPGRADES	
Project Description	Replace outdated HVAC systems with modern alternatives. This includes converting constant flow systems to variable volume, adding variable frequency drives (VFDs) to fans and pumps, and installing high-efficiency motors.
Why Required	Modern alternatives to traditional HVAC systems contribute significantly to overall building energy consumption and can greenhouse gas emissions.
Scope	 Project consists of completing equipment upgrades, dependent on existing system at [BUILDING NAME]. Scope items include: Evaluating remaining useful life of existing equipment Determining appropriate replacement or upgrade for equipment type. Purchasing and installation of upgraded equipment. Connection of equipment to building automation system. Commissioning of new systems.
Success Criteria	HVAC systems are upgraded to modern standards and are more efficient overall, leading to less energy consumption.
Co Benefits	Reduced operations and maintenance, improved indoor air quality, increased occupant comfort.
Expected Outcomes	HVAC equipment is upgraded to modern alternatives and has reduced energy consumption and greenhouse gas emissions.

LIGHTING UPGRADES	
Project Description	Replace outdated, inefficient lighting fixtures, such as fluorescent tubes, metal halide, and incandescent with high efficiency LED alternatives.
Why Required	LED lighting is significantly more energy efficient than older alternatives, which will reduce the electrical consumption of [BUILDING NAME].
Scope	 Project consists of completing lamp replacement or full fixture upgrades, depending on the existing system. Scope items include: Perform a lighting audit to take inventory of existing light fixtures. Evaluation of lighting fixtures to determine appropriate lighting upgrade. Purchase and install high efficiency LEDs.
Success Criteria	Lighting fixtures in are all converted to LED tubes.
Co Benefits	Improved light quality, increased staff performance and satisfaction, increased lighting lifespan, increased lighting durability, and increased safety (for exterior fixtures).
Expected Outcomes	Upgraded LED lighting will increase building efficiency and lower building energy consumption and costs, among many other benefits.

ON-SITE SOLAR INSTALLATION	
Project Description	Install photovoltaic (PV) panels on building roofs and carports to provide renewable energy. These can be coupled with battery systems either now or in the future to increase flexibility and add resiliency.
Why Required	On-Site Solar will reduce carbon emissions from purchased electricity. It also increases a buildings resiliency reducing dependency on grid-supplied electricity.
Scope	 Project consists of installation of PV panels [LOCATION OF PANELS], dependent on existing system at [BUILDING NAME]. Scope items include: Assessment of solar feasibility OR review of existing solar feasibility assessment. Work with contractor for system design. Work with contractor for permitting approval. Construction of racking or mounting system, installation of PV panels, and electrical connections. Testing and commissioning of system. Monitor and track system performance over time.
Success Criteria	[BUILDING NAME] is generating a significant portion of electricity locally.
Co Benefits	Resiliency, improved air quality, reduced energy losses, highly visible example of sustainability commitment
Expected Outcomes	[BUILDING NAME] has PV Panels installed [LOCATION OF PANELS] and is generating electricity successfully.

FLEET ELECTRIFICATION PLANNING	
Related to Electric Vehicle Adoption	
Project Description	Create a long-term plan for fleet electrification and charging system deployment. Update every 3-5 years as learnings accrue and market conditions change.
Why Required	Electric vehicles require a planned approach to charging in order to support their use. In addition to the time required to achieve municipal budget approvals, deployment of fleet-scale charging systems can require an Engineering, Procurement, and Construction lead time of 1-3 years before chargers are operational.
	Incorporation of the first handful of electric vehicles into a fleet may be done without significant planning by utilizing spare electrical capacity, but successfully scaling the use of electric vehicles requires a multi-year plan.
Scope	 Complete a line-by-line review of the vehicles and equipment supporting each departmental mission and user need. Identify the appropriate (<i>if any</i>) electric drivetrain alternative for each user need, and the expected year of adoption of an electric drivetrain alternative for that vehicle. Identify the long-dwell and fast charging needs for each vehicle individually. Aggregate charging needs to a facility level and develop a phased approach to deploy charging equipment to support long-dwell and fast charging needs at each facility, and at locations throughout the County, including required upgrades to County and Utility-Owned electrical infrastructure. Create a phased budget to match the phased plan. (<i>This is similar to the charging plan provided previously for MCTS for buses.</i>)
Success Criteria	Each department, in partnership with MCDOT where appropriate, have contributed to the creation of the fleet electrification plan, and approved the plan as their official intentions. The plan is updated every 3-5 years.
Co Benefits	N/A
Expected Outcomes	[DEPARTMENT] has replaced X% of internal combustion fleet vehicles with electric fleet vehicles, and deployed charging equipment to support long- dwell and fast charging needs.

ELECTRIC VEHICLE ADOPTION	
Related to Fleet Decarbonization Planning	
Project Description	Replace existing internal combustion drivetrain vehicles and equipment with near-equivalent electric drivetrain models, paired with charging equipment to support long-dwell and fast charging needs.
Why Required	Electric drivetrains are the most cost-effective and mature technology for eliminating the emissions from light duty vehicles and equipment, as well as medium- and heavy-duty vehicles & equipment that perform predictable and/or short-duration activities.
Scope	Internal combustion fleet vehicles are replaced with electric drivetrain vehicles where appropriate for the duty cycle and where mature near-equivalent replacements exist.
Success Criteria	[DEPARTMENT] is supporting the needs of their users and constituents using electric vehicles.
Co Benefits	Reduced maintenance burden, improved driving experience, lower total cost of operations (for some vehicle classes and use types).
Expected Outcomes	[DEPARTMENT] has replaced X% of internal combustion fleet vehicles with electric fleet vehicles, and deployed charging equipment to support long- dwell and fast charging needs.