MILWAUKEE COUNTY

Office of Sustainability
Facilities Management Division
Department of Administrative Services

Climate Action 2050

Achieving Net Zero Carbon Emissions While Advancing Equity, Justice, & Community Resilience

A Framework for Developing and Administering a Strategic Carbon Neutrality Plan for Milwaukee County

Originally Submitted: August 13, 2021
Appendix IV Revised: September 7, 2021

Preface

Each year on April 22, Earth Day marks the anniversary of the birth of the modern environmental movement in 1970. The event has its roots in Wisconsin, as it was the brainchild of our Senator Gaylord Nelson. Earth Day also marks a time when we can reflect upon the value of our natural world and resolve to protect it from threats such as global climate change.

On Earth Day 2021, the Milwaukee County Board of Supervisors adopted File 21-389 committing the County to achieve carbon-neutral operations by 2050. The legislation recognizes that reducing or offsetting carbon emissions is critical to lessening the impacts of climate change. Time is of the essence with this matter - by mid-century, the number of extreme heat days in Wisconsin could triple, and extreme precipitation events will likely increase in frequency and magnitude[1]. In Milwaukee County and throughout our state, this could cause more flooding, reduce air and water quality, and increase stress on already vulnerable populations.

This report provides the initial framework for Milwaukee County to achieve carbon neutrality in its operations. It sets out to define the initiative's scope and scale and identifies potential strategies and challenges with this ambitious undertaking. We engaged a Steering Group to develop a set of Guiding Principles and align Climate Action 2050 to the County's Mission, Vision, and Strategic Plan. Finally, as requested in the carbon neutrality legislation, we suggest an approach and timeline for developing a detailed plan for County operations to get to net zero carbon emissions – our roadmap to 2050.

We sincerely hope this report will be useful in Milwaukee County's pursuit of achieving net zero emissions while advancing equity, justice, and community resilience.

Stuart Carron
Gordie Bennett

Co-Chairs, Milwaukee County Sustainability Task Force

[1] Wisconsin Initiative on Climate Change Impacts. (2020). *Report to the Governor's Task Force on Climate Change: Strategies to Improve Wisconsin's Climate Resilience and Readiness*. Accessed 8/6/21 from https://wicci.wisc.edu/wp-content/uploads/wicci-report-to-governors-task-force.pdf

Acknowledgements

Thank you to the many people who contributed to the development of the Climate Action 2050 Framework, including Milwaukee County Executive David Crowley, County Board of Supervisors, DAS Director's Office, and consulting team from ICLEI Local Governments for Sustainability USA. Special thanks to the Sustainability Task Force, whose members are listed below, for their significant contributions to the Framework. Like other planning efforts, this report represents a collaborative effort, built upon the work and passion of many.

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Call to Action

Milwaukee County's vision is that by achieving racial equity, Milwaukee is the healthiest county in Wisconsin. To support this outcome, the County's efforts to achieve net zero carbon emissions by 2050 must advance equity, justice, and community resilience. Accordingly, we call for this 'Climate Action 2050' initiative to be:

> ***BOLD:*** *Propose new ways of doing business that support the County's policy to reduce greenhouse gas emissions at least 50 percent by 2030 relative to 2005, and to achieve carbon-neutral operations by 2050.*
>
> ***RELEVANT:*** *Reduce the County's carbon emissions while building operational and community resiliency to climate change.*
>
> ***INCLUSIVE:*** *Engage County departments and community stakeholders and generate financial, equity, and health co-benefits for communities of color and other vulnerable populations.*
>
> ***ACTIONABLE:*** *Identify cost-effective and sustainable solutions that can be implemented with limited resources and through impactful partnerships.*
>
> ***TRANSPARENT:*** *Follow an open decision-making process, and set goals that can be measured, reported, independently verified, and evaluated.*

-- Milwaukee County Sustainability Task Force

July 15, 2021

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Acronymns

BAU = Business as Usual

BHD = Milwaukee County Behavioral Health Division

Btu = British Thermal Units

CNG = compressed natural gas

GHG = Greenhouse gas

ICLEI = International Council for Local Environmental Initiatives

kW/kWh = kilowatt/kilowatt-hour (1 thousand Watt-hours)

LED = light-emitting diode

LGO Protocol = Local Government Operations Protocol

MATC = Milwaukee Area Technical College

MCTS = Milwaukee County Transit System

MMSD = Milwaukee Metropolitan Sewerage District

MPG = miles per gallon

MTCDE = metric tons of carbon dioxide equivalent

MW/MWh = Megawatt/Megawatt-hour (1 million Watt-hours)

PV = photovoltaic

RECs = Renewable Energy Credits

RFP = Request for Proposals

TBD = to be determined

TGD = The Greening of Detroit

UWM = University of Wisconsin-Milwaukee

VMT = vehicle miles traveled

WDHS = Wisconsin Department of Health Services

WisconsinCCI = Wisconsin Initiative on Climate Change Impacts

1. Introduction

1.1. Framework Overview

a. Purpose & Scope

This report provides a framework for developing a plan for Milwaukee County to achieve carbon-neutral operations by 2050. It sets out the *Guiding Principles* for the carbon neutrality initiative, and defines the starting point, or baseline, from which the County can manage emissions from its future operations. High-level strategies for achieving carbon neutrality were developed and rated by a County team of technical experts and are presented here to help inform the development of the carbon neutrality plan.

This Framework focuses on Milwaukee County government operations rather than activities by external stakeholders or the broader community. The scope includes Milwaukee County Transit System (MCTS) operations, as transit vehicles, equipment, and garages are County property. However, activities occurring in other leased facilities (e.g., Milwaukee Public Museum, Milwaukee County Historical Society, Marcus Center for the Performing Arts) are outside of the County's control and thus excluded.

This report should not be considered 'the plan' for Milwaukee County to achieve carbon neutrality. To determine the best course of action, further research, analysis, stakeholder engagement, detailed planning and funding will need to be identified for each of the recommended strategies (this process will require additional time and effort which is discussed in detail in Section 5 of this report). As such, this Framework should be considered a 'plan to develop a plan'. Recommendations and lessons learned from other government organizations that have undertaken similar efforts are included in this report to help inform and guide next steps.

b. Organization

During May 2021, Milwaukee County Executive David Crowley established the Sustainability Task Force charged with drafting the Framework for achieving carbon-neutral County operations. The Task Force consists of a seven-member Steering Group and an 11-member Technical Group. Both groups met remotely once every two weeks from June through July 2021, with all meetings open to the public. To support the Task Force's work, the Office of Sustainability hired the non-profit organization International Council for Local Environmental Initiatives (ICLEI) - Local Governments for Sustainability USA. In addition to providing technical support, ICLEI connected the Task Force with resources from other local governments that had launched carbon neutrality planning processes. This Framework reflects the important groundwork from this robust organization.

c. Key Definitions

The following terms are used throughout this Framework:

- **Carbon emissions** and **greenhouse gas emissions** are used interchangeably and refer to the release of greenhouse gases into the atmosphere.

- **Carbon neutrality** is defined per the Climate Action 2050 enabling legislation (see Appendix I) as "the process of balancing carbon emissions with carbon removal or elimination until the net effect is zero".

- **Carbon offsets** are metric tons of emissions avoid or reduced by an activity or set of activities outside of an organization's boundaries. Offsets are bought and sold to address direct and indirect emissions associated with an organization's operations[2].

- **Climate change** refers to significant changes in the typical or average weather of a region over several decades or longer.

- **Equity:** The assurance that the culture, values, and opinions of individuals and groups are represented in the decision-making processes.

- **Greenhouse gases** are "any gas that absorbs infrared radiation in the atmosphere, including carbon dioxide, methane, nitrous oxide, ozone, chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride[3]." The principal human-caused greenhouse gases are carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O).

- **Resilience** is the ability "to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment[3]."

d. Brand & Guiding Principles

The Steering Committee of the Sustainability Task Force has branded Milwaukee County's carbon neutrality initiative as 'Climate Action 2050: Achieving Net Zero Carbon Emissions While Advancing Equity, Justice, & Community Resilience.' This branding captures the horizon of the effort (2050) as well as the need for positive forward effort ('Action'), while simultaneously recognizing that the context for this in Milwaukee County is our frontline vision of becoming a healthy community through racial equity.

[2] U.S. Environmental Protection Agency. (2018). *Offsets and RECs: What's the Difference?* Accessed 8/5/21 from https://www.epa.gov/greenpower/offsets-and-recs-whats-difference

[3] U.S. Environmental Protection Agency. (2017). *Glossary of Climate Change Terms*, Accessed 8/5/21 from https://19january2017snapshot.epa.gov/climatechange/glossary-climate-change-terms_.html

Moreover, the Task Force has established the Guiding Principles for Climate Action 2050 as shown in Figure 1. These principles build off the current Milwaukee County Vision of "By Achieving Racial Equity, Milwaukee Will Be the Healthiest County in Wisconsin", and directly align with the three Strategic Focus Areas of:

1. Create Intentional Inclusion
2. Bridge the Gap
3. Invest in Equity

The Task Force recommended this alignment because a large initiative such as climate action will take resources to implement, and this implementation must supplement and not compete with the current County Vision and strategy. Climate change and our response to address it can directly impact health and disparities in Milwaukee County, for instance:

- Average temperatures in Wisconsin are 2.1°F higher today than in the 1950s[1].
- With climate change, the state is expected to have three times as many days where temperature exceeds 90°F by 2050[1].
- Excessive heat is the leading weather-related cause of death in Wisconsin[4].
- Inner-city Milwaukee, where are communities of color are largely concentrated, has the highest heat vulnerability index in Wisconsin[5].
- As a result, climate change may disproportionately impact the health of communities of color and addressing climate change may reduce this disparity.

The alignment of the Guiding Principles for Climate Action 2050 to the County Vision and plan will help build momentum and reinforce the importance of both, and frankly is the only appropriate response for Milwaukee County.

To further align the Climate Action 2050 initiative with Milwaukee County's vision, the Sustainability Task Force identified seven strategic objectives within the three Strategic Focus Areas for climate action planning related to health and racial equity priorities (see Figure 1). These objectives directly parallel strategic objectives in the current Milwaukee County focus areas.

a. Co-Benefits of Climate Action

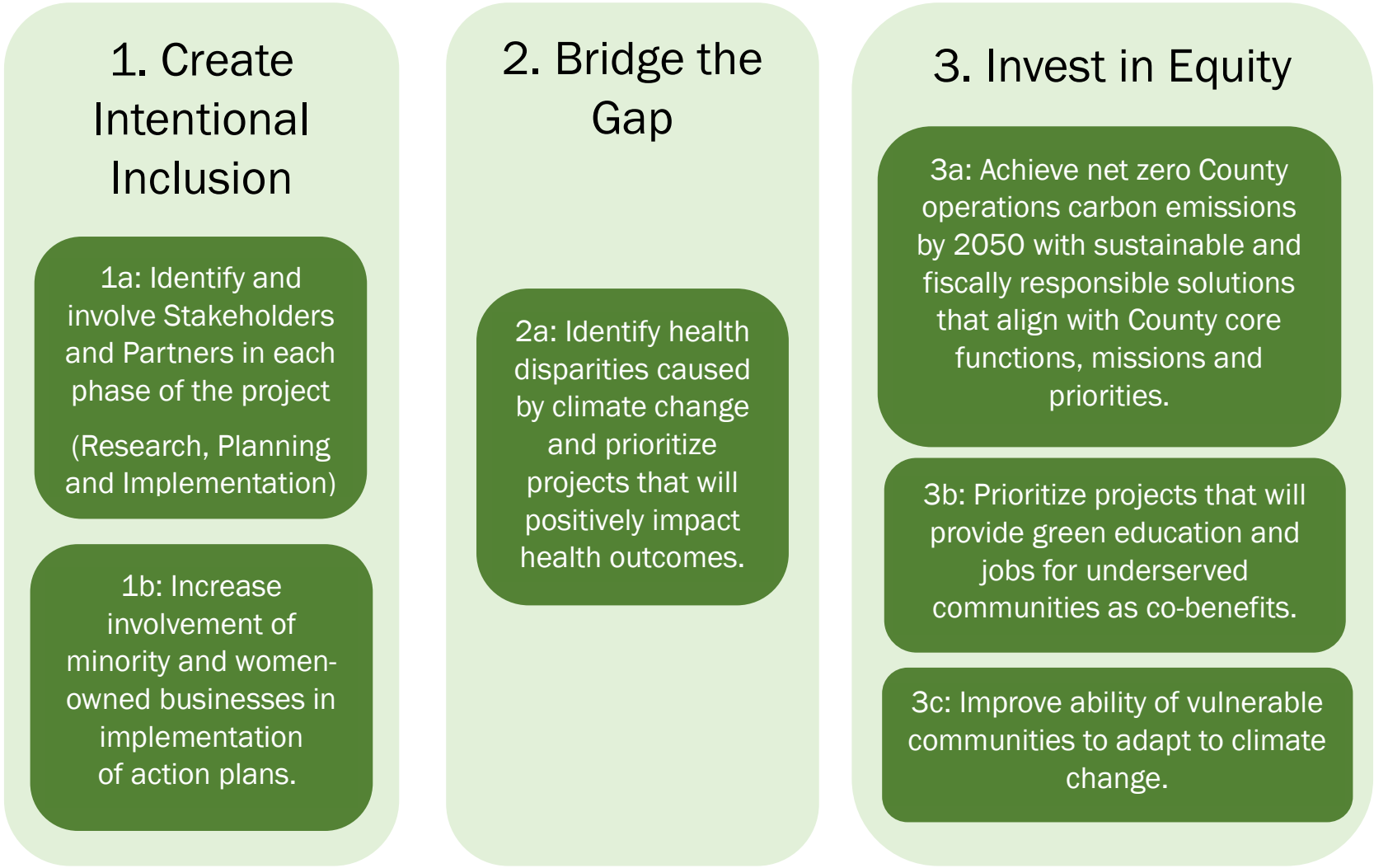
Climate co-benefits are beneficial outcomes from climate actions that are not directly related to mitigating emissions. Co-benefits can include cleaner air, the creation of green jobs, improved public health, and improved biodiversity due to the expansion of green space. Climate actions that promote co-benefits can bolster support from local stakeholders, increasing the likelihood that they will be approved by decision makers. In fact, city

[4] National Weather Service. (2021). *Extreme Heat - 2021 Severe Weather Awareness in Minnesota and Wisconsin*. Accessed 8/13/21 from https://www.weather.gov/mpx/swawday5

[5] Wisconsin Department of Health Services. (2016). *Milwaukee Heat Vulnerability Index*. Accessed 6/8/21 from https://www.dhs.wisconsin.gov/publications/p0/p00882.pdf

Figure 1. Guiding Principles for Climate Action 2050:

Achieving Net Zero Carbon Emissions While Advancing Equity, Justice, & Community Resilience



governments that cite the climate co-benefits reported 2.5 times more successful climate actions than those that did not[6].

To align the Climate Action Framework with Milwaukee County's vision and 10-year plan, the Technical Group chose to evaluate potential mitigation strategies against these co-benefits:

- **Community Engagement.** Engagement can build a stronger sense of 'community' for residents, and jobs with more security and benefits. Case studies show an important shift to more sustainable behaviors – supporting lifestyle change that not only reduces emissions but is also more sustainable in broader terms.

- **Community Business Development.** Planners can and should seek ways to source more solutions from within Milwaukee County, generating economic activity and keeping resources local.

- **Health.** Improved public health is the County vision, and climate action can contribute to it – for example, reduced chronic and acute respiratory diseases due to improved air quality, or increased life expectancy due to lower heat vulnerability.

- **Fiscal Sustainability.** Cost effective solutions should improve the County's overall fiscal situation – good investments should lower operating costs.

- **Efficiency / Effectiveness**. Reduction of department operating costs will allow the County to deliver services more effectively.

- **Jobs.** Climate action initiatives can result in job creation if done intentionally, resulting in economic growth and equity, reduced food, fuel or rent poverty, and increased housing security.

- **Resiliency**. Mitigation (emissions reduction) actions can potentially address adaptation (making the County and residents better able to withstand changes in climate) challenges at the same time. Outcomes may include making the county more able to quickly recover from shocks such as floods, reduced risk of hazards, and increased preparedness of the County and its residents to respond to hazards.

These co-benefit categories align directly to the seven strategic objectives shown in Figure 1. Further discussion on the role of co-benefits in developing a sound climate action plan can be found below in Section 4 - *Potential Challenges*.

[6] Carbon Disclosure Project. (2020). *The Co-Benefits of Climate Action: Accelerating City-Level Ambition*. Accessed 8/13/21 from https://www.cdp.net/en/research/global-reports/co-benefits-climate-action.

1.2. Related Commitments & Plans

a. County Vision & Strategic Plan

Adopted in 2020, Milwaukee County's Strategic Plan directs the County to reduce inequities by improving quality of life, life expectancy, and health disparities in communities of color. Unfortunately, climate change has contributed to disparities in health and quality of life. Case studies show that local governments that frame climate action in a more holistic 'one county' approach may be more effective for getting buy-in from stakeholders who are managing multiple priorities and may not consider climate action to be their primary focus. Opportunities for action can be maximized by integrating the County Vision and strategic plan directly into climate action planning. Thus, as stated above under Guiding Principles, this Climate Action 2050 Framework seeks to identify strategies that reduce or offset carbon emissions while advancing equity, justice, and community resilience.

b. City-County Climate & Equity Plan

Established in 2019 by Milwaukee County and the City of Milwaukee, the City-County Task Force on Climate and Economic Equity was formed to "make recommendations on how to address the ongoing climate crisis, ensure Milwaukee meets the obligations set by scientists for necessary greenhouse gas reduction, and mitigate racial and economic inequity through 'green' jobs" (see File 19-582). The Task Force is developing a climate and equity plan for Milwaukee to achieve the following goals:

- Reduce community-wide net greenhouse gas emissions by at least 45% by the year 2030 and achieve net zero greenhouse gas emissions by 2050 or sooner.
- Reduce racial and income inequality by assuring that greenhouse gas reduction investments and policies will create the maximum number of permanent living wage green jobs for people who live in the most impoverished Milwaukee neighborhoods with limited economic opportunity.

The Climate Action 2050 initiative has a similar focus to Milwaukee's climate and equity plan: achieve carbon neutrality while advancing equity, justice, and community resilience. Moreover, Milwaukee County operations (in particular, transit services) directly impact community-wide emissions. Thus, in planning for carbon neutrality, Milwaukee County should strive to make its goals, policies, and actions consistent with those of Milwaukee. Together these efforts will create a comprehensive approach to addressing climate change and improving health-equity in Milwaukee County.

c. Paris Climate Agreement

During 2017, the Milwaukee County Board of Supervisors established that that the County will support the principles and targets of the Paris Climate Agreement to keep global temperature increases below 2°C (3.8°F) (see File No. 17-506). In 2021, the U.S. government recommitted to the Agreement, pledging to reduce national emissions by at least 50% by 2030, relative to 2005. Thus, for the purpose of this document, Milwaukee County is assumed to have adopted the same emissions baseline year (2005) and interim emissions target.

2. Current & Future Emissions

This chapter summarizes Milwaukee County's contribution to global climate change by offering a detailed accounting of greenhouse gas (GHG) emissions from County operations. First, it presents an inventory of GHG emissions for the County's baseline year, 2005 (see *Paris Climate Agreement*). The chapter then provides a forecast of the County's 2030 and 2050 emissions under a 'business as usual' scenario. In conclusion, the chapter details how much the County will need to reduce or offset emissions to achieve net zero operations by 2050.

2.1. Baseline Emissions

As the old saying goes, "You can't manage what you don't measure." Accordingly, Milwaukee County must document its GHG emissions before it can effectively manage them. During spring 2021, the Office of Sustainability completed a GHG emissions inventory for County operations circa 2005. The Office had previously prepared inventories for calendar years 2016-18, and shared these with the County Board in 2020.

The 2005 and 2016-18 GHG emissions inventories follow the Local Government Operations Protocol v1.1 (LGO Protocol)[7]. ICLEI's ClearPath™ tool[8] was used to LGO Protocol-compliant estimates of carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O) from the County's operations. Hundred-year global warming potential (GWP) values from the 5th IPCC Climate Assessment Report (AR5) were used to convert CH4 and N2O to CO2-equivalent units.

All inventories account for emissions from sources for which County government has full operational authority, or has the ability introduce and implement operating policies. This includes

[7] First released in 2008, the Local Government Operations Protocol serves as the U.S. standard for quantifying and reporting emissions from local government operations.
[8] ClearPath was chosen because it is the leading online software platform for completing GHG inventories and forecasts for local government operations. Milwaukee County is a member of ICLEI, and over 500 cities, towns and counties have used ClearPath (Source: https://icleiusa.org/).

Milwaukee County Transit System (MCTS) operations, as transit vehicles, equipment, and garages are County property. However, emissions from the operations of other leased facilities (e.g., Milwaukee Public Museum, Milwaukee County Historical Society, Marcus Center for Performing Arts) are outside of the County's control and thus excluded from the inventories.

As with previous inventories, the 2005 inventory covers Scope 1 and Scope 2 emissions. This includes emissions generated by Milwaukee Mitchell General Airport buildings and facilities, vehicles, and equipment, but excludes emissions from aviation travel. Scope 3 emissions are excluded from the inventory because they are optional under the LGO Protocol. Moreover, Scope 3 emissions are less directly impacted by Milwaukee County government's policies and programs. Table 1 provides an overview of LGO Protocol scopes and emissions. Appendix II provides a list of all activity data used in the County's inventories, with special notes for 2005.

Table 1. Emission Scopes Under the LGO Protocol

Scope	Description	Examples
1	Direct emissions from operating and maintaining facilities or equipment.	Fuel used by MCTS buses and other Milwaukee County fleet vehicles; fuel and refrigerants used by County-operated buildings
2	Indirect emissions associated with the consumption of purchased or acquired electricity, steam, heating, and cooling.	Purchased electricity and associated transmission and distribution loses; district steam (downtown and County Grounds); district cooling (County Grounds only).
3 (optional)	All other indirect or embodied emissions not covered in Scope 2.	Milwaukee County employee commuting, embodied emissions in good purchased by the County, and emissions associated with the County's solid waste disposal.

During the baseline year (2005), Milwaukee County operations generated approximately 210,980 metric tons of carbon dioxide equivalent (MTCDE) - see Figure 2. This is roughly equivalent to the greenhouse gas emissions generated by 45,884 passenger vehicles driven for one year[9].

Emissions from 2005 County operations were primarily due to three activities:

- Electricity use (41% of emissions)
- Diesel use by MCTS buses (27% of emissions)
- Natural gas for heating and running emergency generators (16% of emissions)

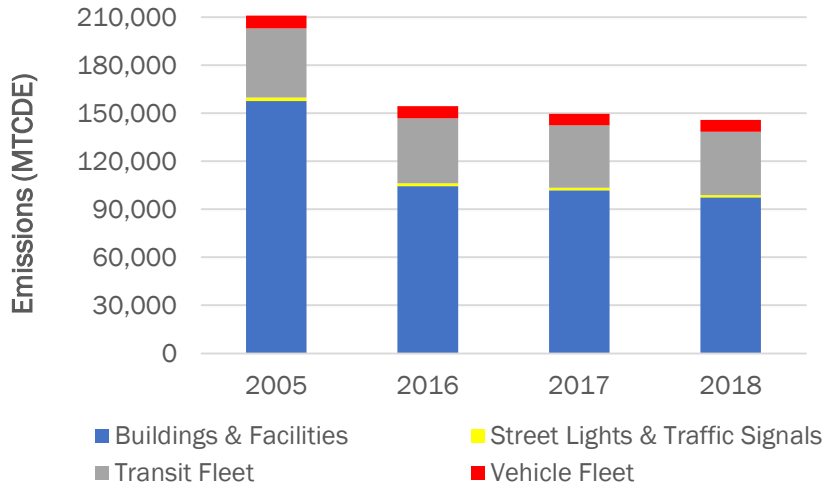
[9] U.S. Environmental Protection Agency. (2019). *Greenhouse Gas Equivalencies Calculator*. Accessed 2/24/20 from https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Other significant sources of 2005 emissions were Downtown district steam use (6% of emissions), fleet vehicle and equipment fuel use (4% of emissions), and County Grounds district steam use (3% of emissions). Streetlights and traffic signals, County Grounds district chilled water use, and fleet equipment fuel use comprised the remaining (3%) emissions.

Milwaukee County's total operational emissions decreased by 65,166 MTCDE (almost 31 percent) between 2005 and 2018. During these years, the County's building portfolio decreased by about 3.2 million square feet (21 percent). At the same time, the energy and fuel used for County operations decreased by 23 percent – see Table 2. Moreover, the carbon intensity of We Energies' electricity supply (MTCDE per MWh) decreased by 22 percent[10]. Thus, three factors most likely decreased Milwaukee County emissions from 2005 to 2018:

- Decreased County building square feet
- Increased County energy and fuel efficiency
- Greener We Energies' electricity supply

Figure 2. Total Emissions by Sector - Milwaukee County Operations



[10] WEC Energy Group. (2019). *Edison Electric Institute and American Gas Association ESG/Sustainability Reporting Template. 2016-18 GHG Emissions – Owned Generation + Purchased Power*. Accessed 1/31/20 from https://www.wecenergygroup.com/csr/eei-aga-esg-sustainability-template.pdf

WEC Energy Group. 2019. *2019 Corporate Responsibility Report*. Accessed 1/31/20 from https://www.wecenergygroup.com/csr/cr2019/wec-corporate-responsibility-report-2019.pdf

Table 2. 2005 vs 2018 Energy & Fuel Use – Milwaukee County Operations

Activity	2005 Use (Million Btu)	2018 Use (Million Btu)	% Change
Purchased Electricity	493,959	334,851	-32
MCTS Buses – Diesel Fuel Used	580,831	529,458	-9
Purchased District Steam – County Grounds	116,136	53,325	-54
Purchased District Steam – Downtown	142,469	115,805	-19
Purchased District Chilled Water	34,775	16,340	-53
Total	1,368,170	1,049,779	-23

2.2. Business as Usual Forecast

ICLEI staff prepared a 'Business as Usual' (BAU) forecast of Milwaukee County's operational GHG emissions using their ClearPath™ tool. The BAU forecast suggests what the County's operational emissions would be from present day to 2050 if it does not take additional actions. Building off the 2018 emissions inventory, the BAU forecast assumes the following:

- Milwaukee County's emissions targets are as follows:
  - By 2030, reduce or offset at least 50% of operational emissions vs. 2005
  - By 2050, achieve carbon-neutral operations (net zero emissions)
- The County's building portfolio and energy use will change as indicated in Appendix III.
- Relative to 2005, We Energies' electricity supply will generate[11]:
  - 60% fewer emissions (MTCDE) per MWh by 2025;
  - 80% fewer emissions (MTCDE) per MWh by 2030; and,
  - No net emissions (i.e., be carbon neutral) by 2050.
- The carbon intensity (MTCDE per mile driven) of County passenger/light duty fleet vehicles will decrease by 1.8% every five years until 2050 due to projected increases in vehicle fuel efficiency[12].

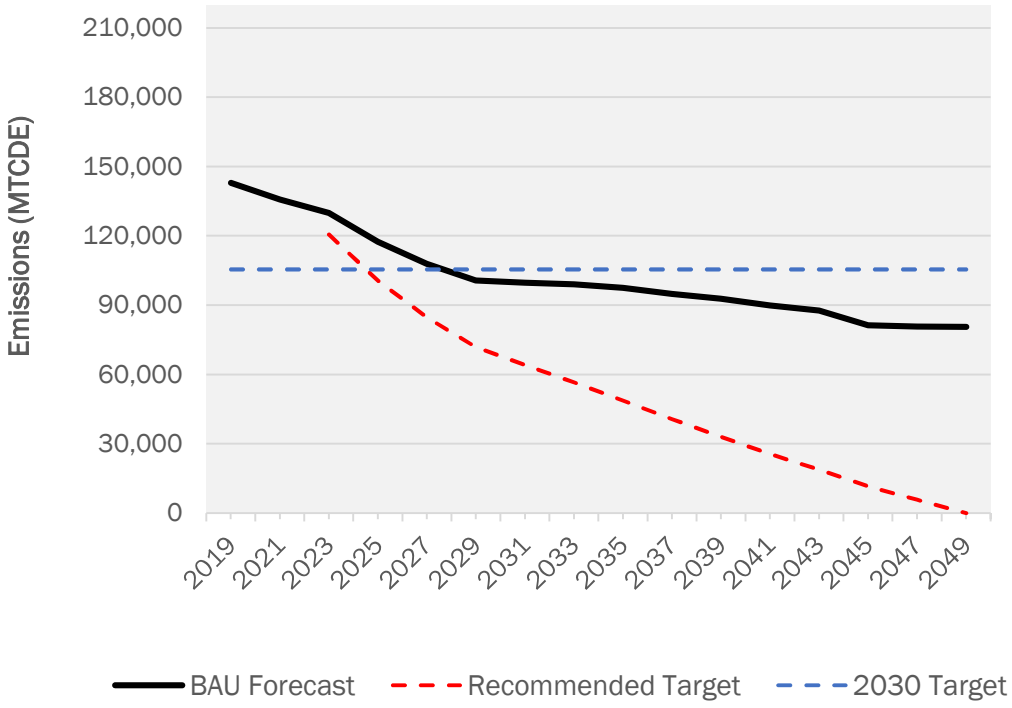
Under these assumptions and using 2018 emission factors, Milwaukee County's BAU emissions would be approximately 100,644 MTCDE by the start of 2030, a 52 percent decrease vs. 2005. In other words, the County is on track to exceed (have fewer emission than) its interim emissions target. By the start of 2050, however the County's emissions will still be around 80,611 MTCDE unless further action is taken. To achieve net zero carbon emissions by 2050, the County must

[11] WEC Energy Group. (2020). *2020 Corporate Responsibility Report*. Accessed 8/4/21 from https://www.wecenergygroup.com/csr/cr2020/wec-corporate-responsibility-report-2020.pdf#pagemode=bookmarks

[12] Based on research by the Center for Climate and Energy Solutions (C2ES) regarding the emissions impacts of Corporate Average Fuel Economy (CAFE) standards for the years 2010-2050.

reduce or offset emissions by average of 3.6% per year (2,879 MTCDE) from 2022 through 2049 – see Figure 3.

Figure 3. BAU vs. Target Emissions – Milwaukee County Operations



3. Potential Mitigation Strategies

At biweekly meetings held during summer 2021, the Sustainability Task Force Technical Group brainstormed potential strategies for Milwaukee County to reduce or offset its operational emissions (see Figure 4). In doing so, the Technical Group considered a 'mitigation hierarchy' adapted from the World Wildlife Foundation (Figure 5), which prioritizes strategies that avoid or reduce emissions before considering renewable energy, building or vehicle electrification, or carbon offsets. Avoid and Reduce strategies tend to be easier and more cost effective to implement than strategies further up the hierarchy.

The Technical Group also categorized potential strategies by emissions sector impacted (Buildings & Facilities, Transit Fleet, Vehicle Fleet, and Street Lights & Traffic Signals). Then, the Technical Group scored each strategy against jobs, equity, and resiliency-related co-benefits. Where possible, ICLEI estimated the potential emissions impacts of the strategies using their ClearPath™ tool.

Figure 4. 2018 Milwaukee County Emissions Profile

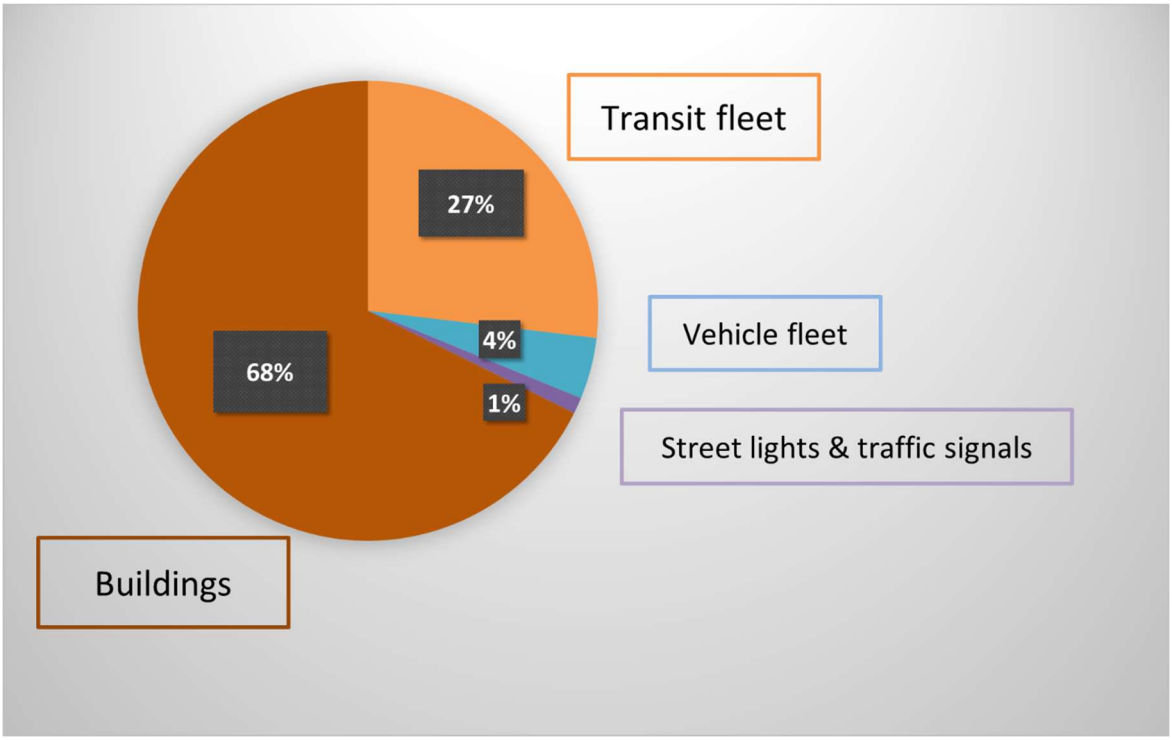
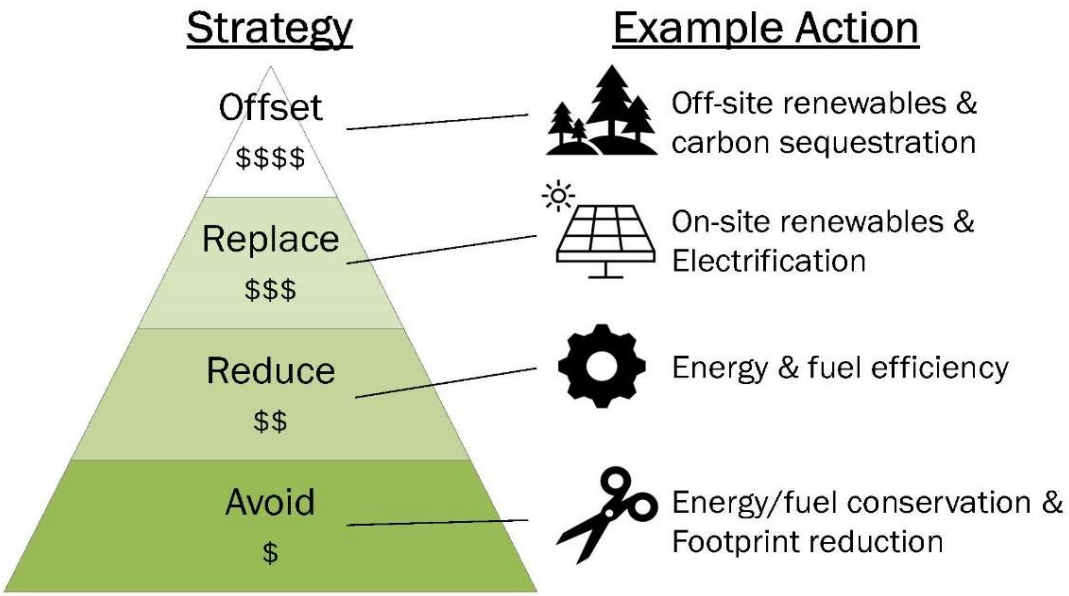


Figure 5. Emissions Mitigation Hierarchy



Adapted from: World Wildlife Fund (2020). *Discussion Paper: Mitigation Hierarchies*. Accessed 4/28/21 from https://wwf.panda.org.

Appendix IV lists the 35 strategies brainstormed by the Technical Group for the Climate Action 2050 initiative. Strategies #1-7, briefly described below, are specific enough that their emissions impacts could be modeled by ICLEI. The Technical Group qualitatively assessed the potential co-benefits of most of the strategies (see Appendix IV). However, the actual co-benefits will depend highly on *how* the strategy would be implemented. Further research, business case development, feasibility and risk analysis, and engagement with County stakeholders and partners is needed to refine the list of strategies.

1. **Replace 15 MCTS diesel buses with Battery Electric Buses, 2022-23.**

   As part of pilot, this strategy is to replace 15 MCTS diesel buses with electric buses. The County Board has approved funding of the initial 11 buses, which will be put in service during 2022. The model assumes that bus replacements would be done on a one-for-one basis.

2. **After initial pilot of 15 buses (see strategy #1), electrify entire MCTS bus fleet by 2040.**

   This Replace strategy is to fully electrify the MCTS bus fleet by replacing 30 diesel buses with electric buses every year from 2026-38 then 15 in 2039. The model assumes no growth in MCTS' bus fleet (currently about 420 vehicles) and that bus replacements would be done on a one-for-one basis Under this scenario, 405 diesel buses would be replaced in addition to the 15 replacements under strategy #1.

3. **Reduce County building energy use 15% per decade 2020-50.**

   This Reduce strategy is to improve the energy efficiency of County buildings through strategies TBD such as lighting and HVAC upgrades, operational data analytics, and building commissioning. In modeling this strategy, the model assumes that the County would reduce building energy use 15% relative to 2018 by 2030, then 30% and 45%, cumulatively, by 2040 and 2050, respectively

4. **Make Senior Centers and Community Centers 'net zero' (energy self-sufficient) by 2050.**

   This Reduce/Replace strategy is intended to Senior Centers and Community Centers can serve residents during emergencies by eliminating dependence on the grid. Net zero energy use could be attained by combining energy efficiency improvements with renewable energy, such as pairing ground-source heat pumps with solar PV and battery storage. The model assumes that 1/3 of the buildings would be net zero by 2030, 2/3 by 2040, and all buildings by 2050.

5. **Maximize participation with We Energies Solar Now program.**

   This Offset strategy is to enter agreement(s) with We Energies to host an additional 1.71-MW We Energies solar PV or wind facility in exchange for lease payments and renewable energy credits (RECs), which offset indirect emissions. The model assumes that the 1.71-MW facility would provide approx. 2,271 renewable energy credits/RECs per year. Their model also assumes that the facility would be constructed during 2022 and 2023.

6. **Install 2-MW ground-mounted solar PV system.**

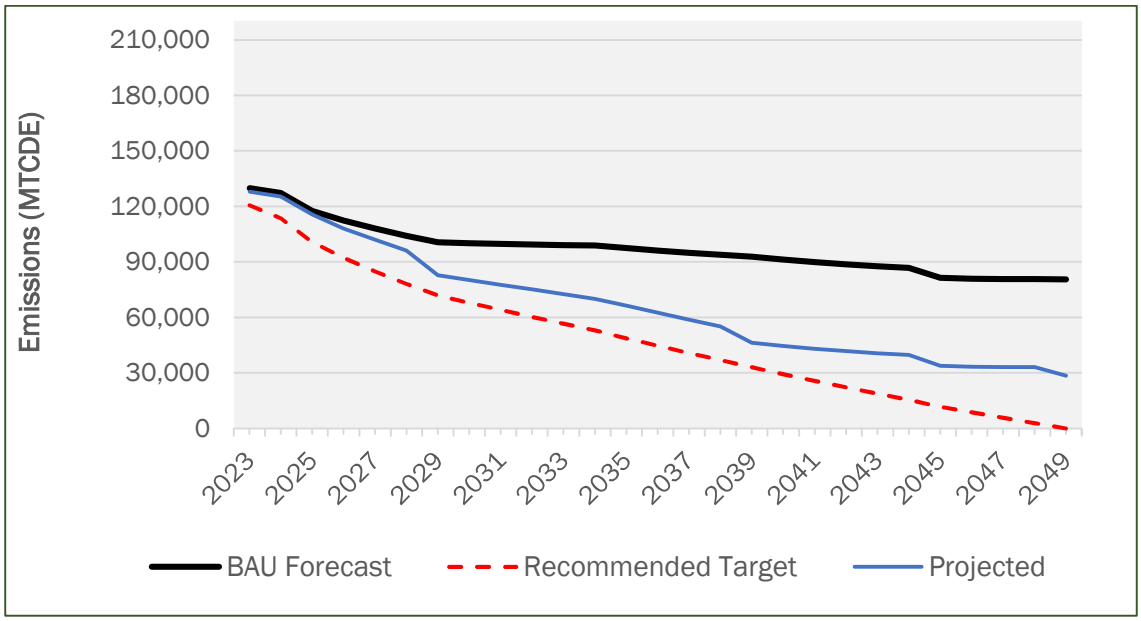
   This Replace strategy is to own or host a utility-scale (2 MW, approximately 8 acres) solar PV system on County property TBD. The model assumes the PV system would provide approx. 2,656 MWh of renewable energy per year. Installation(s) would require review approval of the Wisconsin Public Service Commission. Hence, ICLEI assumed the 'go live' date for the installation(s) would be 2026.

7. **Install solar PV at Oakwood Golf Course under We Energies Solar Now program.**

   This Replace strategy is being implemented - County Parks is entering 20-year agreement with We Energies for 540-kW solar PV installation at Oakwood Golf Course. The project will provide approx. 717 RECs per year. The model assumes the installation will 'go live' by the end of 2022.

Based on ICLEI's modeling, by implementing strategies #1-7 Milwaukee County could reduce its 2050 operational emissions from 80,611 MTCDE (under the Business as Usual scenario) to 28,498 MTCDE. The County's remaining emissions would be from two sectors: Vehicle Fleet (6,208 MTCDE) and Buildings & Facilities (22,290 MTCDE). Achieving net zero emissions will require additional fleet- and building-related strategies and/or purchasing carbon offsets. As of the first quarter of 2018, carbon offsets cost an average of $3 per MTCDE[13]. The cost of offsetting emissions, however, could surge tenfold by 2030 as more organizations adopt net zero targets[14], which makes continued emissions reduction actions all the more important.

Figure 6. Emissions After Strategies #1-7 - Milwaukee County Operations



[13] Hamrick, K., and M. Grant. (2018). *Voluntary Carbon Markets Insights: 2018 Outlook and First-Quarter Trends Ecosystem Marketplace*. Accessed 8/11/21 from https://www.forest-trends.org/wp-content/uploads/2018/08/Q12018VoluntaryCarbon.pdf

[14] https:/www.greenbiz.com/article/carbon-offset-prices-set-increase-tenfold-2030

4. Potential Challenges

4.1. Challenges to Implementation

Every organization tackling climate change has a unique set of stakeholders, resources, and processes to consider. In Milwaukee County, key factors that will drive the Climate Action 2050 planning process will necessarily include leadership from the County Executive and County Board, the desire to align Climate Action with health and racial equity outcomes, a consistent and long-term source of funding for initiatives, support from all County departments, and engagement of all stakeholders.

The Sustainability Task Force Steering Group has taken a critical first step in identifying *Guiding Principles* that align with the current County 10-year Vision and Strategic Focus Areas. By doing so, climate action supports, rather than competes with, current County objectives and plans, and achieves necessary key leadership support. County departments will find it easier to get behind climate action when they see how it's not yet another objective and task at hand, but a way to align their operations with health and racial equity outcomes and achieve support for their annual plans.

Still, co-benefits may be a challenge to realize. For instance, positive health outcomes may depend less on what Milwaukee County does than how the entire world addresses climate change. Green jobs won't just happen because Milwaukee County is going to do a solar photovoltaic installation project. Realization of co-benefits will require intentionality. Development of the climate action plan for Milwaukee County will require careful, detailed and intentional evaluation of co-benefits for every potential strategy. In fact, it may be advisable to flip the evaluation on its head: instead of evaluating an emissions reduction strategy for co-benefits, perhaps the planning team should target specific strategic objectives and evaluate the emissions reduction possibility as the co-benefit.

HOW INDIANAPOLIS REALIZES CO-BENEFITS

In **Thrive Indianapolis**[43], the inaugural sustainability plan published in 2019, the city aims to reduce emissions to net zero by 2050 whilst also increasing community resilience and reducing social inequalities. To do this**, they use a co-benefits approach which treats reduction in GHG emissions as just one of many beneficial outcomes of the actions they are implementing to achieve their overall goal to build a thriving, sustainable and resilient city.**

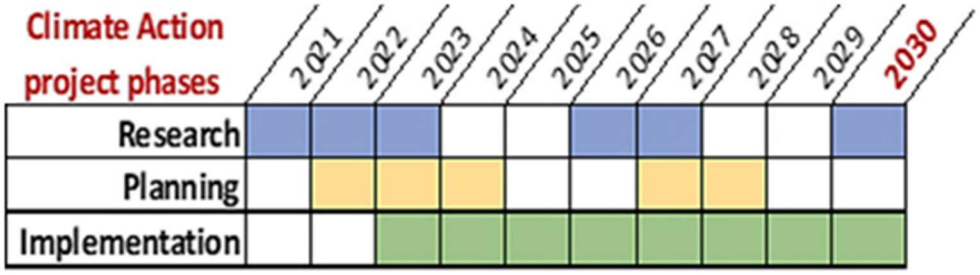
For each of the actions in their plan, they assess whether the action would reduce inequality, improve public health, create jobs, reduce greenhouse gas emissions, and increase the resilience of vulnerable populations. For example, one of the mitigation actions that the city is implementing aims to help communities overcome barriers to installing solar energy through education and support. This action is designed to reduce emissions, create jobs, reduce social inequality and increase resilience in socially vulnerable populations in the city, all at the same time[44].

THE CO-BENEFITS OF CLIMATE ACTION, CDP, 2020

43. City of Indianapolis. Thrive Indianapolis. https://static1.squarespace.com/static/5b4ead40c3c16a711ae78401/t/5c704aa4fa0d6033019e373a/1550863041205/2019CPSR001-ThriveIndianapolis-

It will also be key for leadership to recognize that there are multiple, long-term, and overlapping phases to our Climate Action 2050 Plan. These include research, planning and implementation. While this Framework includes some basic research and brainstorming of potential emissions reductions strategies, further research (and funding for such) will be required during project planning to validate the business case for each. Additionally, technology advances over the next 28 years will have to be continually tracked, and the plan reevaluated to make sure the latest science is incorporated into the plan. Finally, public engagement is part of basic research and will need to be periodically redeveloped and reinforced. Therefore, we should anticipate multiple iterations of research and planning over the course of the project, as illustrated in Figure 7.

Figure 7. Sample Climate Action Project Timeline (Excerpt)



It is the long-term nature of this project and its end goal that lends perhaps the biggest challenge. As the County's elected officials change over the next 28 years, will they continue prioritize climate action over other competing interests? To be sustainable, the County climate action plan and its leaders must annually inspire confidence in elected officials, County employees and the public. It can do this only by engaging stakeholders, including public participation, demonstrating progress, advertising co-benefits, and advocating for support. The County's annual budget process will be a key lever for advancing the project, but year-long strategizing and communications will be needed to make sure this project remains front of mind. Perhaps most importantly, the program benefits that support the County's Vision and Strategy must be clearly articulated and regularly advertised. A transparent communications plan must be part of the overall plan for Climate Action 2050.

4.2. Lessons from Other Local Governments

There are both positive and negative lessons learned from other local governments. For one, a critical success factor will be to assure an inclusive process. The Greening of Detroit (TGD) provides a lesson in this area. In 2014 their plan to plant 5,000 city trees annually ran into local resistance. They had 50,000 volunteers (most of them white and not from Detroit), and only one community outreach person. Where, when and how trees were planted were being determined by the TGD organization, and residents were informed through door hangers and

community meetings, if they attended. This approach failed to engage residents at a meaningful level, and crucially failed to recognize the competing race-based historical narratives and distrust that residents had of city government. Failure to involve residents in environmental initiative decision-making is a classic mistake that can derail plans despite best intentions. Not all Milwaukee County climate action initiatives will require public input, but for those that do dialogue and inclusive decision-making will be critical.

Additional lessons from other cities and counties, and recommendations specific for Milwaukee County, include:

1. Good planning takes time – 18 to 24 months to a final plan is realistic, especially considering engagement goals – and dedicated resources.

2. Consider a County Executive appointee from the public or business sector who can serve as a principal advocate and champion of the Climate Action 2050 Plan.

3. Establish an advisory Task Force that can promote the research, engagement, and planning aspects of the program, and clearly delineate the County decision-makers up front.

4. Develop a system for early and frequent briefings and planning sessions with County department leaders with a goal of establishing not just departmental buy-in, but also detailed department action plans that empower department staff to move forward.

5. Maximize opportunities from taking climate action by integrating co-benefits in our planning.

6. Build on existing initiatives to leverage work already in process – an example is expansion of the battery electric bus fleet.

7. Engage an independent research consultant to provide ideas, validate plans, project emissions reduction, and lend credibility to the overall strategy.

8. Consider establishing a Climate Action 2050 trust fund, which could be the source of funds for research and planning activities, if not also implementation.

9. Annually research and apply for grants from Federal government and non-profit advocacy groups for financial support of the project. Also seek philanthropic support.

10. Integrate climate action into County standard processes. Example: Modify the Racial Equity Budget Tool to recognize the co-benefits of climate action initiatives to help promote budgetary support.

11. Consider funneling cost savings from energy reduction back into support for program.

12. Develop and deploy a comprehensive communications strategy.

13. Ensure success by tracking progress, reporting transparently, and reassessing continually.

Lastly, start on implementation early in the process. This is important for many reasons. Early action planning identifies barriers, which can then be addressed more quickly. Showing early progress builds support and counters skepticism about the seriousness of the climate plan. With big, aggressive goals, getting a quick start with pilot projects provides time to learn and manages expectations.

5. Next Steps / Recommendations

The next step in Climate Action 2050 is to fund, organize and initiate the research and detailed planning required to map out specific strategies that lead to an implementation plan. The various items that require research and planning are detailed in the illustration below.

Figure 8. Planning Tasks – Climate Action 2050

RESEARCH	PLANNING
Climate change impacts/vulnerability assessment in Milwaukee County	Program organizational structure
Resiliency/adaptation strategies for Milwaukee County	Identify partners
Grants available to support climate action	Communications plan
Other funding vehicles	Public engagement plan
Building efficiency strategies	Co-benefits planning
Renewable energy options	Continued modeling of strategies
Racial Equity Budget Tool	Early implementation initiative
Green jobs implementation options	Tracking and Reporting plan
	Budget development
	Near-term implementation plan

Research should be funded, organized and initiated immediately. Some research (grant sources, for instance) may be accomplished with County resources. Others, such as building efficiency (research into deep green retrofits and building electrification for example) will depend on external resources. Benchmarking what other local governments have accomplished will be important. Milwaukee County should convene a local coalition comprised of County department representatives, non-profits (such as Wisconsin Policy Forum, ICLEI, etc.), educational institutions

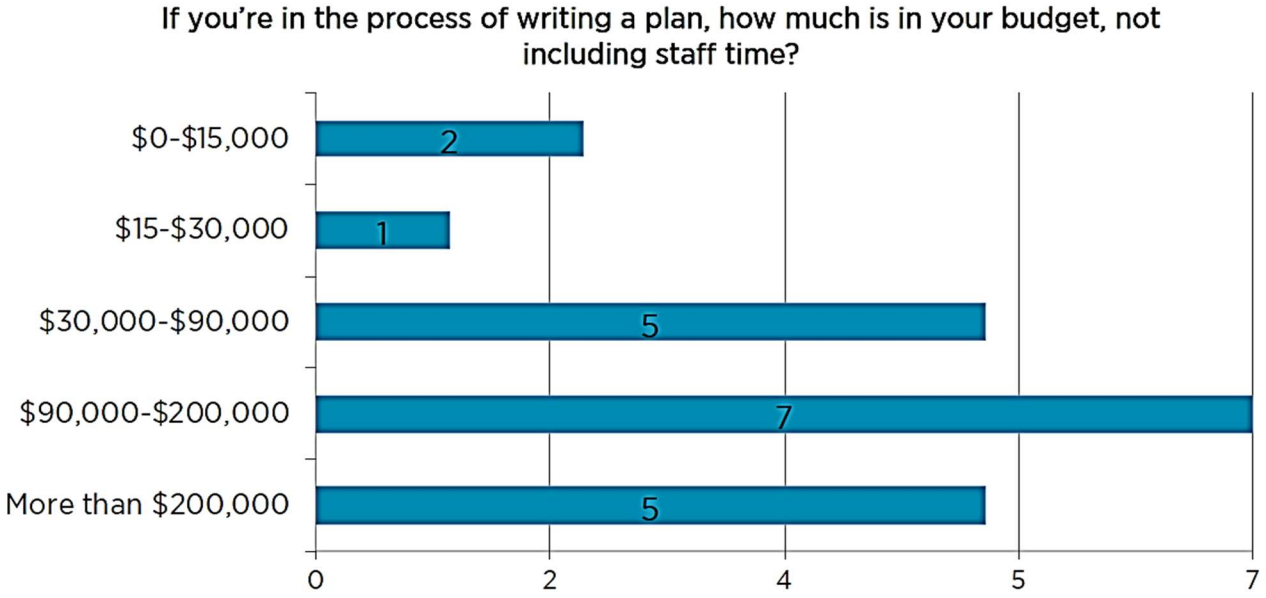
(UWM, MATC, etc.), businesses (Johnson Controls, etc.), municipal entities (City of Milwaukee, MMSD, etc.), local advocacy groups (such as Employ Milwaukee, various community and economic development agencies, , etc.) and philanthropies (Bader Philanthropies, etc.) to participate in this research.

Coalitions and engaged partners will also be important to the development of the Climate Action 2050 Plan. While the research will inform the Plan, the planning process itself will require a well-orchestrated, integrated and engaging approach. A formal engagement strategy to ensure stakeholders are effectively included up front in decision making will be critical. As noted earlier, some strategies will impact not just County operations but also the larger community. It is crucial to make the public aware, allow them to comment, and engage on all topics before finalizing any strategies. During engagement, the County can pursue various survey mechanisms to evaluate the impact on municipal staff and the community. Results of surveys alongside input from coalition partners could be used for a community-wide impact assessment.

As stated above, it should be expected that the time required to produce a comprehensive Climate Action 2050 Plan will take from 18 to 24 months.

The cost to develop the Climate Action 2050 Plan depends on the approach and partners Milwaukee County chooses for the project. The research items alone may involve cost. For most local governments external consulting support is needed and recommended to develop an action plan. External consultants can be used to help benchmark peers, identify technologies, develop strategies, model emissions reduction, set up tracking and reporting mechanisms, and assist in report writing. Table 3 suggests that *community-wide* climate action planning typically costs $90,000-200,000[15]. The Office of Sustainability has not come across similar data for municipal operations plans.

Table 3. Sample Costs – Community Climate Action Plans



[15] Urban Sustainability Directors Network. (2019). *Climate Action Group Survey Report*. Obtained via email on 8/10/21.

After all impacts of mitigation and adaptation strategies have been evaluated, the County should assemble final strategies within an implementation plan. This portion of the Plan should include goals, timelines, resource requirements, responsible parties and monitoring frameworks. Upon assembly of the research, strategy, and implementation plans, the County should follow County procedures to formalize the overall Milwaukee County Climate Action 2050 Plan.

6. Conclusion

In this report, we have framed the challenge for Milwaukee County to achieve net zero carbon emissions for its operations by 2050. The scope of the initiative, the baseline and the current state are defined. Guidelines that align with County strategy have been developed. Strategies to achieve the objective have been identified, as well as potential pitfalls and recommendations for organizing the project to overcome obstacles based on lessons from other benchmark organizations. The costs and timing of the next step – detailed action planning - have been laid out for policymakers to consider. In sum, this Framework is the 'plan to develop a plan' that should serve as solid ground for County climate action progress.

Because the Milwaukee County Climate Action Plan will take a long-term approach, progress will need to be tracked over time and shared with internal stakeholders, policymakers, and the public at regular intervals to maintain positive momentum. Over time, as the County learns what works, the action plans will change. But once the interim goals are achieved, the process will continue until the 2050 goal and all its benefits are realized.

Appendices

I. Carbon Neutrality Legislation

By Supervisors Nicholson, Ortiz-Velez, Sumner, Clancy, Shea, Wasserman, and Martin

File No. 21-389

AN AMENDED RESOLUTION

committing Milwaukee County to becoming carbon neutral by 2050 and requesting the Director of Sustainability, Department of Administrative Services, develop and administer a strategic plan to achieve carbon neutrality in Milwaukee County facilities and operations by 2050

WHEREAS, carbon neutrality is the process of balancing carbon emissions with carbon removal or elimination until the net effect is zero; and

WHEREAS, carbon emissions are a result of extraction, refinery, transportation, and burning of fossil fuels, like coal, natural gas, and oil; and

WHEREAS, normally, trees absorb carbon dioxide in the atmosphere, but the increased creation of carbon dioxide and destruction of forests for agriculture, new developments, and collection of lumber prevents this natural process from occurring and, as a result, excess carbon emissions absorb radiation and prevent heat from escaping the atmosphere, causing disrupted weather patterns, global warming, and climate change; and

WHEREAS, reduction, elimination, or offsetting of carbon emissions is critical to preventing the continued effects of climate change on the planet; and

WHEREAS, the Global Carbon Project outlines the process to become carbon neutral as:

1. Calculating carbon emissions and other greenhouse gas from activities
2. Reducing emissions wherever possible
3. Balancing the remainder by purchasing offsets

; and

WHEREAS, reducing emissions includes limiting energy usage and emissions from transportation, buildings, and equipment, using electrical energy or low carbon energy sources, employing wind, nuclear, hydro, solar and geothermal power; and

WHEREAS, offsetting emissions includes buying and planting trees, investing in carbon offset projects in underserved communities, or purchasing carbon offsets or carbon credits; and

WHEREAS, in the absence of broad federal climate policies, state and local

governments are leading the way in planning for carbon neutrality; and

WHEREAS, eight states, Washington, D.C., and Puerto Rico have 100 percent clean energy goals, with more states considering similar plans, and it is estimated that renewable energy sources will generate nearly a third of the country's electricity by 2050 based on these state commitments alone; and

WHEREAS, Milwaukee County adopted File No. 17-506, committing to the principles and goals of the Paris Agreement for climate change awareness, which the United States provided notice of withdrawal in 2019 but later rejoined in February 2021, and requesting that the Department of Parks, Recreation, and Culture (DPRC) develop a plan for a comprehensive recycling system throughout all parks for approval by the County Board; and

WHEREAS, created through File No. 19-582, Milwaukee County has examined its progress towards eliminating carbon emissions through the Milwaukee City-County Joint Taskforce on Climate and Economic Equity (the "taskforce"); and

WHEREAS, the taskforce met to discuss and provide recommendations as to how Milwaukee can achieve net greenhouse gas emissions reductions by 45 percent of 2010 levels by 2030, achieve net zero greenhouse gas emissions by 2050 or sooner, and how to mitigate racial and income inequality through "green" jobs; and

WHEREAS, related to becoming carbon neutral, some of the taskforce's recommendations as found in File No. 20-496 included:

- Obtaining a community greenhouse gas inventory to measure progress
- Hiring a consultant or expanding sustainability staff to create a narrative form of the greenhouse gas inventory to present to the public and stakeholders
- Developing a Milwaukee Climate and Equity Action Plan for reducing emissions
- Working with other Milwaukee County municipalities and the State of Wisconsin to coordinate and implement mitigation efforts
- Assessing the short, medium and long-term funding needs to implement a Climate and Equity Action Plan
- Analyzing the expected financial savings that could be achieved through the adoption of a Climate and Equity Action Plan
- Aggregating economic data on the emerging green economy in Milwaukee
- Evaluating the potential of larger-scale structural interventions to leverage a climate transition to dramatically improve regional economic equity

; and

WHEREAS, the Milwaukee County Transit System is in the process of acquiring hybrid-electric buses and electric buses for its fleet, which provides an opportunity to greatly decrease the greenhouse gas emissions produced by public transit, and the 2021 Adopted Budget included a provision to study the transition of all County fleet vehicles to electric vehicles; and

WHEREAS, the Solar Now program allows local governments to partner with We Energies to install solar panels on roof tops or land parcels and, in return, receive lease payments, which Milwaukee County is interested in pursuing on a large-scale to offset the costs of implementing carbon neutrality measures throughout Milwaukee County; and

WHEREAS, Milwaukee County adopted File No. 19-397 declaring racism a public health crisis and File No. 20-174 codifying the County's commitment to becoming the healthiest county in Wisconsin through the elimination of racism; and

WHEREAS, in 2018, the United States Global Change Research Program, commissioned through the Global Change Research Act of 1990, released the "Fourth National Climate Assessment" evaluating the impacts, risks, and adaptions in the United States to climate change and found that climate change has a disproportionate effect on communities of color because of a propensity to live in urban areas that suffer from poor air and water quality, inability to quickly or totally recover from climate events, amongst other concerns; and

WHEREAS, improving the health of the environment is vital to improving human health in our goal to become the healthiest county in the state; and

WHEREAS, to make progress towards becoming carbon neutral, Milwaukee County will need to work with its 19 municipalities and the public to provide education on the importance of understanding and reducing greenhouse gas emissions; and

WHEREAS, it is imperative that all levels of government across the United States mobilize to avoid the worst effects of climate change; and

WHEREAS, Milwaukee County is committed to fulfilling the recommendations provided by the taskforce to reduce carbon emissions and become carbon neutral, as well as mitigating racial and climate inequity through "green" jobs; and

WHEREAS, the Committee on Parks, Energy, and Environment, at its meeting of April 13, 2021, recommended adoption of File No. 21-389 as amended (vote 5-0); now, therefore,

BE IT RESOLVED, that it is the policy of Milwaukee County to become carbon neutral by 2050; and

BE IT FURTHER RESOLVED, that the Milwaukee County Board of Supervisors hereby requests the Director of Sustainability, Environmental Services Division, Department of Administrative Services, in conjunction with the Economic Development Division and any other relevant entities, develop and administer a strategic plan to achieve carbon neutrality in Milwaukee County facilities and operations by 2050; and

BE IT FURTHER RESOLVED, that the Milwaukee County Board of Supervisors hereby requests that the Director of Sustainability provide a report on Milwaukee County's current progress on reducing and eliminating its carbon emissions and a framework for developing and administering a strategic plan for becoming carbon neutral by 2050 no later than the September 2021 cycle; and

BE IT FURTHER RESOLVED, that the framework shall include estimates on the costs of developing and implementing the strategic plan, the major avenues for reducing carbon emissions, an approximate timeline for the development of a plan, the entities involved in the development of the plan, and any additional, relevant information.

04/13/21
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II. What's in the Emissions Inventories

Sector	Source	Activity	Notes – 2005 Inventory
Buildings & Facilities	Purchased Electricity	Electricity Used - Excl Street Lights & Traffic Signals (kWh)	
	Natural Gas	Gas Used (6)	
	Diesel Generators	Fuel Used (gallons)	Used earliest data available (2016)
	District Steam - Downtown	Steam Purchased (Btu)	Used earliest data available (2007)
	District Cooling - County Grounds	Cooling Demand (ton-hrs)	Have CW expenditures for 2005, assume 2016 rate ($/ton-hr)
		Steam Purchased (Btu)	Used earliest data available (2007)
Transit Fleet	Buses	Diesel Used - Buses (gal)	
		Annual Miles Traveled - Buses (VMT)	
	Gas Vehicles & Heavy Equipt	Gas Used - Transit Vehicles & Heavy Equipt (gal)	
		Annual Miles Traveled - Transit Gas Vehicles & Heavy Equipt (VMT)	VMT estimated from fuel used and average MPG
	Diesel Vehicles & Heavy Equipt	Diesel Used - Transit Vehicles & Heavy Equipt (gal)	
		Annual Miles Traveled - Transit Diesel Vehicles & Heavy Equipt (VMT)	VMT estimated from fuel used and average MPG
Vehicle Fleet	Small Gas Equipt - Parks	Gas Used - Small Gas Equipt (gal)	Used earliest data available (2016)
	Small Diesel Equipt - Parks	Diesel Used - Small Gas Equipt (gal)	Includes small off-road equipment like mowers, golf carts, etc. Used earliest data available (2016)

	Diesel Vehicles & Heavy Equipt	Diesel Used - Fleet Vehicles & Heavy Equipt (gal)	Used earliest data available (2014)
		Annual Miles Traveled - Fleet Diesel Vehicles & Heavy Equipt (VMT)	VMT estimated from fuel used and average MPG Used earliest data available (2014)
	Gas Vehicles & Heavy Equipt	Gas Used - Fleet Vehicles & Heavy Equipt (gal)	Used earliest data available (2014)
		Annual Miles Traveled - Fleet Gas Vehicles & Heavy Equipt (VMT)	VMT estimated from fuel used and average MPG Used earliest data available (2014)
	Addl Gas Vehicles - Airport	Gas Used - Airport Addl Vehicles (gal)	Includes off-site refueling of airport fleet vehicles Used earliest data available (2008)
		Annual Miles Traveled - Airport Addl Vehicles (VMT)	Includes off-site refueling of airport fleet vehicles. VMT estimated from fuel used and average MPG. Used earliest data available (2008)
	CNG Buses - Airport	CNG Used - Airport CNG Buses (gal)	Used earliest data available (2008)
		Annual Miles Traveled - Airport CNG Buses (VMT)	VMT estimated from fuel used and average MPG. Used earliest data available (2008)
Street Lights & Traffic Signals	Street Lights & Traffic Signals	Electricity Used - Street Lights & Traffic Signals (kWh)	Includes parking lot and tennis court lighting; separate general Used from street lights and traffic signals

III. Anticipated Building Portfolio Changes

The 'business as usual' emissions forecast assumes that the following changes will occur to Milwaukee County's building portfolio. The energy impacts shown are based actual electricity, natural gas, and district steam use of these buildings.

Anticipated Change	By Year Ending	Building SF	Purchased Electricity (kWh/yr)	Natural Gas (therms/yr)	District Steam (1000 lbs/yr)	Chilled Water (ton-hours/yr)	Notes & Assumptions
Closure of D-16 Mental Health Center	2023	-425,400	-5,174,689	0	-50,135	-1,358,285	Served by County Grounds district steam and chilled water system. Assume BHD staff housed at D-16 will relocate to an existing County building (i.e., no additional space or energy use required).
Disposition of Fiebrantz Complex	2025	-94,818	-217,291	-54,053	0	0	County has issued RFP for disposing the property
Construction of new North Highway Garage	2025	47,792	166,968	28,289	0	0	Would coincide with demolition of old building
Demolition of old North Highway Garage	2025	-34,499	-101,426	-27,695	0	0	Would coincide with construction of new building
Acquisition of Public Museum	2026	464,887	5,608,826	25,434	33,849	0	Served by Downtown district steam system. Current tenants may vacate by 2026.
Cumulative Impacts:		-42,038	282,388	-28,025	-16,287	-1,358,285	

IV. Strategies Brainstormed by the Technical Group

#	Strategy	Type	Emissions Sector	Emissions Reduced (MTCDE/yr)*	Co-Benefits (0 = 'no'; 1 = 'yes'; blank if unknown)							
					CE	CB	HT	FS	EE	JB	RE	Total
1	Replace 15 MCTS diesel buses with BEBs, 2022-23	Replace	Transit Fleet	525			1		1			2
2	After initial pilot of 15 buses (see strategy #1), electrify remaining MCTS bus fleet by 2040	Replace	Transit Fleet	28,264			1		1			2
3	Reduce building energy use 15% per decade 2020-50	Reduce	Buildings & Facilities	15,955			1	1	1			3
4	Make Senior Centers and Community Centers 'net zero' (energy self-sufficient) by 2050	Reduce/ Replace	Buildings & Facilities	2,573			1		1		1	3
5	Maximize participation with We Energies Solar Now program	Offset	Buildings & Facilities	1,106	0		1	1	0		0	2
6	Install 2-MW ground-mounted solar PV system, location TBD.	Replace	Buildings & Facilities	937			1	1	1		0	3
7	Install solar PV at Oakwood Golf Course under We Energies Solar Now program	Offset	Buildings & Facilities	365	0		1	1	0		0	2

* Maximum emissions reduced when strategy is fully implemented.

Co-Benefits: CE - Community Engagement; CB - Community Business Development; HT - Health; FS - Fiscal Responsibility; EE - Efficiency/Effectiveness; JB - Jobs; RE – Resiliency

#	Strategy	Type	Emissions Sector	Emissions Reduced (MTCDE/yr)*	Co-Benefits (0 = 'no'; 1 = 'yes'; blank if unknown)							
					CE	CB	HT	FS	EE	JB	RE	Total
8	Plant shade trees near Community Centers and neighborhoods to provide shade and reduce cooling demand	Avoid	Buildings & Facilities		1		1		0	1	1	4
9	Continuing to telework (reduce occupancy)	Avoid	Buildings & Facilities			0		1	1			2
10	Right-size fleet vehicles according to business needs	Avoid	Vehicle Fleet				1		1			2
11	Reduce mower fuel use by converting turfgrass areas to native landscapes	Avoid	Vehicle Fleet		1			1				2
12	Recapture expended energy to use for building cooling	Avoid	Buildings & Facilities		0			1	1			2
13	Install green or 'cool' (reflective) roofs to reduce heating and cooling demand	Avoid	Buildings & Facilities						1			1
14	Survey existing lighting levels, especially in unoccupied areas, and reduce lighting where possible (delamp)	Avoid	Buildings & Facilities									
15	Improve envelope of buildings (walls, windows, roof, and foundation)	Avoid	Buildings & Facilities									

* Maximum emissions reduced when strategy is fully implemented.

Co-Benefits: CE - Community Engagement; CB - Community Business Development; HT - Health; FS - Fiscal Responsibility; EE - Efficiency/Effectiveness; JB - Jobs; RE – Resiliency

#	Strategy	Type	Emissions Sector	Emissions Reduced (MTCDE/yr)*	Co-Benefits (0 = 'no'; 1 = 'yes'; blank if unknown)							
					CE	CB	HT	FS	EE	JB	RE	Total
16	Adopt State of Wisconsin *Sustainability Guidelines for Capital Projects* for new construction and major renovation projects	Reduce	Buildings & Facilities		1			1	1			3
17	Advocate for City to install smart traffic signal systems	Reduce	Transit Fleet		1		1		1			3
18	Commission existing buildings/sites	Reduce	Buildings & Facilities					1	1			2
19	Upgrade lighting to LEDs - buildings	Reduce	Buildings & Facilities					1	1			2
20	Install energy- and water-efficient appliances	Reduce	Buildings & Facilities					1	1			2
21	Launch Operational Data Analytics (ODA) program for all buildings	Reduce	Buildings & Facilities					1	1			2
22	Increase speed of transit service	Reduce	Transit Fleet		1				1			2
23	Upgrade lighting to LEDs - street lights and traffic signals	Reduce	Street Lights & Traffic Signals					1	1			2

* Maximum emissions reduced when strategy is fully implemented.

Co-Benefits: CE - Community Engagement; CB - Community Business Development; HT - Health; FS - Fiscal Responsibility; EE - Efficiency/Effectiveness; JB - Jobs; RE – Resiliency

					Co-Benefits (0 = 'no'; 1 = 'yes'; blank if unknown)							
#	Strategy	Type	Emissions Sector	Emissions Reduced (MTCDE/yr)*	CE	CB	HT	FS	EE	JB	RE	Total
24	Add emissions controls to existing equipment that is not slated for replacement in the near future	Reduce	Vehicle Fleet				1		1			2
25	Conduct a business travel audit to assess employee travel patterns	Reduce	Vehicle Fleet					1	1			2
26	Incorporate water/energy standards into Zoo construction projects	Reduce	Buildings & Facilities						1			1
27	Add emissions controls to existing equipment that is not slated for replacement in the near future	Reduce	Buildings & Facilities				1					1
28	Replacing gravity-fed filtration systems and dump-and-fill pools with enclosed systems.	Reduce	Buildings & Facilities						1			1
30	Charge buses with solar energy	Replace	Transit Fleet				1	1	1			3
31	Switch from gas heating to heat pumps	Replace	Buildings & Facilities				1		1			2

* Maximum emissions reduced when strategy is fully implemented.

Co-Benefits: CE - Community Engagement; CB - Community Business Development; HT - Health; FS - Fiscal Responsibility; EE - Efficiency/Effectiveness; JB - Jobs; RE – Resiliency

#	Strategy	Type	Emissions Sector	Emissions Reduced (MTCDE/yr)*	Co-Benefits (0 = 'no'; 1 = 'yes'; blank if unknown) CE	CB	HT	FS	EE	JB	RE	Total
32	Install rooftop solar panels	Replace	Buildings & Facilities					1	1			2
33	Install solar water heating systems	Replace	Buildings & Facilities					1	1			2
34	Electrify fleet vehicles	Replace	Vehicle Fleet				1		1		0	2
35	Replace gas-powered handheld equipment (chainsaws, leaf blowers, mowers) with rechargeable electric tools, add solar charging stations for battery packs.	Replace	Vehicle Fleet				1		1			2

* Maximum emissions reduced when strategy is fully implemented.

Co-Benefits: CE - Community Engagement; CB - Community Business Development; HT - Health; FS - Fiscal Responsibility; EE - Efficiency/Effectiveness; JB - Jobs; RE – Resiliency