Detroit's Leadership in Establishing Municipal Greenhouse Gas Reduction Targets and an Action Agenda to Address Climate Change

Joel Howrani Heeres, Detroit Office of Sustainability, howraniheeresj@detroitmi.gov
Nishaat Killeen, Detroit Office of Sustainability, killeenn@detroitmi.gov
Elizabeth Palazzola, Detroit Housing and Revitalization Department, epalazzola@detroitmi.gov

Background

In Detroit, climate change is projected to increase the intensity and frequency of storms that will test and overwhelm the city's infrastructure and threaten the health of residents in other ways. Flooding will continue to affect Detroit homes and streets due to projected increases in intense precipitation, seen as recently as Summer 2019 in the Jefferson Chalmers neighborhood (City of Detroit, 2019). Detroit is also projected to see a significant increase in very hot days, with as many as 65 days above 90°F by the end of this century, exacerbating the burden of heat and poor air quality on the city's most vulnerable residents (Figure 1).

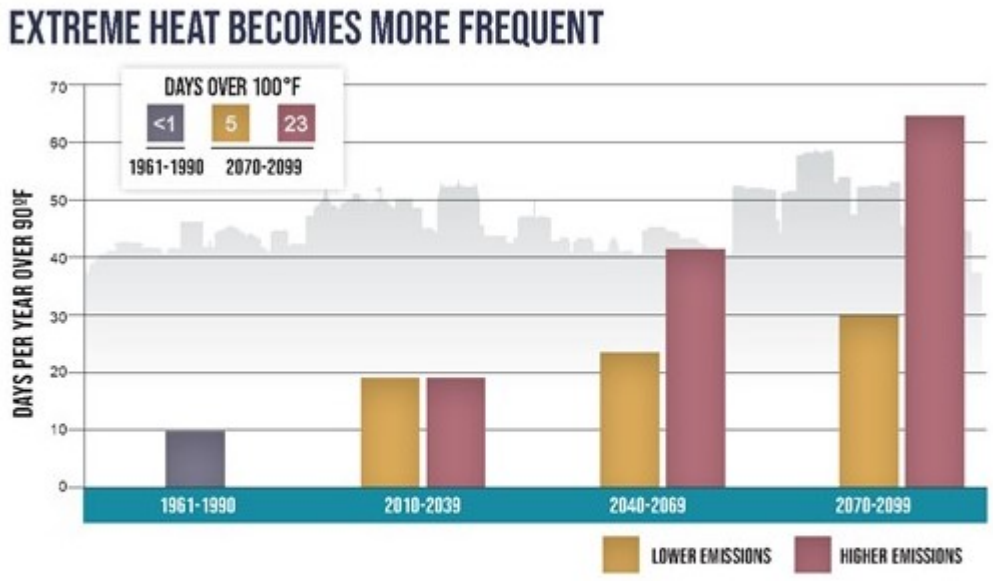

Figure 1. Trends in number of days per year with temperatures above 90° F in Detroit.

Addressing the Climate Change Crisis

Greenhouse gas emissions are driving global climate change, and Detroit is committed to contributing its fair share to efforts led by cities around the world in mitigating the impacts of climate change. In June 2017 the United States pulled out of the Paris Climate Accord. Immediately following this announcement, mayors from throughout the United States started pledging to live up to the Paris Climate Accord and signed on as members of the Climate

Mayors, a bipartisan, peer-to-peer network of mayors working to demonstrate leadership on climate change. Today, over 400 U.S. Mayors, representing 70 million Americans, have signed on, including Detroit Mayor Mike Duggan, to fight climate change and lower greenhouse gas emissions.

On July 24, 2019, Detroit City Council unanimously passed an ordinance to greatly and swiftly reduce greenhouse gas emissions from the city. The ordinance stipulates that greenhouse gas emissions from city sources will be reduced (from 2011 and 2012 baseline conditions as quantified by Carson et al., 2014) by 35% by 2024, 75% by 2043, and 100% by 2050. It will also work towards reducing citywide emissions by 30% by 2025. These carbon emission reduction targets established in the ordinance are based on the standards of the Paris Climate Agreement, which looks to prevent global temperatures from rising more than 2 degrees Celsius by the end of the century. For the U.S., this equates to a 26-28% reduction in greenhouse gas emissions by 2025 from a 2005 baseline.

A comprehensive greenhouse gas emission inventory was performed to quantify baseline annual CO_2 emissions in 2011-2012. This inventory showed that approximately 10.6 million metric tons of carbon dioxide (CO_2) equivalents were emitted in both 2011 and 2012 (Carson et al., 2014). The city has also committed to performing a greenhouse gas inventory assessment every four years, the first of which will be completed by August 1, 2020.

Sustainability Action Agenda

In June 2019, Detroit released a Sustainability Action Agenda that is a strategic roadmap to address key sustainability issues and create a city in which all Detroiters can thrive (City of Detroit, 2019). This Agenda focuses on achieving four outcomes:

- Healthy, thriving people;
- Affordable, quality homes;
- Clean, connected neighborhoods; and
- An equitable, green city.

This Sustainability Action Agenda builds on both the work the City has done since 2014 and community-led efforts like growing more food in the city, cleaning up and caring for vacant lots, and installing rain barrels. Over 6,800 Detroiters were involved in the development of the Agenda for a more equitable, prosperous, and environmentally-sustainable city. It should be noted that climate change is only one of the issues addressed in the Sustainability Action Agenda.

Reducing Municipal and Citywide Greenhouse Gas Emissions

To become a truly green city, the City of Detroit must reduce its greenhouse gas emissions. This includes reducing emissions from city operations as well as emissions from Detroit's residents and businesses. To do this, the City will focus on consistent tracking of our greenhouse gas emissions, identifying targeted actions to address our largest emitting sectors, increasing the use of renewable energy, and ensuring efficient, green buildings operate and are constructed throughout the city.

As noted above, in 2012 Detroit's municipal greenhouse gas emissions were 1.18 million tons of carbon dioxide equivalent (CO_2) and community emissions were 10.6 million tons CO_2 (Carlson et al., 2014). The City's goal, as a signatory of the Chicago Climate Charter, is to reduce community-wide greenhouse gas emissions by 30% by 2025 from a 2012 baseline. For municipal emissions, Detroit has a goal to reduce greenhouse gas emissions by 35% by 2024 and 75% by 2034 from a 2012 baseline.

A sustainable Detroit means embracing the changing landscape of energy production towards more renewable options. Through the development of solar sites, Detroit can contribute to the local economy with green jobs and reduce greenhouse gas emissions and air pollution. As of April 2019, there was an estimated 3.3 MW of solar capacity in Detroit. Detroit aims to double the total solar generation capacity in the city by 2024 and triple it to 10 MW by 2029.

Industrial, institutional, and commercial buildings caused 40% of all greenhouse gas emissions in Detroit, making them prime candidates for impactful reductions. In 2016, industrial energy consumption was 110 thousand BTUs per square foot and commercial energy consumption was 42 thousand BTUs per square foot. As stated in the Detroit Sustainability Action Agenda, the City will work with the community to reduce average industrial and commercial energy consumption by square foot by 10% by 2024 and by 30% to 29 thousand BTU per square foot by 2029 (City of Detroit, 2019).

When 40% of Detroit's sodium streetlights were dark in 2014 and it resolved to switch to an entirely new system of 65,000 LED lights, safer, well-lit streets were not the only benefit. This major citywide project, done in partnership with the U.S Department of Energy, also slashed carbon emissions by 40,000 tons per year. That's the equivalent of taking 11,000 cars off the street. Improving lighting in our neighborhoods also had other benefits – when Detroiters feel safe biking or walking through their neighborhoods, the city becomes better connected and healthier.

As noted above, the City's most recent greenhouse gas inventory was completed in 2012 by the University of Michigan School of Environment and Sustainability (Carson et al., 2014). At that time, citywide emissions were 10.6 million metric tons CO_2. Municipal emissions were 11% of that total, or 1.18 million metric tons CO_2. While the City has taken a number of actions to reduce our emissions, such as the conversion of all of our 65,000 streetlights to LEDs, and numerous actions in the Agenda will result in lower carbon emissions, the City needs an overall strategy to achieve its carbon reduction goals. As a critical first step, we will conduct a new greenhouse gas inventory and Business-As-Usual (BAU) forecast of citywide greenhouse gas emissions. Based on the inventory, the City will develop a quantitative emissions reduction pathway analysis and climate action strategy.

Increasing Solar Generation

The city has over 3.3 MW of installed solar, with significant opportunities for an expansion of solar throughout the city. Solar installations have grown between 4 percent and 240 percent annually since 2012, without targeted marketing or promotion. In 2016, in partnership with DTE Energy, the City installed over 6,500 solar panels in O'Shea Park, constituting the largest urban solar installation in the country, generating 2 MW of power, enough to power 450 homes.

The City will develop a streamlined solar permitting process. The City will publicize existing finance and funding opportunities for integrating solar development into private projects

and encourage developers to consider solar photovoltaic or other renewable energy technology in new housing and commercial projects. The City is also developing a solar potential map that will help property owners and developers quickly evaluate the opportunity to integrate solar into existing and new development projects. Finally, the City will evaluate opportunities to install solar systems on municipal buildings and facilities to lead by example.

Enhancing Energy and Water Efficiency at Municipal Facilities

The City of Detroit operates over 150 facilities, including police and fire stations, parking facilities, recreational centers, and office spaces. Currently, 88 facilities track and report their energy usage. These facilities spend approximately $7.2 million a year on energy. Energy consumption is concentrated heavily among the City's largest facilities, with ten buildings consuming more than half of this energy. The City estimates that energy efficiency measures could result in $2.1 million in annual savings at the ten largest facilities and an additional $860,000 in savings across the remaining facilities. Previous utility bill management efforts identified over $400,000 in savings from incorrect billing information which went directly back to the City. Energy audits have been conducted at 60 of the largest facilities to identify efficiency opportunities and potential capital upgrades. Recommendations are being integrated into capital improvement projects where feasible.

The City will implement both the large efficiency opportunities at the most energy-intensive facilities and the many no- or low-cost efficiency opportunities across all facilities. Beyond the 60 facilities that have already been evaluated, the City will collect energy and water data for all City buildings to understand our baseline energy use. For smaller facilities, the City will develop a set of standard measures and energy best practices, including LED lighting, low-flow hot water fixtures, and programmable thermostats, which can be implemented at a low cost. Finally, the City will implement a utility bill management system to monitor utility use and flag irregular usage and cost information for further investigation.

Launching the Mayor's Challenge Program for Commercial Buildings

Commercial and institutional buildings accounted for 33% of citywide greenhouse gas emissions in 2012. As the City invests in efficiency efforts in our own building stock, it will launch a challenge program to encourage private buildings to track their energy use, increase efficiency, and reduce their greenhouse gas emissions. Similar challenge programs in other cities such as Chicago, New York, and Atlanta have achieved significant energy savings in participating buildings.

The city will launch a challenge program for large commercial buildings to reduce their energy and water usage by 50% by 2030 and to measure these reductions. Together with the Detroit 2030 District, we will facilitate a peer-to-peer technical assistance group of building owners and managers to share proven and cost-effective energy reduction strategies.

Developing an Electric Vehicle Infrastructure Strategy

In 2018, the U.S. Environmental Protection Agency declared seven southeast Michigan counties in violation of ozone pollution standards, including Wayne County. Air pollution in Detroit is largely caused by emissions from industrial facilities and motor vehicles. Electric

vehicles (EV) offer an opportunity to reduce harmful emissions from the transportation sector, which contribute to local asthma rates and other health issues and climate change. A collaborative project with DTE Energy has already resulted in pilot charging infrastructure and EV education in Capitol Park. The City convened government, local utility, and third-party stakeholders to identify the roles of each entity in the operation and maintenance of electric vehicle infrastructure in the city. The City will work with this group to develop a comprehensive electric vehicle strategy to support and accelerate widespread adoption of clean energy transportation. This will include identifying priority locations for new electric vehicle infrastructure; the necessary upgrades to existing infrastructure to support electric vehicles; and local policies, codes and incentives needed to support adoption.

Increasing Resilience

As Detroit begins to experience more extreme precipitation events, its wastewater infrastructure can become overwhelmed. However, by focusing on expanding the amount of and targeting the location of green stormwater infrastructure throughout the city, the City of Detroit can help reduce the impacts of these events. Likewise, informed and prepared communities will be more resilient to climate impacts. The City of Detroit will make information easier to access and provide emergency training to help to prepare communities for extreme events.

Reducing the Volume of Untreated Combined Sewer Overflows (CSOs)

Untreated CSOs are a result of overwhelming the city's system during rain events. In 2017, the regional sewer system recorded 77 CSO events into the Detroit and Rouge Rivers. While over 96% of the sewage released into the Detroit waterways met regulatory requirements, 722 million gallons of untreated sewage were released into Detroit waterways during these events. These discharges create water quality impacts that could impact quality of life for residents, such as through beach closings. The City of Detroit will continue to take actions that reduce the volume of untreated discharges to local waterways.

Doubling the Acreage of Green Infrastructure

Green infrastructure is a key strategy for improved stormwater management, water quality, and neighborhood revitalization. As of 2018, Detroit managed approximately 900 acres through green stormwater infrastructure, direct discharge, and impervious removal (excluding demolitions). The City of Detroit aims to double the acres managed through green stormwater and related techniques citywide in 10 years, resulting in at least 1,800 acres managed by 2029.

Creating Neighborhood-Scale, Green Infrastructure Projects

CSO events are triggered when there is more precipitation than the sewage disposal system can handle, which may also cause neighborhood-level flooding. In the Sustainability Survey, 68% of the respondents indicated that they experience rainfall flooding in their neighborhood that disrupts their daily activity or damages property occasionally, often, or very often. Green stormwater infrastructure can create neighborhood amenities by adding green space

to streets and adjacent properties and help manage stormwater by capturing and detaining rainwater, which keeps it out of the city's stormwater system.

In fiscal year 2017, Detroit Water and Sewerage Department invested over $6 million in green stormwater infrastructure activities. Four Water and Sewerage construction projects reached substantial completion, including Stoepel Park No. 1, Liuzzo Park, transportation corridor projects (joint with the Department of Public Works), and Tireman bioswales. Water and Sewerage also initiated two projects with Parks and Recreation (Crowell and O'Shea) which began construction in fall 2017.

The City of Detroit will work with private and public partners to develop neighborhood scale, distributed green stormwater infrastructure projects, focusing on neighborhoods that have high incidents of flooding and limited green space.

Incorporating Green Infrastructure In Street Redesign and Greenway Projects

Road surfaces are the largest area of impervious surface in the city and present an opportunity to capture and divert stormwater from the sewer system. Four of seven current bond streetscape projects integrate green infrastructure into their design, implementation, and maintenance. Building on this work, the City of Detroit will pilot green infrastructure on streetscape projects through incorporating street trees and vegetation into transportation projects whenever possible, with an emphasis on areas with high-flood risk. The City will also integrate stormwater best management practices into trail planning efforts. Green streets guidelines will be incorporated into the City's Transportation Master Plan of Policies to be completed in 2020.

Integrating Climate Change Impacts In Hazard Mitigation Planning

As Detroit faces a changing climate, natural disasters such as extreme heat and cold events and heavy rainfall are expected to happen more often and with higher intensity. The risks associated with these extreme weather events are not equally distributed across the city, as evidenced by the 2014 floods. The City updates its Federally-mandated Hazard Mitigation Plan every five years to identify actions that will reduce losses caused by disasters, including natural disasters. As part of the 2020 Hazard Mitigation Plan update, the City of Detroit will integrate information on climate change risks for residents and infrastructure and identify potential mitigation strategies. The City will work with all relevant city departments to help them identify the areas where local climate projections can result in substantive policy and programmatic shifts in how departments operate.

Concluding Remarks

Detroit is committed to upholding the Paris Accord and implementing the Sustainability Action Agenda. Detroit's Office of Sustainability developed the Action Agenda as part of an effort to make city operations more efficient by reducing energy costs and greenhouse gas emissions. The Action Agenda intentionally links quality of life with climate action. Responsibilities for each action item are given to specific city departments, as well as their partners in other offices, philanthropy, and the private sector. The Action Agenda also details timelines for carrying out actions and sources of funding currently available. Ultimate success will require broad-based resident buy-in and support.

References

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