CITY OF PLYMOUTH
AGENDA
Regular Environmental Quality Committee
Council Chambers
3400 Plymouth Boulevard, Plymouth, MN
June 10, 2026, 7:00 PM

1. **CALL TO ORDER**

2. **PUBLIC FORUM** - Individuals may address the committee about any item not contained on the regular agenda. A maximum of three minutes is allotted per individual with a total of 15 minutes for the forum. If the full 15 minutes are not needed for the forum, the committee will continue with the agenda. The committee will take no official action on items discussed at the forum, with the exception of referral to staff for future report.

3. **PRESENTATIONS AND PUBLIC INFORMATION ANNOUNCEMENTS**

4. **APPROVE AGENDA** - Environmental Quality Committee members may add items to the agenda for discussion purposes or staff direction only. The committee will not normally take official action on items added to the agenda.

5. **CONSENT AGENDA** - These items are considered to be routine and will be enacted by one motion. There will be no separate discussion of these items unless a committee member or individual so requests, in which event the item will be removed from the consent agenda and placed elsewhere on the agenda.

   5.1 Adopt proposed minutes
   1. EQC 05-13-2026

6. **GENERAL BUSINESS**

   6.1 Draft Climate Action and Resiliency Plan Overview
   1. City of Plymouth Climate Action and Resilience Plan DRAFT

   6.2 2026-2028 Water Efficiency Rebate Program
   1. 2026-2028 Water Efficiency Rebate Program - Information and Application

   6.3 Plymouth Environmental Academy

7. **REPORTS AND STAFF RECOMMENDATIONS**

8. **FUTURE MEETINGS** -

   8.1 Future Meetings

9. ADJOURNMENT

Regular Environmental Quality Committee
June 10, 2026
Agenda Number: 5.1

To:	Environmental Quality Committee
Prepared by:	Ben Scharenbroich, Water Resources Supervisor
Reviewed by:	Michael Payne, City Engineer/Deputy Public Works Director
Item:	**Adopt proposed minutes**

1. Action Requested:
Adopt proposed Environmental Quality Committee minutes from May 13, 2026.

2. Background:
N/A

3. Budget Impact:
N/A

4. Attachments:
1. EQC 05-13-2026

Proposed Minutes
Environmental Quality Committee Meeting
May 13, 2026

Chair Tinjum called a Regular Meeting of the Plymouth Environmental Quality Committee to order at 7:00 p.m. in the Medicine Lake Room of City Hall, 3400 Plymouth Boulevard, on May 13, 2026.

COMMITTEE MEMBERS PRESENT: Chair Tinjum, Committee members Babcock, Blakely, Dmytrenko, Matthiesen, Polzin, and Vavreck.

COMMITTEE MEMBERS ABSENT: None.

STAFF PRESENT: Water Resources Supervisor Scharenbroich, Environmental Stewardship Coordinator Anderson, and City Engineer/Deputy Public Works Director Mike Payne.

OTHERS PRESENT: Councilmember Gregor and six residents.

Plymouth Forum

There was no one present to address the Committee.

Presentations and Public Information Announcements

There were no presentations or public information announcements.

Approval of Agenda

Motion was made by Committee member Polzin and seconded by Committee member Babcock to approve the agenda as presented. With all members voting in favor, the motion carried.

Consent Agenda

Motion was made by Committee member Polzin and seconded by Committee member Matthiesen to approve the consent agenda that included the following item:

(5.1) Adopt April 8, 2026, Regular Environmental Quality Committee Minutes

With all members voting in favor, the motion carried.

General Business

(6.1) Plymouth Environmental Academy

Environmental Stewardship Coordinator Anderson reviewed the different session topics for 2026 and the members who will be leading and assisting for each session. She reviewed the intent and proposed details for each session topic.

Committee member Vavreck suggested that Hennepin County also be considered as a potential partner for the buildings and energy session.

Committee members provided additional suggestions and potential partners to be incorporated into the buildings and energy sessions for the large group and residential. Funding was identified as a potential barrier, and it was suggested that different ideas for financial assistance be provided in the sessions.

Environmental Stewardship Coordinator Anderson moved to the public health topic and reviewed the intent.

Committee members provided additional input on the session's intent and additional suggestions to incorporate. Two potential partners were identified for the session.

Environmental Stewardship Coordinator Anderson welcomed input on the locations and dates for the 2026 sessions.

Committee members had additional discussion about potential dates and locations. It was noted that dates, times, and locations should be chosen for the building and energy sessions prior to the next meeting to ensure that the sessions could be advertised in the newsletter. The group recognized that registration is helpful in predicting the number of people attending and communicating information, but also does not want to create a barrier to attendance.

Water Resources Supervisor Scharenbroich noted that they have had conversations about whether to continue calling this the environmental academy.

Committee member Dmytrenko stated that she could brainstorm a few ideas and email those to staff to disperse for consideration.

Reports and Staff Recommendations

There were no reports or staff recommendations.

Future Meetings

(8.1) Future Meetings

Water Resources Supervisor Scharenbroich reviewed the upcoming meetings as listed in the packet.

Adjournment

Chair Tinjum adjourned the meeting at 7:50 p.m.

Regular Environmental Quality Committee
June 10, 2026
Agenda Number: 6.1

To:	Dave Callister, City Manager
Prepared by:	Ben Scharenbroich, Water Resources Supervisor
Reviewed by:	Michael Thompson, Public Works Director
Item:	**Draft Climate Action and Resiliency Plan Overview**

1. Action Requested:

Receive a presentation and discuss the Draft Climate Action and Resiliency Plan.

2. Background:

As part of the City Council's strategic priority of Environmental Stewardship, development of a Climate Action and Resiliency Plan was identified as a key initiative. To support this effort, the city has prepared a draft Climate Action and Resiliency Plan to guide community-wide climate action and resilience efforts over the next 10 years.

The draft plan outlines strategies to address climate impacts through two complementary approaches: mitigation and adaptation. Mitigation focuses on reducing greenhouse gas (GHG) emissions, while adaptation focuses on strengthening the community's ability to prepare for, respond to, and recover from climate-related impacts and changing environmental conditions.

The Climate Action and Resiliency Plan establishes a framework for reducing emissions, improving community resilience, expanding community engagement and education, and supporting a healthy, sustainable, and prepared community. The plan is intended to enhance the quality of life for residents, businesses, and visitors while providing a roadmap for future environmental stewardship and climate resilience initiatives throughout Plymouth.

3. Budget Impact:

The city received a grant from the Minnesota Pollution Control Agency to support the development of the Climate Action and Resiliency Plan. The grant award of $49,000 and the required city matching funds of $35,126.85 were previously approved by the City Council. This update does not have any additional direct budgetary impact.

4. Attachments:

1. City of Plymouth Climate Action and Resilience Plan DRAFT

City of Plymouth

Climate Action and Resilience Plan

May 2026

DRAFT

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Climate Action

Purposeful activity to mitigate human-made contributions to climate change through Greenhouse Gas reductions.

Resilience

The capacity to withstand, respond to, and recover from climate impacts.

Click to Navigate:
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City of Plymouth Climate Action and Resilience Plan

At-A-Glance

Purpose

The Climate Action and Resilience Plan seeks to:

- Build Community Resilience
- Encourage Pollution Reductions
- Support Informed Decisions

Process

The plan was developed in 5 steps

1. **Context:** 5 baseline research documents
2. **Community** 9 community input meetings
3. **Collaboration** planning team with 28 staff & volunteers
4. **Calibration** detailed city staff plan refinement
5. **Completion** based on public draft plan review

Pathway

To increase climate resilience and long-term greenhouse gas (GHG) reductions:

2035
40%
Lower GHG emissions community-wide
(below 2016)

2050
80%
Lower GHG emissions community-wide
(below 2016)

Plan

The plan guides climate action through:

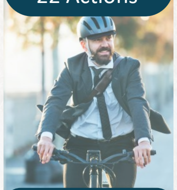
Addresses **7 Sectors** 0f GHG & resilience

Through **23 Strategies** to achieve goals

Supported by **94 Actions** that can be taken

Over a **10 Year** timeframe

Transportation and Land Use
5 Strategies
22 Actions



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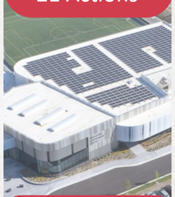
Buildings and Energy
5 Strategies
21 Actions



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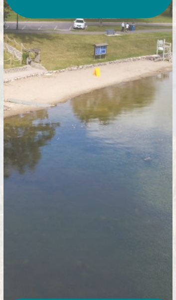
Waste Management
2 Strategies
8 Actions

Click here for section

Water
2 Strategies
9 Actions



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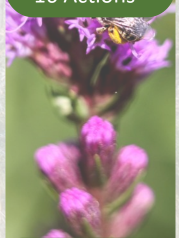
Local Food & Agriculture
2 Strategies
8 Actions

Click here for section

Greenspace & Ecosystems
4 Strategies
16 Actions



Click here for section

Thriving Community
3 Strategies
10 Actions

Click here for section

Potential

By 2035, successful plan implementation could result in:

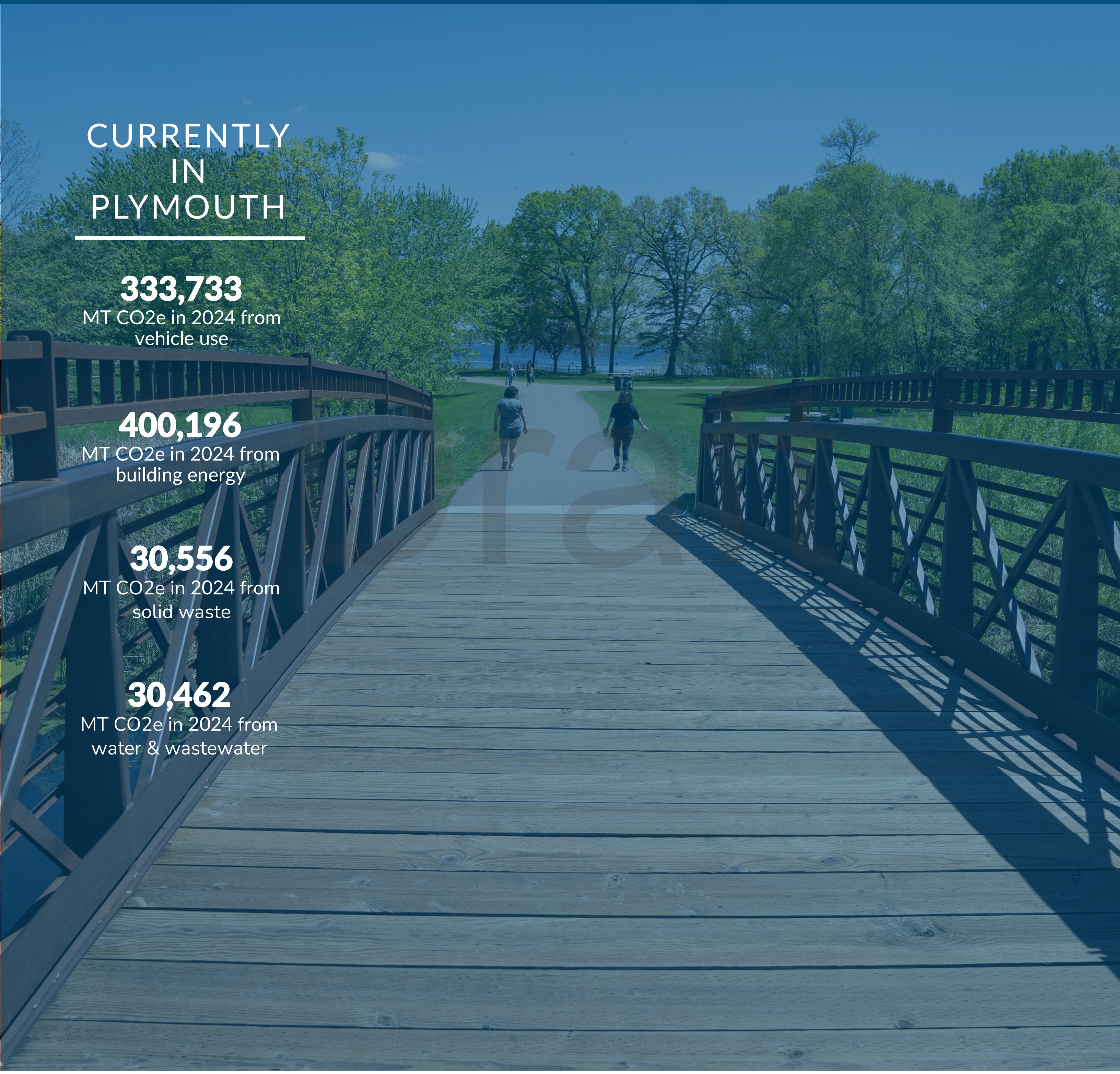
44,600,000 kWh Saved Annually

11,400,000 Therms Saved Annually

1,818,818 Tons of GHG Avoided Through 2035

$287 Million Cumulative Cost Savings Possible Through 2035

Introduction



CURRENTLY IN PLYMOUTH

333,733
MT CO2e in 2024 from vehicle use

400,196
MT CO2e in 2024 from building energy

30,556
MT CO2e in 2024 from solid waste

30,462
MT CO2e in 2024 from water & wastewater

Introduction

What is a Climate Action and Resilience Plan

Climate action includes intentional efforts to address climate change through two complementary approaches: mitigation and adaptation. Mitigation reduces the greenhouse gas (GHG) emissions that drive warming, while adaptation strengthens the community's ability to prepare for, withstand, respond to, and recover from climate-related impacts.

Why Plymouth's Greenhouse Gas Emissions Matter

Greenhouse gases trap heat in the atmosphere, increasing global temperatures as concentrations rise.[1] Measuring, tracking, and reducing greenhouse gas (GHG) emissions are essential steps in climate planning because they help Plymouth understand where emissions come from, set priorities, and measure progress over time.

Although climate change is a global issue, local emissions still matter. Every community contributes to the larger problem, and every reduction helps limit future climate impacts.[2,3,4,5] Local action also creates direct benefits for Plymouth residents and businesses, including lower energy costs, cleaner air, improved transportation choices, reduced waste, healthier buildings, and greater resilience to extreme weather.[6,7,8,9] By reducing its own emissions, Plymouth can do its part while also improving quality of life, strengthening the local economy, and demonstrating leadership for other communities.

In 2024, Plymouth's citywide GHG emissions totaled 794,946 metric tons of carbon dioxide equivalent. Emissions from electricity use, natural gas use, and transportation fuels have declined somewhat over the last eight years, while emissions from solid waste and wastewater have increased.[10] These trends show that progress is possible, but continued action is needed across multiple sectors.

Why Create a CARP

The Plymouth Climate Action and Resilience Plan (CARP) does not commit the City to specific actions or expenditures. Instead, it serves as a long-term roadmap to guide informed decisions that can help the community save energy and money, improve livability, and build lasting resilience—MPCA notes that resilience investments can provide $8–$10 in benefits for every dollar spent.[11,12] Having an established CARP can also help the City secure funds while providing an organizational framework supporting the City's existing and future environmental stewardship efforts. Furthermore, implementing a CARP can spur investment in innovation, create jobs, and implement measures that save money for households and businesses while improving the quality of life.

Co-Benefits

Community actions that reduce greenhouse gas emissions in areas such as housing, transportation, and energy can provide benefits beyond climate mitigation. These efforts can improve air quality, protect public health, reduce health risks, use resources more efficiently, strengthen local economies, and increase the resilience of ecosystems and infrastructure.[13,14,15,16,17,18] Together, these benefits can enhance quality of life, protect natural resources, and create long-term financial value.

Common Co-Benefits of Climate and Resilience Actions

Cost Savings[19,20]
Lower costs through efficiency and reduced resource use.

Less Pollution[21,22]
Cleaner air, water, and less waste.

Energy Resilience[23,24]
Reliable energy during disruptions and extreme weather.

Community Resilience[25,26]
Better preparedness, infrastructure, and support during disruptions.

Safe Streets[27,28]
Safer streets for walking, biking, and driving.

Better Mobility[27,29]
More transportation options and better access.

Healthier Habitats[20,25,30,31]
More biodiversity, greenspace, and healthier ecosystems.

Quality of Life[25,32,33]
Better health, comfort, and community well-being.

Planning Process

The Plymouth Climate Action and Resilience Plan was developed through an inclusive, community-centered process guided by a planning team of volunteers and City staff. Community engagement was central to the effort. Citywide surveys, public meetings, and planning team discussions gave residents multiple opportunities to share their experiences, priorities, and ideas. This input, along with technical analysis and best practices from climate planning efforts in Minnesota and across the United States, helped shape the plan's goals and actions.

From February through May 2026, the 14 member community volunteer community planning team and the 13 member staff planning team participated in a total of six facilitated workshops to identify challenges, explore opportunities, and develop strategies for each plan sector. Informed by community input, the team refined and prioritized goals and actions through a collaborative process. The result is a community-informed plan that reflects Plymouth's values, priorities, and commitment to a more sustainable and resilient future.

Research Based Plan

To guide the plan's goals and actions, the consultant team completed key assessments on climate vulnerability, ground cover and tree canopy, greenhouse gas emissions, and renewable energy potential. These studies provided data on local risks, emissions trends, and other metrics. The Sustainability Assessment compiled these findings, highlighted major community metrics, and outlined initial sector goals. Click the icons below to view these documents.

Climate Action Baseline Study

Climate Vulnerability Assessment

Community-Wide GHG Inventory

Ground Cover, Tree Canopy & Carbon Sequestration Study

Community-Wide Renewable Energy Potential Study

Greenhouse Gases

What Are Greenhouse Gases?

A greenhouse gas (GHG) is a molecule in the atmosphere which does not react to light energy in the visible range (like sunlight), but does react to light energy in the infrared range-like that which is emitted from the Earth after being warmed by the sun. The most common greenhouse gases include carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O).[1]

Why do GHG's Matter?

Greenhouse gases occur naturally and help keep Earth warm, but human activities are adding them faster than natural systems can remove them.[34,35] Burning fossil fuels moves carbon long stored underground into the atmosphere as carbon dioxide or methane.[36] This adds new carbon to the air, increasing the total amount of heat-trapping gases in the atmosphere and strengthening climate change.[37]

Where do community GHGs come from?

A community-wide GHG inventory measures emissions from the key sources listed below. It typically does not include emissions from the goods people buy, known as embodied carbon. Those emissions are estimated through a separate consumption-based inventory.[38]

Energy
Emissions are produced by burning natural gas, coal, and other fossil fuels, primarily to heat and cool buildings and generate electricity.

Mobile Combustion
Emissions come from the combustion of fossil fuels for ground transportation and air travel.

Solid Waste
Emissions in the inventory estimate the decomposition of food and yard waste in the landfill.

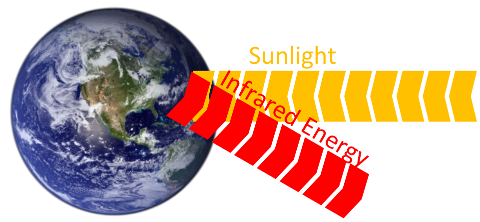
Wastewater
Emissions from energy uses are calculated for the collection and treatment of wastewater.

What can we do to reduce GHG's?

Greenhouse gases can be reduced by making changes within the key greenhouse gas sectors within our community—particularly through the reduction and elimination of fossil fuel combustion and the advancement of clean energy sources.

Earth's Infrared Energy

When sunlight strikes the Earth, it warms the surface and becomes heat energy – or infrared energy. This infrared energy then radiates back towards space.



The Greenhouse Effect

Our atmosphere is made up of both Non-Greenhouse and Greenhouse Gases gasses.[1]

Non-Greenhouse Gases do not react to visible light, nor infrared energy. That means both sunlight and infrared energy pass through them unaffected, allowing Earth's heat energy to radiate into space.

Greenhouse Gases also do not react to visible light, however, they DO react to infrared energy, trapping and reflecting Earth's heat energy back, warming the planet. This is known as the Greenhouse Effect.

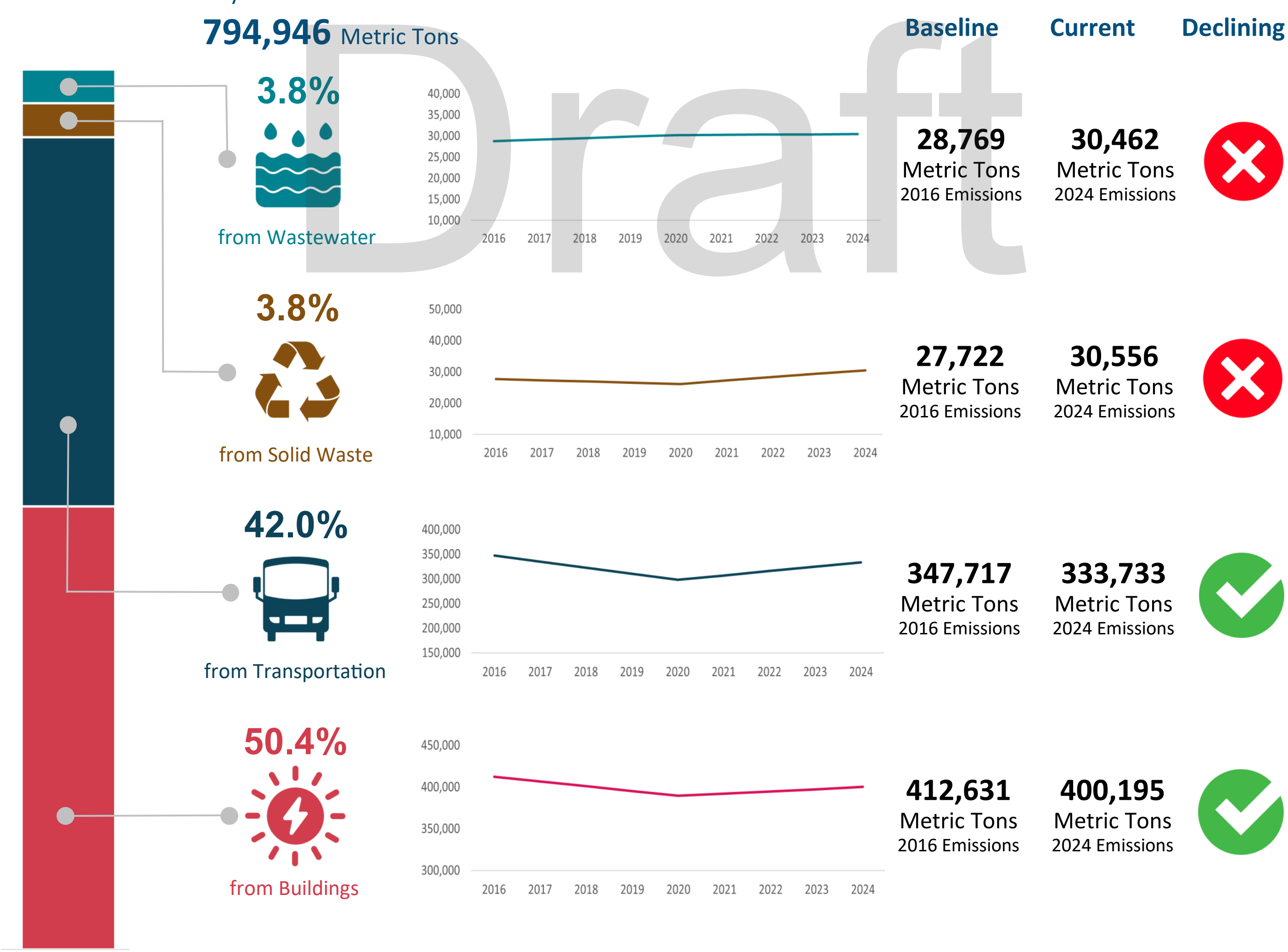
Plymouth's GHG Emissions

Measuring and tracking GHG emissions is vital for any climate mitigation planning or implementation effort. Community-wide total emissions for Plymouth decreased from 816,838 MT CO_2e in 2016 to 794,946 in 2024.[10] This represents a decrease in GHG emissions of 2.7% while the city's population increased 5.9% during the same timeframe. Between 2016 and 2024, Transportation emissions reduced 4% and Building emissions dropped 3%. Meanwhile, Solid Waste emissions increased 10% and Wastewater increased 5.9%. Although many sectors have seen reductions when compared to 2016, all but one have had some increase since 2020. Meanwhile, the pace of community-wide reduction since 2016 does not yet align with science-based recommendations to avoid more harmful climate change impacts in the future.

Plymouth Community-Wide GHG Emission Trends[10]

Citywide 2024 Total:

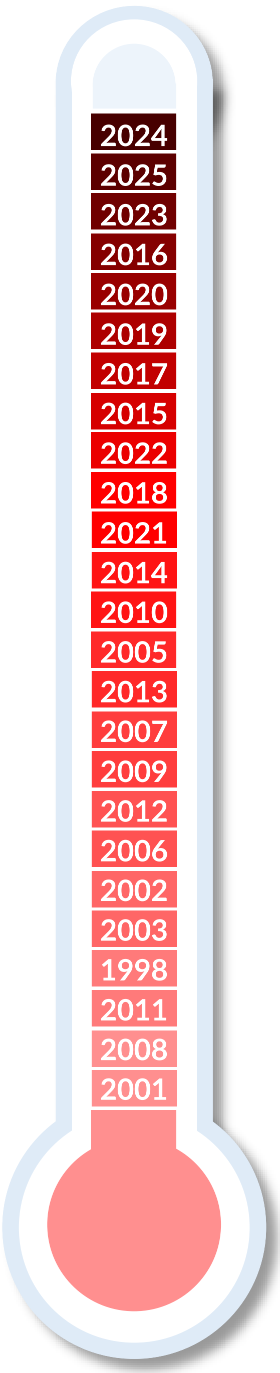
794,946 Metric Tons



Climate Change

The Hottest

26 Hottest Global Years on Record[19]



Climate change is a global phenomenon with significant local consequences. Scientific consensus confirms that increasing greenhouse gas emissions are disrupting Earth's climate system. Twenty-five of the warmest 26 years on record have occurred since 2000. In Minnesota, much of the state has warmed nearly 3°F over the past century, causing drier soils and a 20% increase in heavy rain events.[29,40,41]

Climate Change in Plymouth

Plymouth is experiencing these trends firsthand. Between 1980 and 2018, the city saw rising average temperatures, more days above 95°F, more heavy rain events, and fewer days below 32°F.[42,43] One of the most notable shifts are in precipitation patterns. While overall annual precipitation has increased, the change is uneven across seasons. Fall and winter precipitation rose up to 15.5%, while spring and summer levels remained largely unchanged.[44]

Climate Projections for Plymouth[45]

Over their lifetime, a child in Plymouth can expect:[42,43]

Climate Conditions	Recent Averages	Mid-Century (2050 average)	End of Century (2100 average)
Average Daily Maximum Temperature	55° F	61°F	62°F to 66°F
Number of Days Per Year with Maximum > 95° F	2	21 (1105% increase)	24 to 49.5 (up to 2605% increase)
Number of Days Per Year With Minimum < 32° F	160	134 (16% decrease)	133.1 to 109.4 (up to 32% decrease)
Change in Growing, Allergy, & Tick/Mosquito Season[46,47]	9 days	25 days (275% increase)	25 to 40 days (up to 439% increase)
Change in Annual Precipitation[48]	26"	32" (123% increase)	27 to 35" (up to 135% increase)
Increase in Heavy Precipitation (Days Per Year with > 1" Rainfall)	3.2	4 (31% increase)	4 to 5 (up to 63% increase)
Increase in Air Conditioning Demand (Cooling Degree Days)	600	1400 (133% increase)	1400 to 2100 (up to 250% increase)
Increase In Air Conditioning Related Electricity Use[49]	N/A	39%	39 to 59%

Plymouth's Climate Risks

The anticipated climate changes in Roseville over the next few decades pose potential risks to residents, with certain populations—such as children, seniors, and individuals with disabilities—being more vulnerable to these impacts. Below are some of the most notable risks to the community.[45]

Extreme Heat and Weather

Some people face greater risks from severe storms, flooding, and heat waves.[50,51] Heat stress is more likely for those with diabetes or heart disease, as well as people affected by socioeconomic factors, age, and neighborhood land cover.

Air Quality

Climate change is anticipated to impact air quality through various channels, including higher levels of allergens and pollen, increased regional ozone concentrations, greater risks of smoke from wildfires, and elevated particulate pollution and dust.

Food Insecurity

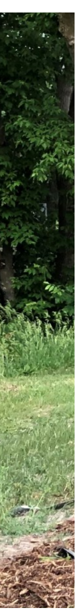
Climate change is likely to destabilize cropping systems, interrupt transportation networks, and trigger food shortages and spikes in food cost.

Infrastructure / Power Failure

Extreme weather, flooding, and growing climate variability threaten aging infrastructure. Power outages, damaged roads and bridges, and water system failures can disrupt essential services and create serious risks for the community—especially to those most vulnerable.

Flooding

The latest National Climate Assessment finds that heavy precipitation is already increasing in Minnesota and across the United States. These intense rainfall events are expected to become more frequent, increasing the risk of river and lake flooding as well as flash flooding.



GHG Mitigation can avoid 57,000 premature deaths in the United States annually by 2100.

- United States Environmental Protection Agency [52]

GHG Reduction Goal

This plan aligns with science-based GHG reduction targets to limit global warming to 2°C above pre-industrial levels.[53,54] Meeting this target for the City of Plymouth represents addressing our fair share of the global GHG reductions needed to greatly reduce future climate risks and impacts.[55,56] The CAP sets both interim and long-term goals.

City of Plymouth's interim GHG goal:

"To reduce citywide GHG emissions 40% below 2016 levels by 2035."

City of Plymouth's long-term GHG goal:

"To reduce citywide GHG emissions 80% below 2016 levels by 2050."

This citywide goal is reflected in strategies for individual sectors. Sector-specific goals for GHG emissions reductions aim to balance reductions across all areas and meet the community's overall emissions targets. These goals strive for achievability while aiming for improvements beyond business as usual.

Survey of Peer Community Carbon Reduction Goals[57]

Burnsville	Reduce community-wide GHG emissions 40% below 2005 levels by 2030 and 80% below 2005 levels by 2050
Eagan	Reduce community-wide GHG emissions 55% below 2014 levels by 2035, and net zero emissions by 2050
Edina	Reduce community-wide GHG emissions 45% below 2019 levels by 2030, and net zero emissions by 2050
Maplewood	Reducing greenhouse gas emissions in alignment with State of Minnesota Goals—45% below 2013 by 2036 and net zero emissions by 2050
Minneapolis	Reach net-zero greenhouse gas (GHG) emissions by 2050.
Minnetonka	Reduce community-wide greenhouse gas emissions by 63% per person by 2030 from 2018 levels and achieve net zero greenhouse gas emissions by 2050
New Brighton	Reduce community-wide GHG emissions 42% below 2013 levels by 2030, and achieve carbon neutrality by 2050
Roseville	Reeduce community-wide GHG emissions 54% below 2016 levels by 2036, and net zero emissions by 2050
St Louis Park	100% renewable electricity citywide by 2030, carbon neutrality by 2040
St Paul	Carbon neutral municipal operations by 2030, carbon neutral citywide by 2050
Woodbury	To reduce community-wide GHG emissions 42% below 2022 levels by 2035.

The Plan

A climate action and resilience plan should be a living document that is reviewed and updated over time. Climate science, technology, regulations, funding, and community needs will continue to change. Regular updates allow the plan to reflect new information, adjust goals, take advantage of new tools and funding opportunities, and respond to changing conditions. This helps keep the plan practical, effective, and useful for guiding future decisions.

The Plymouth Climate Action and Resilience Plan:

Addresses	Through	Supported by a menu of	Over a
7 Sectors	**23 Strategies**	**94 Actions**	**10 Year**
of GHG reductions and climate resilience	To achieve goals	that can be taken	Implementation timeframe

The plan provides organization for City operations and community-wide climate action. It includes an implementation section and seven sectors focused on reducing emissions and building climate resilience. See Plan Framework for a description of each sector.

Each sector includes strategies—or goals—along with a menu of specific actions to support implementation. Each strategy includes an assessment of its potential impact, metrics for tracking progress, and a summary of related co-benefits.

Plan Components

The following section describes these common plan components:

Strategies guide how we achieve our climate action and resilience goals.

Potential summarizes strategy climate and emissions benefits.

Co-Benefits indicate the common co-benefits related with each strategy.

Actions outline steps the City can take to support strategies.

Metrics indicate how we can measure our progress.

Plan Framework

The plan is organized into seven sectors of GHG reduction and climate resilience. See below for a brief description of each of the plan's sectors. Click the arrows below to view each section.

Click here for section

Transportation and Land Use

Strengthen Plymouth's transportation system while reducing greenhouse gas emissions and the environmental impacts of mobility and land use.

Click here for section

Buildings and Energy

Enhancing building resilience and reducing costs and pollution through improved efficiency, renewable energy, and reducing on-site combustion.

Click here for section

Waste Management

Decreasing the environmental impacts of waste management within the community through increased waste reduction, reuse, and recycling

Click here for section

Water

Reducing water consumption, limiting wastewater impacts, and strengthening resilience to flooding and stormwater risks.

Click here for section

Local Food and Agriculture

Increasing food system resilience, access, and security while reducing food waste and hunger.

Click here for section

Greenspace and Ecosystems

Increasing greenspace and natural areas to strengthen ecosystem health and resilience.

Click here for section

Thriving Community

Improving community resilience through healthy community connections, durable local economy, and empowering communications.

GHG Reductions

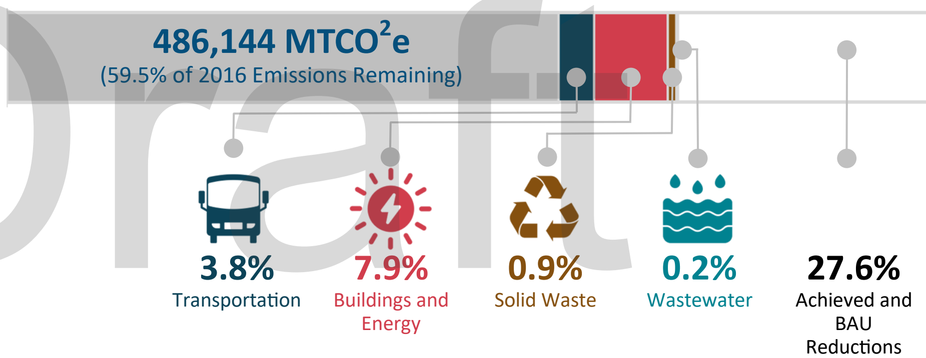
The project team modeled greenhouse gas (GHG) reduction strategies using research, best practices, and stakeholder input. These strategies were analyzed by comparing planned GHG reduction targets with a Business-as-Usual forecast. Sector-level results are then combined to estimate citywide emissions reduction pathways.

Because many strategies work together, their impacts can overlap. For example, using less electricity through energy efficiency and producing cleaner electricity through renewable energy both reduce electricity-related emissions. To avoid counting the same reduction twice, the model first estimates savings from strategies that reduce overall energy use. It then applies strategies such as renewable energy and electrification to the remaining energy demand.

GHG Emission Reductions by Sector

	2016 Emissions	2024 Emissions	2035 Projected Emissions	Reduction from 2016
Transportation	347,717	333,733	205,539	40.9%
Buildings and Energy	412,631	400,195	233,268	43.5%
Solid Waste	27,722	30,556	20,091	27.5%
Wastewater	28,769	30,462	27,246	5.3%
Total GHG Emissions	**816,838**	**794,946**	**486,144**	**40.5%**

Sector Share of Total GHG Reductions by 2035



40.5%
Reduction in annual GHG emissions by 2035

Achieving plan goals will reduce citywide GHG emissions to 486,144 metric tons by 2035.
A 40.5% decrease from 2016 levels.

Over 10 years, the plan avoids **1.8 million metric tons of emissions,** eliminating **35.7 billion cubic feet** of human-made greenhouse gases from the atmosphere.

Potential Plan Benefits

Consumption Savings by Sector

Below is an illustration of modeled reductions in energy use, fuel use, and solid waste associated with selected plan strategies.

	2035 BAU Projection	2035 CARP Projected Savings
Gallons of Vehicle Fuel (gallons)*	26,349,554	3,759,774
Building Electric Use (kWh)*	893,848,568	44,692,428
Building Natural Gas Use (therms)*	41,126,955	11,412,730
Solid Waste Landfilled/Incinerated (tons)*	87,878	27,597

* Values represent calculated savings over business-as-usual (BAU) projected 2035 consumption values. Savings do not include estimated investments in fuel switching, energy efficiency upgrades, etc. See Potential Costs & Savings appendix for order of magnitude investment and savings projections and sources.

Illustrated Cumulative Community Savings

This shows the estimated cumulative citywide savings potential from implementing selected plan strategies through 2035. Community-wide costs and savings are based on strategy-level outcomes, not individual actions, and do not include potential benefits from job creation, new business growth, or other co-benefits. See the appendix for calculation details.

Transportation Economic Potential:

Sector Savings:	$239,900,000
Sector Cost Increases:	-$35,700,000
Potential Sector Net Cost Savings:	**$204,200,000**

Buildings and Energy Economic Potential:

Sector Savings:	$78,900,000
Sector Cost Increases:	-$62,500,000
Potential Sector Net Cost Savings:	**+ $16,400,000**

Waste Reduction Economic Potential:

Residential Savings:	$25,700,000
Commercial Savings:	$1,100,000
Potential Sector Net Cost Savings:	**+ $26,800,000**

Social Cost of Avoided Carbon: **+ $40,500,000**

Estimated Localized Social Cost of Carbon: $70 per MT

Cumulative Community Savings Potential: **= $287,900,000**

Transportation and Land Use

CURRENTLY IN PLYMOUTH

12.5%
of community-wide GHG emissions in 2024 from transportation

704,001,000
Vehicle Miles Traveled in 2024

65.4%
Commuters drove alone in 2024

1.1%
Commuters use public transit

1,709
Battery Electric Vehicles (BEV) registered in January 2025

Sector Goals

40.9% less GHG emissions (below 2016)

5% fewer vehicle miles traveled

125% Increase in public transit use

Increased community walkability

15% registered electric vehicles

Transportation and Land Use

Strengthen Plymouth's transportation system while reducing greenhouse gas emissions and the environmental impacts of mobility and land use.

Transportation is a major source of energy use and emissions. Moving people and goods requires significant fuel, infrastructure, and vehicle resources. In addition to on-road vehicles, off-road equipment such as construction, recreational, and lawn equipment also consumes fossil fuels. Because many of these engines are less efficient and subject to weaker emissions standards, they can produce more greenhouse gases and air pollutants per gallon of fuel than on-road vehicles.[1]

Worldwide, transportation and equipment systems are responsible for as much as 20% to 25% of energy use and carbon dioxide emissions.[2] In Plymouth, the transportation and land use sector is also a major contributor to communitywide greenhouse gas emissions– representing 42% of citywide emissions.[3] Without additional action, vehicle miles traveled are likely to increase over time. However, transportation emissions can decline if more vehicles and equipment transition from fossil fuels to electricity and if Minnesota's electric grid continues to add renewable energy.[4]

Plymouth can make its transportation system more sustainable while also improving quality of life, public health, and equity. Strategies that reduce single-occupancy vehicle trips, expand shared transportation options, and support walking, biking, e-bikes, scooters, and transit can lower emissions while increasing mobility choices and opportunities for physical activity. Transitioning vehicles and equipment to electric and renewable fuel options can further reduce transportation emissions and improve local air quality, including in lower-income neighborhoods where EV ownership may be less common.[5, 6]

Co-Benefits:

Co-benefits associated with this sector are to the right. See each strategy's co-benefits key and the Introduction for brief descriptions.

Reduced Costs | Reduced Pollution | Energy Resilience | Safer Streets | Improved Mobility | Quality of Life

STRATEGY

TL 1

Decrease community wide Vehicle Miles Traveled (VMT) 5% by 2035, and 10% by 2050.

Potential

Community-wide vehicle miles traveled (VMT) in Plymouth was 704 million miles in 2024. Although the city has seen a 1% increase in total VMT since 2016, VMT per household has decreased 4.8%.[3]

Decreasing total city-wide vehicle miles by 5% will decrease vehicle miles traveled by more than 35 million miles, saving over $27 million city-wide annually by 2035 while reducing GHG emissions by nearly 11,000 metric tons annually. Increasing availability and safety of bike and walking routes to schools, retail hub, and recreation centers can support reduced vehicle use for other types of daily trips.[7]

Strategy Co-Benefits

Metrics

Annual VMT data reported (MNDOT);
Reported commuter transportation mode data (US Census)

Actions

TL 1-1	Incorporate a Complete Streets approach in the CIP to make City infrastructure safe, accessible, and convenient for all users.
TL 1-2	Through implementation of the CIP, evaluate roadway reduction opportunities to promote safety and benefit all users.
TL 1-3	Partner with area School Districts to identify Safe Route to School infrastructure improvements.
TL 1-4	Partner with area agencies to support initiatives aimed at increasing safety, such as "Toward Zero Deaths.".
TL 1-5	Explore becoming a League of American Bicyclists Bicycle Friendly Community

STRATEGY

TL 2

Increase public transit commuter ridership from 1.1% to 2.5% by 2035.

Potential

The average commute in the city is 22.6 minutes, or approximately 15 to 17 miles.[8] Of the nearly 42,000 Plymouth residents who are employed, over 36,000 must commute out of the city.[9] Meanwhile, AAA estimates that the cost per mile for operating a vehicle is $0.77.[10] Consequently, every 1% increase in commuter utilization of public transit in the city may decrease vehicle miles traveled by 2.8 million miles, saving an estimated $1.5 million and eliminating 1,348 metric tons of GHG emissions annually.

Strategy Co-Benefits

Metrics

Reported public transit commuter data (Plymouth Metrolink); Annual VMT data reported (MNDOT)

Actions

TL 2-1	Evaluate ridership and routes to optimize provided services and increase public transit usage.
TL 2-2	Evaluate communication efforts for opportunities to promote increased awareness and utilizations of Metrolink services.
TL 2-3	Collaborate to promote Metrolink "Click and Ride" as a weekend shop and ride service.
TL 2-4	Explore opportunities to partner with other agencies to optimize services and increase ridership.

STRATEGY

TL 3

Create thriving spaces that integrate elements of daily life within walking distance of where residents live.

Potential

Creating thriving, walkable places helps residents live closer to daily needs. As Plymouth grows, focusing increased density along transit corridors, increasing adoption of accessory dwelling units, and redeveloping underutilized land can reduce vehicle trips while expanding housing and mobility options. Meanwhile, evaluating parking minimums and reducing excess pavement can lower development costs, improve stormwater management, and create more space for housing, green space, and other community benefits. Together, these support lower transportation emissions, reduced energy consumption, and a more connected, livable Plymouth.[11,12]

Strategy Co-Benefits

Actions

TL 3-1	Promoted increased density along transit corridors by incorporating land use policies prescribed in the comprehensive plan.
TL 3-2	Educate property owners on the city's accessory dwelling unit (ADU) ordinance.
TL 3-3	Evaluate parking minimums at appropriate opportunities to reduce the underutilized surface parking and imperious surfaces throughout the city.
TL 3-4	Identify vacant or underutilized land through the Comprehensive Plan process to evaluate its use for other purposes that could benefit higher density, walkability, transit access, or greenspace.

Metrics

Reported number of residents living within transit and community nodes;
Reported mixed-use densities along transit corridors;
Reported community population density per developed acre.

STRATEGY

TL 4

Increase zero-emission and battery electric vehicle (BEV) use to 15% of vehicles on the road by 2035.

Potential

Transitioning Plymouth's 60,000 vehicles from to low- and zero-emission options will promote long-term pollution reductions. EVs can cut emissions by 50% to 70%, with battery production impacts typically offset within two years.[13] Battery recycling continues to advance, with current methods recovering more than 95% of materials and producing recycled battery components that can outperform those made from newly mined resources.[14,15] Each 1% shift to EVs could save $11 million in vehicle operational costs, and reduce emissions by up to 2,000 metric tons annually—even after accounting for increased vehicle purchase price and electricity use.[3,16,17]

Strategy Co-Benefits

Actions

TL 4-1	Create a citywide EV Roadmap that assesses charging infrastructure, forecasts demand, identification of ideal locations for charging stations, and guides expansion across public, residential, and commercial areas using existing and emerging technologies to support equitable EV adoption.
TL 4-2	Consider implementation of an "EV Ready" zoning ordinance that promotes and incentivizes increased EV use.
TL 4-3	Promote incentive programs that support EV purchases and encourage apartment and rental properties to install EV charging.
TL 4-4	Offer and promote community education material on zero-emission vehicles
TL 4-5	Promote opportunities for fleet operators to advance use of zero-emission vehicles and supporting infrastructure.

Metrics

Registered EV vehicles citywide (MNDOT)

STRATEGY

TL 5

Convert 20% of non-emergency light- and medium-duty gasoline fleet vehicles and equipment to EVs, shift 15% of diesel fuel use to renewable fuels, and improve remaining combustion fleet fuel efficiency 5% by 2035.

Potential

Local governments can demonstrate the benefits of cleaner, lower-cost transportation. In 2024, gasoline accounted for just almost 55% of Plymouth's municipal fleet fuel use, totaling 192,503 gallons. Converting 20% of the City's gasoline fleet to EVs could reduce municipal emissions by over 300 $MTCO_2e$ annually while reducing long-term operational costs.[3,16,17] For vehicles not yet suitable for EV replacement, the City can reduce fuel use through fuel-efficient driving and a focus on fuel efficient vehicle replacements. Eco-driving alone can reduce fuel use by at least 10%, while hybrids can cut fuel use by 20% to 25% and plug-in hybrids by up to 60%.[18,19,20]

Strategy Co-Benefits

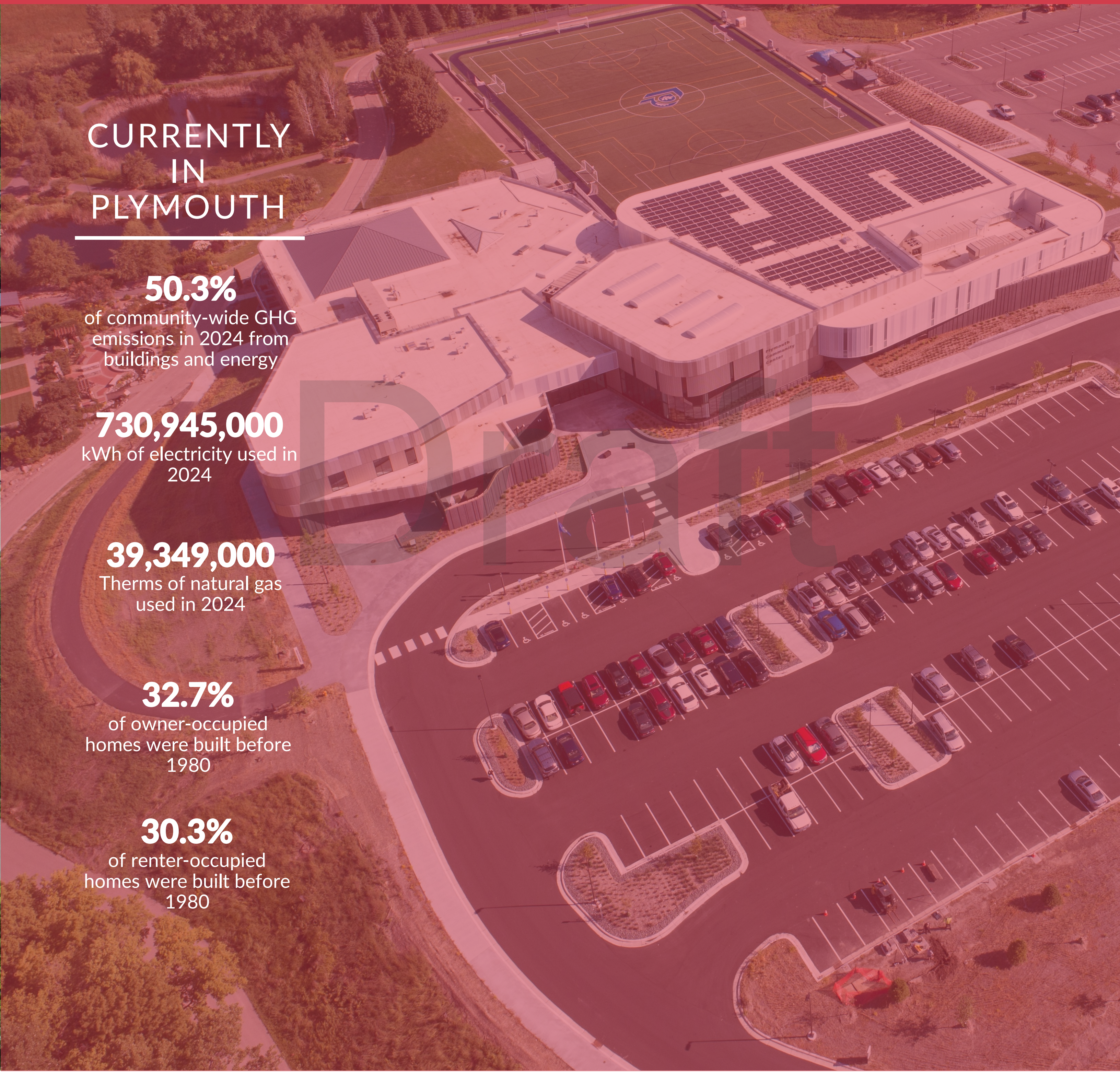
Actions

TL 5-1	Evaluate feasibility of electric and zero-emission fleet alternatives with the CIP process. Include life-cycle costs and environmental footprint assessment.
TL 5-2	Include EV charging infrastructure in CIP development process at municipal sites that supports public and city fleet vehicles.
TL 5-3	Develop or adopt an Eco-Driving Guide for all employees and align fleet operations with its recommendations.
TL 5-4	Use GIS-based tracking to monitor fleet fuel efficiency and identify improvement opportunities including electric vehicle options.

Metrics

City reported vehicle share by fuel type;
City GHG updates;
City reported vehicle fleet fuel consumption by fuel type;
City reported fleet vehicle average MPG

Buildings and Energy



CURRENTLY IN PLYMOUTH

50.3%
of community-wide GHG emissions in 2024 from buildings and energy

730,945,000
kWh of electricity used in 2024

39,349,000
Therms of natural gas used in 2024

32.7%
of owner-occupied homes were built before 1980

30.3%
of renter-occupied homes were built before 1980

Sector Goals

43.5% less GHG emissions (below 2016)

12.5% renewable energy (on-site and purchased)

5% less electricity use

30% less on-site fuel combustion

15% fuel switching from on-site combustion

Buildings and Energy

Enhancing building resilience and reducing costs and pollution through improved efficiency, renewable energy, and reducing on-site combustion.

Building energy use in homes and businesses is a major contributor to the environmental impacts of the built environment, including greenhouse gas (GHG) emissions. These emissions come from direct sources, such as on-site fossil fuel combustion for heating and cooking, and indirect sources, such as electricity generated from fossil fuels off site.

Building design strongly influences long-term efficiency, heating and cooling costs, indoor health, and comfort. Improved energy efficiency can lower GHG emissions while providing substantial cost savings for property owners and tenants. By improving building performance, Plymouth can strengthen resilience and generate environmental, social, and economic benefits.

Residential Energy

According to 2024 citywide data, the residential sector in the City of Plymouth consumes over 267 million kWh annually. This is equal to 8,235 kWh per household. The sector also consumes over 22.8 million therms of natural gas annually, equal to 706 therms per household. Residential energy GHG emissions total 194,634 metric tons annually, approximately 48.6% of Citywide building energy sector emissions.[1]

Non-Residential Energy

The City of Plymouth commercial and industrial sector in 2024 consumed nearly 489.5 million kWh, equal to 9,112 kWh per job. These sectors also consume over 16.4 million therms of natural gas annually, or approximately 308 therms per job. Commercial and industrial energy GHG emissions total 205,145 metric tons annually, approximately 51.3% of Citywide buildings energy sector emissions.[1]

Co-Benefits:

Co-benefits associated with this sector are to the right. See each strategy's co-benefits key and the Introduction for brief descriptions.

Reduced Costs | Reduced Pollution | Energy Resilience | Community Resilience | Quality of Life

STRATEGY

BE 1

Improve total citywide building energy efficiency 5% for electricity and 15% for natural gas by 2035.

Strategy Co-Benefits

Metrics

Annual electricity use reported (electric utilities);
Annual natural gas use reported (natural gas utilities)

Potential

Homes constructed from 2000 to 2009 consume 15% less energy per square foot compared to those built in the 1980s, and 40% less energy than homes built before 1950.[2] Retrofitting older homes with energy efficient appliances, insulation, and windows can provide significant opportunity to reduce energy consumption citywide. Within Plymouth, 77% of owner occupied homes and 75% of renter occupied homes were built before 2000.[2] This share of housing stock alone represents a significant opportunity for reducing community-wide energy consumption—particularly within natural gas use.

Actions

BE 1-1	Continue to partner with Xcel Energy to promote household participation in the Home Energy Squad program. Maintain funding for and promote availability of Plymouth discounted costs for all and income-qualified free participation. Goal: 200 households annually.
BE 1-2	Partner with Wright-Hennepin Electric Coop to evaluate creation and promotion a residential energy efficiency program that offers home audits, installs energy-saving products, and provides customized plans to lower utility bills. Establish funding for and promote availability of Plymouth discounted costs for all and income-qualified free participation. Goal: 35 households annually.
BE 1-3	Partner with Xcel Energy, Wright-Hennepin Electric Cooperative, and the Minnesota Chamber of Commerce to promote commercial and industrial energy efficiency audit and upgrade programs based on or expanding Energy Smart, with performance targets aligned with this plan. Goal: 3 commercial and non-profit properties annually, each achieving >10% energy reductions.
BE 1-4	Following adoption of the 2026 state building code, determine feasibility of establishing and promoting the voluntary use of a Plymouth Stretch Energy Code to encourage high efficiency construction.
BE 1-5	Establish a "Plymouth Energy Challenge" competition to motivate participation in energy efficiency programs. Establish annual targets of households/businesses to reach and award incentives for top efficiency achievements.
BE 1-6	Promote education and outreach strategies to help residents and businesses increase energy efficiency

STRATEGY

BE 2

Achieve "fuel switching" of 15% of citywide on-site fossil fuel combustion to electrification or renewable fuels by 2035.

14.2% of existing households use electric heat according to census and natural gas utility data. Goal would result in 29.2% of households using electric heat.

Strategy Co-Benefits

Metrics

Reported natural gas accounts (natural gas utilities);
Share of homes by heating type (US Census)

Potential

In Plymouth, about 84% of homes heat with natural gas, 14.2% with electricity, and 1.8% with fuel oil, wood, or solar.[3] Switching from fossil fuel heating to electric heat pumps can improve indoor air quality by reducing on-site combustion and pollutants such as carbon monoxide, nitrogen dioxide, and fine particles.[4] Heat pumps also provide efficient heating and cooling, reduce energy use and GHG emissions as the electric grid gets cleaner, and may qualify for state and federal incentives.[5] As the grid moves toward carbon neutrality, transitioning buildings away from fossil fuel heating will be essential to achieving communitywide emissions reductions.[1]

Actions

BE 2-1	Work with Xcel Energy, Wright-Hennepin Electric, Hennepin County, and other partners to promote existing and expand financial incentives with a tiered structure based on income equity to electrify new and existing buildings.
BE 2-2	Identify partnership opportunities with other agencies and organizations to promote education on electrification.

STRATEGY

BE 3

Increase customer owned or purchased renewable electricity to 12.5% of citywide building electric use by 2035.

5% on-site and 7.5% green source purchase - existing is 1% on-site and 2.5% green source purchase.

Strategy Co-Benefits

Metrics

City and electric utility reported customer owned installations; Electric utility reported customer purchased renewable energy

Potential

The GHG emissions associated with grid provided electricity use is anticipated to continue to reduce over the years.[6] Increasing consumer driven renewable energy purchases, however, is still beneficial to provide cost savings, increased resilience, and support GHG reductions.[7,8] As of 2024 there were 292 customer owned on-site solar arrays in Plymouth, with an estimated generating capacity of 11.5 MW.[9] For residents and businesses that are unable to install on-site solar, purchase of renewable energy through the electric utility provides those property owners an opportunity to achieve Net Zero electricity use while supporting an important mechanism in cleaning the State's electric grid.[10,11,12]

Actions

BE 3-1	Evaluate creation or promotion of Solar Group Purchase opportunities to reduce installation costs through bulk buying, designed with an equity focus and support for local installers. Goal: 25 households annually; may be combined with electrification and efficiency group purchase programs.
BE 3-2	Identify top privately-owned sites for Solar PV installations (rooftop, ground, carport) and develop and provide to property owners site assessments detailing estimated costs, energy generation, and 30-year economic payback. Provide assessments to additional property owners biennially through 2035 to maximize solar awareness and promote participation in the Solar Group Purchase Campaign.
BE 3-3	Increase solar permitting ease by becoming a SolSmart Silver city.
BE 3-4	Partner with Xcel Energy, Wright-Hennepin Electric, Hennepin County, and other local organizations to provide information and resources on renewable energy systems and available incentives.
BE 3-5	Explore incorporation of clean energy standards and requirements into the planned unit development (PUD) ordinance.

STRATEGY

BE 4

Reduce share of population living with high energy burden 50% by 2035.

Potential

Energy burden, a measure of energy affordability, is the share of household income spent on energy. A burden of 6% or more is considered high.[13] High energy burdens increase health and resilience risks, especially during extreme weather. As severe weather becomes more frequent in Plymouth, residents experiencing energy poverty will face greater climate vulnerability.[14,15,16] Energy efficiency and renewable energy can lower bills, improve indoor air quality, and strengthen resilience. Programs should be designed to ensure vulnerable households can access these benefits.[17] With 10% of Plymouth residents considered low income, expanding access to these solutions can reduce energy poverty and improve resilience.[3,18]

Strategy Co-Benefits

Actions

BE 4-1	Partner with utilities and community-based organizations (CBOs) who serve income-qualified residents to promote income-qualified programs to low-income residents to reduce energy burden.
BE 4-2	Partner with groups such as Citizens Utility Board to offer regular utility bill clinics that help residents review bills, find savings, apply for rebates, connect with energy and weatherization assistance programs, and access discounted efficiency products.
BE 4-3	Assess the feasibility of community solar on City rooftops or land, with prioritized participation by, or discounted rates for low-income community members.

Metrics

Reported household share with high energy burden (US DOE)

STRATEGY

BE 5

Improve municipal building energy performance reducing electricity use 5%, natural gas use 10%, supplying 50% of electricity from renewable sources, and achieving 25% "fuel switching" from on-site fossil fuel combustion to electrification by 2035.

Strategy Co-Benefits

Metrics

City reported energy use;
City natural gas accounts, City reported fuel switching projects;
City reported natural gas consumption

Potential

Plymouth's municipal operations used over 10.8 million kWh of electricity and 289,000 therms of natural gas, accounting for more than 53% of municipal GHG emissions.[1] Improving electricity efficiency by 5% and natural gas efficiency by 15% could save about 543,000 kWh and 29,000 therms annually, saving up to $62,000 per year.[1,19]

Expanding clean energy and electrifying facilities would further reduce emissions while increasing municipal building resilience.[20] Achieving 50% renewable municipal electricity could cut emissions by up to 1,200 MT CO_2e annually, while electrifying 25% of building heating as the grid decarbonizes could reduce another 344 MT CO_2e annually.[1]

Actions

BE 5-1	Ensure municipal buildings and construction projects contemplate energy efficiency in their design.
BE 5-2	Conduct energy audits of all City facilities by 2030. Use audit results to prioritize energy efficiency upgrades, to be completed within five years.
BE 5-3	Continue conversion of City-owned streetlights and signals to LED through lifecycle replacement in CIP. Encourage utilities to continue conversion of their streetlights to LED, incorporate motion sensors where appropriate, and include measures to prevent upward light pollution.
BE 5-4	Conduct a Solar Feasibility and Master Plan for all non-multifamily City-owned facilities to evaluate ownership options—including direct purchase and third-party agreements (e.g., PPAs)—and identify alternatives such as community solar subscriptions or Renewable Energy Credit purchases for sites unsuitable for on-site solar to support achieving renewable energy goal.
BE 5-5	Develop an electrification assessment to determine feasibility of transitioning City facilities to zero on-site fossil fuel use. Include strategies for new and existing buildings and energy storage needs.

Waste Management

CURRENTLY IN PLYMOUTH

3.8%
of community-wide GHG emissions in 2024 from solid waste

24,066
tons of landfilled waste citywide in 2024

12,008
tons of organics collection citywide in 2024

Sector Goals

27.5% less GHG emissions (below 2016)

10% less solid waste generated

1.6x increase in organics diversion

Waste Management

Decreasing the environmental impacts of waste management within the community through increased waste reduction, reuse, and recycling opportunities and initiatives.

In Plymouth, solid waste management is governed by the Minnesota Waste Management Act and guided by the Metropolitan Solid Waste Policy Plan and Hennepin County Solid Waste Management Plan. These policies follow a waste management hierarchy that prioritizes waste reduction, reuse, recycling, and composting as the most effective ways to reduce pollution and environmental impacts. Energy recovery through incineration is a lower-priority option, while landfilling is considered the least environmentally beneficial.

Solid waste management includes collecting and processing garbage, recycling, and organics. In Plymouth, garbage is sent from regional transfer stations to either the Hennepin Energy Recovery Center or landfills. Recyclables are sorted for reuse, while yard and food waste are composted for uses such as landscaping and road construction.

Waste transportation and landfilling produce greenhouse gas emissions, including carbon dioxide and methane. Reducing waste and increasing recycling and composting can conserve energy, reduce resource extraction, build soil, and lower emissions.

The Amount of Solid Waste in Plymouth[4,5,12]

Citywide municipal solid waste (MSW) handled has been estimated based on the city reporting. In 2024, citywide MSW totaled 83,571 tons, with 23,515 tons (28.1% of total) diverted for recycling, 12,008 tons (14.4%) diverted for organics composting and recycling, and 23,983 tons (28.7%) was diverted for waste-to-energy incineration. The remaining 24,066 tons (28.8%) were landfilled.[1,2]

State and Hennepin County waste studies show that food and yard waste remain major diversion opportunities. Hennepin County estimates food waste makes up 19% of garbage, while the State estimates yard waste adds another 12%, indicating significant potential to reduce landfilled waste.[3,4]

Co-Benefits:

Co-benefits associated with this sector are to the right. See each strategy's co-benefits key and the Introduction for brief descriptions.

Reduced Costs | Reduced Pollution | Enhanced Ecosystems | Quality of Life

STRATEGY

WM 1

Decrease total annual municipal solid waste handled 10% by 2035.

Potential

The Minnesota Pollution Control Agency (MPCA) has created a waste management hierarchy based on environmental impacts. This hierarchy, supported by the US EPA as well, prioritizes waste reduction, reuse, recycling, and organics recovery.[5,6] Reducing waste decreases the materials consumed and discarded, saving energy and lowering landfill greenhouse gas emissions. Homes and businesses that minimize waste can save hundreds of dollars annually.[7,8,9] Continuing to support programs and opportunities to reduce the total volume of waste generated represents a significant environmental opportunity for Plymouth.

Strategy Co-Benefits

Metrics

Reported community-wide total solid waste handled

Actions

WM 1-1	Provide building permit applicants information on Hennepin County construction and demolition waste reduction and diversion programs and incentives and encourage applicants to develop waste management plans that meet CARP-plan-aligned diversion targets.
WM 1-2	Explore options for waste hauling improvements supporting CARP goal achievement, such as alternative pricing structures, increased waste reduction and recycling education/ communication, improved contamination control, low/no emission collection vehicles, etc.
WM 1-3	Continue to collaborate with partners to promote material reuse and waste reduction through community events like swaps, garage sales, and organized electronics recycling. Explore Hennepin County Community Zero-Waste Grant to support implementation and promotion.
WM 1-4	Collaborate with Hennepin County, recycling and organics haulers, and other partners to establish a City of Plymouth outreach campaign that amplifies existing City and partner communications that expands reach and awareness of clear, consistent information on waste reduction, recycling, and organics collection for Plymouth residents and businesses. Explore Hennepin County Community Zero-Waste Grant to support implementation.

STRATEGY

WM 2

Increase organics solid waste diversion to 23% 2035.
Existing is 14.4% organic diversion.

Potential

Most landfill gas arises from bacterial decomposition when organic waste breaks down by bacteria.[10] Organic wastes include food, garden waste, street sweepings, textiles, wood, and paper products. According to the State's Waste Characterization study, as much as 28% of landfilled waste consists of organic waste (yard and food).[3] Similarly, the Hennepin County study finds food waste to make up 19% of landfilled materials[4] These studies underscore the significant landfill diversion and solid waste emissions reduction opportunity organics diversion represents for Plymouth.[1,2]

Strategy Co-Benefits

Metrics

Reported community-wide total organic collection;
Reported community-wide total solid waste landfilled

Actions

WM 2-1	Consider utilizing compost and/or biochar use as a soil amendment for City construction projects where appropriate and cost effective
WM 2-2	Ensure all City of Plymouth facilities have organics and recycling collection where feasible.
WM 2-3	Promote use of Hennepin County's Business Recycling grant program to increase business and non-profit organics diversion participation.
WM 2-4	Collaborate with partners to encourage backyard composting by offering low-cost or free compost bins and educational resources to residents.

Water

CURRENTLY IN PLYMOUTH

3.8%
of community-wide GHG emissions in 2024 from Wastewater management

36
flood events in Hennepin County reported by NOAA since 2000

$5,515,000
in flood damage in Hennepin County reported by NOAA since 2000

Sector Goals

5.3% less GHG emissions (below 2016)

5% less water use

5% reduction of wastewater

Increased stormwater resilience

Water

Reducing water consumption, limiting wastewater impacts, and strengthening resilience to flooding and stormwater risks.

Water is central to sustainability, public health, and environmental protection. In Plymouth, climate-driven changes in temperature and precipitation may affect water supply, water quality, stormwater, and wastewater systems.[1] Strategies such as water conservation, efficient irrigation, and native landscaping can reduce these risks while making better use of limited resources.[2,3] Planning for future climate conditions helps Plymouth strengthen water and wastewater resilience, protect natural systems, and reduce long-term impacts to residents, infrastructure, and the local economy.[4]

Flood Risk and Stormwater Management

According to First Street Foundation, 3,278 properties in Plymouth—about 12% of all city properties—are estimated to be at risk of flooding over the next 30 years.[5]

Flood risks are expected to increase as precipitation patterns change. The U.S. National Climate Assessment indicates that the 10 rainiest days can account for up to 40% of annual precipitation in the Minnesota region.[1] By 2050, the Plymouth area may see up to a 23% increase in annual precipitation and as much as 35% by the end of the century. These increases in annual precipitation are likely to be accompanied by longer dry periods between storms, and an increase in heavy precipitation events.[6,7]

To prepare, the City can continue to review flood-prone areas and evaluate whether current stormwater infrastructure can manage future extreme rainfall. Best Management Practices (BMPs) can help reduce runoff, improve water quality, and strengthen resilience. Examples include rain gardens, infiltration swales, permeable pavement, underground infiltration systems, rainwater harvesting, and native landscape restoration.[8,9]

Co-Benefits:

Co-benefits associated with this sector are to the right. See each strategy's co-benefits key and the Introduction for brief descriptions.

Reduced Costs

Reduced Pollution

Energy Resilience

Community Resilience

Enhanced Ecosystems

STRATEGY W 1

Promote reduced water consumption and wastewater generation Citywide with a targeted reduction of 5% each by 2035.

Potential

Water conservation protects freshwater supplies, natural systems, and aquifers while reducing the energy needed to pump, treat, heat, and distribute water. This is especially important in Minnesota, where groundwater provides drinking water for about 75% of residents.[10] Using less water and producing less wastewater also reduces infrastructure demand, treatment needs, energy use, and greenhouse gas emissions—supporting long-term sustainability and a more resilient water system.[11,12]

Strategy Co-Benefits

Metrics

City Reported community-wide water consumption;
City and Metropolitan Council reported wastewater flows

Actions

W 1-1	Encourage and promote water conservation and explore options for billing that incentivizes reductions in use.
W 1-2	Continue to implement leak reduction strategies. Explore potential new options such as the installation of water distribution pressure management measures for leak reduction and increased distribution efficiency.
W 1-3	Explore options to increase promotion and utilization of the City's Water Efficiency Grant program and other incentives to promote the installation of efficient water fixtures and appliances in homes and businesses, prioritizing low income community members. Goal: achieve 150 households and 10 businesses upgraded annually
W 1-4	Expand water conservation education and outreach in residential and commercial sectors, promoting available efficiency incentives and programs including the City's discounted or free rain barrel program.

STRATEGY W 2

Update engineering design standards and implement plans to meet projected climate change storm water and flood mitigation requirements.

Potential

By 2100, Plymouth may experience up to 35% more annual precipitation, along with more frequent heavy rainfall events.[13,14] These changes could increase stormwater runoff, localized flooding, and flash flood risk.[15] Because traditional infrastructure standards are often based on historic rainfall patterns, the City can strengthen resilience by continuing to incorporate climate projections from NOAA and other sources into infrastructure design and planning. Expanding green infrastructure and other stormwater best management practices can further reduce runoff and improve community resilience.[8,9]

Strategy Co-Benefits

Metrics

Status of climate projection data plan integration;
Share of impervious surfaces flowing to stormwater best management practice

Actions

W 2-1	Update the City's Surface Water Management Plan and stormwater design calculations to reflect NOAA Atlas 15 precipitation data and climate change projections.
W 2-2	Evaluate opportunities to increase native plantings and install stormwater best management practices (BMP) on City-managed property and with capital improvement projects.
W 2-3	Evaluate including green infrastructure and stormwater BMPs in appropriate public locations where impactful and cost-effective improvements can be made.
W 2-4	Collaborate with watershed districts and other partners to promote community use of stormwater best management practices (BMP), inform community members how they may participate in city BMP installation efforts, and provide information on watershed district grant and incentive opportunities.
W 2-5	Explore opportunities to increase incentivization of stormwater management features, green infrastructure, and other best management practices within the City's Surface Water Fee such as credits or discounts.

Local Food and Agriculture

CURRENTLY IN PLYMOUTH

1
community garden citywide

1
farmers market citywide

10.3%
of population estimated with food insecurity in Hennepin county

Sector Goals

Increased local food production and access

Reduced food waste and food insecurity

Local Food and Agriculture

Increasing food system resilience, access, and security while reducing food waste and hunger.

Long-distance food transport relies on fossil fuels and generates greenhouse gas emissions. It can also require extended refrigeration, adding further energy use and emissions. Shortening supply chains and reducing refrigeration needs can help make the food system more sustainable.[1] Meanwhile, buying local food not only can reduce some transportation-related impacts, it can help re-invest in the local economy. Local food systems can provide strong economic and community benefits. Research indicates that produce farms selling through local markets support about 32 jobs for every $1 million in revenue, compared with 10.5 jobs for produce farms using wholesale markets.[2] Community gardens and neighborhood gardening also strengthen social connections, support intergenerational activities, encourage low-impact outdoor exercise, and provide habitat for plants, wildlife, and pollinators.[3]

Climate change also creates growing risks for the food system.[4] More extreme heat and precipitation can affect crops, livestock, infrastructure, and distribution networks, while invasive pests and shifting natural cycles can further disrupt production. These impacts may deepen existing food access inequities. Food insecurity, defined as limited or uncertain access to adequate nutrition due to income, access, or other barriers, already disproportionately affects low-income households, which are nearly three times more likely to experience it.[5] As climate-related disruptions increase, food security challenges are likely to become more severe across communities.[6]

Co-Benefits:

Co-benefits associated with this sector are to the right. See each strategy's co-benefits key and the Introduction for brief descriptions.

Reduced Costs | Reduced Pollution | Energy Resilience | Community Resilience | Enhanced Ecosystems | Quality of Life

STRATEGY

LF 1

Increase and support local food production and access—especially programs and initiatives that serve low-income and food-insecure residents.

Strategy Co-Benefits

Metrics

Food access city-wide (USDA);
Status of policies;
Reported number of community gardens

Potential

The U.S. agriculture system faces climate risks that vary by region.[7] Pacific states may experience reduced water supplies, warmer winters, and less predictable spring weather. In the Midwest, grain production is vulnerable to weather variability, flooding, heat waves, hotter nights, and warmer winters. In the Great Plains, beef, pork, and poultry production may be affected by extreme weather and disruptions to feed, water, and power supplies. These food system impacts can affect all Plymouth residents, especially low-income households and people experiencing food insecurity. Expanding access to locally grown food can help strengthen community resilience and improve food security.[8,9]

Actions

LF 1-1	Update policies to support local food production, including front-yard and rooftop gardens, community gardens, urban farms, beekeeping, and poultry keeping. Explore creation, or sourcing of, model Home Owners Association policies to encourage and promote adoption by HOAs.
LF 1-2	Explore the potential of establishing a City or partner supported "Grow Plymouth" community food project that includes garden plots, a food forest, an urban market garden to train youth and residents in local food production, and donate food to those in need.
LF 1-3	Explore options for increasing incentives for developers and large property owners to include space in new construction, or for the removal of underutilized paved and turf grass areas to establish community gardens and native pollinator-friendly planting.

STRATEGY

LF 2

Reduce food waste and food insecurity Citywide.

Potential

Nationally, an estimated 30–40% of all food goes to waste.[10] Plymouth's solid waste stream includes an estimated 7,000 to 9,000 tons of discarded food each year, representing more than $30 million in lost consumer value.[11,12,13,14] Beyond the greenhouse gases produced, this wasted food could have helped families facing food insecurity, and the land, water, energy, and labor used to grow it could have been used more effectively. Reducing food waste will advance Plymouth's resilience goals, strengthen sustainability, and help address community food insecurity.[15]

Strategy Co-Benefits

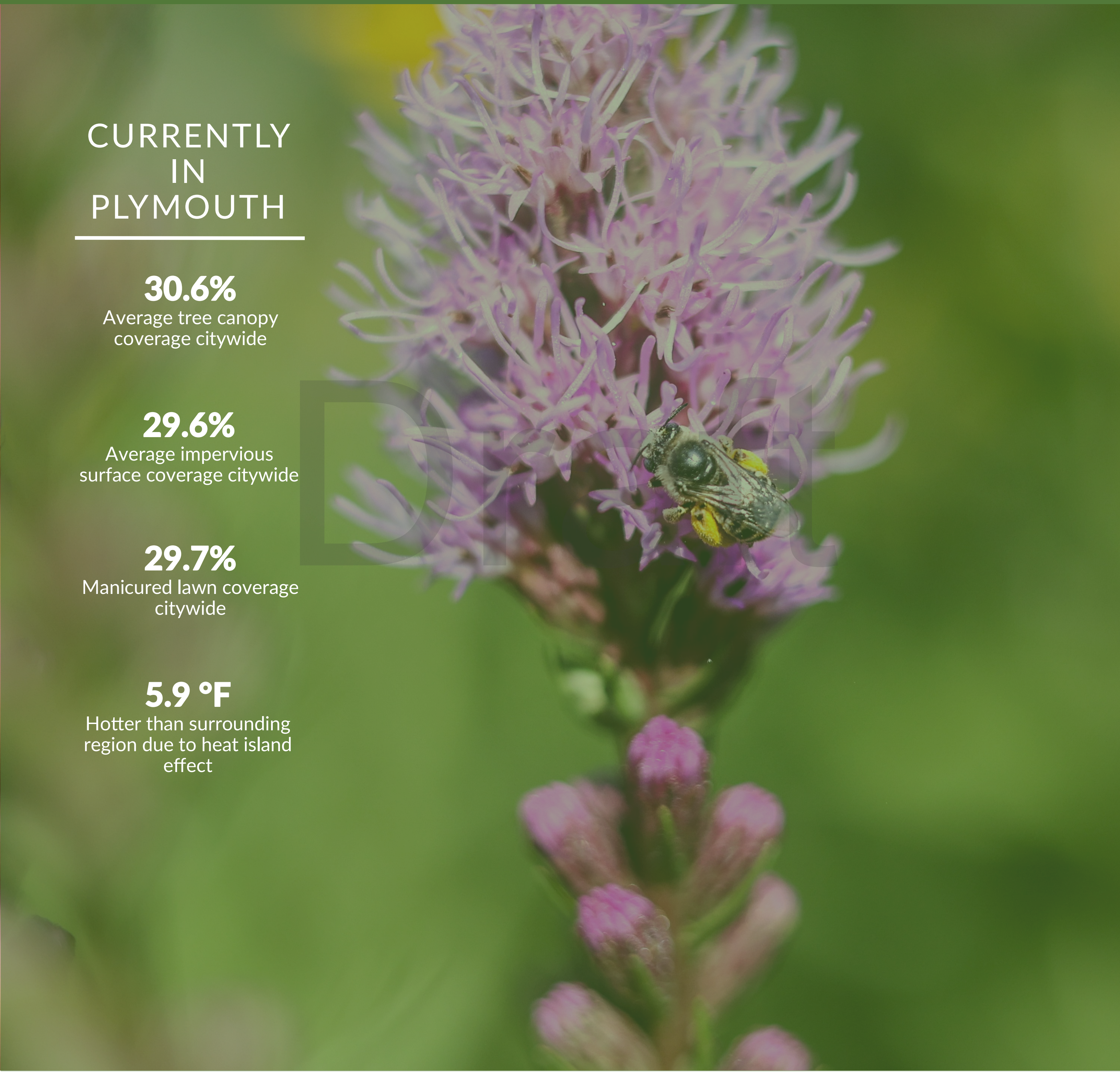
Metrics

Reported organics diversion rate;
Food insecurity reported in City and County;
Reported share of food waste characteristics data

Actions

LF 2-1	Conduct a Food Security Assessment to identify food insecurity, limited grocery access—especially in vulnerable areas—and strategies to improve food security citywide.
LF 2-2	Promote the State of Minnesota Food Retail Improvement and Development Grant to small local food retailers to expand affordable, nutritious, and culturally appropriate food access in underserved low- and moderate-income areas.
LF 2-3	Explore opportunities or partnerships to offer cooking classes focused on home-grown produce or food waste reduction methods like "fridge foraging."
LF 2-4	Explore partnerships to establish a mobile food shelf serving the community with a focus on connecting community members with locally grown food.
LF 2-5	Collaborate with partners to create or source an education campaign on food waste reduction strategies such as effective shopping habits, improved understanding of food expiration dates, etc

Greenspace and Ecosystems



CURRENTLY IN PLYMOUTH

30.6%
Average tree canopy coverage citywide

29.6%
Average impervious surface coverage citywide

29.7%
Manicured lawn coverage citywide

5.9 °F
Hotter than surrounding region due to heat island effect

Sector Goals

Increased tree canopy cover

1% less turf and more native grass

1% less dark impervious surface

Increased climate resilient land practices

Greenspace and Ecosystems

Increasing greenspace and natural areas to strengthen ecosystem health and resilience.

Trees, native vegetation, and natural ground cover support community health, climate resilience, and environmental quality. Trees improve air and water quality, reduce building energy demand, and help mitigate climate change.[1] Research also shows that access to nature, including parks and green spaces, can improve physical and mental health and reduce stress.[2] Trees also filter air pollutants such as carbon monoxide, particulate matter, and ground-level ozone, which can contribute to asthma and other respiratory illnesses at elevated levels.[3]

Lawns, Native Grasses, and Resilience

Traditional lawns often rely on non-native grasses that require frequent mowing, watering, and maintenance, which can increase emissions and resource use. Their shallow roots store limited carbon, provide minimal soil benefits, and offer little habitat or food for native wildlife.

Converting lawns to native grasses, wildflowers, and restored prairie can improve climate resilience. Native plantings are more drought tolerant, better adapted to weather extremes, and typically require little or no fertilizer, reducing nitrogen runoff. Their deep roots improve soil health, reduce erosion, increase water infiltration, store more carbon, and support pollinators and other wildlife.[4,5]

Impervious Surfaces and Resilience

Impervious surfaces such as pavement, rooftops, and buildings can intensify the urban heat island effect by absorbing and retaining heat. This can make developed areas hotter than surrounding rural areas, increasing discomfort, energy demand, and health risks during summer heat waves. Research has found a direct a relationship between a city's share of impervious surface and the degree of heat island temperature increase. This suggests that reducing impervious surfaces and expanding tree canopy and natural ground cover can help lower local temperatures and strengthen community resilience.[6]

Co-Benefits:

Co-benefits associated with this sector are to the right. See each strategy's co-benefits key and the Introduction for brief descriptions.

Reduced Costs | Reduced Pollution | Energy Resilience | Community Resilience | Enhanced Ecosystems | Quality of Life

STRATEGY

GE 1

Increase tree cover, particularly in priority areas, with an emphasis on climate adaptive species.

Potential

Plymouth's tree canopy reduces stormwater runoff, protects drinking water, mitigates heat islands, lowers building energy use, stores carbon, and supports economic vitality.[7,8,9] Expanding and improving canopy health will provide important climate adaptation benefits.[10,11] Tree planting should prioritize canopy equity, household benefits, heat reduction, and native, diverse species. Managing invasives and promoting biodiversity can strengthen ecosystems, support carbon absorption, and provide habitat.[12,13] Preliminary recommendations are provided in the City's Ground Cover, Heat Island, and Carbon Sequestration Study.[14]

Strategy Co-Benefits

Metrics

Reported community-wide tree canopy coverage by census tract / block;
Reported vulnerable population demographics by census tract / block (City Ground Cover Study updates)

Actions

GE 1-1	Evaluate potential updates to tree preservation and landscaping ordinance to increase large and heritage tree protection, tree replacement or banking requirements, address dying or dead tree removal and/or replacement, tree root systems protections, and performance-based requirements for tree canopy coverage.
GE 1-2	Evaluate development of a tree rebate or cost relief program prioritizing low-income households and households in areas with low tree canopy coverage and high urban heat island index.
GE 1-3	Continue and explore expanding Tree and Shrub sale.
GE 1-4	Establish incentives for increased tree canopy coverage by industrial and commercial property owners and developers.
GE 1-5	Promote tree and plant lists available for residents that guides resilient, diverse, non-invasive, and native vegetation planting.
GE 1-6	Expand public education on the benefits of trees and native plants for climate change mitigation, air quality, biodiversity, and local ecosystems, and encourage planting on private property. Include information or resources on fall and spring yard preparation to support native species and pollinators.

STRATEGY

GE 2

Increase pollinator supportiveness and achieve a 1% turf replacement with native grasses and wildflowers citywide by 2035.

Approximately 4 acres annually.

Potential

Replacing lawns with native grasses and wildflowers creates a more natural Minnesota landscape while improving ecosystem health and resilience. Compared with conventional turf, native plantings support songbirds, small wildlife, and pollinators; improve water quality; protect habitat; and increase carbon storage.[15,16,17] In Plymouth, manicured lawns make up 67% of grassland areas, creating a major opportunity to expand pollinator-friendly native landscapes. Converting suitable turf areas can improve stormwater absorption, and resilience, especially in neighborhoods with high lawn and impervious surface cover.[14,18,19,20]

Strategy Co-Benefits

Metrics

Reported community-wide lawn and native grass coverage (City Ground Cover Study updates)

Actions

GE 2-1	Collaborate with partners to increase access to native plant stock for Plymouth property owners through a group purchase program or Plymouth community plant sales events. Explore providing discounted or free kits to income-qualified households.
GE 2-2	Promote existing and future turf replacement programs across the city such as Lawns to Legumes and watershed district programs. Explore creation, or sourcing of, model Home Owners Association policies to encourage and promote adoption by HOAs.
GE 2-3	Promote the State of Minnesota's Lawns to Legumes incentive to support property owners in converting turf areas to native landscaping.
GE 2-4	Enhance communitywide greenbelt and habitat connectivity by identifying and improving pollinator and wildlife corridors. Include interpretive signs and information.
GE 2-5	Explore partnerships to establish Plymouth Native Garden tours to highlight properties with successful turf conversion.
GE 1-6	Expand public education on the benefits of trees and native plants for climate change mitigation, air quality, biodiversity, and local ecosystems, and encourage planting on private property. Include information or resources on fall and spring yard preparation to support native species and pollinators.

STRATEGY

GE 3

Reduce heat island effect through citywide "dark" impervious surface coverage reduction of 1% by 2035, particularly in priority neighborhoods identified with higher heat island impacts.
Approximately 3.6 acres annually.

Potential

The heat island effect occurs when developed areas are warmer than nearby rural areas because buildings, pavement, and other human-made surfaces absorb and retain heat. This increases discomfort and health risks during heat waves, which are expected to become more severe in Plymouth.[21,22] Impervious surfaces, especially dark pavement and roofing, are closely linked to higher heat island temperatures.[6] Reducing these surfaces and using lighter, more reflective materials can help cool the community and strengthen resilience to extreme heat.

Strategy Co-Benefits

Metrics

Reported community-wide impervious surface and "dark" impervious surface coverage (City Ground Cover Study updates)

Actions

GE 3-1	Explore updates to parking and landscape ordinances to promote planting islands in the parking lots of commercial developments that include shade trees, shrubs, and groundcovers and are engineered to ensure long-term growth and reduce heat island effects.
GE 3-2	Evaluate adoption of a policy to assess heat-reduction and air-quality strategies before planned work on City-owned roofs, paved areas, and landscaping, and complete at least two projects that advance equitable community resilience.
GE 3-3	Work with partners to explore and promote an incentive program for cool/green roofs and cool pavements.
GE 2-4	Enhance communitywide greenbelt and habitat connectivity by identifying and improving pollinator and wildlife corridors. Include interpretive signs and information.
GE 2-5	Explore partnerships to establish Plymouth Native Garden tours to highlight properties with successful turf conversion.

STRATEGY

GE 4

Use and promote land management practices that enhance climate resilience.

Potential

Climate-resilient land management practices are science-based techniques designed to maintain ecosystem health, biodiversity, and productivity while adapting to climate change impacts like droughts, floods, and heatwaves.[23] In Plymouth this includes converting low-use turf to native plantings, bee lawns, rain gardens, and other green infrastructure. These practices can reduce mowing and irrigation, improve stormwater management, lesson fertilizer and pesticide pollution, and improve soil health.[24,25] Likewise, reduction of salt use on paved surfaces can also improve ecosystem resilience by lessoning the impacts of chloride runoff.[26,27]

Strategy Co-Benefits

Metrics

Reported community-wide impervious surface and "dark" impervious surface coverage (City Ground Cover Study updates)

Actions

GE 3-1	Explore updates to parking and landscape ordinances to promote planting islands in the parking lots of commercial developments that include shade trees, shrubs, and groundcovers and are engineered to ensure long-term growth and reduce heat island effects.
GE 3-2	Evaluate adoption of a policy to assess heat-reduction and air-quality strategies before planned work on City-owned roofs, paved areas, and landscaping, and complete at least two projects that advance equitable community resilience.
GE 3-3	Work with partners to explore and promote an incentive program for cool/green roofs and cool pavements.
GE 2-4	Enhance communitywide greenbelt and habitat connectivity by identifying and improving pollinator and wildlife corridors. Include interpretive signs and information.
GE 2-5	Explore partnerships to establish Plymouth Native Garden tours to highlight properties with successful turf conversion.

Thriving Community

CURRENTLY IN PLYMOUTH

6 °F
Projected increase in average temperature by 2050

133%
Projected increase in air conditioning demand by 2050

31%
Projected increase in heavy precipitation events by 2050

3,270+
Properties with risk of flooding

3,500
Businesses citywide

Sector Goals

Support
Climate-vulnerable population

Support
Local business climate resilience

Empower
And educate community on risks

Thriving Community

Improving community resilience through healthy community connections, durable local economy, and empowering communications.

Human health, environmental quality, and economic well-being are deeply connected. As temperatures rise in Minnesota and across the Great Lakes region, Plymouth residents will face growing risks from more frequent and intense heat waves, heavier precipitation, flooding, drought, reduced air quality, and longer mosquito and tick seasons.[1,2,3,4,5,6,7,8] These impacts can increase heat illness, waterborne disease, asthma, allergies, vector-borne illness, and mental health stress—especially for residents with lower incomes, communities of color, older adults, young children, and people with existing health conditions.[9,10,11,12,13]

Climate change also carries significant economic costs. National studies estimate that unchecked climate change could cost billions of dollars annually by the end of the century, with future annual impacts potentially far exceeding the global economic effects of COVID-19.[14,15] Taking action now can help avoid these costs. In Plymouth, the avoided cost of carbon is estimated as $70 per metric ton based on county-level climate impacts, while the Minnesota Public Utilities Commission uses a value of $140–$380 per metric ton.[16,17,18]

Climate solutions can also strengthen the local economy. Investments in energy efficiency, renewable energy, public transportation, and other sustainability strategies can lower costs for residents and businesses, keep more energy dollars circulating locally, and support jobs in less resource-intensive sectors.[19,20,21,22]

The Role of Local Governments in Climate Health and Safety

Local governments play a key role in building a thriving, resilient community. Just as cities support public health through safe streets, clean water, parks, and emergency preparedness, Plymouth can reduce climate risks, protect vulnerable residents, and improve quality of life by advancing practical climate solutions that benefit people, the environment, and the local economy.

Co-Benefits:

Co-benefits associated with this sector are to the right. See each strategy's co-benefits key and the Introduction for brief descriptions.

Community Resilience

Quality of Life

STRATEGY

TC 1

Assist the City's climate vulnerable population in preparing for and mitigating climate change impacts.

Potential

To make the most effective use of limited resources, city governments can prioritize climate resilience support for vulnerable populations while still serving the broader community. These residents often face the greatest climate risks, and strengthening their adaptive capacity can reduce long-term social and economic costs. For instance, climate-induced air quality issues disproportionately affect vulnerable populations, heightening risks of respiratory conditions like asthma, especially among communities of color and low-income groups.[3] In Plymouth, the largest population groups with possible heightened vulnerabilities include People of Color, Seniors over 65, and those in Economic Stress.[16]

Strategy Co-Benefits

Actions

TC 1-1	Develop a Neighborhood Resilience Checklist focused on relational networks, resource-sharing, community-building and mutual aid during climate-related challenges. Promote with neighborhood organizers and National Night Out events.
TC 1-2	Explore partnerships to create and promote an Adopt-A-Neighbor or "Neighborhood Resilience Team" program that strengthens trust, builds community support, and assists vulnerable residents during extreme weather events and emergencies.

Metrics

Status of Neighborhood Resilience Checklist;
Status of Neighborhood Resilience Team program

STRATEGY

TC 2

Support local businesses operations in building climate resilience.

Potential

The COVID-19 pandemic revealed how major disruptions can destabilize businesses, workers, and local economies. Global GDP fell 4.3% in 2020, and researchers warn that climate change could cause equal or greater economic damage—even under significant GHG reductions—and far more without emissions cuts.[15] Small businesses, which generate much of Plymouth's economic activity and job growth, are especially vulnerable, making local climate resilience efforts essential.[24,25]

Strategy Co-Benefits

Metrics

Status of recognition program; Status of inclusion of business infrastructure vulnerability considerations in emergency management plans

Actions

TC 2-1	Create a community-wide sustainability recognition or award to honor and promote local climate leadership, raise awareness, and inspire further action. Include categories for local businesses, non-profits, and residents.
TC 2-2	Continue and expand promotion of county and state programs and incentives for local business climate resilience, with a focus on small businesses and local restaurants.
TC 2-3	Make sure key business infrastructure is recognized in the City and County's general hazard mitigation plan and emergency response plan.

STRATEGY

TC 3

Educate, engage, and empower the public on health and safety risks of climate change impacts.

Potential

Education is a key driver of climate action, helping residents understand and respond to the climate crisis. Research shows that climate education can reduce emissions and lower vulnerability to environmental hazards.[26,27,28] Addressing climate change as a public health risk requires prevention-focused strategies, including education and outreach. These efforts can support resident awareness, provide helpful information on building household preparedness, and strengthen community-wide resilience.

Strategy Co-Benefits

Metrics

Status of education, outreach, and communication implementation; Number of community members reached

Actions

TC 3-1	Promote City, county, and partner communication channels and emergency response resources, encouraging residents to sign up for alerts to receive timely updates.
TC 3-2	Partner to create a branded "Plymouth Resilient Together" community education campaign, engaging activities, communications, and resident-led initiatives that increase awareness of climate impacts promote household and neighborhood preparedness, and the benefits of climate action. Include information on City programs such as active transportation, tree planting, and climate-friendly yards.
TC 3-3	Collaborate with partners to establish an annual Environmental Fair during Earth Month. Include promotion of annual CARP implementation focus, benefits of climate action, and what community members can do.
TC 3-4	Incorporate sustainability, climate resilience awareness, what residents can do, and benefits of climate action into City events. Example: have a booth or activity focused on sustainability at Plymouth Fire & Ice.
TC 3-5	collaborate with Hennepin County and school districts to increase climate literacy and education in Plymouth schools.

Implementation

2035 IN PLYMOUTH

205,539
MT CO2e in 2035 from vehicle use (goal)

233,268
MT CO2e in 2035 from building energy (goal)

20,091
MT CO2e in 2035 from solid waste (goal)

27,246
MT CO2e in 2035 from water & wastewater (goal)

Implementation

Implementation Support Tools

To help the City move from planning to action, the paleBLUEdot team has created supporting resources, including:

Implementation Matrix:
Excel tool for implementation coordination and monitoring.

Example Policies
A database supporting action implementation:
Example CRP Policies Plymouth

Policy Alignment Memo
For use in reviewing policy items against plan goals:
Plan Alignment Statement Memo Plymouth

Organizing For Implementation Is Critical

The early implementation period after adoption of the Climate Action and Resilience Plan (CARP) will be essential for translating goals into visible progress. Plymouth's success will depend on defined leadership, effective coordination across City departments, and appropriate funding when needed. Because the plan sets meaningful targets for reducing greenhouse gas emissions and increasing climate resilience, climate considerations will should become part of everyday City operations, decision-making, and service delivery. Effective progress will also require partnership beyond City government, with residents, businesses, organizations, and community leaders helping carry the work forward.

Implementation Is a Shared Responsibility

Climate change is driven by many factors and affects the community in many ways, so impactful progress will require shared action. Some strategies will be carried out by Plymouth's elected officials, departments, and staff, while others rely on choices made by residents, businesses, institutions, and community partners. A more resilient future will depend on leadership from the City and participation across the community. Residents and businesses can use the "What You Can Do" section of this plan to identify practical steps they can take to support CARP goals.

Climate Action Is an Ongoing Process

Carrying out a long-term climate strategy requires flexibility as technologies, costs, funding opportunities, and regulations change over time. To support an adaptive approach, the CARP will be advanced through annual or biannual work plans that identify near-term priorities and next steps. This process helps connect climate action with the City's budget cycle, departmental planning, and related initiatives. While individual actions may be refined as conditions change, the CARP will continue to serve as the guiding framework. Any actions that require new policies, ordinances, or City spending will move through the City Council's normal review and approval process.

STRATEGY

I 1

Organize for Climate Action and Resilience Plan implementation.

Potential

A clear implementation structure can help Plymouth turn plan goals into coordinated, accountable action. Cross-department leadership, staff capacity, policy alignment, annual work planning, communication, and regular progress tracking can improve efficiency, support funding and budget integration, strengthen public transparency, and help the City adjust strategies over time to achieve lasting sustainability and resilience outcomes.

Metrics

Status of Staff Climate Committee implementation team formation;
Status of annual/biannual work plan establishment;
Implementation progress evaluation and reporting

Actions

I 1-1	Utilize Staff Climate Committee, which has representatives from all departments, to coordinate and support implementation of the CARP.
I 1-2	Incorporate implementation of CARP through biannual budget and Capital Improvement Plan (CIP) processes.
I 1-3	Review City operations, policies, and ordinances for alignment with CARP as appropriate.
I 1-4	Establish communication and education efforts that support the CARP.
I 1-5	Evaluate CARP progress and adjust strategies and actions at appropriate intervals.

STRATEGY

I 2

Establish sustainable financing for the City's climate action implementation.

Potential

Sustainable financing can help the City move climate action from planning to implementation with greater consistency and less reliance on one-time funding. Reinvesting a portion of savings from energy efficiency projects, building upgrades, and fleet improvements can create a cycle of continued progress, while grants, incentives, and other outside funding can reduce local costs. Together, these approaches can strengthen budget integration, support priority actions, and help maintain long-term momentum toward CARP goals.

Metrics

Status of CARP funding

Actions

I 2-1	Establish a practice that utilizes a portion of savings from implementation of energy efficiency projects or upgrades to City buildings or fleets to support plan efforts.
I 2-2	Review and utilize outside funding opportunities, such as grants and incentives, to support implementation of the CARP.

What You Can Do

Create Your Own Plan

The previous section presents a 10-year work plan focused on City-led actions to reduce municipal emissions and support community-wide climate progress. While City leadership is essential, achieving the plan's goals will require shared action from residents, businesses, institutions, and community partners.

This section highlights practical steps community members can take, with links to helpful resources. It also includes a form that individuals, households, and businesses can use to create their own climate action plan.

The actions listed on the following pages are intentionally broad and include estimated cost and impact levels to help users choose options that fit their needs, budgets, and interests.

Transportation and Land Use

Reduce Car Use	Cost	Impact
Walk or bike when traveling short distances.	Behavior Change	*
Take public transit to work or to run errands. Plan your trips at Plymouth Metrolink.	Behavior Change	**
If possible, telecommute or carpool to avoid transportation emissions	Behavior Change	***
Consider becoming a one-car household - and save thousands of dollars annually. Explore how to make the change at the theartofsimple.net.	Behavior Change	****
Encourage your child to walk or bike to school, or join a BikeBus - learn more at BikeBus World.	Behavior Change	**

Reduce Your Ride's impact	Cost	Impact
Keep your vehicle well-tuned and and follow Eco-Driving tips like these from The EcoDrivers Manual to save 20% or more in gasoline use	Behavior Change	**
Avoid idling. In winter, warm up for no more than 30 seconds, then drive.	Behavior Change	**
Choose an electric or hybrid vehicle for your next car. Search models available at the US DOE Alternative Fuels Data Center. Explore incentives at the US DOE, State of Minnesota, and Xcel Energy.	$$$	****

Reduce Your Business's Impact	Cost	Impact
Work to be designated as a League of American Bicyclists Bike Friendly Business and encourage your peers to participate.	$$	**
Offer your employees alternative commute incentives—learn more: Victoria Transport Policy Institute.	$$	***
Install charging stations to support employee and visitor electric vehicle use.	$$$	**
Develop and implement a Fleet Transition Plan to shift vehicles to zero-emission models. See the National Association of Regional Councils for more.	$$$$	****

Buildings and Energy

Use Less Energy	Cost	Impact
Turn down your water heater to 120°. Learn more at the US DOE.	Behavior Change	*
Replace an older home thermostat with an "ENERGY STAR Certified smart," programmable model and receive an Xcel Energy rebate.	$	***
Schedule a Home Energy Squad energy audit through Xcel Energy.	$	**
Replace incandescent light bulbs with LEDs.	$	*
Use ENERGY STAR certified energy-efficient appliances.	$$	**
Install, or have a licensed contractor install, more insulation in your home.	$$$	****
Install ENERGY STAR Certified energy-efficient windows and doors, working with a licensed contractor.	$$$	***

Go Renewable	Cost	Impact
Support solar development by subscribing to community solar, learn more at Minnesota Clean Energy Resource Teams.	Behavior Change	*
If you don't own your home buy renewable electricity through Xcel Energy or Wright-Hennepin.	$	***
If possible, participate in a residential solar group purchasing program like this one from MREA.	$$$	****
Install solar PV or solar thermal panels at your home or business - see MnSIEA to begin your search.	$$$$	****

Eliminate Fossil Fuel Use	Cost	Impact
Replace your clothes dryer with an ENERGY STAR Certified heat pump dryer.	$$	**
Replace your gas range with an ENERGY STAR Certified induction cooktop.	$$	**
Replace your water heater with an ENERGY STAR Certified heat pump model.	$$	***
Replace gas heating equipment with a heat pump system—learn more at Fresh Energy.	$$$	****

Waste Management

Reduce What You Throw Away	Cost	Impact
Refuse Single-Use Plastics: Carry a reusable water bottle, travel mug, and a set of utensils to avoid plastic bottles and disposable cutlery when out.	Behavior Change	*
Donate unwanted items and buy secondhand clothing, furniture, and electronics when possible.	Behavior Change	**
Go Paperless: Opt out of junk mail, pay bills online, and use digital subscriptions to reduce paper waste.	Behavior Change	**
Buy in Bulk and Select Eco-Friendly Packaging: Purchase items in bulk to minimize packaging waste and choose products with minimal or recyclable packaging.	Behavior Change	*
Become familiar with Hennepin County recycling guidelines for what you can recycle and alternative locations for items not accepted.	Behavior Change	***
Reduce eWaste by donating electronics to places like Goodwill, or recycling them at Hennepin County Drop-off sites.	Behavior Change	***
Choose Durable over Disposable: Invest in high-quality items that last longer, such as safety razors instead of plastic disposables or rechargeable batteries	$	**

Increase Organics Diversion	Cost	Impact
Eat seasonally and shop local to ensure fresher, higher-quality produce with longer shelf life	Behavior Change	**
Reduce food waste by using what you have, planning meals, and shopping with a list. Learn more from the U.S. EPA and Utah State University.	Behavior Change	***
Sign up for the City's food waste curbside collection program.	Behavior Change	****
Create a backyard compost for vegetable food and yard waste. Learn more from the US EPA.	$	****
Work with your employer/business to compost, or start organics recycling on site	$$	****

Water

Reduce Water Use Inside	Cost	Impact
Be mindful of your water use and focus on changes in habits such as turning off water when brushing your teeth and taking shorter showers - see more tips at the US EPA.	Behavior Change	*
Change out your shower heads and faucets for WaterSense labeled low-flow, water-efficient options.	$	**
Install - or have a licensed plumber install - a WaterSense labeled, water-saving low-flow toilet.	$$$	****
Install a leak detection system - learn more at the US EPA.	$$$	****
Replace your clothes washer with a low water use, ENERGY STAR Certified unit, and avoid running small or partial loads.	$$$	***
Replace your dishwasher with a low water use, ENERGY STAR Certified unit.	$$$	***

Reduce Water Use Outside	Cost	Impact
Water lawns and gardens deeply but less often, preferably in the early morning or evening.	Behavior Change	**
Avoid improper pruning, fertilization, mulching, and salting to reduce landscape water usage and contamination - see the US EPA Water-Smart Landscapes guide for more.	Behavior Change	*
Collect rainwater in rain barrels to water your lawn and/or plants - see the City of Roseville for more.	$	**
Retrofit existing irrigation systems with smart irrigation controls that use soil moisture and weather data to determine irrigation needs - see the US EPA for more.	$$	***
Replace your lawn with prairie grass, wildflowers, and learn more drought resistant landscape principles from Eco Home.	$$$$	****

Local Food and Agriculture

Grow Your Own Food	Cost	Impact
Start a vegetable garden in your yard - learn more from the University of Minnesota.	$	****
Visit the American Community Gardening Association to see if there is a community garden near you, or work with others to start a community garden so you can grow your own.	$	**
Keep chickens for eggs - learn more from the University of Minnesota.	$$$	**
Plant fruit or nut bearing trees or shrubs that are well suited for our hardiness zone on your property - see the Arbor Day Foundation for information.	$$$	***

Eat Climate-Friendly	Cost	Impact
Plan meals to maximize nutrition and minimize climate impact - see tips from NC State Extension.	Behavior Change	***
Eat a more plant-rich diet by cutting back on meat and dairy, starting with simple habits like Meatless Mondays - see tips from Mayo Clinic.	$	****
See Minnesota Grown for options for regionally grown foods and learn more about how these reduce emissions from The Hill.	$$	**

Support Local Growers	Cost	Impact
Support restaurants and grocery stores that use and sell locally-grown food - see Minnesota Grown for locations.	Behavior Change	***
Support local growers at local farmers markets - see the USDA Local Food directory to find locations.	$	***
Buy food that is in season, minimizing the distance food must travel - see Minnesota Grown for what is in season.	$$	**
Join a local CSA to buy lower-emission, locally produced food directly from growers; see Local Harvest for locations.	$$$$	****

Greenspace and Ecosystems

Create a Pollinator-Friendly Yard	Cost	Impact
Practice slow-mow-summer with your lawn. See the University of Minnesota for more.	Behavior Change	*
Eliminate pesticide use - see the University of Minnesota Bee Lab for more.	Behavior Change	***
Convert your lawn to a bee lawn - see the University of Minnesota for more.	$$	***
Plant native flowers, shrubs, and trees that bloom from spring through fall to support pollinators and biodiversity; see the Xerces Society for more.	$$$	****
Replace all or part of your lawn with native plants and wildflowers; see the University of Minnesota for ideas and Minnesota's Lawns to Legumes program for possible funding.	$$$$	****

Increase The Tree Canopy	Cost	Impact
Volunteer for tree planting with the City of Plymouth or Hennepin County - or visit Tree Trust for other opportunities.	Behavior Change	**
Plant native trees in your yard to provide shade and cooling in summer heat. See the City's Ground Cover Study for trees suited for our changing climate.	$	***
Protect mature trees on your property to preserve shade, canopy cover, and the benefits large trees already provide - see Arbor Day Foundation for tips.	$	****

Thriving Community

Make Your Home Resilient	Cost	Impact
Plan and rehearse a fire evacuation plan with everyone who lives in your home or apartment-learn more from FEMA.	Behavior Change	**
Keep yourself and your family current with physicals, vaccinations and prescribed medications and therapies.	$	***
Have breathing-protection masks available for you and your family for when air quality alerts are declared - see AirNow.gov for sources.	$	**
Put together an emergency preparedness kit for your household - see FEMA for more.	$$	***
See the Red Cross for first-aid and CPR certification training.	$$	**
Prepare your home for extreme weather by understanding its risks and taking steps to protect against heat, flooding, wildfire, and other hazards - see My RainReady and The National Interagency Fire Center for more.	$$$	****

Make Your Community Resilient	Cost	Impact
Check on vulnerable neighbors, especially during extreme weather or disasters.	Behavior Change	****
See the US DHS to locate your local community resilience hub or the Twin Cities Mutual Aid Project for cooling center locations.	Behavior Change	***

Make Your Business Resilient	Cost	Impact
Access information on sustainable business practices through resources like MIT, University of New Hampshire, or the Green Business Benchmark.	$	**
Create a Disaster Preparedness Plan for your business - see the US Small Business Administration and LISC for tips.	$$	****

Create Your Own Climate Action and Resilience Plan

We can all help achieve the goals of the Plymouth Climate Action and Resilience Plan!

How Will You Take Action?

Change will take time, so consider what steps you can begin over the next few years. Using the What You Can Do action list, identify actions you want to take and use the space below to create your own climate action plan.

Actions I Will Take	Action Timeline	Notes

Appendix A:

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Appendix B:

Potential Cost & Savings

The following documents the calculations and source references used for estimating the potential cumulative community-wide cost savings of select strategies included in the Climate Action and Resilience Plan.

Summary of Estimated Cumulative Savings of Modeled Reductions

City of Plymouth

Climate Action Plan

Notes

Transportation

VMT Reductions (public transit, bike, walk, etc)

Formula:

Cumulative vehicle miles saved x Average vehicle operation cost per mile = Gross VMT savings

	VMT saved (goal year)	35,200,047
	Cumulative vehicle miles saved (through goal year):	193,600,256
1	Average vehicle operating cost per mile:	$0.770
	Gross VMT Savings	**$149,072,197**

1 Savings per VMT based on AAA estimates (https://newsroom.aaa.com/asset/2025-your-driving-cost-fact-sheet/)

Increased Public Transit Use

Formula:

Cumulative increased public transit mileage x Average public transit cost per mile = Increased spending on public transit

	Increased public transit miles (goal year)	4,534,035
	Cumulative increased public transit miles (through goal year):	24,937,191
2	Annual increased public transit pass costs (goal year):	-$1,023,449
	Cumulative increased public transit pass costs (through goal year):	-$5,628,972
	Increased Spending on Public Transit	**-$5,628,972**

2 Annual increased public transit pass costs calculated based on increased percentage of population using public transit (target increased public transit percentage) multiplied by cost of monthly transit pass. Negative numbers indicate increased consumer spending. (https://www.census.gov/programs-surveys/sis/resources/data-tools/quickfacts.html https://www.metrotransit.org/fares-passes)

EV and Alt Fuel Conversions

Formula:

Cumulative VMT converted to EV/alt fuel x Average vehicle operation cost savings per mile = Gross EV VMT savings - Gross EV purchase spending difference = Net EV VMT Savings

	VMT converted to EV/Alt fuel (goal year)	100,320,133
	Cumulative VMT converted to EV/alt fuel (through goal year)	551,760,729
3	Average fuel savings per mile:	$0.124
4	Average vehicle maintenance savings per mile:	$0.041
	Cumulative Gross EV VMT savings (through goal year)	$90,851,410
5	Spending difference on EV purchase vs ICE purchase per mile driven	-$0.054
	New electric vehicle purchases	7,465
	Gross EV purchase spending difference (through goal year)	-$30,045,211
	Net EV VMT Savings	**$60,806,199**

3 Fuel Savings per VMT based on average reported gasoline costs (https://gasprices.aaa.com/state-gas-price-averages/) divided by current average MPG (Federal Highway Administration: https://www.fhwa.dot.gov/policyinformation/quickfinddata/qftravel.cfm) compared against average fuel cost per mile using current kWh rate (https://www.electricitylocal.com/) and average kWh/100 mile data (https://www.fueleconomy.gov/feg/byfuel/EV2024.shtml ; https://ev-database.org/cheatsheet/energy-consumption-electric-car)

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5 Average EV purchase price increse per vehicle on Kelly Blue Book average EV purchase price compared to average gasoline vehicle purchase price (https://www.coxautoinc.com/market-insights/february-2025-atp-report/) with available local, state, or federal tax credits applied. The total cost difference is then divided by an assumed average EV lifespan of 150,000 miles to arrive at an estimated cost difference per mile driven. Negative numbers indicate increased consumer spending.

Potential Total Cumulative Transportation Cost Savings

Formula:

Transportation sector savings - Transportation sector cost increases = Potential Total Cumulative Transportation Cost Savings

Transportation Sector Savings		
Gross VMT savings		$149,072,197
Gross EV VMT savings		$90,851,410
	Total Gross Transportation Savings	$239,923,607
Transportation Sector Cost Increases		
Increased spending on public transit		-$5,628,972
Gross EV purchase spending difference		-$30,045,211
	Total Gross Transportation Cost Increases	-$35,674,183
Potential Total Cumulative Transportation Cost Savings		**$204,249,424**

Summary of Estimated Cumulative Savings of Modeled Reductions

City of Plymouth

Energy - Residential

Notes

Residential Savings - grid electricity to customer owned solar

Formula:

Cumulative kWh converted to solar x Average cost savings per kWh = Residential solar savings

	Residential kWh converted (goal year)	12,779,985
	Cumulative residential kWh converted (through goal year)	70,289,917
	Average net solar cost savings per solar kWh	$0.075
6a	Average solar installation cost per KW	$3,160.00
7	Average kWh produced annually per solar pv KW installed	1,287
	Estimated installed solar PV KW installed (goal year)	9,930
	Estimated total solar installation costs	$31,378,984
8	Est average lifespan kWh produced per solar pv KW installed	38,429
8	Estimated cumulative lifespan kWh produced	381,602,364
9	Estimated value of cumulative lifespan kWh produced	$60,138,929
	Average solar cost savings per kWh produced	$0.075
	Residential Solar Savings	**$5,297,489**

6a Recent average cost per KW is 1000x the per watt cost reported by Solar Reviews for a 6KW array https://www.solarreviews.com Potential savings from tax credits, depreciation, or grants are not included and would reduce these costs.

7 Calculations are based on the geographic energy production factor (https://www.nrel.gov/docs/fy04osti/35297.pdf) multiplied by an average performance ratio of 78% (https://www.nrel.gov/docs/fy13osti/57991.pdf)

8 Based on an assumed average useful life of 32.5 years according to NREL research with an average degradation rate of 0.5% (https://www.nrel.gov/docs/fy24osti/90042.pdf)

9 Savings per kWh based on average electricity cost per kWh (https://www.electricitylocal.com/) calculated to the solar array's midlife (year 16) using an estimated average electrical cost inflation of 2% annually

Residential Savings - community solar

Formula:

Cumulative kWh converted to community solar x Average cost savings per kWh = Residential community solar savings

	Residential kWh converted (goal year)	0
	Cumulative residential kWh converted (through goal year)	0
10	Average community solar cost savings per kWh	$0.011
	Residential Community Solar Savings	**$0**

10 The average cost savings per kWh of community solar subscription is estimated at 10%.

Residential Savings - utility purchased renewable

Formula:

Cumulative kWh converted to utility purchased renewable x Average cost/savings per kWh = Residential utility purchased cost/savings

	Residential kWh converted (goal year)	12,779,985
	Cumulative residential kWh converted (through goal year)	70,289,917
11	Average utility purchased cost/savings per kWh	-$0.013
	Residential Utility Purchased Cost/Savings	**-$891,979**

11 The average cost/savings per kWh of utility purchased renewable energy subscription is based on utility fee information. Negative numbers indicate increased consumer spending

Residential Savings - electrical energy efficiency

Formula:

Cumulative kWh saved from energy efficiency x Average cost per kWh = Gross Residential electrical energy efficiency savings - Residential Efficiency Upgrade Costs = Net Residential Electrical Energy Efficiency Savings

	Residential kWh saved (goal year)	10,223,988
	Cumulative residential kWh saved (through goal year)	56,231,934
12a	Average cost per kWh	$0.115
	Gross Residential Electrical Energy Efficiency Savings	**$6,455,426**
13	Residential Electrical Efficiency Upgrade Costs	-$5,680,775
	Net Residential Electrical Energy Efficiency Savings	**$774,651**

12a Energy efficiency savings per kWh saved based on average electricity cost per kWh (https://www.electricitylocal.com/)

13 Assumed energy efficiency upgrade costs are calculated assuming an average ROI of 12% (https://www.aceee.org/blog/2019/05/existing-homes-energy-efficiency) Negative numbers indicate increased consumer

Residential Savings - natural gas energy efficiency

Formula:

Cumulative therms saved from energy efficiency x Average cost per therm = Gross Residential natural gas energy efficiency savings - Residential Natural Gas Efficiency Upgrade Costs = Net Residential Electrical Natural Gas Efficiency Savings

14	Residential therms saved (goal year)	6,348,127
14	Cumulative residential therms saved (through goal year)	34,914,701
15	Average cost per therm	$1.106
	Gross Residential Natural Gas Energy Efficiency Savings	**$38,615,659**
14, 16	Residential Natural Gas Efficiency Upgrade Costs	-$33,981,780
	Net Residential Electrical Natrual Gas Efficiency Savings	**$4,633,879**

14 Includes fuel switching from fossil fuel heat to electric

15 Energy efficiency savings for natural gas is based on average natural gas cost per therm https://naturalgaslocal.com/

16 Assumed energy efficiency upgrade costs are calculated assuming an average ROI of 12% (https://www.aceee.org/blog/2019/05/existing-homes-energy-efficiency) Negative numbers indicate increased consumer spending

Potential Total Cumulative Residential Energy Cost Savings

Formula:

Residential solar savings + Residential community solar savings + Residential utility purchased renewable + Residential electrical efficiency savings + Residential natural gas energy efficiency savings - Residential increased electrical costs = Potential Total Cumulative Residential Energy Savings

Residential solar savings	$5,297,489
Residential community solar savings	$0
Residential utility purchased renewable cost/savings	-$891,979
Residential electrical efficiency savings (net)	$774,651
Residential natural gas energy efficiency savings (net)	$4,633,879
Potential Total Cumulative Residential Energy Savings	**$9,814,040**

Summary of Estimated Cumulative Savings of Modeled Reductions
City of Plymouth

Notes

Energy - Non Residential

Non-Residential Savings - grid electricity to solar
Formula:
Cumulative kWh converted to solar x Average cost savings per kWh = Non-Residential solar savings

	Non-Residential kWh converted (goal year)	26,997,150
	Cumulative Non-Residential kWh converted (through goal year)	148,484,324
	Average solar cost savings per kWh	$0.039
6b	Average solar installation cost per KW	$2,770.00
7	Average kWh produced annually per solar pv KW installed	1,287
	Estimated installed solar PV KW installed (goal year)	20,977
	Estimated total solar installation costs	$58,105,754
8	Estimated average lifespan kWh produced per solar pv KW installed	38,429
8	Estimated cumulative lifespan kWh produced	806,118,019
9	Estimated value of cumulative lifespan kWh produced	$89,599,923
	Average solar cost savings per kWh produced	$0.039
	Non-Residential Solar Savings	**$5,801,124**

6b Recent average cost per KW is 1000x the per watt cost reported by Solar Reviews for a 10KW array https://www.solarreviews.com Potential savings from tax credits, depreciation, or grants are not included and would reduce these costs.

7 Calculations are based on the geographic energy production factor (https://www.nrel.gov/docs/fy04osti/35297.pdf) multiplied by an average performance ratio of 78% (https://www.nrel.gov/docs/fy13osti/57991.pdf)

8 Based on an assumed average useful life of 32.5 years according to NREL research with an average degradation rate of 0.5% (https://www.nrel.gov/docs/fy24osti/90042.pdf)

9 Savings per kWh based on average electricity cost per kWh (https://www.electricitylocal.com/) calculated to the solar array's midlife (year 16) using an estimated average electrical cost inflation of 2% annually

Non-Residential Savings - community solar
Formula:
Cumulative kWh converted to community solar x Average cost savings per kWh = Non-Residential community solar savings

	Non-Residential kWh converted (goal year)	0
	Cumulative Non-Residential kWh converted (through goal year)	0
10	Average solar cost savings per solar kWh	$0.01
	Non-Residential Community Solar Savings	**$0**

10 The average cost savings per kWh of community solar subscription is estimated at 10%.

Non-Residential Savings - utility purchased renewable
Formula:
Cumulative kWh converted to utility purchased renewable x Average cost/savings per kWh = Non-Residential utility purchased cost/savings

	Non-Residential kWh converted (goal year)	26,997,150
	Cumulative Non-Residential kWh converted (through goal year)	148,484,324
11	Average utility purchased cost/savings per kWh	-$0.013
	Non-Residential Utility Purchased Cost/Savings	**-$1,884,266**

11 The average cost/savings per kWh of utility purchased renewable energy subscription is based on utility fee information. Negative numbers indicate increased consumer spending

Non-Residential Savings - electrical energy efficiency
Formula:
Cumulative kWh saved from energy efficiency x Average cost per kWh = Gross Non-Residential electrical energy efficiency savings - Non-Residential Efficiency Upgrade Costs = Net Non-Residential Electrical Energy Efficiency Savings

	Commercial kWh saved (goal year)	21,597,720
	Cumulative commercial kWh saved (through goal year)	118,787,459
12b	Average cost per kWh	$0.081
	Gross Commercial Electrical Energy Efficiency Savings	**$9,617,825**
13	Commercial Electrical Efficiency Upgrade Costs	-$8,463,686
	Net Commercial Electrical Energy Efficiency Savings	**$1,154,139**

12b Energy efficiency savings per kWh saved based on average electricity cost per kWh reported for commercial and industrial with a weighted average (2/3rds commercial rate, 1/3rd industrial rate) reflecting typical non-residential electric consumption patterns (https://www.electricitylocal.com/)

13 Assumed energy efficiency upgrade costs are calculated assuming an average ROI of 12% (https://www.aceee.org/blog/2019/05/existing-homes-energy-efficiency) Negative numbers indicate increased consumer spending

Non-Residential Savings - natural gas energy efficiency
Formula:

Cumulative therms saved from energy efficiency x Average cost per therm = Gross Non-Residential natural gas energy efficiency savings - Non-Residential Natural Gas Efficiency Upgrade Costs = Net Non-Residential Electrical Natural Gas Efficiency Savings

14	Non-Residential therms saved (year 10)	4,571,265
14	Cumulative Non-Residential therms saved	25,141,957
15	Average cost per therm	$0.522
	Gross Non-Residential Natural Gas Energy Efficiency Savings	**$13,124,102**
14, 16	Non-Residential Natural Gas Efficiency Upgrade Costs	-$11,549,210
	Net Non-Residential Natural Gas Energy Efficiency Savings	**$1,574,892**

14 Includes fuel switching from fossil fuel heat to electric

15 Energy efficiency savings for natural gas is based on average natural gas cost per therm https://naturalgaslocal.com/

16 Assumed energy efficiency upgrade costs are calculated assuming an average ROI of 12% (https://www.aceee.org/blog/2019/05/existing-homes-energy-efficiency) Negative numbers indicate increased consumer spending

Potential Total Cumulative Non-Residential Energy Cost Savings

Formula:

Non-Residential solar savings + Non-Residential community solar savings + Non-Residential utility purchased renewable + Non-Residential electrical efficiency savings + Non-Residential natural gas energy efficiency savings - Non-Residential increased electrical costs = Potential Total Cumulative Non-Residential Energy Savings

Non-Residential solar savings	$5,801,124
Non-Residential community solar savings	$0
Non-Residential utility purchased renewable cost/savings	-$1,884,266
Non-Residential electrical efficiency savings	$1,154,139
Non-Residential natural gas energy efficiency savings	$1,574,892
Potential Total Cumulative Non-Residential Energy Savings	**$6,645,889**

Potential Total Cumulative Energy Cost Savings (Residential + Non-Residential)

Formula:

Energy sector savings - Energy sector cost increases = Potential Total Cumulative Energy Cost Savings

Energy Sector Savings		
Total solar energy savings		$11,098,612
Total community solar energy savings		$0
Total energy efficiency savings - electricity		$16,073,251
Total energy efficiency savings - natural gas		$51,739,761
	Total Gross Energy Savings	$78,911,624
Energy Sector Cost Increases		
Total solar PV installation costs		(included in estimated Total Solar Energy Savings)
Total utility purchased renewable cost/savings		-$2,776,245
Total energy efficiency upgrade costs - electricity		-$14,144,461
Total energy efficiency upgrade costs - natural gas		-$45,530,990
	Total Gross Energy Cost Increases	-$62,451,695
Potential Total Cumulative Energy Cost Savings		**$16,459,929**

Summary of Estimated Cumulative Savings of Modeled Reductions

City of Plymouth

Notes

Solid Waste - Residential

Residential savings - Food Waste Reduction

Formula:

Cumulative tons of food waste reduced and diverted x Average cost savings per ton = Residential food waste savings

	Residential food waste reduced (goal year)		1,898
	Cumulative residential food waste reduced (through goal year)		10,438
17	Average cost savings per ton reduced		$2,469
		Residential Food Waste Savings	**$25,770,410**

17 Value per ton of residential food waste avoided is based on average for Prevent and Recover strategies by ReFED "A Roadmap To Reduce U.S. Food Waste" (https://refed.com/downloads/the-roadmap-to-reduce-u-s--food-waste/). Food waste share of total organics diverted is calculated based on available waste sort data (see Baseline Assessment document)

Potential Total Cumulative Residential Solid Waste Reduction Cost Savings

Residential food waste savings **$25,770,410**

Notes

Solid Waste - Non-Residential

Non-Residential savings - Solid Waste Reduction

Formula:

Cumulative participant/years x Average reported cost savings per participant/year = Non-Residential solid waste savings

	Participating businesses (goal year)		50
	Cumulative participant/years (through goal year)		500
18	Average cost savings per participant/year		$431
		Commercial Solid Waste Savings	**$1,185,250**

18 Savings per business engaged in waste reduction programs are based on MN WasteWise reported average business savings ($431) escalated to 5 year (mid point) Cumulative savings assume businesss reduction strategies remain in force (https://www.mnchamber.com/your-opportunity/waste-wise)

Potential Total Cumulative Solid Waste Savings

Formula:

Residential Food Waste Savings + Commercial Solid Waste Savings + Commercial Food Waste Savings = Potential Total Cumulative Solid Waste Savings

Residential Food Waste Savings	$25,770,410
Non-Residential Solid Waste Savings	$1,185,250
Non-Residential Food Waste Savings	$0
Potential Total Cumulative Solid Waste Savings	**$26,955,660**

Appendix C:

Estimated Job Potential

The following is a preliminary estimate of the possible job potential related to some key strategies included in the Climate Action and Resilience Plan. This estimate is intended to be an illustration and does not necessarily include all job potentials.

Summary of Estimated New Job Potential of Modeled Reductions

City of Plymouth

Climate Action Plan

Total Community Job Potential Estimate

The following is an estimate of the local job potential of achieving plan goals for the community. See detail and assumptions in sector break-downs that follow.

Building and Energy Jobs Estimate:	53
Transportation Jobs Estimate:	26
Waste Management Jobs Estimate:	25
Total Community Job Potential Estimate:	**105**
Total Estimated Annual Income Potential:	**$5,514,807**

Building and Energy Jobs Estimate

Notes		
1	Energy Efficiency and Fuel Switching - Residential	12
1	Energy Efficiency and Fuel Switching - Non-Residential	6
2	Renewable Energy - Residential	12
2	Renewable Energy - Non-Residential	23
	Building and Energy Jobs:	**53**
	Annual Income Potential (at $55,000)	**$2,932,985**

1: Assumptions & Rationale: Calculated at 45 jobs per $15 million in investment based on “How Does Energy Efficiency Create Jobs?” by the American Council for an Energy-Efficient Economy (ACEEE) which illustrates that a $15 million investment in energy efficient facilities, when compared against “business-as-usual,” would increase local employment by 45 jobs in year one along with on-going impacts creating up to 20 additional jobs annually for 20 years. See "Summary of Estimated Cumulative Savings of Modeled Reduction" for investment value calculations and assumptions. Source: https://www.aceee.org/fact-sheet/ee-job-creation

2: Assumptions & Rationale: Calculated based on average values from the National Renewable Energy Laboratory (NREL) The Jobs and Economic Development Impacts (JEDI) Solar Photovoltaics (PV) Model for construction and professional services jobs https://www.nrel.gov/analysis/jedi/pv See "Summary of Estimated Cumulative Savings of Modeled Reduction" for investment value calculations and assumptions.

Transportation Jobs Estimate

Notes

3	Public Transit	100
4	Fuel Switching - Electric Vehicle Infrastructure	2
	Transportation Jobs:	**102**
	Annual Income Potential (at $55,000)	**$5,630,575**

3: Assumptions & Rationale: An additional 1,000 daily transit riders generate roughly 500,000–700,000 annual passenger trips (assuming round trips), requiring several dozen new local transit workers such as drivers, mechanics, and support staff. Because public transit is labor-intensive—employing over 430,000 people nationwide—ridership growth directly boosts local employment. Indirectly, expanded service also supports jobs through supplier contracts and improved access to employers. While APTA estimates that public transit supports millions of jobs economy-wide, the 30–40 jobs per 1,000 new riders figure reflects only the direct local employment impact.. Sources: New APTA Data Shows Public Transportation Drives Economic Growth, Creates Jobs, and Powers U.S. Mobility - American Public Transportation Association; https://www.apta.com/news-publications/press-releases/releases/new-apta-data-shows-public-transportation-drives-economic-growth-creates-jobs-and-powers-u-s-mobility/

4: Assumptions & Rationale: A national study projects over 160,000 U.S. jobs by 2032 from expanding the EV charging network to support roughly 40 million EVs. These positions are inherently local, including electricians, technicians, and trained auto service staff maintaining charging infrastructure and EV systems. While EVs require less routine maintenance than gasoline vehicles, job gains stem from new sectors—charging installation, grid upgrades, battery servicing, and software support. Calculations for new EVSE demand are based on the US DOE Alternative Fuels Data Center Electric Vehicle Infrastructure Toolbox. Calculations for jobs potential per EVSE installations are based on National Renewable Energy Laboratory's 2017 National Demand for Electric Vehicle Charging Infrastructure. Values per EVSE based on Table 11 Workforce estimates in job-years in order to meet 2030 charger demand estimated by NREL of "Workforce Projections to Support Battery Electric Vehicle Charging Infrastructure Installation" by Energy and Environmental Research Associates, LLC. Sources:US DOE Alternative Fuels Data Center Electric Vehicle Infrastructure Toolbox https://afdc.energy.gov/evi-x-toolbox#/evi-pro-ports?region_type=cbsa; https://www.etcommunity.org/wp-content/uploads/2024/03/Workforce-ProjectionstoSupportBatteryElectricVehicleChargingInfrastructureInstallation.pdf
Additional Sources: "New Study Estimates Over 160,000 Jobs to be Created by U.S. Electric Vehicle Charging Infrastructure Buildout by 2032" - International Council on Clean Transportation; https://theicct.org/pr-new-study-estimates-over-160000-jobs-to-be-created-by-uss-ev-charging-infrastructure-buildout-jan24/ ; "3 Trends in the US EV Industry" - World Resources Institute; https://www.wri.org/insights/trends-electric-vehicle-workforce-us

Waste Management Jobs Estimate

Notes

5	Organics Diversion and Composting	5
6	Recycling Diversion	20
	Waste Management Jobs:	**25**
	Annual Income Potential (at $45,000)	**$1,139,781**

5: Assumptions & Rationale: Establishing organics collection and composting programs also generates local jobs, though on a somewhat smaller scale than recycling. Composting facilities need workers for tasks like waste hauling, site operations (turning and curing compost), and marketing the finished compost. A reasonable estimate is around 0.5 to 1.0 jobs per 1,000 tons of organic waste diverted from landfill to commercial composting. Sources: "More Jobs, Less Po lution: Growing the Recycling Economy in the U.S" - Tellus Institute; https://tellus.org/wp-content/uploads/2023/05/More-Jobs-Less-Pollution-Growing-the-Recycling-Economy-in-the-US.pdf ; "Composting for Community | Composting Makes ene: Jobs through Composting & Compost Use" - Institute for Local Self Reliance ; https://ilsr.org/article/composting-for-community/composting-sense-tables/

6: Assumptions & Rationale: Diverting waste from landfills to recycling is more labor-intensive than disposal, and thus creates local jobs in collection, processing, and downstream manufacturing. Studies show approximately 1–2 jobs per 1,000 tons of materials recycled (diverted) instead of landfilled. Sources: "Jobs & Economic Benefits of Zero Waste" - Eco-Cycle: https://ecocycle.org/learn-about-zero-waste/jobs-and-economic-benefits/ ; "What Are the Benefits of Recycling in the Community?" - Okon Recycling; https://www.okonrecycling.com/consumer-recycling-initiatives/learn-about-recycling/benefits-of-recycling-community/

Appendix D:

Glossary of Terms

The following are abbreviations and terms used in the Climate Action and Resilience Plan as well as others common to sustainability and climate action concepts.

Abbreviations

ADU	Accessory Dwelling Unit
BAU	Business as usual forecast
BEV	Battery electric vehicle
BIPOC	Black, Indigenous, people of color
C&D	Construction and demolition
CAP	Climate Action Plan
CE	Carbon Equivalent
CDP	Carbon Disclosure Project
CFC	Chlorofluorocarbons
CH_4	Methane
CHP	Combined Heat and Power
CO_2	Carbon dioxide
CO_2 e	Carbon dioxide equivalent
CSG	Community Solar Garden
DCFC	Direct Current Fast Charger
DOE	U.S. Department of Energy
EMS	Emergency medical services
EPA	U.S. Environmental Protection Agency
EV	Electric vehicle
EVSE	Electric vehicle supply equipment
FEMA	Federal Emergency Management Agency
FTE	Full-time equivalent
GCoM	Global Covenant of Mayors
GDP	Gross Domestic Product
GHG	Greenhouse gas
GWP	Global warming potential
HFC	Hydrofluorocarbons
HVAC	Heating, Ventilation, and Air Conditioning
ICE	Internal Combustion Engine vehicle
IPCC	Intergovernmental Panel on Climate Change
kWh	Kilowatt-hour
LEED	Leadership in Energy and Environmental Design
LEV	Low emission vehicle
LIDAC	Lower Income and Disadvantaged Community
MWH	Megawatt hour – 1,000 Kilowatt-hours
MSW	Municipal Solid Waste
MT	Metric ton equivalent to 1,000 kg (also known as Metric Tonne)
MMT	Million Metric tons
MMBTU	Million British Thermal Units
MT CO_2 e	Metric tons of carbon dioxide equivalent
NGO	Non-Governmental Organization
N_2O	Nitrous Oxide
NO_x	Nitrogen Oxides
NOAA	National Oceanic and Atmospheric Administration
NZE	Net-Zero Emissions
O_3	Ozone
ODS	Ozone Depleting Substances
PACE	Property Assessed Clean Energy
PFC	Perfluorocarbons
PHEV	Plug-in hybrid electric vehicle
PM2.5	Particulate matter of 2.5 micrometer diameter or less
POC	People of color
PPA	Power Purchase Agreement
PUB	Public Utilities Board
PV	Photovoltaic (solar photovoltaic)
REC	Renewable Energy Credit
RCP	Representative Concentration Pathway
SO_2	Sulfur Dioxide
SF_6	Sulfur Hexafluoride
SULEV	Super ultra-low emission vehicle
t	Ton equivalent to 2,000 lbs (United States)
TOG	Total Organic Gasses
USGS	U.S. Geological Survey
VMT	Vehicle miles traveled
VHT	Vehicle hours traveled
ZEV	Zero emission vehicle
ZNEB	Zero Net Energy Building

A

Accessory Dwelling Unit (ADU)
A secondary dwelling unit associated with a primary single-family home, which can be located within or attached to the main residence, or in a separate accessory building on the same property.

Action
Specific tasks set out to realize the objectives and methods highlighted in a given plan.

Activity Data
Information regarding the scale of human actions that lead to emissions or removals within a specified timeframe. This includes data like energy consumption, metal production, land coverage, management procedures, and usage of lime, fertilizers, and waste generation.

Adaptation
Refer to "Climate Readiness or Resilience"

Adaptive Capacity
The combination of societal, technological, and monetary abilities that individuals or groups possess to initiate and sustain actions against climate change.

Aerosols
Airborne particles, either solid or liquid, typically ranging between 0.01 and 10 micrometers. These particles, which can be of natural or human-made origin, can persist in the atmosphere for extended periods. They can affect climate by directly interfering with radiation or indirectly by influencing cloud properties.

Afforestation
The process of establishing forests on lands that weren't previously forested.

Air Pollutant
Any substance, either originating from human activities or naturally, present in the atmosphere that might have detrimental impacts on humans, fauna, flora, or materials.

Anthropogenic
In relation to greenhouse gas records, "anthropogenic" denotes emissions and removals directly stemming from human actions or from natural processes influenced by human activities.

Atmosphere
The layer of gases encasing the Earth. It mainly consists of nitrogen and oxygen, along with trace gases like argon, helium, and certain greenhouse gases like carbon dioxide and ozone. The atmosphere also encompasses varying amounts of water vapor and contains other components like clouds and aerosol particles.

B

Baseline Emissions
A reference point, either through measurement, calculation, or a specific timeframe, for making comparisons. It represents emission levels in scenarios devoid of policy changes or project implementations. Such evaluations are crucial to gauge the impact of emissions-reducing measures.

Base Year
The initial year used for data gathering. Emission-reducing goals are often set with this year as a reference.

Beneficial Electrification
Beneficial electrification is the process of replacing fossil fuels with electricity to reduce energy costs and greenhouse gas emissions. It can be applied to many sectors, including transportation, residential buildings, and commercial buildings.

Biogenic
Derived from the biological activities of living entities. The term "biogenic" exclusively pertains to recently formed biological materials. The IPCC suggests categorizing peat as fossil carbon due to its lengthy replacement cycle.

Biogeochemical Cycle
The continuous transfer of essential chemicals, crucial for life, within Earth's systems, including carbon, nitrogen, oxygen, and phosphorus.

Biomass
Refers either to (1) the combined weight of all living organisms within a designated area or species, usually represented as dry weight or (2) Organic substances originating from or recently derived from

living beings, excluding peat, and encompasses derived products and waste.

Biomass Waste
Biological, non-fossil substances of biological origin that are either residual or discarded. This definition includes biogenic municipal waste, landfill gas, and other forms of biomass but excludes certain fuels and biofuels. EIA's data on "biomass waste" also count energy crops produced specifically for power generation.

BIPOC
Defined as "Black, Indigenous, and people of color", this U.S.-specific term emphasizes the experiences of Black and Indigenous communities, showcasing or influencing the broader socio-economic dynamics encountered by all non-white individuals.

Black Carbon
A type of aerosol characterized based on its capacity to absorb light, its chemical reactivity, and/or thermal resistance; comprises elements like soot and charcoal.

Blue Carbon
Carbon that's absorbed and retained by coastal ecosystems and wetlands, aiding in countering climate change impacts.

British Thermal Unit (BTU)
A conventional measure of thermal energy, representing the energy needed to elevate the temperature of a pound of water by a single degree Fahrenheit.

Business As Usual Forecast (BAU)
The Intergovernmental Panel on Climate Change (IPCC) describes this as the predicted emission levels if upcoming trends emulate historical ones and no additional policy amendments are enacted. This projection presumes no further emission-curbing actions will be adopted beyond existing or committed measures. BAU forecasts do include anticipated reductions resulting from existing requirements or commitments, such as federal vehicle fuel efficiency standards and electric utility carbon-reduction commitments, which are outside the scope of this plan.

C

Carbon Cycle
The systematic flow and storage of carbon across different reservoirs. This involves four primary carbon storage areas: the atmosphere, the terrestrial environment (including freshwater systems), oceans, and sediments (which encompass fossil fuels). The carbon exchanges between these reservoirs are driven by a mix of chemical, physical, geological, and biological factors. Though the ocean holds a significant amount of near-surface carbon, its exchange with the atmosphere is relatively slow.

Carbon Dioxide (CO_2)
A gas found naturally in the environment, but also produced from burning fossil fuels, biomass, through land-use alterations, and various industrial activities. As the main human-induced greenhouse gas, it impacts the Earth's ability to reflect heat. Other greenhouse gases are often measured relative to CO_2, which has a Global Warming Potential set at 1.

Carbon Dioxide Equivalent (CO_2 e)
A standard for comparing the emissions from different greenhouse gases based on their potential to warm the planet. It's determined by equating the amount of a gas emitted to the amount of CO_2 that would have the same global warming impact.

Carbon Disclosure Project (CDP)
A global initiative allowing organizations and cities to publicly share their environmental impacts, notably related to climate risks. CDP stands as one of the recognized disclosure platforms endorsed by GCoM.

Carbon Emissions
The process of releasing carbon dioxide into the atmosphere, primarily through human activities like burning fossil fuels for energy.

Carbon Equivalent (CE)
A metric for comparing emissions from various greenhouse gases based on their capacity to influence global warming. Carbon equivalents are derived from carbon dioxide equivalents using a specific conversion factor related to molecular weights.

Carbon Free
Activities, systems, or products that don't emit carbon dioxide or other greenhouse gases. Often

associated with sustainable or renewable energy discussions, not every "carbon free" source is renewable. For instance, while both wind and nuclear energy are carbon-free, only wind is renewable.

Carbon Intensity
The ratio of carbon emitted for every unit of energy used. A typical measure of this is the carbon weight per British thermal unit (Btu) of energy. When considering a single fuel type, carbon intensity and the emission coefficient are the same. With multiple fuels, it's an aggregate value.

Carbon Neutral / Carbon Neutrality
Achieving a balance where the amount of CO_2 produced annually is equal to the amount removed or offset, leading to net-zero CO_2 emissions by a specific date. Carbon Neutrality is also sometimes applied to all greenhouse gas emissions. In those instances the term is sometimes used interchangeably with “Net Zero” or “Climate Neutral”

Carbon Offsets
Mechanisms to counterbalance carbon dioxide or other greenhouse gas emissions by funding equivalent reductions elsewhere. They are quantified in metric tonnes of CO_2 -equivalent and can be traded to neutralize emissions from an entity's operations.

Carbon Sinks
Natural environments, such as forests or oceans, recognized for their ability to absorb and store carbon dioxide from the atmosphere.

Carbon Sequestration
The process of capturing and storing CO_2, either in oceans, terrestrial environments like forests and soils, or in geological formations underground.

Chlorofluorocarbons (CFCs)
Gases, regulated under the 1987 Montreal Protocol, used in several applications like refrigeration and air conditioning. Since they don't break down in the lower atmosphere, they reach the upper atmosphere and can deplete ozone. Their usage is being phased out in favor of alternative compounds, some of which are greenhouse gases under the Kyoto Protocol.

Circular Economy
A sustainable economic model that deviates from the traditional linear approach (produce, use, discard) by focusing on reducing resource inputs and waste. It emphasizes durable product design, repair, reuse, and recycling to minimize waste.

Clean Energy
Clean, or “carbon-free,” energy is electricity produced by facilities that do not release greenhouse gases, like carbon dioxide, during the generation process.

Climate
Often described as the "typical weather" of an area, climate is a statistical representation of weather patterns over extended periods, typically 30 years as per World Meteorological Organization (WMO) standards. It encompasses averages and variability of factors like temperature and precipitation. On a broader scale, climate is the comprehensive state of the climate system, including statistics.

Climate Adaptation or Resilience
The ability of ecosystems or communities to anticipate, stand against, respond, and recover from disruptive events. It involves adjusting to changing climate conditions to lessen risks and vulnerabilities.

Climate Action Plan
A comprehensive strategy detailing steps that a municipality, business, or government will take to decrease greenhouse gas emissions and prepare for climate change, fostering sustainable and resilient growth.

Climate Change
Any significant, lasting change in the average or variability of climate conditions over extensive periods. It can stem from natural processes, persistent changes in atmospheric composition due to human activities, or alterations in land use.

Climate Hazard
A climate event or situation that can negatively affect human health, resources, or livelihoods, encompassing sudden shifts in climate systems like heavy rainfall or prolonged droughts.

Climate Migration

The relocation of individuals due to the effects of climate change impacting their way of life or degrading their living conditions. This can result from changing water supplies, altered agricultural yields, or factors like rising sea levels and increased storm intensity.

Climate Model
A mathematical representation used to simulate the key components of climate, including the atmosphere, oceans, land, and ice. These models are used to forecast potential future climate changes.

Climate Neutral / Climate Neutrality
Achieving a balance where the amount of all GHG emissions produced annually is equal to the amount removed or offset, leading to net-zero GHG emissions by a specific date. "Climate Neutral" is sometimes used interchangeably with "Carbon Neutral", however, "Carbon Neutral" often interpreted as addressing CO_2 emissions only, whereas "Climate Neutral" is intended to address all GHG gases.

Climate Scenario
A structured and logical narrative of potential future climatic conditions, built on a set of assumptions about potential future events.

Climate Risk
The potential negative outcomes due to climatic changes, where valuable assets are at risk. The risk is calculated based on the likelihood of certain climate events or changes happening and the potential impact of those changes. It is a product of the system's vulnerability and the climate hazards faced.

Climate Vulnerability
The extent to which a system is at risk from adverse climate changes, including climate variability and extremes. It depends on how exposed the system is to these changes, its inherent sensitivity, and its ability to adapt. Vulnerability can be described as the potential negative impact minus the system's adaptive capacity.

Climate Vulnerability Assessment
An analysis aiming to pinpoint and categorize the threats posed by climate change. It guides the creation of strategies to address these threats and can cover diverse areas like food security, socio-economic factors, and extreme weather patterns.

Co-Benefit
Additional advantages or benefits (e.g., health, economic, societal) that arise indirectly from climate adaptation and mitigation measures.

Co-generation
A facility or system that simultaneously and efficiently produces multiple forms of energy, usually heat and power, in an integrated manner.

Community Choice Aggregation (CCA)
CCA programs, or sometimes known as "Community Power Aggregation", empower local governments to source power for their citizens, businesses, and municipal facilities from alternative providers, while still utilizing the distribution services of their existing utilities. Setting up a CCA generally needs state-level legislation. For more details, one can visit EPA's dedicated CCA website: [EPA's CCA webpage https://www.epa.gov/green-power-markets/community-choice-aggregation]

Combined Heat and Power (CHP)
A system designed to concurrently generate electricity and useful heat, aiming for optimal energy use. Some utilities might sell the heat produced for public use, while certain industries might sell surplus electricity to other businesses or utility companies.

Community Power Aggregation
Refer to "Community Choice Aggregation"

Community Solar / Community Solar Garden (CSG)
Shared solar installations that allow community members to benefit from solar energy without installing panels on individual properties. Participants receive bill credits based on their share of the generated power. Generally, the electricity from community solar farms is priced lower than traditional utility rates.

Complete Streets
A street design concept that ensures streets are made to accommodate all users safely and efficiently, regardless of their mode of transportation or age.

Consistency

Ensuring that an inventory remains uniform in its methodologies and data over time. If the same methods and datasets are consistently applied over years, then the inventory is considered consistent.

Continuous Emission Monitor (CEM)
A monitoring system placed within smokestacks or other emission sources that continuously measures and reports air emissions.

Cool Roof
Roofing materials engineered to reflect more sunlight and absorb less heat, thereby reducing the heat transferred to the building or its surroundings.

Cool Pavement
Pavement materials designed to reflect sunlight and decrease heat absorption, minimizing heat transfer to the nearby environment.

Criteria Air Pollutant
Specific air pollutants for which permissible exposure levels are determined, and corresponding air quality standards are established. Examples include carbon monoxide, ozone, and various particulates. The term arises from the U.S. EPA's obligation to define these pollutants and their impacts on health and the environment. Standards can be reviewed and updated based on new scientific information.

D

Decarbonization
The transition towards reducing carbon emissions by adopting cleaner energy sources, enhancing energy efficiency, or capturing and storing released carbon. The ultimate aim is to minimize the climate impact and move towards a carbon-neutral society.

Deforestation
The conversion of forested areas into non-forest uses. Deforestation is often linked to the amplified greenhouse effect for two main reasons: the combustion or decay of wood releases carbon dioxide, and the removed trees no longer absorb atmospheric carbon dioxide through photosynthesis.

Demand Side Management (DSM)
Initiatives designed to modify consumer energy consumption patterns using methods like education and financial incentives. DSM seeks to reduce energy consumption, particularly during peak demand periods, and shift usage to times when demand is typically lower.

Direct Current Fast Charger (DCFC)
DCFC charging is designed to deliver more power at faster speeds than Level 2 chargers with outputs ranging from 50 kW to 350 kW. They can recharge an EV battery to 80% in anywhere from 15 minutes to 45 minutes, depending on the vehicle's voltage capacity. DCFC is also sometimes known as "Level 3 charging", or "Rapid Charging".

Distillate Fuel Oil
A category of petroleum products obtained through standard distillation processes. This encompasses diesel fuels and fuel oils, including types like No. 1, No. 2, and No. 4 diesel fuel. These products are used in various engines, from road vehicles to trains and agricultural equipment. Additionally, No. 1, No. 2, and No. 4 fuel oils are typically employed for heating spaces and generating electricity.

District Heating
A system that distributes heat, generated at a centralized point, via a network of pipes to provide heating for homes and businesses in a specified area or community.

E

Ecosystem Services
The benefits ecosystems offer to human welfare. These benefits range from tangible resources like water and food to services like air purification, flood control, and climate stabilization.

Electric Vehicle (EV)
A vehicle that can be powered by an electric motor that draws electricity from a battery and is capable of being charged from an external source. An EV includes both a vehicle that can only be powered by an electric motor that draws electricity from a battery (all-electric vehicle) and a vehicle that can be powered by an electric motor that draws electricity from a battery and by an internal combustion engine (plug-in hybrid electric vehicle).

Electric Vehicle Supply Equipment (EVSE)
The infrastructure that allows electric vehicles to charge from an electricity source. It's also known as an EV charging station, EV charger, or charging dock. EVSE takes electrical power from the grid and transfers it to the vehicle's battery.

Emissions
The act of discharging certain substances, often gases in the context of climate change, into the environment.

Emission Factor
A value that signifies the amount of a gas emitted or removed per unit of activity. This coefficient is usually derived from a collection of measurement data and provides a representative emission rate for a set of specific conditions.

Emission Inventory
A calculation of the total pollutants released into the atmosphere from various significant sources, measured over a defined period, such as daily or annually.

Emission Rate
The quantity of a specific pollutant released over a set duration, commonly expressed in units like tons per year.

Energy Burden
The fraction of a household's total income spent on energy costs. An "high" energy burden is identified when energy costs comprise 6% or more of the household income, while it's deemed "severe" if above 10%.

Energy Savings / Energy Efficiency
Refers to the sustainable reduction in the amount of energy consumed for the same level of output or performance. For instance, a modern heater that requires less energy to provide the same warmth results in energy efficiency improvements.

Energy Tariff
A pricing structure, or utility tariff, that dictates how consumers are charged by energy providers for their electric or gas consumption. Energy tariffs are subject to government approval and review.

Environmental Justice
The equitable treatment and active participation of all individuals, regardless of their race, ethnicity, income, or origin, in the processes related to environmental laws, policies, and regulations.

Equity
Being just and fair in treatment, acknowledging that people have diverse circumstances and providing them with the necessary resources and opportunities to achieve equal outcomes. In terms of climate change, equity encompasses both shielding from environmental hazards and ensuring access to environmental benefits, irrespective of socio-economic factors.

F

Federal Emergency Management Agency (FEMA)
A federal agency that leads the country's response to disasters, including natural disasters, man-made incidents, and terrorist events.

Fluorocarbons
Molecules made up of carbon and fluorine, which can also include elements like hydrogen, chlorine, or bromine. Some well-known types are chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).

Flux
(1) Materials, like limestone and dolomite, used to moderate the heat or energy demands of mineral processing, like metal smelting. They can also function as agents to produce slag. (2) The rate or volume of a liquid or gas moving across a specific area over time, such as the " CO_2 absorption rate by forests".

Fossil Fuel
Deposits of hydrocarbons formed from ancient organic matter, including coal, oil, and natural gas.

Fuel Combustion
The intentional burning of materials in a device designed to provide heat or mechanical energy. This process can be for direct application or use elsewhere.

Fuel Switch (see also "Beneficial Electrification")

The process of transitioning from one energy source to another, commonly from non-renewable sources like fossil fuels to renewable ones like wind or solar, to reduce both costs and emissions.

Fugitive Emissions
Unintentional leaks of gases from surfaces such as seals or underground pipelines due to deterioration or faults.

G

Geologic Carbon Sequestration
The practice of capturing CO_2, often from sources like coal-powered plants, and injecting it deep underground for storage. With careful site selection and management, this approach has potential in reducing atmospheric CO_2 levels.

GHG
Refer to "Greenhouse Gas"

Global Environmental Change
Significant, accelerated alterations to Earth's natural systems, encompassing climate shifts, biodiversity loss, resource depletion, pollution, and other large-scale environmental disruptions.

Global Warming
The average rise in atmospheric temperature near the Earth's surface and within the troposphere, which can lead to shifts in global climate. This warming can arise from both natural phenomena and human activities. Typically, "global warming" is used to refer to the temperature increase resulting from the enhanced emissions of greenhouse gases due to human actions. See also Climate Change.

Global Warming Potential (GWP)
An index that calculates the radiative effects of greenhouse gases, considering their ability to trap heat compared to carbon dioxide over a specified timeframe. The GWP evaluates the cumulative effect of these gases in the atmosphere based on their longevity and their potential to absorb infrared radiation. The Kyoto Protocol uses GWPs derived from 100-year timespan emissions.

GCoM Global Covenant of Mayors
GCoM represents the world's largest alliance dedicated to urban climate leadership. Comprising over 10,000 city and local governments, GCoM's goal is to encourage and support action on climate and energy at the grassroots level globally.

Green Streets
An urban design approach that incorporates plant life, soil, and engineered structures to manage, slow, and purify stormwater runoff from surfaces that don't absorb water.

Greenhouse Effect
A natural process where specific gases in the atmosphere trap heat near the Earth's surface, leading to a warming effect. If concentrations of these greenhouse gases increase, this effect intensifies, leading to a gradual increase in the Earth's temperature.

Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories
A comprehensive and transparent framework adopted globally for cities and local governments to consistently measure, calculate, and report their greenhouse gas emissions.

Greenhouse Gas
A gas that can absorb and emit infrared radiation, contributing to the greenhouse effect. Some common greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxide, and certain industrial gases like hydrofluorocarbons.

Greenhouse Gas Reduction
Efforts aimed at diminishing the amount of greenhouse gases released into the atmosphere, thereby mitigating potential adverse climate impacts.

Green Infrastructure
Green infrastructure encompasses a diverse array of green spaces and features, both in urban and rural areas, that serve to enhance the well-being of communities and provide environmental advantages. It extends beyond traditional open spaces like parks and playing fields to include a range of measures that use plant or soil systems, permeable pavement and surfaces, stormwater harvest and reuse, or landscaping to manage stormwater and reduce flows to sewer systems or to surface waters. This approach helps counter water pollution in urbanized areas caused by stormwater carrying contaminants.

Green Roof
A roof that incorporates vegetation over a waterproof layer. Green roofs can be categorized as extensive, intensive, or semi-intensive based on the depth of planting medium and amount of maintenance they require. They offer benefits like mitigating the heat island effect, managing stormwater, and enhancing green space in urban areas.

Green Wall
This is a vertical extension of the green roof concept, where vegetation is grown on building exteriors.

Gross Domestic Product (GDP)
The total value of goods and services produced within a country's borders in a specific timeframe, typically a year. It doesn't account for the depreciation of assets or depletion of natural resources.

Groundwater
Water located beneath the Earth's surface, filling the spaces between soils and rocks.

H

Halocarbons
A group of organic compounds composed partially of halogens. They encompass chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs), halons, and more. Many halocarbons have significant Global Warming Potentials and some also contribute to ozone layer depletion.

Hazard
The potential for an event, whether natural or human-induced, to cause harm to people, property, infrastructure, or the environment.

Heat Island
An urban area that exhibits higher temperatures than its surrounding rural areas due to human activities. This phenomenon is attributed to factors like heat-absorbing surfaces and structures. See also "Micro Heat Island".

Heating, Ventilation, and Air Conditioning (HVAC)
Systems that regulate and move heated and cooled air throughout buildings. HVAC systems are used to improve air quality and maintain a comfortable indoor climate.

Hydrocarbons
Compounds made up of only hydrogen and carbon atoms. The term can also refer to petroleum compounds which might contain elements like sulfur, nitrogen, or oxygen. Unsaturated hydrocarbons contain either double or triple carbon-carbon bonds.

Hydrofluorocarbons (HFCs)
Molecules made up of hydrogen, fluorine, and carbon. These were developed as replacements for ozone-depleting substances and are used in a variety of industrial processes. While HFCs don't deplete the ozone layer, they are potent greenhouse gases with varying Global Warming Potentials.

I

ICLEI Local Governments for Sustainability
An association of local governmental entities focused on reducing carbon emissions and fostering sustainable urban growth. ICLEI members, along with a team of specialists, collaborate through capacity building, partnerships, and peer interaction to effect change towards urban sustainability.

Impact
A consequence or effect that arises due to climate change on any system's structure or functioning. Examples include severe heatwaves, sea-level rise, or alterations in rainfall causing floods or droughts.

Indicator
A numerical representation highlighting a specific facet of vulnerability to climate change. For instance, a forecasted alteration in annual average temperature or the count of species at risk.

Internal Combustion Engine Vehicle (ICE)
Vehicles which ignite and combust fuel within an internal combustion engine. Fuels used in ICE vehicles are typically gasoline and diesel.

Intergovernmental Panel on Climate Change (IPCC)
Founded in 1988 by the World Meteorological Organization and the United Nations Environment Programme, the IPCC is tasked with evaluating scientific and technical information related to all aspects of climate change. The IPCC informs

governments about the state of knowledge of climate change by examining all the relevant scientific literature on the subject. The IPCC is scientific entity and is not a legislative body.

K

Kilowatt Hour (kWh)
A unit representing electrical energy consumption, equivalent to using 1,000 watts continuously for an hour.

Kyoto Protocol
A supplement to the United Nations Framework Convention on Climate Change (UNFCCC) ratified in Kyoto, Japan, in 1997. This protocol incorporates legally binding obligations to reduce greenhouse gas emissions. Countries listed in the Protocol's Annex B pledged to reduce their emissions of six major greenhouse gases by at least 5% from 1990 levels between 2008 and 2012. The Protocol became effective on February 16, 2005.

L

Land Use and Land Use Change
Land use pertains to the human activities performed on a certain type of land cover. Meanwhile, land use change denotes alterations in how land is managed or utilized by humans, which can influence land cover. Changes in land cover and land use can affect climate properties such as surface albedo and greenhouse gas sources/sinks, potentially influencing climate on various scales.

Leadership in Energy and Environmental Design (LEED)
LEED is a certification system for evaluating and promoting sustainable building and design practices. Developed by the U.S. Green Building Council (USGBC), LEED provides a framework for environmentally responsible construction, aiming to improve energy efficiency, reduce water usage, and decrease greenhouse gas emissions. Buildings can earn LEED certification at different levels (Certified, Silver, Gold, or Platinum) based on their performance across several criteria, including energy use, indoor environmental quality, and sustainable site development.

Level 1 Charger
An electric vehicle charging device that provides charging through a common residential 120-volt (120V) AC outlet. Level 1 chargers can take 40-50+ hours to charge a BEV to 80 percent from empty and 5-6 hours for a PHEV.

Level 2 Charger
An electric vehicle charging device with a higher AC charging capacity than Level 1 chargers. They typically operate at 240V for residential use or 208V for commercial use. Level 2 chargers can charge a BEV to 80 percent from empty in 4-10 hours and a PHEV in 1-2 hours.

LIDAC Communities
Low Income / Disadvantaged Communities (LIDACs): Communities where residents have low incomes, limited access to resources, and face disproportionate environmental or climate burdens.

Living Streets
"Living streets" amalgamate the principles of green streets and complete streets while emphasizing the enhancement of residents' life quality in urban areas.

LULUCF
An abbreviation for "Land Use, Land Use Change, and Forestry," a category in greenhouse gas inventory documentation.

M

Megawatt Hour (MWH)
An electrical energy unit denoting the consumption of a million watts over an hour.

Methane (CH_4)
A hydrocarbon that acts as a greenhouse gas with a global warming potential estimated to be 28 times stronger than carbon dioxide. Methane arises from several sources, including decomposition in landfills, flooded rice fields, digestion in animals, and fossil fuel production. The GWP value is sourced from the IPCC's Fifth Assessment Report (AR5).

Metric Ton
Equivalent to a Megagram or 1,000 kilograms, a metric ton, sometimes referred to as a metric tonne, is a standard international unit for mass.

Micro Heat Island
Smaller localized zones within urban environments experiencing elevated temperatures in comparison

to surrounding areas. Such hotspots might include asphalt roads, non-green roofs, or barren parking lots. The microclimate and unique built environment conditions heavily influence these micro heat islands. Refer also to "Heat Island".

Million Metric Tons (MMT)
A standard measurement often utilized in greenhouse gas documentations, equivalent to a Teragram (Tg).

Mitigation
Efforts to reduce or curb the extent or speed of long-term climatic warming and its associated effects. Mitigation typically encompasses the reduction of human-induced greenhouse gas emissions.

Mobile Sources
Transportation means that emit pollutants, including cars, motorbikes, trucks, off-road vehicles, boats, and planes.

Mode Share
The proportion of travelers opting for a specific mode of transportation. Mode share serves as a vital metric when shaping sustainable transportation strategies in a city or region, as it highlights the prevalent use of different transport options. This metric showcases the effectiveness of infrastructures, policies, investments, and urban designs in facilitating various transport modes.

Model
A model serves as a numerically-based representation of real-world scenarios, often omitting or simplifying certain details to emphasize core elements.

Municipal Power Aggregation
Refer to "Community Choice Aggregation."

Municipal Solid Waste (MSW)
Waste originating from homes and certain non-hazardous industrial, institutional, and commercial sources. Typically, this waste is directed to municipal disposal sites.

N

National Oceanic and Atmospheric Administration (NOAA)
A US agency responsible for weather forecasting, monitoring oceanic and atmospheric conditions, charting the seas, conducting deep-sea exploration, and managing fishing and protection of marine mammals and endangered species in the US exclusive economic zone.

Natural Sources
Emission sources that aren't human-induced, including biological, geological sources, wildfires, and dust carried by the wind.

Net Energy Metering (NEM)
Net Energy Metering, commonly referred to as Net Metering, enables residential and business consumers generating their own solar energy to sell their surplus electricity back to the grid. The rate schedule for NEM determines compensation for this electricity. While net metering laws exist in many states, in others, utilities may offer these programs either voluntarily or due to regulatory decisions.

Net Zero Emissions (NZE)
Pertains to a community, business, institution, or building that produces the same amount of energy it consumes through renewable and GHG emission-free sources, resulting in zero net emissions over a year. With a net zero target, only a small portion of residual emissions, no more than 5-10%, should be offset using high-quality carbon removal methods.

Nitrogen Fixation
The process where atmospheric nitrogen gas transforms into forms beneficial for plants and other organisms, achieved through lightning, bacteria, and blue-green algae. This process is integral to the nitrogen cycle.

Nitrogen Oxides (NOx)
Gaseous compounds comprising nitrogen and oxygen. These gases emerge from vehicle exhaust and power generation. As they can form photochemical ozone, impact visibility, and harm health, they're deemed pollutants.

Nitrous Oxide (N_2O)
A potent greenhouse gas with a warming potential 265 times greater than carbon dioxide. Key sources encompass soil management practices, fossil fuel burning, and biomass combustion. Its global

warming potential is derived from the IPCC's Fifth Assessment Report (AR5).

Non-Governmental Organization (NGO)
A group that works independently of governments to improve social conditions. NGOs are often non-profit institutions that are established at the community, national, or international level.

O

Ozone (O_3)
A gaseous compound composed of three oxygen atoms. In the troposphere, ozone forms naturally and through photochemical reactions involving human-produced gases. In the stratosphere, it forms when solar UV radiation interacts with diatomic oxygen. While tropospheric ozone is a greenhouse gas, stratospheric ozone is vital for blocking harmful UV radiation.

Ozone Depleting Substances (ODS)
Compounds causing the depletion of the stratospheric ozone layer. This category includes substances like CFCs, HCFCs, halons, and more. These substances, predominantly stable in the troposphere, degrade in the stratosphere under UV radiation, releasing ozone-depleting chlorine or bromine.

P

Perfluorocarbons (PFCs)
Man-made compounds solely composed of carbon and fluorine. Used as substitutes to ozone-depleting substances and emitted during certain industrial processes. Despite not depleting the ozone, they are formidable greenhouse gases. (IPCC's Fourth Assessment Report (AR4))

Phantom Load
Refers to the power consumed by electronic devices and appliances even when switched off. Devices drawing "phantom loads" constantly utilize electricity.

Photosynthesis
A biological process where plants absorb carbon dioxide to produce carbohydrates, releasing oxygen in the process. The mechanism varies based on different atmospheric carbon dioxide concentrations.

Plug-in hybrid electric vehicle (PHEV)
A type of vehicle that combines features of both gasoline-powered and electric vehicles. PHEVs use batteries to power an electric motor, and another fuel, such as gasoline or diesel, to power an internal combustion engine or other propulsion source. PHEVs can charge their batteries through charging equipment and regenerative braking.

Plug Load
Refers to the energy consumption of devices plugged into electrical outlets. In offices, major plug loads include computers, printers, and copiers. As buildings become more energy efficient, the relative importance of plug loads increases.

POC
An acronym for “people of color” or “person of color”, encompassing all non-white demographic groups. See also “BIPOC.”

Point Sources
Specific locations emitting pollutants into the atmosphere, like industrial smokestacks.

Power Purchase Agreement (PPA)
A contract where one party, the generator, produces electricity, and the other, the buyer, agrees to purchase it. Individual or grouped customers can forge PPAs with energy developers. PPAs enable long-term renewable energy commitments and can serve as direct renewable energy investments.

Property-Assessed Clean Energy (PACE)
A financial structure allowing property owners to fund renewable energy and energy efficiency improvements. Eligible properties include residential, commercial, and industrial sites. Upgrades can be geared toward energy efficiency, renewable energy, and water conservation.

Process Emissions
These are emissions resulting from chemical transformations in industrial processes that are distinct from burning.

R

RCP 8.5
A Representative Concentration Pathway climate model frequently considered the climate model representing “business as usual” forecasts if global

GHG emissions are not reduced and fossil fuels are continued to be used.

Radiative Forcing
A shift in equilibrium between incoming sunlight and outgoing infrared radiation. Ordinarily, the Earth's incoming and outgoing radiations are almost balanced. However, the introduction of greenhouse gases captures more infrared radiation, reflecting it back to Earth's surface, leading to a warming effect.

Reforestation
The act of reintroducing forests on lands that once held forests but were later repurposed.

Regeneration
The process of reestablishing young trees, either naturally or through human intervention, typically preserving the existing forest type after the previous forest has been removed.

Renewable Energy
Energy sourced from naturally renewable elements such as the sun, wind, water, and geothermal heat.

Renewable Energy Credits (RECs)
Certificates representing the benefits and attributes of electricity generated from renewable sources. Each REC represents one megawatt-hour (MWh) of renewable electricity dispatched to the grid. The largest reduction in Evanston's emissions is attributed to REC purchases.

Representative Concentration Pathway (RCP)
climate change scenarios to project future greenhouse gas concentrations. These pathways describe future greenhouse gas concentrations and have been formally adopted by the IPCC. There are a range of RCP climate models from RCP 2.6 to RCP 8.5 reflecting a range of potential human-made GHG emission scenarios. The numbers represent the expected change in radiative forcing through the end of the 21st century.

Residence Time
The typical duration a single atom or molecule remains in a particular storage area. In the context of greenhouse gases, it generally refers to the duration a molecule lingers in the atmosphere.

Resilience / Resiliency
The capacity to foresee, ready for, counteract, and promptly bounce back from climate-induced threats, ensuring minimal damage to society, economy, and natural settings.

Resilience Hub
A resilience hub is a community-serving facility that supports residents and communities before, during, and after emergencies. Resilience hubs can also provide resources to support communities in reducing greenhouse gas emissions.

Reservoir
Either (1) a part of the climate system where a greenhouse gas or its precursor is housed; or (2) human-manipulated water bodies where significant variations in water area might occur due to water regulation.

Respiration
A biological process where living entities transform organic substances into carbon dioxide, using up oxygen and releasing energy in the process.

Retro-commissioning
A comprehensive approach to enhance a building's operational efficiency by ensuring its control systems operate optimally and align with the building's intended and actual usage.

Ride-share
A system where individuals share transport means, usually through carpooling or joining a vanpool. Typically facilitated by a platform connecting drivers with potential riders.

S

Scope 1
Refers to emissions discharged directly within the city's boundaries due to fossil fuel combustion and the decomposition of waste in landfills and wastewater facilities.

Scope 2
Refers to emissions generated outside the city resulting from the city's consumption of electricity.

Scope 3
Pertains to emissions linked to local government functions that can be quantified and disclosed but

don't fall under Scope 1 or 2. Examples include outsourced activities and commuting of employees.

Short Ton
A standard ton measurement in the U.S., equivalent to 2,000 lbs or about 0.907 metric tons.

Sink
Any activity, process, or mechanism responsible for removing a greenhouse gas, aerosol, or their precursor from the atmosphere.

Social Cost of Carbon
An estimation of the economic damage due to climate change effects, calculated as the monetary value of total damages arising from emitting a single ton of carbon dioxide.

Solar Radiation
The sun's emitted electromagnetic waves. This radiation, also known as shortwave radiation, has wavelengths mainly in the visible spectrum due to the Sun's temperature.

Solar Photovoltaic (PV)
A system that directly transforms sunlight into electricity using semiconductors, primarily silicon. Suitable for homes, businesses, and large-scale operations, solar PV systems can be roof-mounted, ground-based, or integrated into building structures to produce renewable energy.

Source
Any process or activity that introduces greenhouse gases, aerosols, or their precursors into the atmosphere.

Stationary Sources
Fixed locations like power stations, manufacturing plants, and refineries that emit pollutants into the air.

Strategy / Strategic Goal
Detailed directions built upon the foundation of the sustainability vision and GHG reduction objectives that guide future policy decisions, community investments, and initiatives.

Sulfur Dioxide (SO_2)
A molecule made of one sulfur atom and two oxygen atoms. Released both naturally and by human activity, it can transform into sulfate aerosols in the atmosphere. These aerosols can cool the Earth's surface, contribute to acid rain, and decrease visibility.

Sulfur Hexafluoride (SF_6)
A colorless gas that mixes well with alcohol and ether but less so with water. It's an extremely potent greenhouse gas, with a global warming potential much higher than carbon dioxide (CO_2). SF6 is predominantly used in electricity transmission and as an insulator in electronics. Its global warming potential is derived from the IPCC's Fourth Assessment Report (AR4). It is a potent greenhouse gas with a warming potential 23,500 times greater than carbon dioxide.

T

Terrestrial Carbon Sequestration
The process where trees, plants, and crops absorb carbon dioxide (CO_2) from the atmosphere through photosynthesis and store it as carbon in biomass (like tree stems, branches, and roots) and soil. This stored carbon creates "sinks" which counteract emissions when the absorbed carbon is greater than the released carbon over time.

Therm
A unit of energy equivalent to 100,000 British Thermal Units, roughly akin to the energy in 100 cubic feet of natural gas. Commonly used to gauge natural gas consumption for billing.

Total Organic Gases (TOG)
Organic gases that encompass both reactive and relatively non-reactive compounds, such as methane.

Transparency
Clear presentation of methodologies and assumptions used in an inventory so users can easily replicate and evaluate the inventory. Transparency is crucial for effective communication and consideration of information.

Tree Bank
A designated location, such as a school or public park, where property owners or developers may donate and plant a portion of zoning ordinance-required trees if planting them within their own project site is not practical.

Trend
A measure of a quantity's change over time. A positive trend signifies growth, while a negative one indicates a decline. It's expressed in percentage or fractional terms concerning the quantity's initial value.

U

Urban Tree Canopy
The composition and traits of trees in urban settings.

U.S. Department of Energy (DOE)
A federal agency that oversees the nation's nuclear infrastructure, energy policy, and funds scientific research in the field.

U.S. Environmental Protection Agency (EPA)
A federal agency tasked with safeguarding human health and the environment. It offers technical support for recovery planning, long-term cleanup, and environmental surveillance. This includes assistance with public health infrastructure, such as wastewater treatment plants, and addressing threats through monitoring, assessment, and decontamination efforts.

V

Vehicle Miles Traveled (VMT)
Represents the distance traveled by vehicles, be it cars, trucks, or motorcycles. Each mile is counted as one vehicle mile, irrespective of the number of passengers.

Vision Zero
A strategy focused on eliminating severe injuries and fatalities from traffic accidents, aiming to provide safe and equal mobility for all individuals.

Vulnerability
The extent to which a system is exposed to, sensitive to, or unable to handle the adverse impacts of climate change. This encompasses:

- Exposure: The presence of assets or organisms in areas potentially adversely impacted by climate change.
- Sensitivity: The level at which assets or organisms are impacted by climate change.
- Adaptive capacity: The capability of systems, assets, or organisms to adjust to detrimental impacts.

W

Water Vapor
The predominant greenhouse gas present in the form of water in its gaseous state in the atmosphere. Water vapor is a natural part of the greenhouse effect. Its concentration is not significantly altered by human activities, but it amplifies the greenhouse effect due to positive feedback mechanisms. Water vapor also plays a vital role in climate regulation by forming clouds and precipitation.

Weather
Weather represents the immediate atmospheric conditions at a specific time and place, while climate refers to the long-term average of these conditions in a particular region over an extended period. In simpler terms, weather is what you experience outdoors on any given day, while climate describes the typical weather patterns you'd anticipate for a particular season and location.

Z

Zero Emission Vehicles (ZEV)
A vehicle that doesn't release harmful pollutants during its operation. Examples include electric cars, hydrogen-fueled vehicles, and bicycles. These emissions, when released, can have detrimental effects on both the environment and human health.

Zero Net Energy Building (ZNEB)
Also known as a Net-Zero Energy Building is one that is optimally efficient, and over the course of a year, generates renewable energy onsite equal to or greater than the total amount of energy consumed onsite.

Zero Waste
An approach focusing on the efficient utilization of resources through responsible production, consumption, and recovery. This means products, packaging, and materials are reused and recycled without causing harm to the environment or health, and without resorting to incineration or releases to land, water, or air.

Appendix E:
Acknowledgements

We are grateful to the community members and City staff whose insights supported this plan. The contributors listed below played key roles in shaping City of Plymouth's Climate Action and Resilience Plan:

Project Leads

MK Anderson	City of Plymouth, Environmental Stewardship Coordinator

Community Steering Committee

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Keisha Sedlacek	Attorney
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Holly Engrav	Interior Designer
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Michael Payne	Public Works Deputy Director

Consultant Team

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www.paleBLUEdot.llc

City of Plymouth
2026-2028
Water Efficiency Rebate Program

3400 Plymouth Boulevard, Plymouth, MN 55447
(763) 509-5527

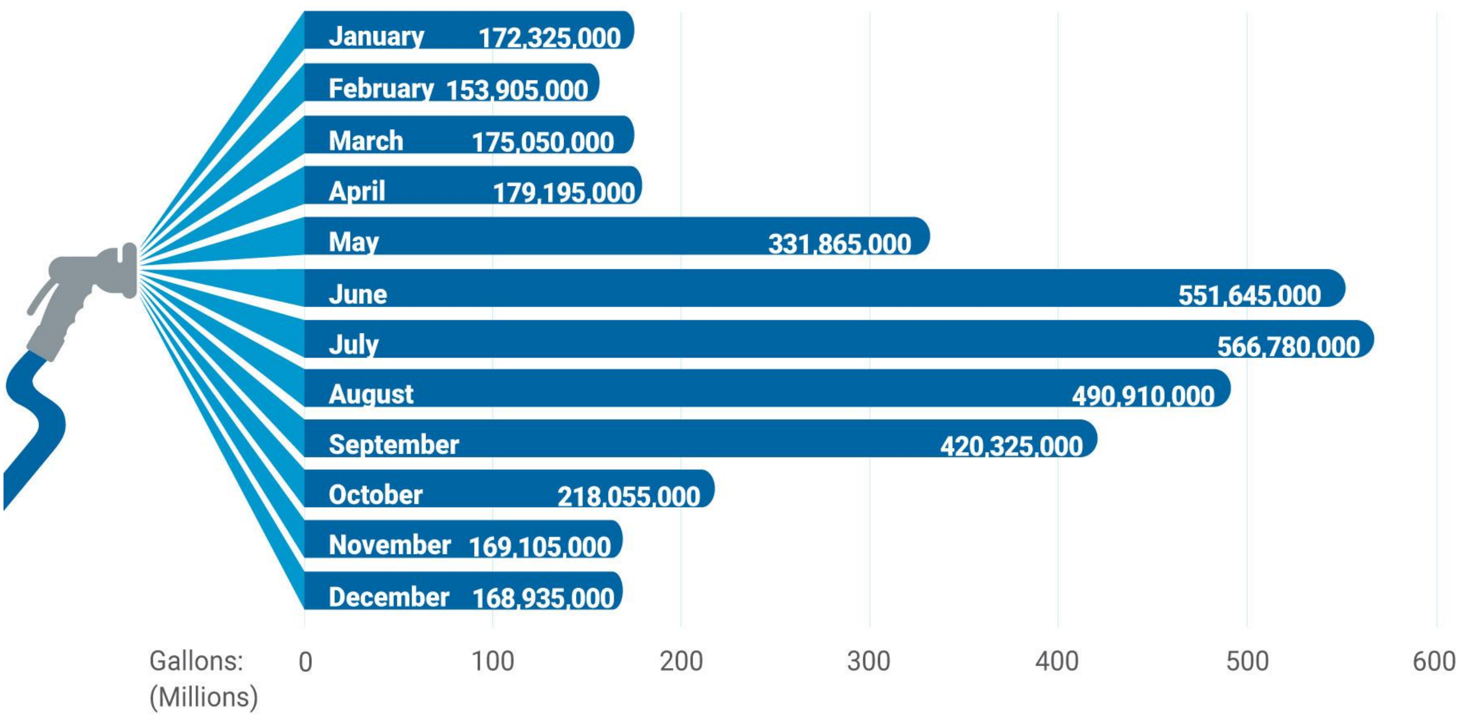
Rebates for projects that improve water efficiency and conserve water

The City of Plymouth supports water conservation practices that help to reduce the water demand from municipal water supply customers. To encourage water conservation, the City of Plymouth has received a grant from the Metropolitan Council to establish a rebate program to reduce municipal water use in both residential and commercial properties within the city.

Purpose of Program

The City of Plymouth is offering rebates to residents and commercial property owners to promote water conservation and use their drinking water more efficiently. Plymouth's water supply is abundant, but it is not limitless. Water usage can increase from about 153 million gallons per month in February to over 566 million gallons per month in July.

2023 Water Usage in Plymouth By Month



Saving water is simple and smart. Residential and commercial property owners in a position to upgrade to more water efficient appliances and equipment can receive a rebate to help offset the cost of upgrading.

The rebate program is set up to help reduce the amount of water being wasted in a home or business by inefficient appliances and equipment. Replacing old, inefficient toilets, washing machines and irrigation systems with WaterSense® and Energy Star® certified appliances and equipment can help improve water efficiency, conserve water and reduce utility bills. The City of Plymouth aims to reduce the amount of water used by 5,400,000 gallons per year with this rebate program.

Eligible Applicants

Plymouth property owners who are customers of the municipal water supply system that replace existing inefficient toilets, irrigation systems and washing machines with **WaterSense®** certified toilets, irrigation systems and **Energy Star®** washing machines & dishwashers. Rebate items must be installed within the City of Plymouth.

Eligible Activities

The following products purchased after **July 1, 2026** could qualify for rebates.

- Replacing existing **toilets** with high-efficiency, WaterSense® certified units.
  www.epa.gov/watersense/products/toilets.html

- Replacing existing **washing machines & dishwashers** with Energy Star® certified units.
  https://www.energystar.gov/products/clothes_washers
  www.energystar.gov/products/dishwashers

- Replacing existing **irrigation system controllers** and **sprinkler heads** with WaterSense® certified controllers and sprinkler heads (no audit required).
  www.epa.gov/watersense/products/controltech.html

- **Lawn irrigation system audits** conducted by certified professionals that result in WaterSense® certified equipment replacement.
  https://lookforwatersense.epa.gov/pros/

WaterSense® certified products can be found here:
www.epa.gov/watersense/product_search.html

EnergyStar® certified products can be found here:
www.energystar.gov/productfinder/product/

Award Amounts

The rebate is 75% of the cost of the item, up to a maximum of:

- $50 for WaterSense® **toilets**
- $100 for Energy Star® **washing machines & dishwashers**
- $200 for residential WaterSense® **irrigation controllers**, or $500 for commercial/multi-family controllers
- $15 per WaterSense® **sprinkler head replacement** up to $500 (minimum 10 sprinkler heads)
- $125 for **soil moisture sensors**
- $200 per **irrigation system audit** conducted by a WaterSense® Certified Irrigation Professional

This funding is available until June 30, 2028, or until funds are exhausted. Applications are first come, first served.

Deadline

Reimbursements will be issued on a first come, first served basis until June 30, 2028, or until funds are exhausted, whichever comes first. Payment will be made upon successful completion of work and submission of the Rebate Request Form accompanied by original receipts for expenses. Payment is for equipment cost only. Labor charges are not applicable for rebates.

Additional Information

- **EPA WaterSense® – Water Conservation:** www3.epa.gov/watersense/our_water/start_saving.html
- **Disposal - Hennepin County Drop-off:** http://www.hennepin.us/dropoffs

2026-2028 Water Efficiency Rebate Program Request Form

PLYMOUTH UTILITIES CUSTOMER INFORMATION

Applicant Name | E-mail Address

Cell Phone Number | Daytime Phone Number

Mailing Address | City | State | Zip Code

Installation Address (*if different from above)* | City | State | Zip Code

I am a: ☐ Residential Customer ☐ Commercial Customer

I am a: ☐ Owner / Occupant ☐ Owner / Non-Occupant

Number of people in household: ___________

CONTRACTOR / RETAILER INFORMATION

Contractor / Retailer Name | Contact Person | E-mail Address

Installer Name **(write SELF if customer installed)** | Installation Date

APPLIANCE & EQUIPMENT REBATE INFORMATION

Toilets — High Efficiency

Minimum Requirements: US EPA **WaterSense®** Label

Rebate: $50 per Toilet

Manufacturer's Name | Bowl Model # | Tank Model #

City staff will calculate estimated water savings

Gallons Per Flush (GPF) | # of Units Installed | Date of Installation | Estimated Annual Water Savings (Gal)

Why was this purchased? ☐ No previous unit ☐ Failed Unit ☐ Working Unit

Previous unit was: ☐ 1.6 GPF ☐ 3.5 GPF ☐ 5.0 GPF

Old Unit Manufacturer:

Old Unit Model #:

Old Unit Age:

Clothes Washing Machine & Dishwasher — High Efficiency

Minimum Requirements: Certified **Energy-Star®** Label

Rebate: $100 per Washing Machine and/or Dishwasher

Manufacturer's Name | Make # | Model #

City staff will calculate estimated water savings

# of Units Installed | Date of Installation | Estimated Annual Water Savings (Gal)

Old Unit Manufacturer: | **Old Unit Model #:** | **Old Unit Age:**

IRRIGATION EQUIPMENT REBATE INFORMATION

IRRIGATION CONTROLLER SYSTEM UPGRADE

Minimum Requirements: US EPA **WaterSense®** Label

REBATE IS 75% OF THE COST OF ITEM UP TO: $200 FOR RESIDENTIAL OR $500 FOR COMMERCIAL / MULTI-FAMILY

Manufacturer Name	Make #	Model #
		City staff will calculate estimated water savings
# of Units Installed	Date of Installation	Estimated Annual Water Savings (Gal) *(See link to calculator on information sheet)*

Old Manufacturer:	**Old Model #:**	**Old Days Watered per Week:**	**Old Minutes Watered per Day:**

IRRIGATION SPRAY SPRINKLER HEAD UPGRADE

Minimum Requirements: US EPA **WaterSense®** Label, minimum of 10 sprinkler heads replaced

REBATE IS 75% OF THE COST OF ITEMS UP TO A MAXIMUM OF: $15 PER SPRINKLER HEAD AND $500 TOTAL

Manufacturer Name	Make #	Model #
		City staff will calculate estimated water savings
# of Units Installed	Date of Installation	Estimated Annual Water Savings (Gal) *(Assume 30% reduction)*

Old Manufacturer:	**Old Model #:**	**Old Days Watered per Week:**	**Old Minutes Watered per Day:**

IRRIGATION SYSTEM SOIL MOISTURE SENSOR

REBATE IS 75% OF THE COST OF THE ITEM UP TO A MAXIMUM OF: $125 PER UNIT

Manufacturer Name	Make #	Model #
		City staff will calculate estimated water savings
# of Units Installed	Date of Installation	Estimated Annual Water Savings (Gal) *(Assume 30% reduction)*

APPLICANT AGREEMENT

My signature indicates that the information provided is true, I have read and understood the rebate program guidelines, and that I comply with the City of Plymouth rebate program requirements. Upon compliance, a rebate will be distributed if funding is available at the time of application. I will allow a representative of the City of Plymouth to verify the installation if requested.

Signature:______________________________

Date:______________________________

FOR OFFICIAL OFFICE USE ONLY

Date: __________________

Receipt Attached?: __________________

Total Allowable Rebate: __________________

Verified By: __________________

Comments: __________________

PLEASE NOTE: Receipts must be submitted with the application.

Send Application to:

City of Plymouth
Water Efficiency Grant Program
3400 Plymouth Blvd
Plymouth, MN 55447
Phone: 763-509-5500 Fax: 763-509-5510
e-mail: WERP@plymouthmn.gov

For more information, visit **www.plymouthmn.gov/waterconservation**

Regular Environmental Quality Committee
June 10, 2026
Agenda Number: 6.3

To:	Environmental Quality Committee
Prepared by:	MK Anderson, Environmental Stewardship Coordinator
Reviewed by:	Michael Payne, City Engineer/Deputy Public Works Director
Item:	**Plymouth Environmental Academy**

1. Action Requested:
Discuss the 2026 Plymouth Environmental Academy

2. Background:

The Environmental Quality Committee's 2026 Work Plan includes the continuation of the Plymouth Environmental Academy (PEA), scheduled to begin in the third quarter of 2026. During the first four meetings of 2026, Committee members held extensive discussions regarding the future of the Academy, including potential options for restructuring and rebranding of the Academy.

At the May 2026 meeting, the Committee reviewed the planned 2026 topics: Buildings and Energy (commercial/non-profits), Buildings and Energy (single-family homes), and Public Health. Committee members divided responsibilities, with one member serving as the lead for each topic and two additional members providing support for each topic. At the June 2026 meeting, the Committee will discuss possible rebranding options for the Academy, as well as finalize dates, times, and locations for the first two events in 2026.

3. Budget Impact:
N/A

4. Attachments:

Regular Environmental Quality Committee
June 10, 2026
Agenda Number: 8.1

To:	Environmental Quality Committee
Prepared by:	Ben Scharenbroich, Water Resources Supervisor
Reviewed by:	Chris McKenzie, Engineering Services Manager
Item:	**Future Meetings**

1. Action Requested:
Receive update on upcoming meetings related to the EQC.

2. Background:
Staff will review the upcoming meeting and volunteering opportunities for members of the EQC.

Regular Planning Commission Meeting – June 17, 2026 – 7:00pm – Plymouth City Hall (3400 Plymouth Boulevard)
Special City Council Meeting - June 23, 2026 - 5:00pm - Plymouth City Hall (3400 Plymouth Blvd)
Music in Plymouth – July 8, 2026 – 5:00pm – Hilde Performance Center (3500 Plymouth Boulevard)
Regular Environmental Quality Committee Meeting – August 12, 2026 – 7:00pm – Plymouth City Hall (3400 Plymouth Boulevard)
Plymouth Environmental Academy - Sessions 1 & 2 - July-September 2026

3. Budget Impact:
N/A

4. Attachments: