

**CITY OF PLYMOUTH
AGENDA
Regular Environmental Quality Committee
Council Chambers
3400 Plymouth Boulevard, Plymouth, MN
September 9, 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 06-10-2026

6. GENERAL BUSINESS

- 6.1** Final Climate Action and Resiliency Plan Overview
1. Climate Action and Resiliency Plan Modification Memo
2. Final Climate Action and Resiliency Plan

- 6.2** Plymouth Stewardship Academy

7. REPORTS AND STAFF RECOMMENDATIONS

8. FUTURE MEETINGS -

- 8.1** Future Meetings

9. ADJOURNMENT

Proposed Minutes Environmental Quality Committee Meeting June 10, 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 June 10, 2026.

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

COMMITTEE MEMBERS ABSENT: Committee member Blakely.

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

OTHERS PRESENT: Councilmember Gregor, Ted Redmund from paleBLUEdot.

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 Matthiesen and seconded by Committee member Polzin to approve the agenda as presented. Upon a roll call vote, with all members voting in favor, the motion carried.

Consent Agenda

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

(5.1) Adopt May 13, 2026, Regular Environmental Quality Committee Minutes

Upon a roll call vote with all members voting in favor, the motion carried.

General Business

(6.1) Draft Climate Action and Resiliency Plan Overview

Environmental Stewardship Coordinator Anderson provided an introduction, noting the length of time staff have been working on this draft.

Ted Redmund, paleBLUEdot, provided information on the purpose of the climate action plan and the process that was followed, and the data that was used to develop the draft document. He provided information on the structure of the plan, its components, and how it could be implemented over time. He reviewed the sector goals and potential impacts from those goals. He stated that the what you can do section includes a range of options that people can choose and related impacts. He reviewed the next steps, anticipating that the final draft plan is anticipated to come back before the commission on August 12th and the City Council on August 25th.

Chair Tinjum welcomed input from the public.

Jessie Vavreck, ward 2 resident, thanked everyone who assisted in drafting this plan, noting that this will provide a vital roadmap for the community. He appreciated the focus on native plants and habitat, but would like to see more specific information on plant-based food options and opportunities for organic recycling at city-sponsored events. He thanked the group for creating realistic and achievable goals and thinking about equity.

Lisa Anderson, ward 2 resident, commented that these are lofty and idealistic plans and goals. She spoke about walkability and asked members of the committee to spend a week without a vehicle, using walking and bicycling as their only options for transportation. She commented on her lived experience as someone who cannot drive a vehicle and the challenges she has experienced. She stated that perhaps they could better reflect and think about goals that would be achievable in this area and climate conditions.

Holly, ward 2 resident, stated that she cares deeply about the community and future and expressed support for the plan as she believes it reflects an investment in the long-term health, prosperity, and resiliency of the city. She liked that the plan includes and focuses on environmental stewardship, social well-being, and economic vitality. She commented that too often, sustainability is seen as an additional expense when it can actually lower costs. She stated that thoughtful planning today can avoid most costly solutions in the future.

Chair Tinjum noted the upcoming meetings of other city groups where the plan will be discussed, as well as the continued public comment period, which allows for additional opportunities for public comments to be made.

A member of the committee commented that this plan is focused on Plymouth and asked for more information on how global goals could be achieved.

Mr. Redmund stated that science-based goals provide a range to aim for and provided more information on the most recent guidance in 2019, which aims to cap global warming at two degrees Celsius. He stated that if everyone aimed in that direction, it would result in 1.5 to two degrees. He reiterated that

was from 2019, science is a continuous practice with more information gathered each year, and changing results.

A member of the committee noted the focus on individual action and asked for more information on larger groups such as businesses, which could have a larger impact.

Mr. Redmund stated that there is equal opportunity to share content and incentivize items for both households and businesses.

Committee member Matthiesen asked if there is a list of five actions that are most effective and should be focused on to have the largest impact.

Mr. Redmund stated that they do encourage looking at all potentials as the city is robust with many different activities and areas of focus. He commented that the two most critical issues are related to the reduction of reliance on fossil fuels. He also supported working opportunistically to address items as the opportunity arises.

Committee member Vavreck referenced the strategies under ecosystem, noting typographic issues, and believed that strategy four should include something to address road salt use.

Mr. Redmund confirmed that they did catch those draft errors and have corrected them.

Committee member Vavreck referenced local food and agriculture, which mentions beekeeping, and commented that beekeeping is harmful to biodiversity.

Mr. Redmund stated that was included as a local food strategy, as that is an opportunity for people to harvest their own food items. He recognized that competition with local bees is something to consider.

Committee member Vavreck referenced the “what you can do” section and provided suggestions related to plant-based food options.

Chair Tinjum stated that there is a lot of discussion about electricity demand growth in the electrical industry and asked if that was a factor that was considered in the plan.

Mr. Redmund stated that the plan does not address that, as it is a utility-scale consideration with guidance from the state and is outside of the scope of a municipality to engage. He acknowledged that it is an important consideration and recognized that local utilities have been working to address that issue. He stated that Minnesota has been in the leading share of states that have put policies into place to ensure that it continues to be part of the dialogue. He commented that it has been soundly proven that renewable energy sources can meet the needs of the population. He stated that they need to be mindful of how goals can be integrated rather than competing against each other.

Chair Tinjum thanked Mr. Redmund and the members of the public who attended tonight to provide their input.

(6.2) 2026-2028 Water Efficiency Rebate Program

Water Resources Supervisor Scharenbroich presented the proposed renewal for the 2026-2028 water efficiency rebate program. He stated that the city first implemented the program in 2016 and has participated each year since then. He provided an overview of the current city program, the results of the program participation, and the water conservation efforts achieved. He reviewed the grant fund award received by the city and provided an overview of the program, noting that there are no changes proposed from the previous year.

A committee member asked if there is a sweet spot for water usage for the city.

Water Resources Supervisor Scharenbroich estimated that around 20,000,000 gallons per day would be ideal.

City Engineer/Deputy Public Works Director Payne stated that if the production rate were to change, there are baseline costs that need to be met. He stated that if there were a significant change, they would adjust rates to cover those costs.

A member of the committee asked for information on which program requests are the highest.

Water Resources Supervisor Scharenbroich stated that it is a pretty even split between toilets, washing machines, dishwashers, and irrigation controllers, although the irrigation controllers probably have the biggest benefit for residents, as most are overwatering.

Committee member Babcock asked about the subscription rate and whether the city is fully using the awarded grants each cycle.

Water Resources Supervisor Scharenbroich reported that the city is currently at 105 percent utilization. He explained that funds were fully expended in February, and the city made the decision to continue to offer the program, using its water utility funds to provide consistency, and it was believed that the program would continue to be offered through the metropolitan council. He stated that the city has exceeded its funding request each cycle.

Committee member Babcock asked if there are plans to update the graphic for this cycle.

Water Resources Supervisor Scharenbroich confirmed that the graphic will be updated for 2026.

A member of the committee asked if additional items could be eligible for reimbursement through the program.

Water Resources Supervisor Scharenbroich stated that the city does allow reimbursement for all items allowed by the grant program, and if additional items were desired to be added, staff would need to speak with the metropolitan council to determine eligibility. He stated that there is a component of the grant program that allows improvements to city facilities. He explained that there have been allocations to convert irrigated portions of city property to native landscaping, and staff are working to identify locations where that could work and these grant funds could be used for that purpose.

A member of the committee asked if thought had been given to stormwater reuse.

Water Resources Supervisor Scharenbroich stated that it is not part of this program, but noted that there are communities in the city that participate in that concept.

Motion was made by Committee member Polzin and seconded by Committee member Mattheisen to recommend approval of the water efficiency rebate program as presented, with an update to the graphic. Upon a roll call vote, with all members voting in favor, the motion carried.

(6.3) Plymouth Environmental Academy

Environmental Stewardship Coordinator Anderson asked if there were any new name ideas for the academy or individual sessions.

A member of the committee provided some suggestions for consideration.

Environmental Stewardship Coordinator Anderson reviewed proposed details for the sessions, and members of the committee provided an update on the work they had done to plan for those sessions. There was additional discussion about the planning for the sessions and how to best reach the desired target market.

Environmental Stewardship Coordinator Anderson stated that she would send out a list of potential names for the group to vote on.

Reports and Staff Recommendations

There were no reports and staff recommendations.

Future Meetings

Noted.

Adjournment

Chair Tinjum adjourned the meeting at 8:21 p.m.

To: Environmental Quality Committee

Prepared by: MK Anderson, Environmental Stewardship Coordinator

Reviewed by: Michael Thompson, Public Works Director

Item: **Final Climate Action and Resiliency Plan Overview**

1. Action Requested:

Receive a presentation on the Final 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 plan to guide community-wide climate action and resiliency efforts over the next 10 years.

The plan establishes a framework for addressing climate impacts through two complementary approaches: mitigation and adaptation. Mitigation focuses on reducing greenhouse gas (GHG) emissions, while adaptation focuses on preparing for, responding to, and recovering from climate-related impacts and changing environmental conditions.

The Climate Action and Resiliency Plan identifies strategies to reduce emissions, improve community resiliency, expand community engagement and education, and support a healthy, sustainable, and prepared community. The plan is intended to provide a framework for future environmental stewardship and climate resiliency initiatives throughout Plymouth.

A summary of changes made to the draft plan since the June 2026 EQC meeting is included in the meeting packet.

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 budgetary impact.

4. Attachments:

1. Climate Action and Resiliency Plan Modification Memo
2. Final Climate Action and Resiliency Plan



To: City of Plymouth Planning Commission

From: MK Anderson, Environmental Stewardship Coordinator

Memorandum

Date: September 9, 2026

Item: Summary of Changes Between Draft and Final Versions of the City of Plymouth Climate Action and Resiliency Plan

This memo summarizes key revisions made between the draft and final versions of the City of Plymouth's Climate Action and Resiliency Plan. Edits focused on improving clarity, accuracy, and transparency while ensuring all content reflects Plymouth-specific conditions. Strategic direction and overall goals remain unchanged and the updates improve usability for the public.

General Planwide Updates

- The plan now uses consistent wording, titles, terminology, abbreviations, and formatting.
- References to other cities were removed and replaced with Plymouth-specific information.
- Old or unreliable sources were replaced with newer, credible, and local sources.
- All data, calculations, and citations were checked, corrected, and updated.
- New keys were added to show co-benefits and cost/impact ranges for actions residents can take.
- Unnecessary references and content were removed.
- Terms and abbreviations are now clearly defined.

These improvements ensure the plan is easier to understand and more transparent for residents and decision-makers.

Changes by Section

Introduction

- Updated list of peer cities to match Plymouth's typical comparison group.

Transportation

- Consolidated duplicative actions.

Buildings & Energy

- Updated emissions numbers and future projections.

Waste Management

- Corrected numbers related to organics recycling and waste composition.

Water

- Updated the number and percentage of properties at risk of flooding.

Local Food & Agriculture

- Added actions to reduce commercial food waste.
- Added actions encouraging plant-forward diets and plant-based food options at City events.

Greenspace & Ecosystems

- Removed repeated actions and corrected labeling.
- Updated actions under GE 4.
- Added an action to explore switching from gas-powered to electric lawn equipment.

Thriving Community

- Updated action to look at more ways neighborhoods can build resiliency outside of Night to Unite.

Implementation

- Removed the Policy Alignment Memo because it did not add value.

What You Can Do

- Added a suggestion to switch outdoor equipment to electric.
- Removed a printable “Make a Plan” page to reduce printing.

Appendix A – References

- All references now come from recent, trustworthy, conflict-free sources (2015 or later).
- Numbering corrected, outdated international agreement references removed, and older studies replaced with updated versions.

Appendix B – Costs & Savings

- Updated all numbers and calculations.
- Added the method used to calculate the Social Cost of Carbon.

Glossary

- Added needed terms and abbreviations and removed unused ones.

Acknowledgements

- Updated descriptions of the Steering Committee and staff roles.



Climate Action and Resiliency Plan

September 2026



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Climate Action

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

Climate Resiliency

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

Click to Navigate:

Click on any section in the TOC above to navigate to that section.

Click on the return icon  on any page to return to this page.



City of
Plymouth

Climate Action and Resiliency Plan

At-A-Glance

Purpose

The Climate Action and Resiliency Plan seeks to:



**Build
Community
Resilience**



**Encourage
Pollution
Reductions**



**Support
Informed
Decisions**

Process

The plan was developed in 5 steps:



Context:
5 baseline
research
documents

Community:
9 community
input meetings



Collaboration:
City Staff Team +
Community
Steering
Committee

Calibration:
Detailed City
staff plan
refinement



Completion:
Based on public
and staff 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:

Focusing on GHG
reductions and building
climate resiliency
across
7 Sectors

Through
23 Strategies
that are

Supported by
96 Actions
that can be taken

Over a
10-Year
time frame



**Transportation
and Land Use**

5 Strategies
22 Actions

[Click here
for section](#)



**Buildings and
Energy**

5 Strategies
20 Actions

[Click here
for section](#)



**Waste
Management**

2 Strategies
8 Actions

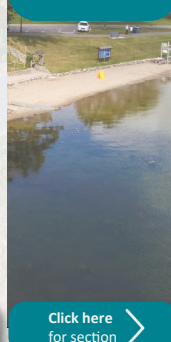


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for section](#)



Water

2 Strategies
9 Actions



[Click here
for section](#)



**Local Food &
Agriculture**

2 Strategies
10 Actions



[Click here
for section](#)



**Greenspace &
Ecosystems**

4 Strategies
17 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 Emissions
Avoided
Through 2035



\$287 Million
Cumulative Cost Savings
Possible Through 2035



Introduction

CURRENTLY IN PLYMOUTH

333,733

MTCO₂e of Plymouth's
GHG emissions in 2024
were from vehicle use.

400,196

MTCO₂e of Plymouth's
GHG emissions in 2024
were from building
energy use.

30,556

MTCO₂e of Plymouth's
GHG emissions in 2024
were from solid waste.

30,462

MTCO₂e of Plymouth's
GHG emissions in 2024
were from water and
wastewater.



Introduction

Why Plymouth's Greenhouse Gas Emissions Matter

Greenhouse gases trap heat in the atmosphere, resulting in 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 community-wide 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 community-wide GHG emissions totaled 794,947 metric tons of carbon dioxide equivalent (MTCO₂e). Greenhouse gas emissions are frequently measured in metric tons of carbon dioxide equivalent. This measurement converts one metric ton of another greenhouse gas to the equivalent number of metric tons of carbon dioxide (CO₂) emissions that would be needed to have the same global warming potential (GWP) as the metric ton of the initial gas.² Not all gasses trap heat in the same way, global warming potential is a measure of how much heat a specific greenhouse gas traps in the atmosphere over a specific period of time- typically 100 years, occasionally 20 years for short-lived gases- relative to CO₂. Converting each type of greenhouse gas emissions to the equivalent amount of CO₂ emissions allows us to distill information into a single, easy to compare number.²

Community-wide emissions from electricity use, natural gas use, and use of transportation fuels have declined slightly over the last eight years, emissions from solid waste and wastewater increased over the same time period.¹⁰ These trends show that progress is possible, but continued action is needed across multiple sectors.

What is a Climate Action and Resiliency 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, undertaking mitigation activities is climate action. Adaptation strengthens the community's ability to prepare for, withstand, respond to, and recover from climate-related impacts. Adaptation strengthens community resiliency. A Climate Action and Resiliency Plan is a long-term road map detailing steps that a municipality, business, or government can take to decrease greenhouse gas emissions and prepare for climate change, while also fostering sustainable and resilient growth.

Why Create a Climate Action and Resiliency Plan?

The Plymouth Climate Action and Resiliency Plan 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. The Minnesota Pollution Control Agency (MPCA) notes that resilience investments can provide \$8–\$10 in benefits for every dollar spent.^{11,12} Having an established Climate Action and Resiliency Plan 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 Climate Action and Resiliency Plan can spur investment in innovation, create jobs, and support measures that save money for households and businesses while improving 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 resiliency 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 for the Plymouth community.

Common Co-Benefits of Climate and Resiliency 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 and greenspace, as well as healthier ecosystems.



Quality of Life^{25,32,33}

Better health, comfort, and community well-being.

Process

The Plymouth Climate Action and Resiliency Plan was developed through an inclusive, community-centered process guided by a Community Steering Committee and City Staff Team. Community engagement was central to the effort. Community-wide surveys, public meetings, and Community Steering Committee discussions gave residents multiple opportunities to share their experiences, priorities, and ideas. This input, along with technical analyses 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 12-member Community Steering Committee and the 14-member City Staff Team participated in a total of six facilitated workshops to identify challenges, explore opportunities, and develop strategies for each plan sector of focus. 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 community-wide assessments on climate vulnerability, ground cover and tree canopy, greenhouse gas emissions, and renewable energy potential. These assessments provided data on local climate risks, emissions trends, and other metrics. The Climate Action Baseline Assessment compiled these findings, highlighted major community metrics, and outlined suggested initial sector goals.

Click the icons below to view these documents.



Climate Action
Baseline Assessment



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 the energy emitted by 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 GHGs Matter?

Greenhouse gases occur naturally and help keep the Earth warm, but human activities are adding them faster than natural systems can remove them.^{34,35} Burning fossil fuels moves carbon that had been 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 are estimated from the decomposition of food and yard waste in landfills.



Wastewater

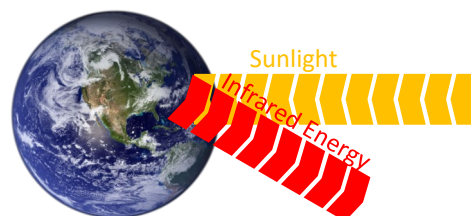
Emissions from energy use are calculated for the collection and treatment of wastewater.

What can we do to reduce GHGs?

Greenhouse gases can be reduced by making changes within the key sectors of focus 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 gases and greenhouse gases.¹

Non-Greenhouse Gases do not react to visible light or 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.

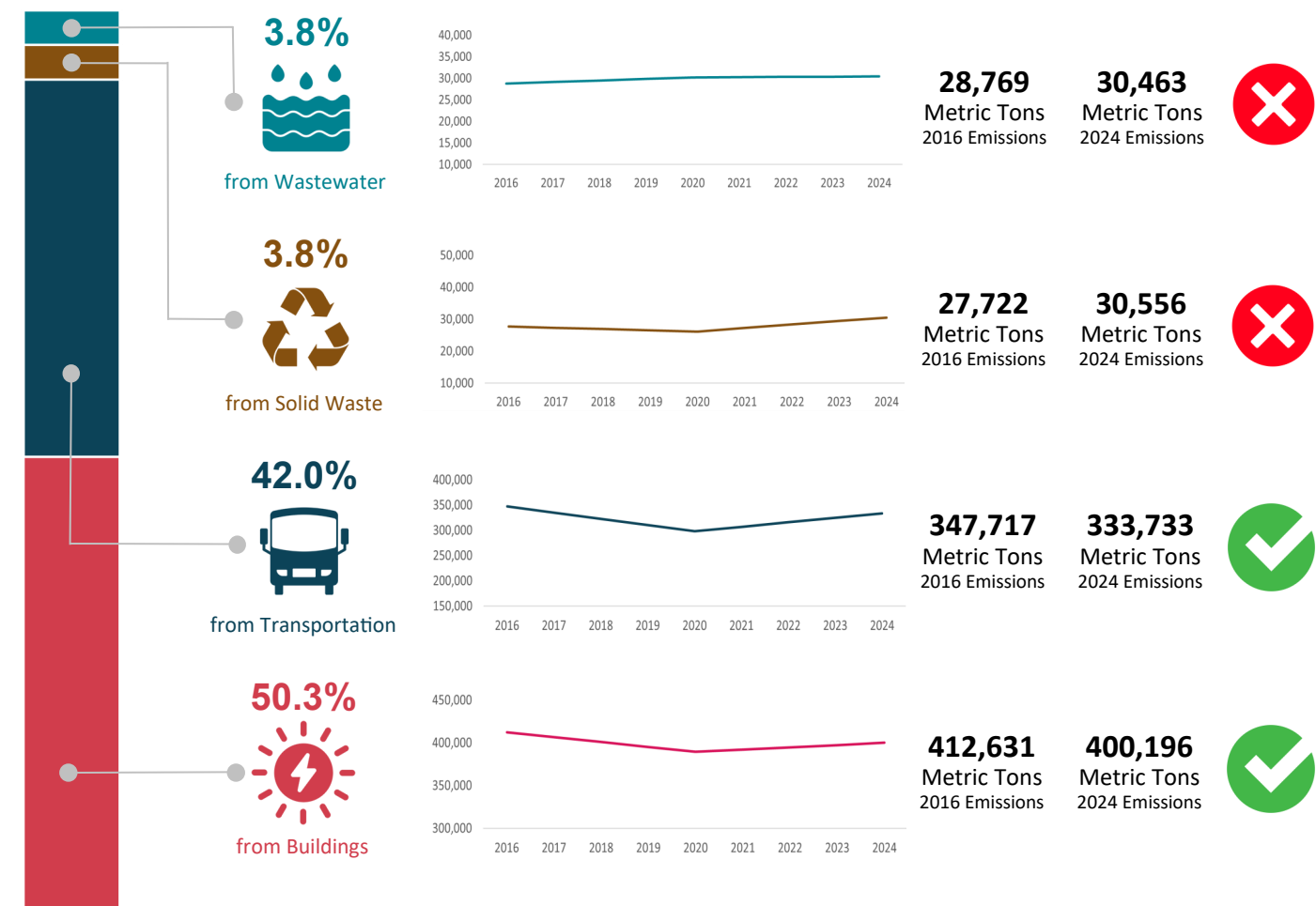
Plymouth's GHG Emissions

Measuring and tracking GHG emissions is vital for any climate mitigation planning or implementation effort. Total community-wide emissions for Plymouth decreased from 816,838 MTCO₂e in 2016 to 794,947 in 2024.¹⁰ This represents a 2.7% decrease in GHG emissions. The city's population increased 5.9% during the same time frame. These metrics show that localized population growth, does not necessarily mean a rise in local GHG emissions. Between 2016 and 2024, transportation emissions decreased by 4%, and building emissions decreased by 3%. Additionally, solid waste emissions increased by 10% and wastewater emissions increased by 5.9%. Although many sectors have seen emissions reductions when compared to 2016, all but one sector have seen increased emissions since 2020. The pace of community-wide emissions reductions since 2016 does not yet align with the science-based recommendations to avoid the most harmful climate change impacts in the future.

Plymouth's Community-Wide GHG Emission Trends¹⁰

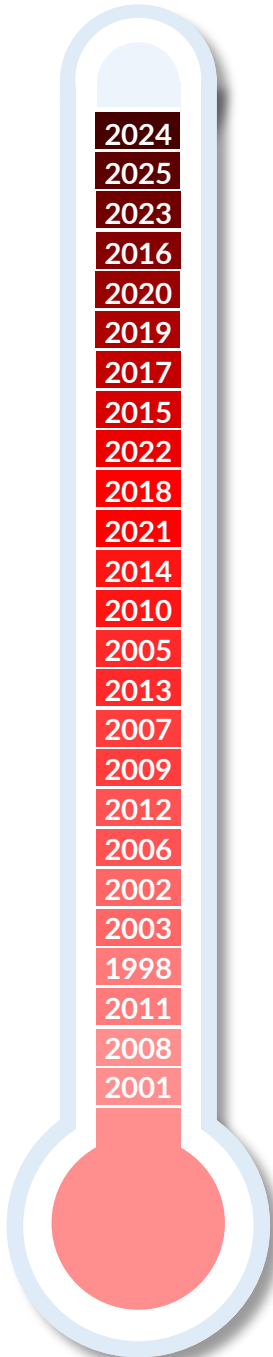
Community-Wide 2024 Total: **794,947** Metric Tons

Baseline Current Declining



Climate Change

The 25 Hottest Global Years on Record³⁹



Climate change is a global phenomenon with significant local consequences. Scientific consensus confirms that increasing greenhouse gas emissions are disrupting Earth's climate system. 24 of the warmest 25 years on record have occurred since the year 2000. In Minnesota, much of the state has warmed by 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.^{40,41,42,43} One of the most notable shifts has been 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 Plymouth⁴⁵

Over their lifetime, a child in Plymouth can expect:^{40,41,42,43}



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 a Maximum Temperature > 95° F	2	21 (950% increase from recent averages)	24 to 49.5 (up to 2375% increase from recent averages)
Number of Days Per Year with a Minimum Temperature < 32° F	160	134 (16% decrease from recent averages)	133.1 to 109.4 (up to 32% decrease from recent averages)
Increase in the Length of Growing, Allergy, and Tick and Mosquito Seasons ^{46,47}	9 days	25 days (178% increase from recent averages)	25 to 40 days (up to 344% increase from recent averages)
Change in Annual Precipitation ⁴⁸	26"	32" (23% increase from recent averages)	27 to 35" (up to 35% increase from recent averages)
Increase in Heavy Precipitation (Days Per Year with > 1" Rainfall)	3.2	4.2 (31% increase from recent averages)	4.2 to 5.2 (up to 63% increase from recent averages)
Increase in Air Conditioning Demand (Cooling Degree Days)	600	1400 (133% increase from recent averages)	1400 to 2100 (up to 250% increase from recent averages)
Increase In Air Conditioning Related Electricity Use ⁴⁹	N/A	39% (from recent averages)	39 to 59% (from recent averages)

Plymouth's Climate Risks

The anticipated climate changes in Plymouth 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.^{52,53} Heat stress is more likely for those with diabetes or heart disease, as well as people affected by socioeconomic factors, age (children under 5 and adults over 65), 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 and climate change impacts are likely to destabilize cropping systems, interrupt transportation networks, and trigger food shortages and spikes in food costs.



Infrastructure and 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 found 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 Agency⁵²



GHG Reductions Goals

This plan aligns with science-based GHG reduction targets to limit global warming to 2°C above pre-industrial levels.^{53,54} Reducing GHG emissions by 40% by 2035 and by 80% by 2050 represents substantial progress toward the deep emissions cuts required and provides a strong foundation for advancing towards current science-based targets.^{55,56} The plan sets both interim and long-term goals. These community-wide goals are reflected in strategies for individual sectors.

The plan seeks to achieve the community's overall 2035 emissions reductions target through balanced, meaningful progress across all sectors of focus. This means pursuing reductions that are both achievable and better than a business as usual (BAU) scenario, rather than only focusing on the largest emissions sources.

City of Plymouth's interim GHG goal:

“To reduce community-wide GHG emissions by 40% below 2016 levels by 2035.”

City of Plymouth's long-term GHG goal:

“To reduce community-wide GHG emissions by 80% below 2016 levels by 2050.”

Survey of Peer Communities' Emissions Reductions Goals⁵⁷

Bloomington	75% reduction in city-wide energy-related greenhouse gas (GHG) emissions by 2035, relative to 2016 levels.
Burnsville	Reduce community-wide GHG emissions 40% below 2005 levels by 2030 and 80% below 2005 levels by 2050.
Coon Rapids	Reduce citywide greenhouse gas (GHG) emissions by 35% by the year 2030.
Eagan	Reduce community-wide GHG emissions 55% below 2014 levels by 2035, and achieve net-zero emissions by 2050.
Eden Prairie	Achieve community-wide carbon neutrality (zero carbon emissions) by 2050.
Edina	Reduce community-wide GHG emissions 45% below 2019 levels by 2030, and achieve net-zero 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.
St Louis Park	100% renewable electricity citywide by 2030, achieve carbon neutrality by 2040.
Woodbury	To reduce community-wide GHG emissions 42% below 2022 levels by 2035.

Please note, baseline year and plan scopes vary by city.

The Plan

A Climate Action and Resiliency 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 Resiliency Plan:

Focuses on GHG reductions and climate resiliency across 7 Sectors	Through 23 Strategies that are designed to achieve goals	Supported by a menu of 96 Actions that can be taken	Over a 10-Year implementation time frame
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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 designed to enable Plymouth to reach our 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 each strategy's climate and emissions benefits.

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



Reduced Costs



Reduced Pollution



Energy Resilience



Community Resilience



Safer Streets



Improved Mobility



Enhanced Ecosystems



Quality of Life



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 focus for GHG reductions and improving Plymouth's climate resilience community-wide. See below for a brief description of each of the plan's sectors. Click the arrows below each icon 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 reduced on-site fossil fuel 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, a durable local economy, and effective communication.

GHG Reductions

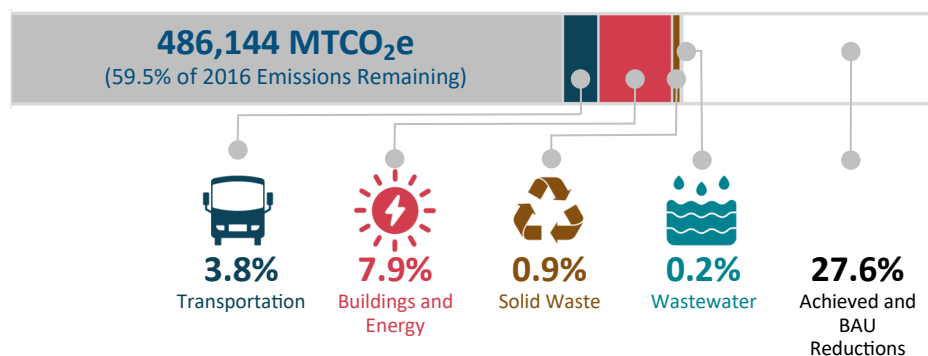
The project team modeled greenhouse gas (GHG) reduction strategies using research, best practices, and stakeholder input. These strategies were analyzed by comparing planned GHG reduction targets with a Business-as-Usual (BAU) forecast. Sector-level results are then combined to estimate community-wide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

GHG Emissions Reductions by Sector

	2016 Emissions	2024 Emissions	Projected 2035 Emissions	Projected Emissions Reductions from 2016
Transportation	347,717	333,733	205,539	40.9%
Buildings and Energy	412,631	400,196	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	794,947	486,144	40.5%

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

Sector Share of Total GHG Reductions by 2035



Goal:

40.5%

Reduction in annual GHG emissions below 2016 levels by 2035

Achieving the plan's 2035 goals will reduce community-wide GHG emissions to 486,144 metric tons by 2035.

This represents a 40.5% decrease from 2016 levels.

Over 10 years, achieving the plans goals would avoid

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

Potential Plan Benefits

Potential Consumption Savings by Sector

Below is an illustration of modeled reductions in energy use, fuel use, and tons of municipal solid waste (MSW) handled that are associated with selected plan strategies. See Appendix B for specific modeling methodology.

	2035 BAU Projections	2035 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 Potential Cumulative Community-Wide Savings

This shows the estimated cumulative community-wide 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. Estimated localized social cost of carbon was calculated specifically for Plymouth.^{54,55,58} Please note, the calculations below have been rounded. See Appendix C for specific 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: \$26,000,000

Social Cost of Avoided Carbon:

Estimated Localized Social Cost of Carbon:	\$40,500,000 \$70 per MT
--	-----------------------------

Cumulative Community Savings Potential: \$287,100,000



Transportation and Land Use

CURRENTLY IN PLYMOUTH

42%

of community-wide GHG emissions in 2024 were from the transportation sector

704,001,000

Vehicle Miles Traveled (VMT) in 2024

65.4%

of commuters drove alone in 2024

1.1%

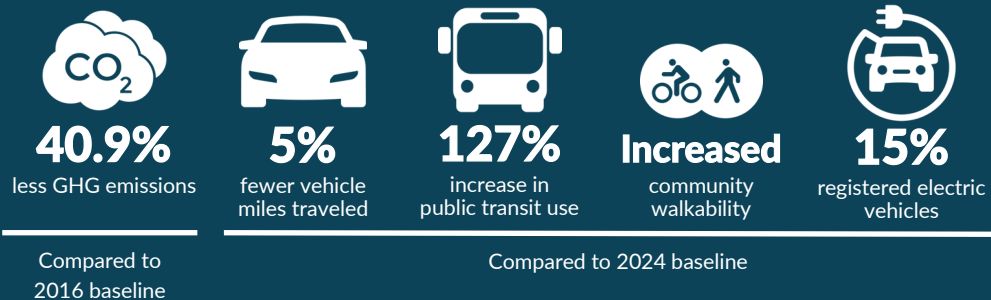
of commuters use public transit

1,709

Battery Electric Vehicles (BEVs) registered in Plymouth as of January 2025



Sector Goals:



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 consume fossil fuels. Because many of these engines are less efficient and subject to weaker emissions standards than on-road vehicles, they can produce more greenhouse gases and air pollutants per gallon of fuel used.¹

Worldwide, the transportation sector is the second largest source of global greenhouse gas emissions and is responsible for 15% of total global emissions.² In Plymouth, the transportation and land use sector is also a major contributor to community-wide greenhouse gas emissions, representing 42% of community-wide emissions.³ Without additional action, vehicle miles traveled (VMT) are likely to increase over time.⁴ However, transportation emissions can decline if more vehicles and equipment transition from using fossil fuels to using electricity for fuel.⁵ Transportation emissions can decline even further if Minnesota's electric grid continues to add renewable energy.

Plymouth can make its transportation system more sustainable while also improving quality of life, public health, and equity community-wide. Strategies that reduce single-occupancy vehicle trips, expand shared transportation options, and support walking, biking, e-bikes, scooters, and public 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.



STRATEGY

TL 1

Decrease community-wide Vehicle Miles Traveled (VMT) 5% below 2024 levels by 2035, and 10% below 2024 levels by 2050.

Strategy Co-Benefits



Metrics

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

Potential

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

Decreasing total community-wide vehicle miles traveled by 5% below 2024 levels will decrease vehicle miles traveled by more than 35 million miles, saving over \$27 million community-wide annually by 2035 while reducing GHG emissions by nearly 11,000 metric tons annually. Increasing the availability and safety of biking and walking routes to schools, retail hubs, and recreation centers can support reduced vehicle use for these types of daily trips.⁷

Actions

- | | |
|--------|---|
| TL 1-1 | Incorporate a Complete Streets approach in the Capital Improvement Plan (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 Routes 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

Of the nearly 42,000 Plymouth residents who are employed, 36,000 commute out of the city for their jobs.⁹ The average commute for residents of Plymouth is 22.6 minutes or approximately 15 to 17 miles.⁸ The American Automobile Association (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 annually, saving Plymouth commuters an estimated \$1.5 million and eliminating 1,348 metric tons of greenhouse gas emissions annually.

Strategy Co-Benefits



Metrics

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

Actions

- | | |
|--------|--|
| TL 2-1 | Evaluate current 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 use of Metrolink's services. |
| TL 2-3 | Collaborate to promote Metrolink's "Click-and-Ride" service 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.

Strategy Co-Benefits



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.

Potential

Creating thriving, walkable places helps residents live closer to their daily needs. As Plymouth grows, focusing increased density along transit corridors, increasing the adoption of accessory dwelling units, and redeveloping underutilized land can reduce vehicle trips while expanding housing and mobility options. Additionally, 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 actions support lower transportation emissions, reduced energy consumption, and a more connected, livable Plymouth.^{11,12}

Actions

- | | |
|--------|--|
| TL 3-1 | Promote 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 underutilized surface parking and impervious surfaces throughout the city. |
| TL 3-4 | Identify vacant or underutilized land through the City's Comprehensive Plan update planning process to evaluate its potential use for other purposes that could support higher density and/or increase walkability, transit access, or greenspace. |

STRATEGY

TL 4

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

Strategy Co-Benefits



Metrics

Registered EVs community-wide (MNDOT)

Potential

Transitioning Plymouth's roughly 60,000 vehicles to low- and zero-emission options will promote long-term pollution reductions. Using electric vehicles (EVs) as opposed to vehicles with an internal combustion engine (ICE) can cut vehicle lifecycle emissions by 55% or greater, with battery production impacts typically being offset within two years of vehicle use.^{13,14} Battery recycling continues to advance, with some methods recovering more than 95% of certain critical metals and producing recycled materials used in key battery components that can outperform commercially manufactured equivalents.^{15,16} 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 the increased vehicle purchase price and increased electricity use.^{3,17,18}

Actions

- | | |
|--------|--|
| TL 4-1 | Create a community-wide EV Roadmap that assesses charging infrastructure, forecasts demand, identifies 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 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 | Promote community education materials on zero-emission vehicles. |
| TL 4-5 | Promote opportunities for fleet operators to advance the use of zero-emission vehicles and supporting infrastructure. |

STRATEGY

TL 5

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

Strategy Co-Benefits



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

Potential

Local governments can demonstrate the benefits of cleaner and lower-cost transportation. In 2024, gasoline accounted for almost 55% of Plymouth's municipal fleet's fuel use, totaling 192,503 gallons.³ Converting 20% of the City's gasoline fleet to EVs could reduce municipal emissions by over 300 metric tons of carbon dioxide equivalent (MTCO₂e) annually while reducing long-term operational costs.^{3,17,18} For vehicles that are not yet suitable for EV replacement, the City can reduce fuel use through fuel-efficient driving and a focus on fuel-efficient vehicle replacements. Adjustments in driving style alone can reduce fuel use by at least 10%, while hybrids can cut fuel use by 20%-25% and plug-in hybrids by up to 60%.^{18,19,20}

Actions

- | | |
|--------|--|
| TL 5-1 | Evaluate the feasibility of purchasing electric and zero-emission fleet alternatives through the CIP process. Include lifecycle costs and an environmental footprint assessment. |
| TL 5-2 | Include EV charging infrastructure in the CIP development process at municipal sites to support public and City fleet vehicles. |
| TL 5-3 | Develop or adopt a Fuel-Efficient 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. |



Buildings and Energy

CURRENTLY IN PLYMOUTH

50.3%

of community-wide GHG emissions in 2024 were from the buildings and energy sector

754,460,000

kWh of electricity were used community-wide in 2024

39,349,000

therms of natural gas were used community-wide in 2024

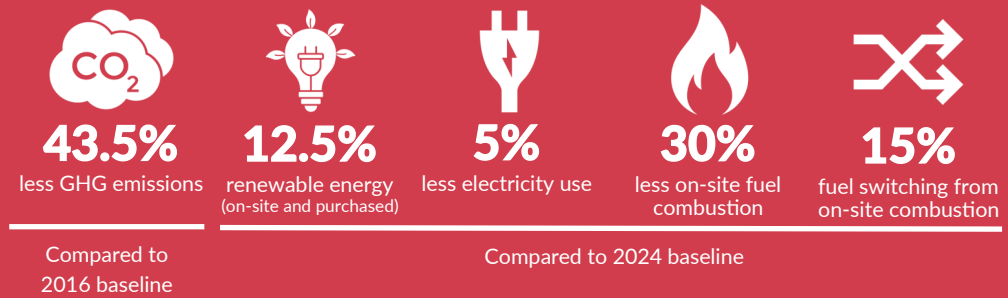
32.7%

of owner-occupied homes were built before 1980²

30.3%

of renter-occupied homes were built before 1980²

Sector Goals:



Buildings and Energy

Enhancing building resilience and reducing costs and pollution through improved efficiency, renewable energy, and reduced 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 off site combustion of fossil fuels.

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

Residential Energy

According to 2024 community-wide 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. Which is equal to 706 therms per household. GHG emissions from residential energy use total to 194,634 MTCO₂e annually, approximately 48.6% of the community-wide buildings and energy sector emissions.¹

Non-Residential Energy

Plymouth's commercial and industrial sectors consumed nearly 489.5 million kWh, equal to 9,112 kWh per employee. These sectors also consumed over 16.4 million therms of natural gas annually, or approximately 308 therms per job. GHG emissions from commercial and industrial energy use totals to 205,561 MTCO₂e annually, representing approximately 51.3% of the community-wide buildings and 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.



STRATEGY

BE 1

Improve total community-wide building energy efficiency by 5% below 2024 levels for electricity and by 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 compared to homes built before 1950.² Retrofitting older homes with energy efficient appliances, insulation, and windows can provide significant opportunities to reduce energy consumption community-wide. 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, CenterPoint Energy and the Center for Energy and the Environment to promote household participation in the Home Energy Squad program. Maintain funding to provide discounted participation for all Plymouth households and free participation for low-income households. Goal: 200 households annually. |
| BE 1-2 | Partner with Wright-Hennepin Electric Coop to evaluate the creation and promotion of a residential energy efficiency program that offers home energy audits, installs energy-saving products, and provides customized plans to lower utility bills. Establish funding to provide discounted participation for all Plymouth households and free participation for low-income households. Goal: 35 households annually. |
| BE 1-3 | Partner with Xcel Energy, Wright-Hennepin Electric Cooperative, CenterPoint Energy and the Minnesota Chamber of Commerce to promote commercial and industrial energy efficiency audits and upgrade programs based on the Energy Smart program or that expand the Energy Smart program, with performance targets aligned with this plan. Goal: 3 commercial and non-profit properties annually, each achieving reductions in energy use greater than 10%. |
| BE 1-4 | Establish a "Plymouth Energy Challenge" competition to motivate participation in energy efficiency programs. Establish annual participation targets for households and businesses and award incentives for top efficiency achievements. |
| BE 1-5 | Promote education and outreach strategies to help residents and businesses increase energy efficiency. |

STRATEGY

BE 2

Achieve 15% "fuel switching" from using on-site fossil fuel combustion to using electricity or renewable fuels for heating, cooking, clothes drying community-wide by 2035.

Strategy Co-Benefits



Metrics

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

Potential

In 2024, about 84% of Plymouth homes were heated with natural gas, 14.2% with electricity, and 1.8% with fuel oil, wood, or solar.³ Achieving strategy BE 2, would result in about 29.2% of Plymouth households using electric heating. Switching from fossil fuel heating to electric heat pumps can improve indoor air quality by reducing on-site combustion and related 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 towards carbon neutrality, transitioning buildings away from fossil fuel heating will be essential to achieving community-wide emissions reductions goals.¹

Actions

- | | |
|--------|---|
| BE 2-1 | Work with Xcel Energy, Wright-Hennepin Electric Co-op, Hennepin County, and other partners to promote existing financial incentives and expand them with a tiered, income-based structure designed to advance 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 community-wide building electricity use by 2035.

Strategy Co-Benefits



Metrics

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

Potential

GHG emissions associated with grid-provided electricity use are expected to continue declining over time.⁶ Increasing consumer-driven renewable energy purchases can still provide cost savings, increase 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 The electricity generated from on-site solar arrays in Plymouth, in 2024, represents 1% of all community-wide electricity use. For residents and businesses that are unable to install on-site solar, the purchase of renewable energy through their electric utility provides those property owners with an opportunity to achieve net-zero electricity use while supporting an important mechanism for cleaning the state's electric grid.^{10,11,12} In 2024, purchased renewable electricity represented 2.5% of community-wide electricity use. Achieving strategy BE 3 could look like an increase to 5% of community-wide electricity use coming from on-site generation from solar arrays, and 7.5% of community-wide electricity use coming from purchased renewable electricity.

Actions

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

STRATEGY

BE 4

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

Strategy Co-Benefits



Metrics

Reported household share with high energy burden (US DOE)

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— difficulty affording adequate household energy- will face greater climate vulnerability than households that are not experiencing energy poverty.^{14,15,16} Energy efficiency and renewable energy can lower energy bills, improve indoor air quality, and strengthen climate resilience. Programs should be designed to ensure vulnerable households can access these benefits.¹⁷ With 10% of Plymouth residents considered low-income, and 3-4% of Plymouth households that high energy burdens, expanding access to these solutions can reduce energy poverty and improve resilience.^{3,18,19}

Note: Plymouth statistics under review and subject to change

Actions

- | | |
|--------|--|
| BE 4-1 | Partner with utilities and community-based organizations (CBOs) who serve low-income residents to promote programs for low-income residents to reduce their energy burden. |
| BE 4-2 | Partner with groups 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 energy efficiency products. |
| BE 4-3 | Assess the feasibility of installing community solar on City rooftops or land, with prioritized participation by, or discounted rates for low-income community members. |

STRATEGY

BE 5

Improve municipal building energy performance by:

1. Reducing electricity use by 5% from 2024 levels
2. Reducing natural gas use by 10% from 2024 levels
3. Supplying 50% of electricity use community-wide from renewable sources and,
4. Achieving 25% fuel switching from on-site fossil fuel combustion to using electricity in all municipal buildings.

Strategy Co-Benefits



Metrics

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

Potential

In 2024, 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 the municipal share of community-wide GHG emissions.¹ Improving municipal buildings efficiency to achieve a 5% reduction in electricity use and a 10% reduction in natural gas use could save about 543,000 kWh and 29,000 therms annually, saving up to \$62,000 per year.^{1,20}

Expanding clean energy use and electrifying facilities would further reduce emissions while increasing municipal building resilience.²¹ Supplying 50% of municipal electricity from renewable sources could cut emissions by up to 1,200 MTCO₂e annually, while electrifying 25% of total municipal building heating as the grid decarbonizes could reduce another 344 MTCO₂e 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 and use the results to prioritize energy efficiency upgrades in the CIP. |
| BE 5-3 | Continue the conversion of City-owned streetlights and signals to LED through lifecycle replacement in CIP. Encourage utilities to continue the 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 Study and develop a road map for all non-multi-family, 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 (RECs) purchases for sites unsuitable for on-site solar to support achievement of the renewable energy goal. Please note, purchasing RECs should only be used, once all other options have been exhausted. |
| BE 5-5 | Develop an electrification assessment to determine the 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 were
from the solid waste
sector

24,066

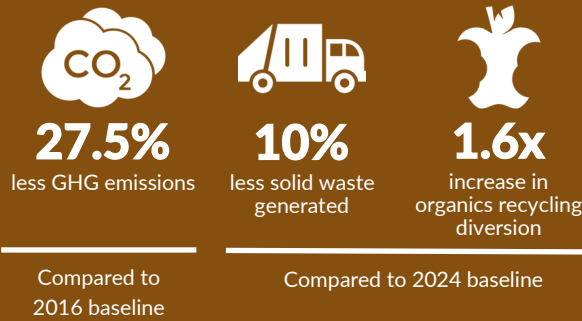
tons of community-wide
waste was landfilled in
2024

12,008

tons of organics recycling
was collected community
-wide in 2024



Sector Goals:



Waste Management

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

Solid waste management includes collecting and processing garbage, recycling, and organics recycling. 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.

In Plymouth, garbage is sent from regional transfer stations to either the Hennepin Energy Recovery Center (HERC) or landfills. Recyclables are sorted for reuse and food waste is composted for uses such as landscaping and road construction. In Plymouth, yard waste is sorted into two categories, brush and logs and garden waste. The brush and logs are processed and sold as landscaping mulch and the garden waste is composted and sold as compost.

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

The Amount of Solid Waste in Plymouth

Community-wide municipal solid waste (MSW) handled has been estimated based on City reporting. In 2024, community-wide MSW totaled 83,571 tons, with 23,515 tons (28.1% of total) diverted for recycling, 12,008 tons (14.4%) diverted for organics recycling and composting, and 23,983 tons (28.7%) were 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, wood and other organic wastes add another 12.21%, 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.



STRATEGY

WM 1

Decrease total annual municipal solid waste handled by 10% below 2024 levels by 2035.

Strategy Co-Benefits



Metrics

Reported community-wide total solid waste handled

Potential

The Minnesota Pollution Control Agency 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 lowers the energy use, resource consumption, and transportation and landfill emissions associated with producing and discarding materials. The U.S. EPA estimates food waste costs the average consumer about \$728 annually. Households can save money by planning meals, storing food properly, and eating leftovers. Businesses can also reduce purchasing, hauling, and disposal costs through reuse, recycling, composting, and better inventory management.^{8,9,10}

Actions

- | | |
|--------|--|
| WM 1-1 | Provide building permit applicants with information on Hennepin County construction and demolition waste reduction and diversion programs and incentives; and encourage applicants to develop waste management plans that meet the Climate Action and Resiliency Plan diversion targets. |
| WM 1-2 | Explore options for waste hauling improvements supporting the Climate Action and Resiliency Plan's goal achievements, such as alternative pricing structures, increased waste reduction and recycling education/communication, improved contamination control, low- or zero-emission collection vehicles, etc. |
| WM 1-3 | Continue to collaborate with partners to promote material reuse and waste reduction through community events like swaps, repair/ fix-it clinics, garage sales, and organized electronics recycling. Explore use of the Hennepin County Community Zero-Waste Grant to support implementation and promotion. |
| WM 1-4 | Collaborate with Hennepin County, recycling and organics recycling 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 recycling collection for Plymouth residents and businesses. Explore the Hennepin County Community Zero-Waste Grant to support implementation. |

STRATEGY

WM 2

Increase organic waste diversion to 23% by 2035.

Strategy Co-Benefits



Metrics

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

Potential

Most landfill gas arises when organic waste decomposes.¹¹ Organic wastes include food, garden waste, street sweepings, textiles that are made of 100% natural-fibers, wood, and paper products. According to the State's Waste Characterization study, at the Pine Bend facility, as much as 28% of landfilled waste consists of organic waste (yard, food, wood, and other organic materials).³ Similarly, the Hennepin County study finds that food waste alone makes up 19% of landfilled materials in Hennepin County.⁴ These studies underscore the significant opportunity that organic waste diversion represents for reducing landfilled waste and solid waste emissions for Plymouth.^{1,2} In 2024, Plymouth diverted 14.4% of organics recycling from incineration and landfills.

Actions

WM 2-1	Consider using compost and/or biochar as soil amendments for City construction projects where appropriate and cost effective.
WM 2-2	Ensure all City of Plymouth facilities have recycling and organics recycling collection where feasible.
WM 2-3	Promote use of Hennepin County's Business Recycling Grant program to increase business and non-profit organics recycling and composting 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 were
from wastewater
management

36

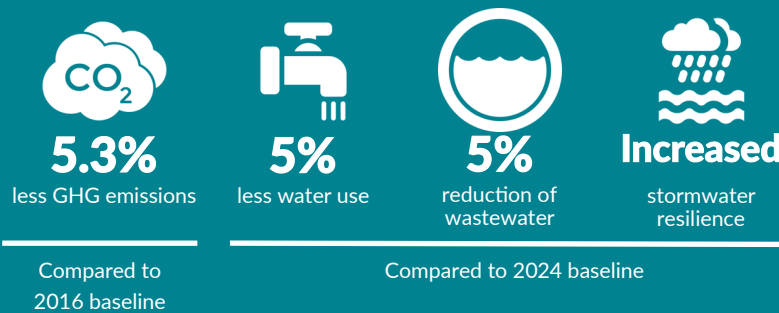
flood events in Hennepin
County reported by NOAA
since 2000¹

\$5,515,000

in flood damage in
Hennepin County reported
by NOAA since 2000¹



Sector Goals:



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.² Strategies such as water conservation, efficient irrigation, and native landscaping can reduce these risks while making better use of limited resources.^{3,4} Planning for future climate conditions will help Plymouth strengthen water and wastewater resilience, protect natural systems, and reduce long-term impacts to residents, infrastructure, and the local economy.⁵

Flood Risk and Stormwater Management

According to First Street Foundation, 812 properties in Plymouth—about 3.2% of all properties community-wide—are estimated to be at risk of flooding over the next 30 years.⁶

Flood risks are expected to increase as precipitation patterns change. The U.S. National Climate Assessment indicates that the 10 rainiest days of the year can account for up to 40% of annual precipitation in the Minnesota region.² By 2050, the Plymouth area may see up to a 23% increase in annual precipitation and as much as a 35% increase by the end of the century. These increases in annual precipitation are likely to be accompanied by longer dry periods between storms and more frequent heavy precipitation events.^{7,8}

To prepare, the City can continue to review flood-prone areas of the community 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.^{9,10}

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.



STRATEGY

W 1

Promote reducing water consumption and wastewater generation community-wide with a targeted reduction of 5% each below 2024 levels 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.¹¹ 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.^{12,13}

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 incentivize reductions in water 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 the promotion and utilization of the City's Water Efficiency Rebate Program and other incentives to promote the installation of efficient water fixtures and appliances in homes and businesses, prioritizing low-income community members. Goal: Upgrade's installed in 150 households and 10 businesses annually. |
| W 1-4 | Expand water conservation education and outreach in residential and commercial sectors, promoting available water efficiency incentives and programs including the City's discounted rain barrel program. |

STRATEGY

W 2

Update engineering design standards and implement plans to meet stormwater and flood-mitigation needs under projected climate conditions.

Strategy Co-Benefits



Metrics

Status of integrating climate projection data into plans;
Share of runoff from impervious surfaces directed to stormwater best management practices

Potential

By 2100, Plymouth may experience up to 35% more annual precipitation on average than it typically does now, along with more frequent heavy rainfall events.^{14,15} These changes could increase stormwater runoff, localized flooding, and flash flood risk.¹⁶ Because traditional infrastructure standards are often based on historic rainfall patterns, the City can strengthen climate resilience community-wide by continuing to incorporate climate projections from National Oceanic and Atmospheric Administration (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's climate resilience.^{9,10}

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 (BMPs) on City-managed property and as part of 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 (BMPs), inform community members how they may participate in city BMP installation efforts, and provide information on watershed district grants and incentive opportunities. |
| W 2-5 | Explore opportunities to increase incentives for 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
community-wide

1

farmers market
community-wide

10.3%

of population estimated
to face food insecurity in
Hennepin County



Sector Goals:



Compared to 2024 baseline

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 additional energy use and emissions. Shortening supply chains and reducing refrigeration needs can help make the food system more sustainable.¹

Buying local food can not only reduce some transportation-related impacts but also helps residents and businesses to reinvest 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 selling through 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, who 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.⁷

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.



STRATEGY

LF 1

Increase and support local food production and access and encourage plant-based food options at City events.

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 rooftop gardens, community gardens, urban farms, bee-keeping, and poultry keeping. Explore creating or sourcing model homeowners association policies to encourage and
- 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 and an urban market garden that trains youth and residents in local food produc-
- LF 1-3 Explore options for developers and large property owners to include space in new construction or remove underutilized paved and turf-grass areas to establish community gardens and native pollinator-friendly plantings.
- LF 1-4 Promote greater adoption of plant-forward diets by sharing educational resources and supporting community campaigns such as Meatless Monday.
- LF 1-5 Encourage event organizers to include plant-based food options at City events.

STRATEGY

LF 2

Reduce food waste and food insecurity community-wide.

Potential

Nationally, an estimated 30–40% of all food goes to waste.¹⁰ Plymouth’s solid waste stream includes an estimated 7,000-9,000 tons of discarded food each year, representing more than \$30 million in lost consumer value.^{11,12,13,14} The impacts extend beyond greenhouse gas emissions; 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 resiliency goals, strengthen environmental stewardship and help address food insecurity community-wide.¹⁵

Strategy Co-Benefits



Metrics

Reported organics diversion rate;
Food insecurity reported in City and County;
Reported food-waste characterization 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 community-wide. |
| LF 2-2 | Promote the State of Minnesota’s 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. |
| LF 2-6 | Partner with the State of Minnesota and Hennepin County to drive Plymouth business participation in programs offering technical assistance, grants, and recognition for food waste prevention, rescue, and organics recycling (such as MNimize, Hennepin County Recycling Grants, and the MPCA Climate-Smart initiatives). |



Greenspace and Ecosystems

CURRENTLY IN PLYMOUTH

30.6%

average tree canopy
coverage community-
wide

29.6%

average impervious
surface coverage
community-wide

29.7%

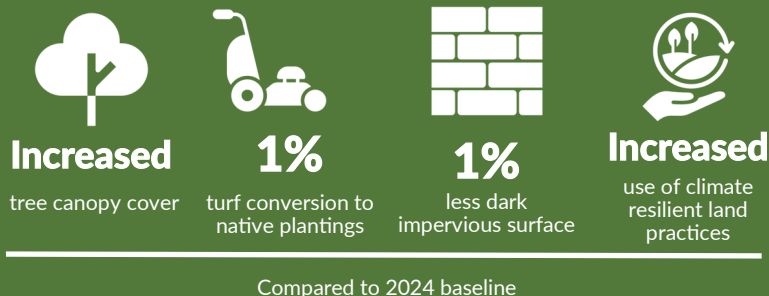
manicured lawn coverage
community-wide

5.9 °F

hotter than the
surrounding region due to
the heat island effect



Sector Goals:



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 Trees also filter air pollutants such as carbon monoxide, particulate matter, and ground-level ozone, which can contribute to the developing and worsening of asthma and other respiratory illnesses in the community at elevated levels.² In addition, research shows that access to nature, including parks and green spaces, can improve physical and mental health and reduce stress.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 land 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 than non-native plantings, 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 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 the local 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.



STRATEGY

GE 1

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

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)

Potential

Plymouth's tree canopy reduces stormwater runoff, protects drinking water, mitigates heat islands, lowers building energy use needs, 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 planting native, diverse species. Managing invasives and promoting biodiversity can strengthen ecosystems, support carbon absorption, and provide habitat for native species.^{12,13} Preliminary recommendations are provided in the City's Ground Cover, Heat Island, and Carbon Sequestration Study.¹⁴

Actions

- | | |
|--------|--|
| GE 1-1 | Evaluate potential updates to the City's tree preservation and landscaping ordinances to increase large and heritage tree protection, tree replacement or banking requirements, address dying or dead tree removal and/or replacement, protections for tree root systems, and performance-based requirements for tree canopy coverage. |
| GE 1-2 | Evaluate the development of a tree rebate or cost relief program that prioritizes low-income households and households in areas with low tree canopy coverage and a higher urban heat island index than the community-wide average. |
| GE 1-3 | Continue to expand the City of Plymouth's tree sale with native varieties and plant swap opportunities. |
| 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 for residents that guide 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 support for pollinators and achieve a 1% turf conversion rate, by replacing turf with native grasses and wildflowers community-wide by 2035.

Strategy Co-Benefits



Metrics

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

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} Achieving strategy GE 2, would mean converting 4 acres of turf to native grasses and wildflowers annually.

Actions

- | | |
|--------|--|
| GE 2-1 | Collaborate with partners to increase access to native plant stock for Plymouth property owners through a group purchasing program or the City of Plymouth's community plant sale events. Explore providing discounted or free native plants to low-income |
| GE 2-2 | Promote existing and future turf replacement programs across the city such as the State of Minnesota's Lawns to Legumes program and watershed district programs. Explore creating or sourcing model homeowners association (HOA) policies to encourage and promote adoption by HOAs. |
| GE 2-4 | Enhance community-wide 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 3

Reduce the heat island effect reducing "dark" impervious surface coverage by 1% below 2024 levels community-wide by 2035, particularly in neighborhoods that have been identified as having higher heat island impacts than the community-wide average.

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 at a greater rate than natural surfaces. 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. Achieving strategy GE 3 would mean reducing/eliminating approximately 3.6 acres of dark impervious surface coverage annually.

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 the City's parking and landscaping 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 the 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 by prioritizing climate-risk reduction for the most vulnerable populations and neighborhoods in Plymouth, in regards to heat island impacts. |
| GE 3-3 | Work with partners to explore and promote an incentive program for cool/green roofs and cool pavements. |

STRATEGY

GE 4

Use and promote land management practices that enhance climate resilience.

Strategy Co-Benefits



Metrics

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

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 turf areas that serve little recreational or functional use to native plantings, bee lawns, rain gardens, and other green infrastructure. These practices can reduce mowing and irrigation, improve stormwater management, reduce pollution from fertilizer and pesticides, and improve soil health.^{24,25} Likewise, reducing salt use on paved surfaces can improve ecosystem resilience by reducing the amount of chloride runoff going into our waterways and groundwater.^{26,27}

Actions

- | | |
|--------|---|
| GE 4-1 | Manage City-owned lawns and turf to expand native plant communities and promote these practices community-wide through education and outreach. |
| GE 4-2 | Develop a Salt Reduction Plan to reduce chloride runoff from pavement treatment by the City and private operators. Potential strategies include reviewing parking lot size requirements, pursuing low-salt community designation, offering training, and exploring limited liability protections for commercial and institutional properties. |
| GE 4-3 | Explore replacing gas-powered lawn equipment with electric powered lawn equipment. |



Thriving Community

CURRENTLY IN PLYMOUTH

6 °F

projected increase in
current average daily
maximum temperature by
2050

39%

projected increase in
current average air
conditioning demand by
2050

31%

projected increase in the
current average of heavy
precipitation events by
2050

812

properties with risk of
flooding

3,500

businesses
community-wide

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, a durable local economy, and effective communication.

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} These impacts can increase the occurrence of heat-related illnesses, waterborne diseases, asthma, allergies, vector-borne illnesses, and mental health stressors—especially for residents with lower incomes, communities of color, adults over 65, children under 5, and people with existing health conditions.^{3,4,8,9,10,11,12,13}

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 the COVID-19 pandemic.^{14,15} Taking action now can help avoid these costs. In Plymouth, the avoided social cost of carbon is estimated as \$70 per metric ton based on the estimated potential community-wide economic impact of long-term county-level climate change impacts divided by the amount of community-wide greenhouse gas emissions to arrive at a per-ton value. The Minnesota Public Utilities Commission currently uses a range of \$140–\$380 per metric ton which indicates that the community-specific value of \$70 per metric ton is likely conservative.^{16,17,18}

Implementing 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 dollars circulating locally, and support jobs in less resource-intensive sectors.^{19,20,21,22}

Local Government's Role in Climate Health and Safety

Local governments play a key role in building a thriving, resilient community. Just as cities support public health through providing and maintaining 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 community's climate vulnerable population in preparing for and mitigating climate change impacts.

Strategy Co-Benefits



Metrics

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

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 developing or worsening of respiratory conditions like asthma, especially among communities of color and low-income residents.³ In Plymouth, the largest population groups with possible heightened vulnerabilities include people of color, adults age 65 and older, and people experiencing economic stress.¹⁶

Actions

-
- | | |
|--------|--|
| TC 1-1 | Research opportunities for neighborhood resiliency coordination and develop a Neighborhood Resilience Checklist focused on relational networks, resource-sharing, community-building and mutual aid during climate-related challenges. Promote it through neighborhood organizers and National Night Out events. |
| <hr/> | |
| 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. |
-

STRATEGY

TC 2

Support local businesses in building climate resilience.

Strategy Co-Benefits



Metrics

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

Potential

The COVID-19 pandemic produced a sharp economic contraction at every geographic scale. Global gross domestic product (GDP), a measure of the total monetary value of all final goods and services produced in a certain geographical region in a specific time period, declined by approximately 3.1% in 2020, while inflation-adjusted GDP in Hennepin County declined approximately 3.3%^{24,25,26} Although official GDP estimates are not available for individual cities, Plymouth's gross business sales, the total of all raw sales revenue generated by every business operating within a specific geographical region over a set period of time, declined approximately 4.1% between 2019 and 2020.²⁶ Researchers warn that climate change could cause equal or greater economic damage—even with significant GHG emissions reductions—and far more without emissions reductions.^{14,15} Small businesses support important economic activity and employment in Plymouth but, may have fewer resources than larger firms to prepare for and recover from major disruptions, underscoring the importance of local climate resilience efforts.^{27,28}

Please note: Global GDP statistics are under review and subject to change.

Actions

- | | |
|--------|---|
| TC 2-1 | Create a community-wide environmental stewardship recognition program 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 strengthening or improving 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 Hennepin County Hazard Mitigation Plan and the City of Plymouth's Emergency Operations Plan. |

STRATEGY

TC 3

Educate, engage, and empower the public on the health and safety risks associated with climate change.

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.^{29,30,31} 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, and promote household and neighborhood preparedness, as well as the benefits of climate action. Include information on relevant City programs and provide information on topics such as active transportation, tree planting, and climate-friendly yards. |
| TC 3-3 | Continue to expand environmental education programming including Arbor Day/ Earth Month outreach & education. Look into collaborating with partners to develop an annual Environmental Fair. |
| TC 3-4 | Incorporate environmental stewardship information, climate resilience awareness, actions residents can take, and the benefits of climate action into City events. Example: Have a booth or activity focused on climate action and community-wide climate resiliency at Plymouth Fire & Ice. |
| TC 3-5 | Collaborate with Hennepin County and local school districts to increase climate literacy and education in Plymouth schools. |



Implementation

2035 IN PLYMOUTH

If this plans goals are achieved by 2035, when compared to our 2016 baseline emissions, we will have cut:

142,178

MTCO₂e annually from the transportation sector

179,363

MTCO₂e annually from the buildings and land use sector

7,360

MTCO₂e annually from the solid waste sector

1,523

MTCO₂e annually the water sector

Implementation

Implementation Support Tools

To help the City move from planning to implementation, 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 Policies Plymouth](#)

Organizing For Implementation Is Critical

The early implementation period after the adoption of the Climate Action and Resiliency Plan, 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 should become part of everyday City operations, decision-making, and service delivery. Effective progress will also require partnerships beyond City government, with residents, businesses, organizations, and community leaders helping to carry the work forward.

Implementation Is a Shared Responsibility

Climate change is driven by many factors and affects the community in many ways. Impactful progress will require shared action. Some strategies will be carried out by Plymouth’s elected officials, City departments, and City staff, while others will 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 the Climate Action and Resiliency Plan’s goals.

Climate Action Is an Ongoing Process

Carrying out long-term climate and resiliency strategies requires flexibility as technologies, costs, funding opportunities, and regulations change over time. To support an adaptive approach, the Climate Action and Resiliency Plan will be advanced through annual or biennial work plans that identify near-term priorities and next steps. This process will help connect climate action and resiliency work with the City’s budget cycle, departmental planning, and related initiatives. While individual actions may be refined as conditions change, the plan 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 processes.

STRATEGY



Organize for the implementation of the Climate Action and Resiliency Plan.



A clear implementation structure can help the City of Plymouth turn this plan's goals into coordinated, accountable action. Cross-departmental 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 emissions reductions and resiliency outcomes.



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



I 1-1	Utilize the Staff Climate Committee to coordinate and support the implementation of the Climate Action and Resiliency Plan.
I 1-2	Incorporate implementation of the Climate Action and Resiliency Plan through the biennial budget and Capital Improvement Plan (CIP) processes.
I 1-3	Review City operations, policies, and ordinances for alignment with the Climate Action and Resiliency Plan as appropriate.
I 1-4	Establish communication and education efforts that support the Climate Action and Resiliency Plan.
I 1-5	Evaluate progress towards achieving the goals in the Climate Action and Resiliency Plan and adjust strategies and actions at appropriate intervals.



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 and improved climate resiliency. 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 that community members can take, with links to helpful resources.

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

Key—Potential Cost Range

Behavior Change	No cost or only cost savings
\$	Low cost; generally less than \$250.
\$\$	Moderate cost; generally \$250–\$1,500.
\$\$\$	Substantial cost; generally \$1,500–\$10,000.
\$\$\$\$	Major cost; generally more than \$10,000.

Cost Explanatory Note:

Cost levels provide a high-level estimate of the cost of implementing the action for an 'average' household. Actual costs will vary by project size, installation needs, and available incentives.

Key—Impact Potential

*	Focused Impact
**	Moderate Impact
***	Significant Impact
****	Major Impact

Impact Explanatory Note:

Impact levels reflect the action's potential contribution to climate, resilience, health, environmental, and community goals. Actual results depend on the scale, frequency, and duration of the action.

Transportation and Land Use

Reduce Vehicle Use	Cost	Impact
Walk or bike when traveling short distances.	Behavior Change	*
Take public transit to work or to run errands. Plan your trips: 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: AAA	Behavior Change	****
Encourage your child to walk or bike to school, or join a BikeBus. Learn more: BikeBus World	Behavior Change	**
Reduce Your Ride's Impact	Cost	Impact
Keep your vehicle well-tuned and follow fuel efficient driving tips like these from The EcoDrivers Manual to save 20% or more in gasoline use.	Behavior Change	**
Avoid idling. In winter, warm up the vehicle for no more than 30 seconds, then drive.	Behavior Change	**
Choose an electric or hybrid model for your next vehicle. Search available models: US DOE Alternative Fuels Data Center	\$\$\$\$	****
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 as well.	\$	**
Offer your employees alternative commute incentives—learn more: US DOE Alternative Fuels Data Center	\$	***
Install EV charging stations to support employee and visitor electric vehicle use.	\$	**
Develop and implement a Fleet Transition Plan to shift vehicles to zero-emission models. Learn more: National Association of Regional Councils	\$\$\$\$	****

Buildings and Energy

Use Less Energy	Cost	Impact
Turn down your water heater to 120°. Learn more: US EPA	Behavior Change	*
Replace an older home thermostat with an ENERGY STAR Certified , “smart” programmable model.	\$	***
Schedule a Home Energy Squad energy audit through the Center for Energy and the Environment	\$	**
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 a community solar program or garden. Learn more: Minnesota Clean Energy Resource Teams	Behavior Change	*
If you don't own your home, or your home is not suitable for adding solar panels, buy renewable electricity through Xcel Energy or Wright-Hennepin Electric Co-op	\$	***
If possible, participate in a residential solar group purchasing program. Ex: 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: International Energy Agency (IEA)	\$\$\$\$	****

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, be intentional about what you purchase, 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 reusable/recyclable/compostable packaging.	Behavior Change	*
Become familiar with Hennepin County's Green Disposal Guide for information on the best way to recycle, reuse, or dispose of items from your home.	Behavior Change	***
Reduce e-waste by donating electronics to places like Goodwill , or recycling them at Hennepin County drop-off locations .	Behavior Change	***
Choose durable over disposable: Invest in high-quality items that last longer. Ex: Using safety razors instead of plastic disposables razors/razor heads	\$	**

Increase Organics Diversion

	Cost	Impact
Eat seasonally and shop locally to ensure fresher, higher-quality produce with a longer shelf life.	Behavior Change	**
Reduce food waste by using what you have, planning meals, and shopping with a list. Learn more: U.S. EPA and Hennepin County	Behavior Change	***
Sign up for the City's curbside organics recycling program.	Behavior Change	****
Start backyard composting food scraps and yard waste. Learn more: US EPA .	\$	****
Work with your employer or business to start composting or on-site organics recycling.	\$\$-\$\$\$	****

Water

Reduce Water Use Inside

	Cost	Impact
Be mindful of your water usage and focus on changes in habits such as turning off the water when brushing your teeth and taking shorter showers. Learn more: US EPA	Behavior Change	*
Change out your showerheads 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: 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. Learn more: US EPA	Behavior Change	*
Collect rainwater in rain barrels to water your lawn and/or plants. The City of Plymouth sells rain barrels at a reduced cost to residents.	\$	**
Retrofit existing irrigation systems with smart irrigation controls that use soil moisture and weather data to determine irrigation needs. Learn more: US EPA	\$\$	***
Replace your lawn with native prairie grasses, and wildflowers, or other native plant alternatives. Learn more drought resistant landscaping principles: Eco Home	\$\$\$-\$\$\$\$	****

Local Food and Agriculture

Grow Your Own Food

Start a vegetable garden in your yard. Learn more: [University of Minnesota](#) Cost: \$-\$\$ Impact: ****

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 food. Cost: \$ Impact: **

Keep chickens for eggs. Learn more: [University of Minnesota](#) Cost: \$\$\$ Impact: **

Plant fruit- or nut-bearing trees or shrubs that are well suited to the local hardiness zone and conditions of your property. Learn more: [Arbor Day Foundation](#) Cost: \$\$\$ Impact: ***

Eat Climate-Friendly

Plan meals to maximize nutrition and minimize climate impact. Learn more: [University of Minnesota Extension](#) Cost: Behavior Change Impact: ***

Eat a more plant-rich diet by cutting back on meat and dairy, starting with simple habits like Meatless Mondays. Learn more: [Mayo Clinic](#) Cost: \$-\$\$ Impact: ****

Support Local Growers

Support restaurants and grocery stores that use and sell locally grown food; see [Minnesota Grown](#) for locations. Cost: Behavior Change Impact: ***

Support local growers at local farmers markets; see the [USDA Local Food directory](#) to find locations. Cost: \$ Impact: ***

Buy food that is in season, minimizing the distance food must travel; see [Minnesota Grown](#) for what is in season. Cost: \$\$ Impact: **

Join a local CSA to buy lower-emission, locally produced food directly from growers; see [Local Harvest](#) for locations. Cost: \$\$-\$\$\$ Impact: ****

Greenspace and Ecosystems

Create a Pollinator-Friendly Yard

Practice slow-mow-summers with your lawn. Learn more: [University of Minnesota](#) Cost: Behavior Change Impact: *

Eliminate pesticide use. Learn more: [University of Minnesota Bee Lab](#) Cost: Behavior Change Impact: ***

Convert your lawn to a bee lawn. Learn more: [University of Minnesota](#) Cost: \$\$-\$\$\$ Impact: ***

Plant native flowers, shrubs, and trees that bloom from spring through fall to support pollinators and biodiversity; Learn more: [MN Department of Natural Resources](#) Cost: \$\$\$ Impact: ****

Replace all or part of your lawn with native plants and wildflowers; see the [University of Minnesota](#) for ideas and the [State of Minnesota's Lawns to Legumes program](#) for possible funding. Cost: \$\$-\$\$\$ Impact: ****

Increase the Tree Canopy

Volunteer for tree planting with the [City of Plymouth](#) or [Hennepin County](#). Additionally, you can visit [Tree Trust](#) for other opportunities. Cost: Behavior Change Impact: **

Plant native trees in your yard to provide shade and cooling during summer heat. See the [City's Ground Cover Study](#) for trees suited for our changing climate. Cost: \$-\$\$ Impact: ***

Protect mature trees on your property to preserve shade, canopy cover, and the benefits large trees already provide. Learn more: [Arbor Day Foundation](#) Cost: \$ Impact: ****

Reduce Your Yard Work Impact

Consider replacing your lawn equipment with electric models to reduce your fossil fuel use. Explore brand-free guides and resources at [Shift2Energy](#) Cost: \$\$\$-\$\$\$\$ Impact: ****

Thriving Community

Make Your Home Resilient

	Cost	Impact
Plan and rehearse a fire evacuation plan with everyone who lives in your home. Learn more: FEMA	Behavior Change	**
Keep yourself and your family up to date on physicals, vaccinations, prescribed medications, and therapies.	\$\$	***
Have breathing-protection masks available for you and your family for when air quality alerts are issued - see AirNow.gov for sources.	\$	**
Put together an emergency preparedness kit for your household. Learn more: FEMA	\$\$	***
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. Learn more: My RainReady and The National Interagency Fire Center	\$\$\$-\$\$\$\$	****

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.	\$\$	****

Appendix A: References

The following are sources and additional references used in the Climate Action and Resiliency Plan.

Note: Reference numbers and sources under review and subject to change

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The differences among emissions pathways become much greater later in the century. End-of-century projections are therefore shown as a range, with a low- to intermediate-emissions pathway at the lower end and a very-high-emissions pathway at the upper end. The very-high-emissions pathway is now considered less likely if countries continue to strengthen climate policies, expand clean-energy use, and significantly reduce fossil fuel use. However, it remains useful for showing the more serious risks that could occur if climate progress slows,

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Appendix B:

GHG Reduction Modeling Methodology

The following documents the methodology used in GHG reduction modeling represented in the Climate Action and Resiliency Plan.

Transportation

Reduce Community Wide VMT:

Mileage reductions are calculated as a percentage of current mileage based on the most recent GHG inventory year. Emission reductions are then calculated by multiplying the reduced mileage by the projected per-mile emission factor for the goal year.

Increase Public Transit Commuting:

While the goal of increasing public transit use applies to all trip types, available data is strongest for work and school commutes. Therefore, this metric is based on commuter data. Total community-wide commuter mileage is estimated using U.S. Census jobs-by-distance and commuter-by-mode data. It assumes each commuter travels to work 5 days a week for 48 weeks per year, accounting for holidays and time off.

The total is then multiplied by the percentage of commuters who drive alone to estimate current drive-alone commuter VMT. The targeted VMT reduction is calculated by applying the projected increase in commuter transit use to that total. Emission reductions are then determined by multiplying the reduced mileage by the projected per-mile emission factor for the goal year.

Increase Zero Emission / Electric Vehicle Utilization:

The net increase in the share of zero-emission vehicles (ZEVs) is calculated by subtracting the projected business-as-usual ZEV share from the target ZEV registration percentage. The net increase in ZEV mileage is calculated by applying this percentage to total VMT growth (from the most recent GHG inventory year to the plan year), after subtracting projected VMT reductions from community-wide VMT and public transit goals.

The estimated increase in electricity emissions is calculated by dividing the net ZEV mileage by the projected average EV efficiency (in kWh per 100 miles) and multiplying by the projected electricity emission factor for the goal year.

Emission reductions are then calculated by multiplying the net ZEV mileage by the projected per-mile emission factor and subtracting the associated increase in electricity emissions.

Buildings and Energy

Electricity Energy Efficiency

Electricity use reductions are calculated as a percentage of current use based on the most recent GHG inventory year. Emission reductions are then calculated by multiplying the electricity savings by the projected emission factor for the goal year.

Heating Fuel Energy Efficiency Increase:

Heating fuel use reductions are calculated as a percentage of current use based on the most recent GHG inventory year. Emission reductions are then determined by multiplying the reduced heating fuel use by the heating fuel emission factor.

Fuel Switching (electrification)

The total reduction in heating fuel use from fuel switching is calculated as a percentage of current use (based on the most recent GHG inventory year) minus reductions from energy efficiency improvements and net zero building stock growth. The estimated increase in electricity use from buildings switching off fossil fuels is based on findings from Greenhouse Gas Emission Forecasts for Electrification of Space Heating in Residential Homes in the US (<https://doi.org/10.1016/j.enpol.2022.112813>) and "I Fully Converted a Home to Electricity. Here's How It Worked — and What It Cost" (<https://www.greentechmedia.com/articles/read/whole-home-electrification-electricity-is-cheap-so-why-stop-at-net-zero>). Emissions from this increased electricity use are calculated by multiplying the projected electricity use increase by the goal year's emission factor. Net emission reductions from fuel switching are then calculated as the avoided heating fuel emissions (heating fuel reduction times its emission factor) minus the additional electricity emissions.

Increased Renewable Energy:

The increased renewable energy target (from on-site generation and purchases) is calculated as a percentage of projected total electricity use under a business-as-usual scenario, minus expected savings from energy efficiency improvements and net zero building stock growth, plus the projected increase in electricity use from fuel switching. Emission reductions are then calculated by multiplying the increase in renewable energy by the projected electricity emission factor for the target year

Waste Management

Waste Reduction:

Waste reductions are calculated as a percentage of current total estimated solid waste handled based on the most recent GHG inventory year. Emission reductions are then calculated by multiplying the reduced solid waste handled by the projected blended emission factor per ton of solid waste handled for the goal year.

Organics Diversion:

The organics diversion target is calculated as a percentage of total estimated solid waste based on the most recent GHG inventory year. Emission reductions are then calculated by multiplying the increased organics diversion by the landfill emission factor per ton, minus the same amount multiplied by the organics diversion emission factor.

Wastewater

Wastewater Reduction:

Wastewater reduction is calculated as a percentage of current use based on the most recent GHG inventory year. Emission reductions are then calculated by multiplying the wastewater savings by the current per-gallon wastewater emission factor. Where emission calculations or detailed community-specific wastewater volumes and process energy data are not available from facility, calculations are based on US EPA Local GHG Inventory Tool (LGGIT)

<https://www.epa.gov/statelocalenergy/local-greenhouse-gas-inventory-tool> LGGIT calculations assume all wastewater treatment uses anaerobic treatment and nitrification / denitrification.

Appendix C:

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 Resiliency Plan.

Summary of Estimated Cumulative Savings of Modeled Reductions

City of Plymouth

Climate Action and Resiliency Plan

Notes Transportation

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

Formula:

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

VTM 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

VTM 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>)

4 Maintenance savings per mile based on US Department of Energy FOTW #1190, June 14, 2021: Battery-Electric Vehicles Have Lower Scheduled Maintenance Costs than Other Light-Duty Vehicles (<https://www.energy.gov/eere/vehicles/articles/fotw-1190-june-14-2021-battery-electric-vehicles-have-lower-scheduled> ; <https://publicinterestnetwork.org/wp-content/uploads/2023/07/USP-EA-FG-Electric-Vehicle-Fleets-Jun23-062323.pdf>)

5 Average EV purchase price increase 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

Notes Energy - Residential

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

Summary of Estimated Cumulative Savings of Modeled Reductions City of Plymouth

Notes

Potential Total Cumulative Social Cost of Avoided Carbon Savings

Formula:

Total Estimated Cumulative GHG Reduction (MT) x Per Ton Social Cost of Avoided Carbon Rate = Potential Total Cumulative Social Cost of Avoided Carbon Savings

Total Estimated Cumulative GHG Reduction (MT) of Plan Actions only (excludes "Business as Usual" reductions)	579,087
¹⁹ Per Ton Social Cost of Avoided Carbon Rate	\$70.03
Potential Total Cumulative Social Cost of Avoided Carbon Savings	\$40,554,236

19 Per Ton Social Cost of Avoided Carbon Rate is based on pro rata community share of projected County annual economic impacts by 2100 divided by the community's current GHG emissions. Projected annual economic impacts are from Estimating economic damage from climate change in the United States By Solomon Hsiang, Robert Kopp, Amir Jina, James Rising, Michael Delgado, Shashank Mohan, D. J. Rasmussen, Robert Muir-Wood, Paul Wilson, Michael Oppenheimer, Kate Larsen, Trevor Houser Science30 Jun 2017 : 1362-1369 See: <https://science.sciencemag.org/content/356/6345/1362>

Appendix D:

Glossary of Terms

The following are abbreviations and terms used in the Climate Action and Resiliency Plan.

Abbreviations

ADU	Accessory Dwelling Unit
BAU	Business as usual forecast
BEV	Battery electric vehicle
CH ₄	Methane
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
CSA	Community Supported Agriculture
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
EV	Electric vehicle
FEMA	Federal Emergency Management Agency
GDP	Gross Domestic Product
GHG	Greenhouse gas
kWh	Kilowatt-hour
MSW	Municipal Solid Waste
MT	Metric ton equivalent to 1,000 kg (also known as Metric Tonne)
MT CO ₂ e	Metric tons of carbon dioxide equivalent
N ₂ O	Nitrous Oxide
NOAA	National Oceanic and Atmospheric Administration
PPA	Power Purchase Agreement
PV	Photovoltaic (solar photovoltaic)
VMT	Vehicle miles traveled

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.

Adaptation

Refer to “Climate Readiness or Resiliency”

Adaptive Capacity

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

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.

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

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 Dioxide (CO₂)

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 CO₂, which has a Global Warming Potential set at 1.

Carbon Dioxide Equivalent (CO₂ 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 CO₂ that would have the same global warming impact.

Carbon Emissions

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

Carbon Neutral / Carbon Neutrality

Achieving a balance where the amount of CO₂ produced annually is equal to the amount removed or offset, leading to net-zero CO₂ 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 Sequestration

The process of capturing and storing CO₂, either in oceans, terrestrial environments like forests and soils, or in geological formations underground.

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 Resiliency

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 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 to identify 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.

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 power generated. Generally, the electricity from community solar farms is priced lower than traditional utility rates.

Community Supported Agriculture (CSA)

A system in which individuals purchase a share of a local farm's harvest, typically receiving regular deliveries or pickups of seasonal food.

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.

Cool Roof

Roofing materials that are 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.

D**E****Eco-Friendly**

Designed or carried out in ways that minimize harm to the environment and conserve natural resources.

Eco-Driving

Driving practices that reduce fuel or energy use and greenhouse gas emissions, such as accelerating smoothly, maintaining a steady speed, avoiding unnecessary idling, and keeping tires properly inflated.

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).

Emissions

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

Energy Burden

The fraction of a household's total income spent on energy costs. A "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 Poverty

A condition in which a household struggles to afford the energy needed for a safe, healthy, and comfortable home. It can result from limited household income, high energy costs, and inefficient housing or appliances, and may force households to reduce essential energy use or make difficult tradeoffs with other basic needs.

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.

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.

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.

G

GHG

Refer to "Greenhouse Gas" (see below)

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.

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.

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.

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 soil and rocks.

H

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".

I

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.

K

Kilowatt Hour (kWh)

A unit representing electrical energy consumption, equivalent to using 1,000 watts continuously for an hour.

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.

M

Methane (CH₄)

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 ton, is a standard international unit for mass.

Million Metric Tons (MMT)

A standard measurement often used in greenhouse gas documentation, 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.

Model

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

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.

Native Plant Communities

Groups of native plants that naturally occur together in a region and provide habitat, food, and other ecological benefits for local wildlife.

Net Zero Emissions (NZE)

A condition in which community-wide human-caused greenhouse gas emissions are reduced as much as feasible and any remaining residual emissions – typically no more than 5-10% -are balanced by durable, high-quality carbon dioxide removal. This is the standard, economy-wide climate term often tied to corporate or global carbon reduction goals

Nitrous Oxide (N₂O)

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-Multi-Family, City Owned Facilities

This refers to buildings that the city of Plymouth owns, that are not considered multi-family homes/properties.

O

Ozone (O₃)

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.

P

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.

R

Renewable Energy

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

Renewable Energy Credits (RECs)

Certificates represent the benefits and attributes of electricity generated from renewable sources. Each REC represents one megawatt-hour (MWh) of renewable electricity dispatched to the grid.

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.

S

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 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.

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.

T

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.

Toward Zero Deaths

A traffic-safety approach that aims to eliminate deaths and serious injuries on roads through safer driving, road design, vehicles, enforcement, and emergency response.

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.

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

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.

Vulnerability

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

- 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

Weather

Weather represents 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 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 Resiliency Plan:

Project Lead

MK Anderson	City of Plymouth, Environmental Stewardship Coordinator
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Clark Gregor	City Council Member
Claudia Aurand	Non-Profit (retired)
Fred Rose	Retired Engineer & University Professor
Holly Engrav	Interior Designer
Keisha Sedlacek	Attorney
Khushi Shah	Student
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Consultant Team

Climate Action Planner
and Team Lead:



To: Environmental Quality Committee

Prepared by: Ben Scharenbroich, Water Resources Supervisor

Reviewed by: Ben Scharenbroich, Water Resources Supervisor

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.

Plymouth Stewardship Academy - Residential Energy Savings and Programs -
September 17, 2026 - 7:00pm - Plymouth Community Center (14800 34th Avenue
North)
Fall Shred Event - September 30, 2026 - 3:00-6:00pm - Plymouth Maintenance Facility
(14900 23rd Avenue North)
Regular Environmental Quality Committee Meeting – October 14, 2026 – 7:00pm –
Plymouth City Hall (3400 Plymouth Boulevard)
Plymouth Stewardship Academy - Sessions 3 & 4 - October / November 2026
Regular Environmental Quality Committee Meeting – Thursday November 12, 2026 –
7:00pm – Plymouth City Hall (3400 Plymouth Boulevard)

3. Budget Impact:

N/A

4. Attachments: