



CORPORATE GREENHOUSE GAS REDUCTION PLAN

City of Temiskaming Shores

2023

CONTENTS

KEY TERMS	ii
EXECUTIVE SUMMARY	1
CLIMATE ACTION BACKGROUND.....	2
Previous Greenhouse Gas Reduction Plan	2
Climate Change Committee	2
Key Accomplishments	2
COMMITMENT TO CLIMATE CHANGE.....	4
LOCAL CLIMATE PROJECTIONS	5
PARTNERS FOR CLIMATE PROTECTION PROGRAM	8
CORPORATE BASELINE GHG INVENTORY	9
Fleet	10
Buildings.....	10
Water	10
Streetlights	11
BAU Forecast.....	11
Excluded Corporate GHGs.....	11
TARGETS	12
GHG REDUCTION PROGRAMS.....	14
Light-duty Fleet Electrification	14
Fuel Switching to Biodiesels.....	16
Building Decarbonization Projects	17
Potential for Future Reduction Programs	19
Additional Programs to Explore	20
Carbon Offsets	22
MEASURING AND MONITORING.....	23
New Inventories	23
EnergyCAP.....	23
EnergyStar Portfolio Manager.....	23
Climate Lens.....	24
Climate Change Committee	24
REDUCTION TIMELINE.....	25

KEY TERMS

BAU: stands for “Business as usual” and is used in the context of if no changes are made to operations, then operations are business as usual.

Biodiesel: a form of diesel fuel derived from plants or animals and consisting of long-chain fatty acid esters.

Carbon Offset: a reduction in GHG emissions or an increase in carbon storage (e.g., through land restoration or the planting of trees) that is used to compensate for emissions that occur elsewhere.

Climate Lens: a decision-making tool which considers the implications of a project on the climate as well as the impact the climate will have on a project.

Climate Normal: a 30-year period of recorded average weather used to help distinguish changes in climate.

GHG: stands for “greenhouse gas” which are gases released into the atmosphere that contribute to the greenhouse gas effect or climate change.

GHGRP: stands for “greenhouse gas reduction plan”.

GJ: stands for “giga joule” and is the unit of measurement for energy consumption.

HPS: stands for “high pressure sodium” which is an older streetlight fixture that is less energy efficient than an LED.

kWh: stands for “kilowatt hour” which is the unit of measurement for electricity consumption.

LED: stands for “light-emitting diode” which is a much more efficient type of light fixture.

Net zero: the balance between the amount of greenhouse gas that's produced and the amount that's removed from the atmosphere.

PCP: stands for “Partners for Climate Protection” which is a 5-milestone program that helps municipalities through their climate action initiatives.

RCP: stands for “representative concentration pathways” which are the scenarios designed by the Intergovernmental Panel on Climate Change to compare various degrees of warming by the concentration of greenhouse gases in the atmosphere.

tCO₂e: stands for “tonnes of carbon dioxide equivalent” which is the common unit of measurement for emissions by all types of greenhouse gases.

EXECUTIVE SUMMARY

The City of Temiskaming Shores is committed to reducing its greenhouse gas emissions from municipal operations. This reduction plan outlines a pathway to reaching the City's reduction goals. Over the past few years, the City has prioritized incorporating climate considerations in everyday operations. In 2018, the City joined the Partners for Climate Protection (PCP) program to help guide their climate action journey. The City also created the Climate Change Committee to help review all proposed climate action initiatives. Initially, the City hired a consultant to complete the first three milestones of the PCP program. Upon review of the completed work, the overall consensus from the Climate Change Committee and community was that the first three milestones needed more ambition and explanation. From there the Climate Change Committee and staff set out to revise and rewrite the first three milestones.

First, staff worked on a new baseline GHG emissions inventory using 2019 data. The inventory looked at both corporate and community emissions. The subset of emissions that make up the corporate inventory include the buildings, fleet, water, and streetlight sectors. This data shows that the City's fleet produced the most emissions, closely followed by buildings, then water and lastly streetlights. The sectors which use the most fossil fuels produced the highest emissions. In November 2022, the PCP program approved the City's inventory submission and awarded milestone 1 of the program. The City then decided to primarily focus on emissions produced by municipal operations. In doing so, corporate target setting and reduction planning was to be completed first, and then afterwards the same will be done for community emissions. Staff analyzed the corporate inventory to help identify potential reduction programs based on which sectors produced the most emissions. These programs were then presented to the Climate Change Committee and helped to guide the target setting process. The corporate targets that were decided by committee and adopted by council are 40% below 2019 levels by 2033 and net zero emissions from municipal operations by 2050.

In order to reach these targets, the City will have to implement various reduction measures. Three identified measures are the electrification of the light-duty fleet, fuel switching to biodiesels, and building decarbonization. With some preliminary calculations, the City feels confident that a reduction of 23% can be accomplished through these programs over the next few years. Further, the City will look to implement measures which address the carbon intensive sectors in order to reach their goals. It will be important to stay up to date with emerging green technologies and funding opportunities to support the implementation of additional programs. Projects which prioritize carbon sequestration, optimization and energy efficiency will be the most impactful on the City's overall GHG emissions.

As these measures are implemented, it is crucial for the City to have a monitoring plan to keep track of the results. An important monitoring tool will be the creation of new GHG emission inventories. Every 5 years the City plans to create a new inventory to analyze any reductions in corporate emissions. The City also uses the energy management software EnergyCAP for monthly energy usage monitoring and Energy Star Portfolio Manager for annual reporting. Each software will focus on monitoring changes in energy use between each inventory. The City will also use the climate lens framework to keep track of the climate implications of everyday decision making. Finally, the Climate Change Committee will act as a sounding board throughout the entire implementation process. Their ideas and expertise will keep the City on track to reach these targets. As the target dates approach this plan will be revised and strengthened to ensure the City is on track with reaching its goals.



CLIMATE ACTION BACKGROUND

The City of Temiskaming Shores has been working hard to prioritize climate action. Since joining the Partners for Climate Protection (PCP) Program in 2018, the City has been making changes in its operations to better prioritize climate mitigation and adaptation measures.

Previous Greenhouse Gas Reduction Plan

In 2018 the City hired VIP Energy to work on the first 3 milestones of the PCP program. After a thorough review of the inventory, targets and reduction plan created, the City opened up consultation with the public to invite their input before any formal adoption of these milestones. The consensus from the community and the City's Climate Change Committee was that the inventory needed more explanation, the targets were not ambitious enough and the greenhouse gas reduction plan should be further revised to reflect the targets of other municipalities who are more in line with the Federal Government's goal of net zero by 2050. With that understanding, the City decided not to submit these items to the PCP program for approval and instead chose to work on revising and rewriting them to meet an elevated standard.

Climate Change Committee

In order to encourage meaningful discussions around climate change the City created an Ad-Hoc Climate Change Committee, comprised of public appointees, council, and staff. Initially the goal of this group was to help revise the 2019 greenhouse gas reduction plan and set more ambitious targets. Since then, the committee has become a standing committee of council and discusses a variety of topics centered around sustainability in the community. The Climate Change Committee will have a key role to play in the implementation and monitoring of this plan.

Key Accomplishments

One of the Climate Change Committee's first goals was the development of a new baseline greenhouse gas emissions inventory to satisfy milestone 1 of the PCP program. The greenhouse gas inventory sets the foundation for the remainder of the PCP program as it provides the municipality with a baseline which can be used to monitor and track progress towards reduction targets. On November 2nd, 2022, the PCP program awarded milestone 1 to the City of Temiskaming Shores for successful completion of a GHG inventory and business-as-usual (BAU) forecast compliant with their protocol. The data sources, assumptions, and calculations used in this new inventory are now explained in full in an additional supporting document that will act as a tool to staff as they analyze, review, and recreate this inventory in the future.

With the successful completion of milestone 1, the City was then able to identify the “low-hanging fruit”. This is where there is the most potential for GHG emission reductions. With the understanding that the City has the most control over the emissions produced through municipal operations, staff and the Climate Change Committee decided to set targets and develop a plan for reducing corporate emissions first. After identifying some potential reduction measures and deciding on a target with the Climate Change Committee, staff brought a recommendation forward to council and received approval. On April 19th, 2023, the City was awarded milestone 2 from the PCP program for setting targets compliant with their protocol.

The City has also successfully implemented a Climate Lens framework which is used for regular reporting to council. The Climate Lens is a series of questions which gives managers the opportunity to explain how their proposed action is impacting the climate, or how the changing climate might impact their proposed action. This framework is used by managers when writing administrative reports to council and allows council to consider climate change in all decision making. This encourages the crucial mindset shift that is necessary to successfully implement sustainable changes in the community. To support the implementation of this framework, a guide document was developed to help inspire sustainable thinking, give some background on a variety of topics, and showcase some examples.

The City has also been focusing on improving its energy management practices. One way has been through the use of the energy management software, EnergyCAP. EnergyCAP is a useful tool for the City to use when monitoring utility data and energy usage in municipal buildings and facilities. EnergyCAP spots errors and highlights any reductions in energy consumption. The software allows the user to run a variety of fully customizable reports which helps to simplify the data analysis process. As the City implements reduction measures, EnergyCAP can be used to measure and monitor progress towards the climate targets.



COMMITMENT TO CLIMATE CHANGE

The City of Temiskaming Shores is committed to implementing changes that will help to reduce their overall impact on the climate. The City recognizes the urgency of the issue and is working hard to include climate considerations in everyday decision making. In April 2023, the City adopted corporate GHG reduction targets of 40% below 2019 levels by 2033 and net zero emissions from municipal operations by 2050. The objective of this greenhouse gas reduction plan is to lay out some detailed steps as to how the City can reach its goals.

The City of Temiskaming Shores understands that these goals will not be achievable without a concerted effort across the corporation. Effective communication between all staff and department managers will help to ensure that the City is prioritizing actions that will reduce the GHG emissions produced through municipal operations. The corporate sectors that will be targeted for reductions include fleet, buildings, water, and streetlights. In order to meaningfully make positive changes in these sectors, communication, knowledge sharing and teamwork between all staff will be essential.

As the changes suggested in this plan are implemented and efforts are made towards these targets, there will be plenty of opportunities to fine-tune and adjust this workplan to better align with current factors and climate. There is flexibility with this plan to ensure that all recommendations are best suited to the City's specific needs. New greenhouse gas emission inventories will be created every 5 years to monitor progress towards these goals. The City of Temiskaming Shores will continuously be searching for new technologies, funding opportunities and innovative solutions to incorporate into this plan to help reach these targets.





LOCAL CLIMATE PROJECTIONS

Climate change is becoming increasingly more apparent and understanding what those changes might look like in Temiskaming Shores is important when it comes to climate change planning. Though this data is useful for determining appropriate adaptation measures, understanding what is expected to change is an important part of mitigation planning for the future.

The local climate change data that is displayed in figures 01, 02, and 03 was sourced from the Climate Atlas of Canada. This data shows the historic baseline as well as short- and long-term projections for each variable into the future. These projections are based off the RCP 8.5 scenario which is the “business-as-usual” or “worst-case” scenario forecast. This represents the changes in climate we would see if there was no action taken moving forward. The data uses three representative climate normals: historic, short- and long-term. These are 30-year periods that show how the actual climate is changing since there can be such drastic fluctuations in the day-to-day weather. Taking the average of 30 years and comparing that to previous and potential climate normals helps to clearly display changes over time and what can be expected in the future.

First looking at the annual mean temperatures in figure 01, it shows that from our historic baseline the mean annual temperature is expected to increase over time.

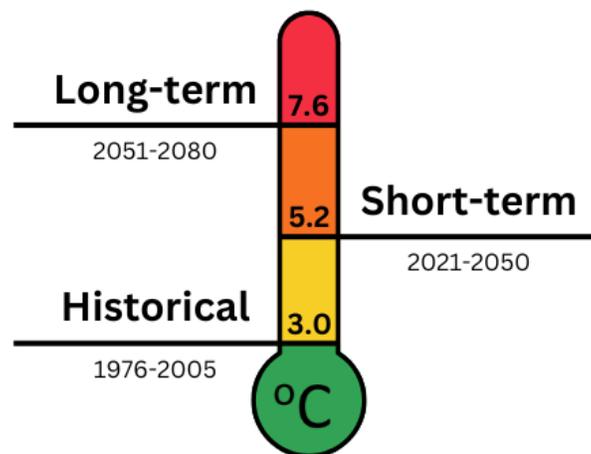


Figure 01: shows the annual mean temperature for the Temiskaming Shores region based on the RCP 8.5 business as usual projection. (Source: [Climate Atlas of Canada](#))

When looking at figure 02, the number of extreme heat days over +30°C will increase and the number of extreme cold days below -30°C will decrease. This means longer, hotter summers with more heatwaves and shorter, milder winters moving forward. In Temiskaming Shores, hotter summers could equate to more forest fires around the area which would lower air quality and potentially have further devastating effects to the built and natural environments. A milder winter would lead to poorer snow and ice conditions which would have a negative impact on the tourism industry as this region receives many visitors in the winter season for the abundant snowmobiling and ice-fishing opportunities. Though a longer summer and a shorter winter might sound nice, these changes will drastically affect Temiskaming Shores’ environments, ecosystems, industries, and vulnerable populations.

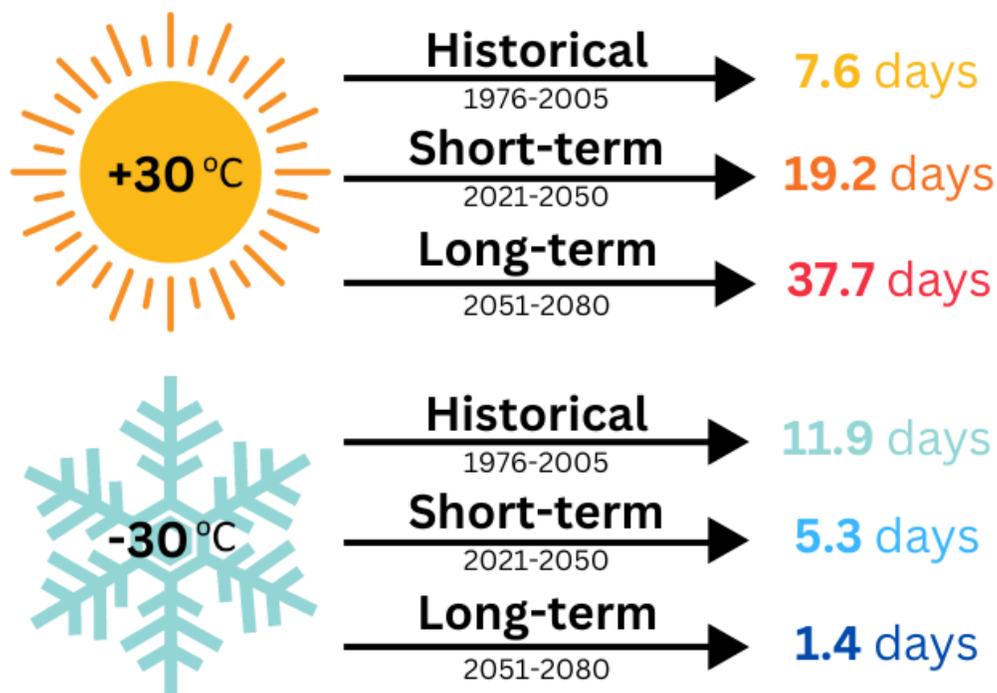


Figure 02: shows the mean temperature extremes for number of +30 °C days and number of -30 °C days for the Temiskaming Shores region based on the RCP 8.5 business as usual projection. (Source: [Climate Atlas of Canada](#))

Figure 03 looks at mean seasonal precipitation in the area. It shows that in spring and fall there will be an increase in precipitation over time which means more heavy rainfall events, surface runoff, and instances of flooding. In the summer, precipitation is projected to increase over the short-term likely leading again to larger amounts of flooding, but in the long-term there is a decrease in precipitation which means that the region will likely experience some drought and more forest fires due to the drier conditions. In winter there is an increase in precipitation, which means there will be more intense snowfall events. The loads of extra snow can damage infrastructure, create dangerous roadways, and lead to higher volumes of snowmelt runoff in the spring contributing further to instances of flooding. Though the projected changes

in rainfall might not seem significant, the precipitation experienced will be more intense in shorter bouts. The intensity of these storms will create a large threat to the environment.

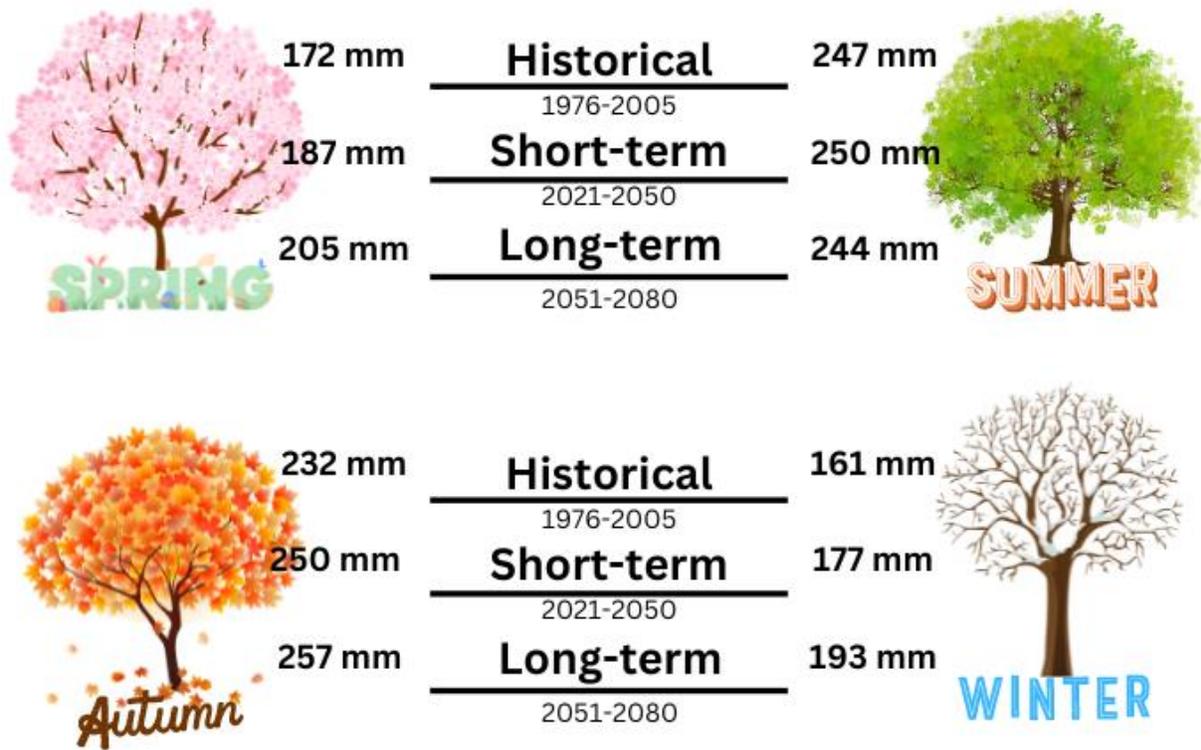


Figure 03: shows the mean seasonal precipitation for all 4 seasons in the Temiskaming Shores region based on RCP 8.5 business as usual projection. (Source: [Climate Atlas of Canada](#))



PARTNERS FOR CLIMATE PROTECTION PROGRAM

The Partners for Climate Protection (PCP) program is organized by ICLEI – Local Governments for Sustainability (ICLEI Canada) and the Federation of Canadian Municipalities (FCM). Together they have developed a five-step milestone framework to help municipalities create positive change by highlighting opportunities to reduce the emissions produced within the municipality. The 5 milestones are as follows:

- Milestone 1: Create a baseline emissions inventory and business-as-usual forecast
- Milestone 2: Set emissions reductions targets
- Milestone 3: Create a local climate action plan
- Milestone 4: Implement a local climate action plan
- Milestone 5: Monitor and report results

This program helps municipalities reach ambitious goals that align with the Intergovernmental Panel on Climate Change's (IPCC) scientific targets. The program is designed to be user friendly and offers many resources and tools to members for no cost at all. Through the program, municipalities get access to the PCP Secretariat for guidance, the PCP hub which is an online network of other member municipalities and the PCP Milestone Tool, which is a resource to assist in quantifying, monitoring, and measuring GHG emissions in both the corporate and community sectors. Overall, the PCP program is a free resource that simplifies and encourages climate action from Canadian municipalities, all who have a large role to play in the fight against climate change.

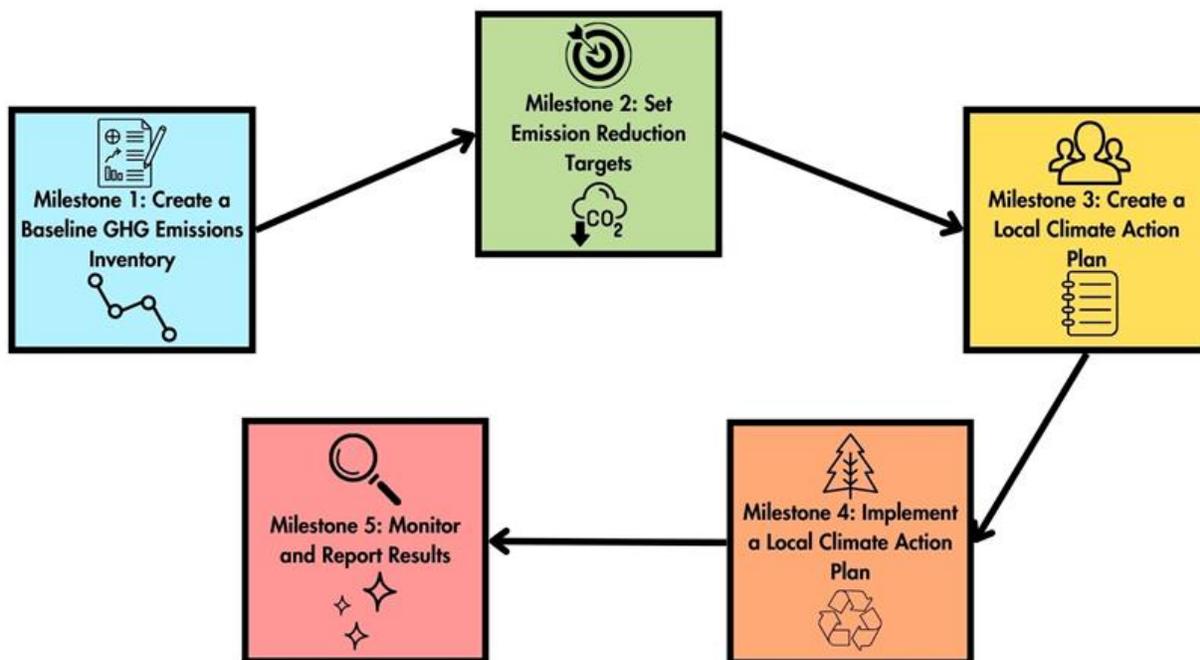


Figure 04: Partners for Climate Protection program 5-milestone framework.

CORPORATE BASELINE GHG INVENTORY

For the 2019 corporate inventory the largest quantity of greenhouse gas emissions came from the City's fleet at 49.9%, followed by buildings at 41.6%, water and sewage at 8.1% and finally streetlights at 0.5% (see figure 05). This proves that action taken in the building and fleet sectors will have the biggest impact on reducing the City's corporate emissions. For GHG emissions by energy source, diesel produced the most emissions at 41.9%, followed by natural gas at 41.7%, then gasoline at 8.5%, electricity at 7.5% and propane at 0.4% (see figure 06). Though electricity uses the most energy it has the lowest emissions because of Ontario's low-carbon electricity grid. Diesel and natural gas produce the most emissions in the corporate inventory and therefore highlights the importance of shifting away from its use to help drastically lower corporate emissions.

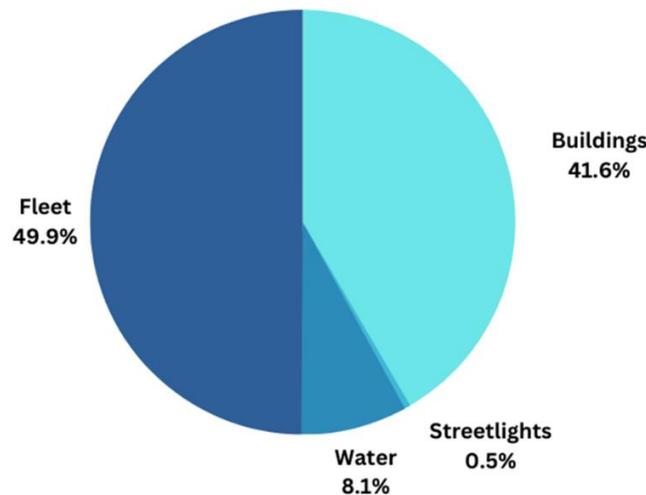


Figure 05: shows greenhouse gas emissions by sector for the 2019 City of Temiskaming Shores corporate emissions inventory.

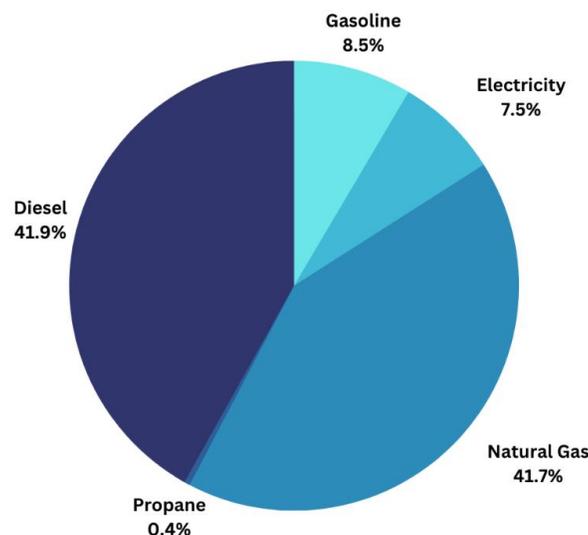


Figure 06: shows GHG emissions by energy source for the 2019 City of Temiskaming Shores corporate emissions inventory.

Fleet

Corporate fleet vehicles make up 49.9% of the 2019 corporate greenhouse gas emissions within the City of Temiskaming Shores. This was calculated following the PCP protocol and using the PCP Milestone Tool. In 2019, the City did not track the fuel usage in each vehicle, so this data comes from the total volume of fuel purchased in 2019. The data was separated by fuel type: gasoline, clear diesel, and dyed diesel. Each of these categories were inputted into the PCP Milestone Tool with their total volume (L), expenditure and any applicable assumptions. The tool then calculated the total energy consumption in GJ and the total greenhouse gas emissions in tCO₂e (see table 01). Propane usage data was also gathered for the City’s two ice-resurfacers. This data was sourced from Grant Fuels and was inputted into the PCP tool with the total volume (L) used and any applicable assumptions. Transit buses were also included in the corporate fleet calculations. Actual fuel consumption data for the City’s transit buses was not available, so this calculation used the average number of kilometers travelled in a year and the typical fuel economy of the bus to estimate how much fuel was consumed in 2019. This number was then input into the PCP tool including methodology and assumptions.

Table 01: Fleet Vehicles Summary

Fleet Vehicles	GHG Emissions	Energy Consumption	Expenditure
	976 tCO ₂ e/year	13,969 GJ/year	\$312,249/year*

*Does not include cost for propane or transit bus fuel

Buildings

Corporate buildings and facilities make up 41.6% of the 2019 corporate emissions within the City of Temiskaming Shores. This was calculated following the PCP protocol and using the PCP Milestone Tool. 2019 energy use data was gathered and all the buildings and facilities were separated out, including parks and marina facilities. Each individual building was inputted into the PCP Milestone Tool with their gross floor area, electricity use, natural gas use, expenditure, and any applicable assumptions. The tool then calculated the total energy consumption in GJ and the total greenhouse gas emissions in tCO₂e (see table 02). Having each building input separately helps to visualize which buildings are the top emitters and will require the most focus for reduction measures.

Table 02: Building and Facilities Summary

Buildings and Facilities	GHG Emissions	Energy Consumption	Expenditure
	813 tCO ₂ e/year	23,070 GJ/year	\$663,181/year

Water

Water and sewage make up 8.1% of 2019 corporate greenhouse gas emissions in Temiskaming Shores. This was calculated following the PCP protocol and using the PCP Milestone Tool. This data was collected from the City’s 2019 Hydro One and Union Gas bills and was separated by each facility. Each facility was then input into the PCP Milestone Tool with their total electricity consumption, natural gas consumption, expenditure, and any applicable assumptions. The tool then calculated the total energy consumption in GJ and the total greenhouse gas emissions in tCO₂e (see table 03). This data shows which specific water facilities are using the most energy to help uncover some energy saving opportunities.

Table 03: Water and Sewage Summary

Water and Sewage	GHG Emissions	Energy Consumption	Expenditure
	158 tCO ₂ e/year	12,547 GJ/year	\$607,566/year

Streetlights

Streetlights make up 0.5% of the 2019 corporate greenhouse gas emissions in Temiskaming Shores. This was calculated following the PCP protocol and using the PCP Milestone Tool. The data was gathered from the City's 2019 Hydro One bills and then separated into different lighting categories: decorative, streetlights, traffic lights and others. Each of these categories were inputted into the PCP Milestone Tool with their total electricity consumption, expenditure, and any applicable assumptions. The tool then calculated the total energy consumption in GJ and the total greenhouse gas emissions in tCO₂e (see table 04).

Table 04: Streetlights Summary

Streetlights	GHG Emissions	Energy Consumption	Expenditure
	9 tCO ₂ e/year	1100 GJ/year	\$84,711/year

BAU Forecast

The business-as-usual (BAU) forecast is an estimate of what future GHG emissions would look like if the City took no climate action moving forward. This is done by applying the annual population growth rate to baseline emissions levels. The PCP Tool completes these calculations using the baseline inventory year, mid-term target year and forecast year which should be around 10 years into the future. For the purposes of this inventory, 2019 was used as the baseline year, 2028 as the mid-term target year and 2033 as the forecast year as it is about 10 years from when the inventory was created (2022). Temiskaming Shores' BAU forecast predicts that due to the City's negative growth rate, GHG emissions will decrease by -8%.

Excluded Corporate GHGs

Some data was excluded from the 2019 corporate inventory as it was not available or suitable to include. One exclusion was all travel by municipal staff that did not occur in a corporate fleet vehicle. This data was not readily available and because the corporate inventory is a subset of the community inventory these emissions would likely have been accounted for in the community inventory instead.

Data on solid waste generated within City facilities was also excluded. This information is not explicitly tracked by the City and so including any estimate for how much waste is produced in corporate facilities would, overall, decrease the accuracy of the emissions reported in this inventory. For this reason, solid waste is only reported in the community inventory and encompasses all waste produced by municipal operations. With the City of Temiskaming Shores implementing a new waste tracking system at the New Liskeard landfill, a decision on whether corporate waste generation will be included in future inventories will be decided based on data quality. This decision is expected to take place before the next corporate emissions inventory is completed in 2028.

TARGETS

Climate change has been an increasingly more noticeable part of everyday life with record breaking heat waves, droughts, wildfires, floods, hurricanes, and rainfalls occurring on a more frequent basis. To avert the worst aspects of climate change, corporations, governments, and individuals must transition away from emitting greenhouse gases. The City of Temiskaming Shores is not alone in its efforts to reduce greenhouse gas emissions. By setting targets, Temiskaming Shores has joined thousands of municipalities around the world taking action to reduce emissions.

Staff and the Climate Change Committee have had extensive discussions around what potential GHG emission reductions could be achievable in Temiskaming Shores and over what timeframe. During these discussions, the City decided to focus initially on targeting corporate GHG emissions. The City recognized they have the most control over the emissions produced by municipal operations. This decision was made knowing that as the City works towards the corporate targets, efforts will be made to also incorporate community reductions by similarly setting reduction targets and creating a community-specific reduction plan. Ultimately, this approach should allow the City to leverage success in reductions of its corporate emissions to better influence the community and implement programs to reduce community emissions.

From these discussions, the Climate Change Committee recommended to council the greenhouse gas reduction target of 40% below 2019 levels by 2033 for municipal operations for a handful of reasons. First, the 2019 baseline was chosen based on the City's extensive work in creating a 2019 emissions inventory. In the future, using the documentation on the process to calculate the 2019 inventory, the City will be able to accurately determine its progress towards its emission reduction goals. Next, 2033 was chosen as the interim target year as it provides a time period of 10 years from adoption to be reached. Lastly, the 40% reduction figure has been chosen based on three main principles:

- Based on preliminary calculations for emission reduction programs, the City is confident that a reduction of 23% below 2019 levels can be achieved with proposals that can be implemented with minimal changes to current operations.
- As further investment in green technologies is realized there will be further opportunities to reduce emissions from the City's operations.
- Targets should be ambitious to match the urgency of the current situation and to recognize that the reductions accomplished today, will have a disproportionately positive impact on the climate vs the same actions taken in the future.

Staff and the Climate Change Committee also chose to recommend to council the corporate reduction target of net-zero by 2050. Net-zero emissions by 2050 is an important milestone to reach that could ensure global temperatures due to climate change do not exceed +1.5°C with no, to limited, overshoot based on modelling completed by the IPCC. This target has been adopted by numerous provincial and municipal governments such as the provinces of Newfoundland and Labrador, Quebec, and Prince Edward Island (by 2040), and the cities of Guelph, Vancouver, Hamilton, Toronto, Halifax, Thunder Bay, Sault Ste. Marie, Sudbury, and others.

From these discussions with the Climate Change Committee, a detailed report was brought to council recommending that corporate targets be adopted. After consideration, council passed the following resolution on April 4, 2023:

Be it resolved that Council for the City of Temiskaming Shores acknowledges receipt of Administrative Report RS-008-2023;

That Council adopts a greenhouse gas emission reduction target for municipal operations of 40% below 2019 levels by 2033 and net-zero greenhouse gas emissions from municipal operations by 2050;

That Council direct staff to submit these targets to the Partners for Climate Protection program as the City's submission for Milestone 2; and further

That Council directs staff to submit a report to City Council for its consideration that shall be titled the City of Temiskaming Shores' Greenhouse Gas Reduction Plan that includes a roadmap to meet the City's emissions reduction targets and submit that report no later than September 1, 2023.

The City of Temiskaming Shores recognizes that target setting is not a one-and-done event. These targets will need to be re-evaluated to ensure that they are still suitable and on track to be met. It may be appropriate to set new targets if the current target is approaching, if it is over or underachieving, if there are significant changes in the community, or if there is significant new strategic planning taking place.

Available budget and staff resources can play a huge role in the feasibility of achieving these reduction targets. Although municipalities bear the direct cost of reducing corporate emissions, they also reap the benefits of lower energy bills and operating costs, helping with the affordability of these changes as time passes. The investment into reducing corporate emissions will be financially worthwhile in the long run.

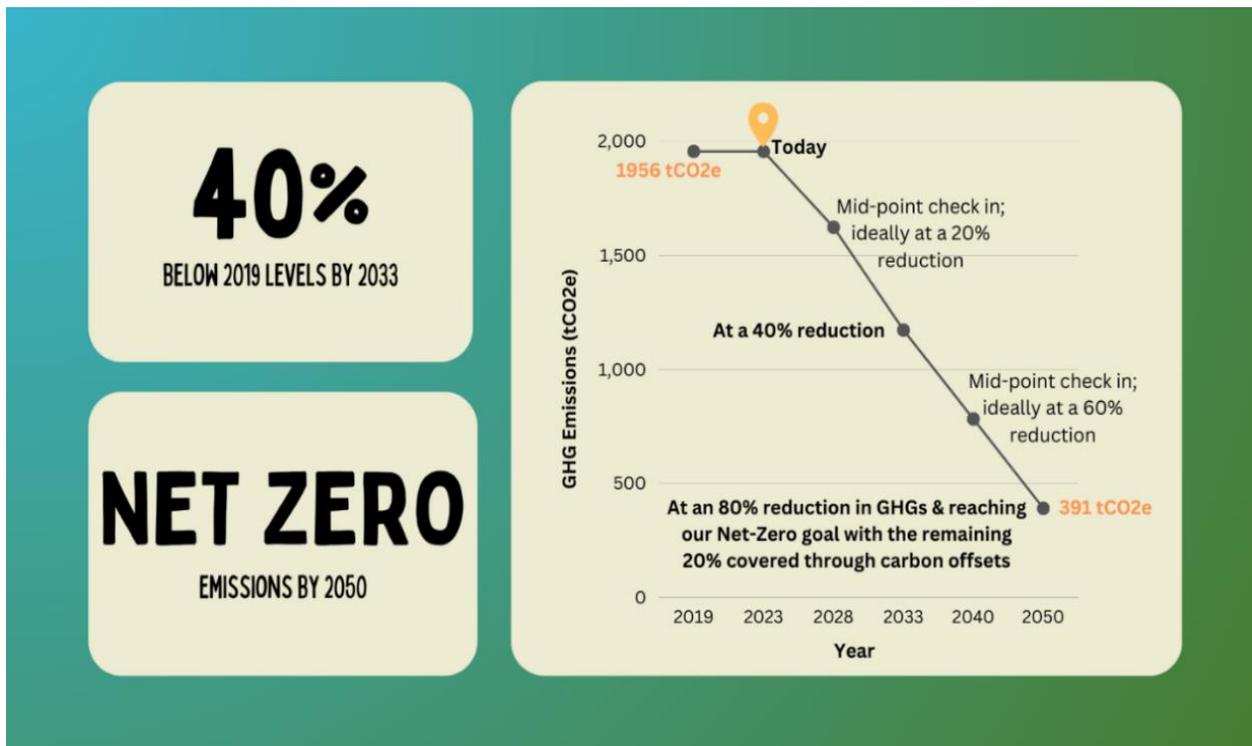


Figure 07: Overview of the City of Temiskaming Shores targets and rough timeline to net zero by 2050.

GHG REDUCTION PROGRAMS

The City’s corporate baseline GHG inventory shows that the fleet produces the most emissions at 49.9%, closely followed by buildings at 41.6%. These two sectors make up the majority of all corporate emissions, which makes them a priority target for reduction programs. Both fleet and buildings, use carbon intensive fuel sources which is what leads to the increase in emissions. The other two corporate sectors, water facilities and streetlights, rely mostly on electricity which in Ontario is a low-carbon emission energy source. This is why, for example, reducing energy consumption in municipal buildings is going to have a much larger impact towards the City’s climate targets than there would be from reducing energy consumption in the water facilities.

The following are three reduction programs that will form the backbone of the City’s steps toward net-zero by 2050. Table 05 shows that the estimated percent reduction from implementing these programs would be around 23%. These programs were selected because they target some of the highest emitting sectors, they will be relatively straightforward to implement, and they will minimally impact regular operations.

Table 05: Reduction Programs to Reduce Corporate GHG Emissions

Sector	Program	Estimated % Reduction	Note
Fleet	Light-duty EVs	3%	Targeting a small portion of the city fleet
Fleet	Biodiesels	5%	Assuming a 12% reduction in GHGs from diesel
Buildings	Decarbonization Studies	0%	Study Results will guide retrofits
Buildings	Implementation of Decarbonization Measures	15%	Reduction over first 10 years, will increase more over time
Total		23%	

Light-duty Fleet Electrification

This program considers the transition to all electric vehicles in the City’s light-duty fleet over the span of 5 years. With the current electric vehicle technology that is available, the City of Temiskaming Shores could transition its gasoline fueled light-duty fleet vehicles over to electric vehicles. Though this does come with increased initial costs. The expenses associated with operation and maintenance of electric vehicles are estimated to save the City money in the long term.

This program will lead to a reduction in GHGs from the baseline. This is estimated using data based on the corresponding annual emissions for each type of internal combustion engine vehicle currently in our fleet and each electric vehicle replacement, assuming each vehicle is being driven the average of 15,000 km per year. The annual emissions from each type of vehicle can determine what the City’s GHG reduction would be from the baseline at the end of this project.

There are added costs associated with implementing this project. Electric vehicles come at a higher cost than internal combustion engine vehicles. The City currently budgets for its fleet using a fleet replacement plan, on the schedule of each vehicle being replaced about every 7 years. In order to fund this program,

the City will have to account for these additional costs in a variety of ways. First, the budgeted amount in the fleet replacement plan will need to be increased. Small incremental increases over the duration of the program timespan will help improve the affordability of these vehicles. The City will also look for funding streams that offer grants or loans for this type of project. Funds through the Federation of Canadian Municipalities or through Government programs could be reliable options to consider. Looking for funding sources that can cover both electric vehicles and charging stations will be a priority for the City. Finally, cost savings are expected over the lifecycle of these electric vehicles. Reinvesting any savings back into the program to help cover the costs of future electric vehicles will help account for some of the additional costs. The result of this program will show an overall net benefit. Paying higher prices up front when there’s still available funding and when we can start accumulating savings will ultimately mean cost savings for the City over the long term.

Table 06 shows the annual reduction in GHGs based on the light-duty fleet composition, with the baseline being year 0 and working towards year 5 where the City will have transitioned the entire light-duty fleet to electric. In the baseline year the light-duty fleet is emitting an estimated 59.72 tCO₂e, in year 5 of the program the light-duty fleet will be emitting an estimated 2.35 tCO₂e. This means that this project will lead to a reduction of 57.37 tCO₂e or a 96% reduction in emissions from the baseline year. The result of this project clearly demonstrates the benefit of switching to electric vehicles, and the benefit electrification could have on the overall fleet emissions, especially if eventually the City could transition the medium- and heavy-duty fleet as well. Though this change in light-duty emissions will only have a 6% reduction in the overall corporate vehicle emissions, it is an opportunity for the City to start making some meaningful changes that will help prepare staff and the community for the further electrification that is inevitably to come.

Table 06: Light-duty Fleet Program Reduction

Year	# Gasoline Trucks	# Electric Trucks	# Gasoline Crossovers	# Electric Crossovers	Annual Light-duty Fleet Emissions (tCO ₂ e)	Reduction from Baseline (Year 0)
0	13	0	2	0	59.72	0%
1	10	3	2	0	47.90	20%
2	6	7	0	2	26.00	56%
3	4	9	0	2	18.11	70%
4	3	10	0	2	14.17	76%
5	0	13	0	2	2.35	96%

Total Reduction = 57.37 tCO₂e

The City aims to implement this program starting in 2024. The City will have to review the fleet replacement plan and adjust this program to match what vehicles are being replaced in what year. This project should take 5 years to implement, so it should be completed by 2029. With the light-duty fleet all electric, the City can shift its focus to see what EV opportunities are available for the medium- and heavy-duty fleet.

Fuel Switching to Biodiesels

The City of Temiskaming Shores used 296,685.79 L of diesel in the 2019 baseline year. This amount comes from dyed diesel, clear diesel, and transit diesel consumption. That diesel usage results in the associated emissions of 803.73 tCO₂e. Switching to biodiesel requires little to no infrastructure change, which greatly simplifies the transition and reduces the cost. Most diesel vehicles and equipment are capable of running on biodiesel, sometimes only up to a certain blend level, but by checking with the manufacturers of the vehicles and equipment the limits can be determined. Biodiesels aren't a long-term solution to climate change, but they can act as a better lower carbon option in the meantime as other options to reduce fleet emissions such as optimization and electrification are pursued.

The goal for this program is to switch from petroleum diesel to using biodiesel blends: B5 in the winter, B10 in the spring and fall, and B20 in the summer. The City of Toronto also followed this implementation structure and estimated an annual GHG reduction of 8.4%-12%. This emission reduction is estimated using just the tailpipe emissions rather than the lifecycle of biodiesel usage. Using the same blends as Toronto, Temiskaming Shores should see a similar reduction in its GHG emissions from the 2019 corporate diesel consumption. By doing this, it is estimated to lead to a \$6,381.39 increase in cost in a year, which is a small premium for the resultant GHG emission reductions. The cost for this program is low enough that it could be covered through an increase in the budget. Otherwise, the City could use savings from other reduction programs to help pay for the increase.

Looking at three scenarios that estimated similar reductions to what was reported by the City of Toronto, anywhere from a 7% to 10% reduction in GHG emissions from the corporate fleet inventory could be achieved (Table 07). This result comes from making a few assumptions. The assumptions are that all of the diesel fleet can accept up to B20 level biodiesel, that the costs of fuel will stay relatively stable, and that day-to-day operations won't see any consequential changes. Any real-life differences from the assumptions made in these scenarios can lead to either greater or lesser savings in cost and GHG emissions.

Table 07: Biodiesel Fuel Switching Summary

Total Corporate Fleet Emissions 2019 (tCO ₂ e)	976
Total Diesel Emissions 2019 (tCO ₂ e)	803.73
Total Biodiesel Emissions (tCO₂e)	
After 8.4% Reduction	736.22
After 10.0% Reduction	723.36
After 12.0% Reduction	707.28
Reduction in Corporate Fleet Emissions from the 2019 Baseline (%)	
After 8.4% Reduction	7%
After 10.0% Reduction	8%
After 12.0% Reduction	10%

The City aims to begin integrating biodiesels into use in 2025. The plan is to begin this program with a phased in approach, so starting with a few diesel vehicles to trial the fuel source and see how they operate. Then slowly integrating biodiesel use into the remaining fleet. The Implementation of this project will be over two years, focusing on analyzing biodiesel performance in each season and in different types of

equipment and vehicles. If all goes as planned through the trial period, biodiesel will be used in all diesel equipment by 2027.

Building Decarbonization Projects

The City is currently planning to conduct a decarbonization study in 2023 which will uncover ways to reduce emissions from City buildings. In doing this, professionals will analyze the structures, functions, and operations of selected buildings to help determine an appropriate decarbonization pathway to the greatest GHG reductions.

The building portfolio of the baseline GHG inventory shows which buildings are producing the greatest amount of GHG emissions and which are the most GHG intensive based on building size. This information was used to select which buildings should be prioritized for the implementation of decarbonization measures. Based on the inventory, the top 8 priority buildings are the Don Shepherdson Memorial Arena, Shelley Herbert-Shea Memorial Arena, Waterfront Pool and Fitness Centre, City Hall, Riverside Place, Dymond Complex, New Liskeard Public Works Main Garage, and Haileybury Public Works Garage. These eight buildings have the highest GHG intensity per square foot of building and present the greatest opportunities for the implementation of decarbonization measures.

Prioritizing those eight buildings first will target the “low-hanging fruit”, after which select solutions uncovered in the decarbonization pathways can be implemented into additional buildings beyond this scope when it comes time to complete regular maintenance. A good example of this would be looking at the public works garages. The City has many garages in its building portfolio which could benefit from GHG reduction measures. By studying in depth and developing reduction pathways for the main public works garages, the measures could easily be applied to the other similar facilities in the City. The development of decarbonization pathways will not result in any emission reductions, it is the measures uncovered by the study that, when implemented, will eventually lead to reductions. With targets in mind, the City can aim for a certain reduction amount and use the study as a tool that uncovers a pathway to get there.

With the costs that are associated with studying each building, the City won't be able to target all buildings at once. The City is in the process of securing funding through the Green Municipal Fund's Community Building Retrofit Program to cover the associated costs of hiring a consultant to study and develop decarbonization pathways for those eight listed buildings. Having this feasibility study completed will create opportunities to further apply for funding initiatives to cover the cost of implementing the retrofit measures. Having pathways laid out will align these improvements with regular scheduled maintenance, so that the City can spend money when they would need to be spending it regardless. There is also an opportunity to use any cost savings from implemented measures to fund further projects and initiatives.

Table 08 looks at a 50% reduction in GHGs in 10 years and an 80% reduction in 20 years for the portfolio of eight selected buildings. These reductions meet the criteria of the Green Municipal Fund's Community Building Retrofit program. Seeing these reductions would result in a 15% reduction from the overall corporate baseline in 10 years and a 23% reduction in 20 years. This is the equivalent reduction of 292 tCO₂e in 10 years and 467 tCO₂e in 20 years. As the City plans to apply some of the identified reduction measures beyond the eight buildings, the resultant GHG reductions would further increase.

Table 08: Selected Buildings to reduce emissions from the baseline by 50% in 10 years and 80% in 20 years.

Building	Baseline GHGs (tCO2e)	GHGs After 50% Reduction (tCO2e)	GHGs After 80% Reduction (tCO2e)
Don Shepherdson Memorial Arena	144.17	72.085	28.834
Shelley Herbert-Shea Memorial Arena	62.77	31.385	12.554
Waterfront Pool and Fitness Centre	114.08	57.04	22.816
Dymond Complex	41.35	20.675	8.27
City Hall	56.7	28.35	11.34
New Liskeard Public Works Garage	87.15	43.575	17.43
Riverside Place	26.55	13.275	5.31
Haileybury Public Works Garage	51.21	25.605	10.242
Total	583.98	291.99	116.796

There are many variables and unknowns that could present themselves when running a program like this, and because of that there could be opportunities for smaller or for much larger savings. A 15% reduction in corporate emissions will help the City significantly progress towards meeting its interim targets and goals. As 2050 approaches, there will be more opportunities to reduce corporate building GHGs if the City implements low-carbon initiatives as part of regular maintenance. If there is no investment into decarbonizing these facilities now, then many of these opportunities may remain unknown. Building decarbonization presents a promising case for more efficient corporate buildings, energy savings, cost savings, and reductions in the City’s overall GHG emissions.

The City aims to begin developing decarbonization pathways in 2024, depending on funding being provided by the Green Municipal Fund’s Community Building Retrofit program. The process of analyzing the buildings, uncovering solutions, and mapping out a pathway should take around six months. With the pathways completed the City will then shift their focus to implementing the chosen solutions which should take 10 years to reach a 50% reduction and 20 years to reach an 80% reduction from the baseline. During the implementation process the City will also look for opportunities to apply these decarbonization measures in additional buildings beyond the eight that were originally selected. After 2033, the City will be creating a new GHG reduction plan to map out their 2050 goals. At this time the City will reassess where they are at with building decarbonization, and which buildings are the next priority items on the list.





Potential for Future Reduction Programs

With the reductions expected from electrification of the light-duty fleet, fuel switching to biodiesel and building decarbonization projects, the City feels confident in reaching a reduction of 23%. It is likely that greater reductions could result and help to reach these targets with fewer changes than initially anticipated. These programs alone are not going to be the only actions required. Additional programming will be needed to meet the targets set by the City. As the City begins implementing the identified programs they will continue to research and evaluate potential reduction programs to incorporate into this GHG reduction plan.

The largest source of GHG emissions is from burning fossil fuels. There will be the greatest reductions in the City's emissions by limiting dependency on these carbon intensive fuels. As opportunities present themselves over the next ten years and beyond, the City will need to incorporate decarbonization into all plans moving forward. Decarbonization doesn't only mean fuel switching, decarbonization efforts can include optimization as well. For example, limiting the number of vehicles that are being driven, improving building envelopes or ensuring that all heating systems are only running when they need to be. Implementing small changes like those can have just as strong of an impact on GHG reductions as large changes to the energy sources being used.

One large barrier with the implementation of these changes is high costs. Moving forward the City will continue to identify funding opportunities to support these climate action measures. As staff begin to implement energy reduction improvements to operations, the City will start to realize cost savings associated with decreased energy bills. Further, as the City moves towards low-carbon energy options, such as electricity, these costs will result in greater savings due to the planned carbon price increases. The cost to heat with electricity has traditionally been much higher than heating with natural gas. With the technological improvements of low-temp heat pumps and the rising price of carbon associated with natural gas, the cost to heat with electricity is expected to fall below that of natural gas within the next decade. Today, the price of carbon is \$65 per tonne of greenhouse gases emitted. With yearly increases the price is scheduled to reach \$170 per tonne by 2030. If the City's consumption does not change and the same volume of natural gas and fuel is consumed in 2030, carbon costs will rise significantly. Implementing decarbonization measures earlier rather than later will help the City to see much greater savings from their efforts.

As time passes, there will also be advances in the green technology that is available. There is expected to be increased quantities and more options for electric vehicles, which will make it easier to shift away from internal combustion engines. There is also expected to be more professionals with enhanced knowledge of green building standards that can help to install green technology into all City buildings. As more opportunities present themselves, the City will incorporate additions to this GHG Reduction Plan to keep on track with reaching the corporate reduction targets. New GHG emission inventories will be created every 5 years to check in on this progress. At those times the City can revisit this Reduction Plan to highlight new opportunities for reduction programs. The new inventories will showcase the sectors that create the most emissions and will help to show where the strongest efforts should be targeted.

There is not one big change that will reduce the City's emissions to net zero and entirely solve this issue. Climate change is a highly complex problem. It is going to take trial and error as well as many small changes to reach these goals. Though it isn't possible to know the perfect combination of reduction measures at this time that will help the City reach its targets, there will be ample opportunity to revisit this plan to strengthen and fine-tune the pathways to net zero emissions from municipal operations.



Additional Programs to Explore

With the initial focus of targeting GHG emissions produced by municipal operations, the City wanted to consult the public for their ideas for potential reduction programs, beyond what has been previously identified. The City advertised to the community a survey which was made available on the City website. Overall, everyone who completed this survey was satisfied with the reduction targets that had been set and had some great ideas for different programs that could potentially help to reduce corporate GHG emissions. Table 09 below gives an overview of the other potential reduction programs to explore that

have been recommended by both staff and members of the community. This is not the final list of reduction programs and some of these may not be feasible to implement at this time. These additional program ideas will help to explore different reduction scenarios as the City looks to implement more climate action measures.

Table 09: Potential corporate reduction programs

Sector	Program	Explanation
Buildings	Minimizing the number of buildings the City owns and operates	Ensuring buildings are being used as efficiently as possible so that the City isn't operating/heating/cooling facilities that are minimally used.
Buildings	Switching to renewable energy sources and battery storage	Implementing renewable energy sources where possible, like solar energy. Possibilities to store some of this energy in batteries to maximize efficiency.
Buildings	LED Lighting retrofits	Ensure that fixtures are efficient and up to date to limit the amount of energy consumed.
Fleet	Reduce the number of vehicles driven	The City owns and operates many vehicles, there could be opportunities to reduce the number of vehicles used daily through vehicle sharing and optimization.
Streetlights	Decorative LED Streetlight Retrofit	Many of the City's streetlights are already LEDs, but some older HPS fixtures are still used for decorative streetlighting. As these lights will need to be replaced eventually anyways opting for an LED fixture would help to increase efficiency and lower emissions.
Water	Energy efficiency upgrades to equipment	Water facilities use a lot of electricity, though electricity is relatively low-carbon, ensuring that the equipment operated is running properly and is energy efficient will help to reduce cost, energy consumption and GHG emissions.
Carbon Offsets	Landfill gas capture to fuel additional buildings or transit	Capturing landfill gas would have multiple benefits, it would help the City to greatly reduce methane emissions as well as potentially repurpose the gas to run a building or transit bus.
Carbon offsets	Tree planting and land restoration to capture carbon from the atmosphere	Trees absorb carbon from the atmosphere which will be necessary to help counteract the stubborn GHG emissions. They also help to keep areas cool, encourage people to go outside and overall improve ecosystem health.

Carbon Offsets

Carbon offsets will be required in order to reach the overall target of net zero emissions by 2050. Even if the City eliminated the use of all fossil fuels they wouldn't be able to reach zero emissions as electricity use still produces some GHGs. The inclusion of carbon offsets will help to balance the remaining GHG emissions and get the City to an overall net zero level.

Carbon offsets are actions which help to remove carbon from the atmosphere. One of the most commonly identified offsets is tree planting. Trees absorb carbon dioxide from the atmosphere which reduces the GHGs and can be used to compensate for the emissions that are produced elsewhere. Carbon offsets do not technically need to be implemented in the same area that the target emissions are being produced. Climate change is a global problem, so many organizations will buy carbon offset credits that support an initiative elsewhere in the world to help counteract the emissions they're producing.

According to [Tree Canada's carbon offset calculator](#), it would take the City an estimated 4,118 trees to offset the emissions produced from the City's 2019 natural gas usage alone. Mature trees sequester the most carbon and so it would take many additional years after tree planting to see desired results. The City of Temiskaming Shores could look into tree planting and land restoration within the community to help offset some emissions, otherwise looking to purchase carbon offset credits is equivalent and will positively contribute towards the net zero target.



MEASURING AND MONITORING

An important part of this reduction plan includes considering how to measure and monitor progress. In order to stay on track with the targets and set interim goals moving forward, the City will need to implement a regular monitoring schedule using measurable methods.

New Inventories

Recreating the baseline inventory using the same methodology and calculations but including up-to-date data will be an important way to track progress. A new inventory of corporate emissions should be created every five years from 2023 to 2050 (i.e., 2028, 2033, 2038, 2043, and 2048). Inventories can be created at any time throughout the measuring and monitoring period but is crucial that official inventories are created every 5 years on this consistent schedule. City staff have access to an inventory guide document that explains the detailed process of how the 2019 baseline inventory was created and can reference that document to ensure that each inventory is comparable. This will provide an overall summary of corporate emissions on a consistent schedule.

EnergyCAP

The City has many other tools which can be utilized to assist in the measuring and monitoring of its emissions as the targets approach. Effective energy management and reporting will help to keep accurate data of both where energy is being consumed and how much.

EnergyCAP is an online software that helps corporations accurately track their energy consumption. The City uses EnergyCAP to analyze utility data, spot billing errors, and uncover carbon intensive facilities. This easy-to-use software will allow the City to perform necessary measurements on specific buildings.

There are a few features in EnergyCAP that will be particularly useful when monitoring progress towards the targets. One feature is the software's "Reports" function. With over 20 customizable reports to choose from, EnergyCAP can run reports that are specific to each building, building type, fuel source, geographical location, date, energy intensity and beyond. When implementing building specific projects to lower emissions in that sector, these reports will help to accurately track the changes in energy consumption. EnergyCAP also makes this data sharable. Through features such as "Dashboards", the City can create public facing content that showcases the exciting successes and progress towards the targets. These dashboards can highlight many of the co-benefits of emission reductions such as lower energy costs and consumption.

Using this tool will be a simple way to monitor the changes implemented in City buildings and how each change furthers progress towards the reduction targets.

Energy Star Portfolio Manager

Energy Star Portfolio Manager is another software similar to EnergyCAP that will help to monitor the City's progress by measuring energy use in all buildings. The unique feature of Energy Star Portfolio Manager is that it helps to easily benchmark these buildings to other similar buildings outside of the municipality. Energy consumption can differ greatly based off of the function and typical use of a building and by using

benchmarking software we can see if Temiskaming Shores' energy consumption is typical or noteworthy to address through reduction measures.

Portfolio manager is also the new software used for the Government of Ontario's Broader Public Sector reporting. Every year the City provides an emissions report to the province that includes the data for electricity use, natural gas use and annual flow from water facilities. Each of the City's buildings are uploaded to Portfolio Manager along with data that describes them. This information becomes available for the public and is a way for the province to also track the emissions the City produces. Using Portfolio Manager to not only track emissions reductions but to be able to share these successes in the required annual reporting is an additional bonus to this software.

Climate Lens

The City of Temiskaming Shores practices the use of a Climate Lens in regular reporting. The climate lens is an easy-to-use questionnaire that helps staff explain how they considered the climate when working on a project, plan, or policy. The climate lens considers both mitigation and adaptation components, so how a project impacts the climate and also how the climate might impact a project. Using the climate lens tool helps to keep climate change at the forefront of all decision making and gives staff the opportunity to clearly explain their thought process. Results of the climate lens are then summarized and included into administrative reports to council in a "Climate Considerations" section. Often climate is already being considered behind the scenes, but by requiring staff to record this process and explicitly share it helps to formalize this process and encourage more sustainable decision-making. This tool is particularly useful to members of council as they can now clearly understand the climate implications of each report to help guide their decision making.

As the City begins implementing programs outlined in this plan, the climate lens will be a good way to keep track of all of the small sustainable changes that are incorporated into regular operations. If there are a lot of reports that feature greenhouse gas intensive outcomes, then the City will have a better idea of additional changes that will need to be made to mitigate those emissions. Overall, the climate lens will be a useful tool to qualitatively monitor the sustainable thinking and effort from staff when working towards these goals.

Climate Change Committee

The City's Climate Change Committee will play a key role in the monitoring process. Typically, the committee meets every 2 months to discuss current climate action tasks, review progress on initiatives and propose new ideas. As the City begins implementing the reduction measures outlined in this plan the Climate Change Committee will be involved with monitoring progress and keeping each project on track. Their expertise on sustainability and climate change topics makes them the perfect sounding board to help guide the implementation of this plan. Since a large part of this plan is continuing to research and form reduction programs that will help the City reach its targets, these committee meetings will be important for proposing, discussing, and hatching out the details of new projects. Ultimately, the Climate Change Committee will be used to ensure that the City takes ambitious steps forward and continues to prioritize efforts that will help them to reach their climate goals.

REDUCTION TIMELINE

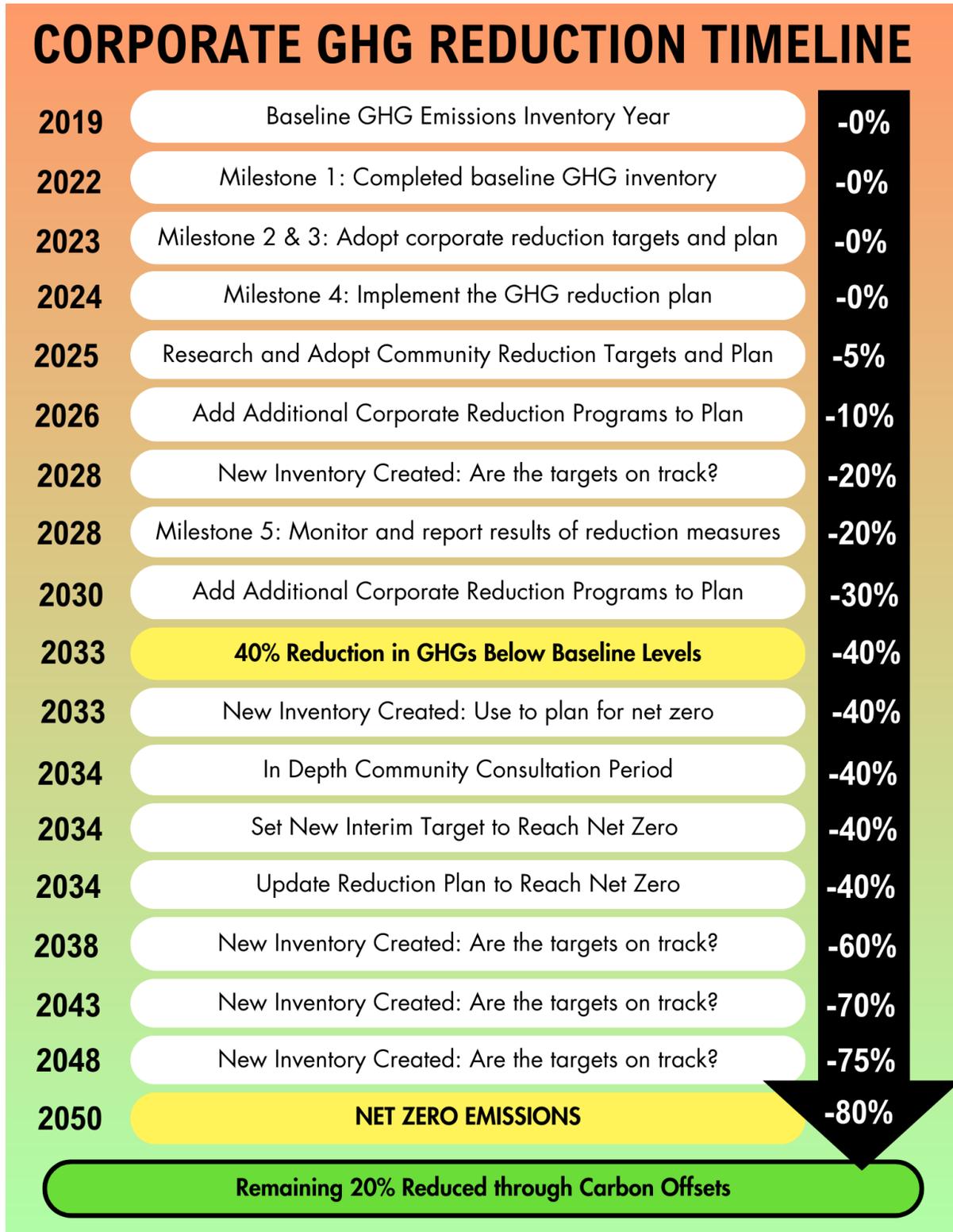


Figure 08: Maps out the corporate GHG reduction timeline deliverables to 2050.