



Greater Peterborough Area Climate Change Action Plan

**Township of Otonabee-South Monaghan
Partners for Climate Protection Milestone 4 & 5 Report
Corporate Sector Implementation, Monitoring and Reporting Results**

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Section 1: Introduction

The effects of climate change are projected to intensify over the next decade. Peterborough County's annual average temperature is projected to rise 2.1°C to 4.2°C above current levels (Appendix A). A changing climate will exacerbate extreme weather events as the following risks will become more prevalent:

- Heightened frequency of severe rainfalls and wind storms
- Mean winter temperatures in 2030 to rise from -7°C to -4.9°C
- A 20% rise in 10-year storm rain events projected by 2030
- Days above 30°C to increase to 23 days from 6 days by 2030
- Chance of freezing rain events 40% more probable in winter

In 2018, the United Nation's Intergovernmental Panel on Climate Change (IPCC) released a special report urging mitigation of greenhouse gas (GHG) emissions to limit the global average temperature increase to only 1.5°C from the current 1°C of global warming. The IPCC recommends that a decrease in GHG emissions of 45 percent from 1990 levels by 2030 is necessary to prevent the worst implications of climate change. At present national commitment levels, a 3°C rise in global heating is forecasted by the year 2100.

The good news is that climate change can still be managed that restrains the worst effects, but immediate action is critical. Municipalities have within their authority the ability to influence positive climate stewardship among its operations and the communities they serve. By leading by example, municipalities can demonstrate this positive approach to climate actions by curtailing GHG emissions from all corporate facilities and assets. By ratcheting down, all GHG emissions originating from corporate assets will reduce Otonabee-South Monaghan's overall contribution as a source of climate change.

Section 2: Overview

Background

In 2012, the City and County of Peterborough, the eight-member Townships, Curve Lake First Nation, and Hiawatha First Nation adopted the Greater Peterborough Area Integrated Community Sustainability Plan, coined Sustainability Peterborough Plan. Within this Plan, climate change was identified as one of the eleven key theme areas.

In 2014, each of the twelve Greater Peterborough Area (GPA) member communities came together to develop a Climate Change Action Plan (CCAP), designed to reduce local contributions to climate change while preparing the community for future changes. They joined a network of more than 250 other communities across Canada to address climate change through participation in the Federation of Canadian Municipalities' Partners for Climate Protection (PCP) program. The PCP program aims at reducing GHG emissions from both

municipal/First Nation operations (“corporate” emissions) and the community at large (“community” emissions). The program uses a five-milestone (Table 1) framework:

Table 1. Partners for Climate Protection Milestone Framework

	Milestone Description	Status
Milestone 1	Create a greenhouse gas emissions inventory & forecast	completed 2015
Milestone 2	Setting an emissions reductions target	completed 2016
Milestone 3	Developing a local action plan/CCAP	completed 2016
Milestone 4	Implementing the local action plan	underway 2019
Milestone 5	Monitoring progress & reporting results	underway 2019

Milestone 1 – Otonabee-South Monaghan GHG Emissions Inventory and Forecast

The CCAP established a 2011 GHG emission baseline (Table 2). As outlined in the Milestone 1 report (<https://sustainablepeterborough.ca/wp-content/uploads/2015/11/CCAP-Township-of-OtonabeeSouth-Monaghan-PCP-Milestone-1-Report-FINAL.compressed.pdf>), the total Corporate Sector emissions for the Township of Otonabee-South Monaghan (OSM) was 499 tonnes of carbon dioxide equivalent (tCO₂ e).

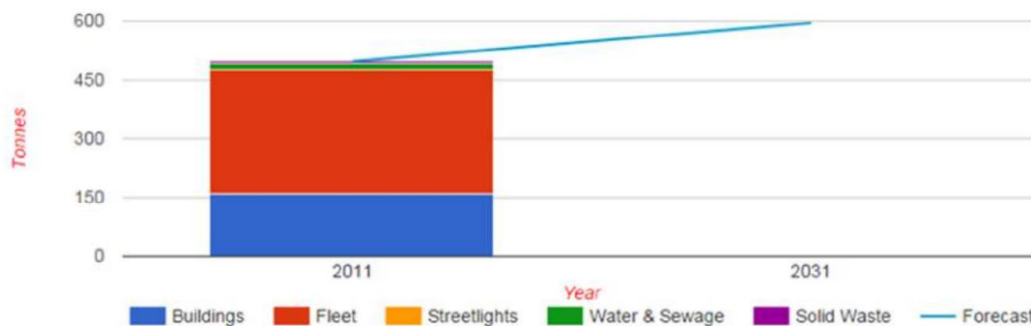
Table 2. Otonabee-South Monaghan Milestone 1 GHG Emission Sources

Sector	Emissions (tCO ₂ e)	Source	Emissions (tCO ₂ e)
Buildings	160	Natural Gas	29
Fleet	316	Electricity	86
Water & Sewage	16	Gasoline	173
Streetlighting	2	Diesel	143
Solid Waste	5	Propane	41
Total	499	Fuel Oil	20
		Solid Waste	5
		Total	497

(Note: totals are not equal due to rounding)

A business-as-usual (BAU) forecast is an estimate of annual GHG emissions coupled with population growth to project emissions that would have occurred in the absence of regulation in the Township. The BAU forecast for the corporation is based on annual growth rates derived from official population projections (Figure 1). It was assumed that the associated corporate emissions would increase with population growth – this aligns with standard PCP methodology for creating BAUs. Projected emissions from the municipality are slated to increase to 389,587 tCO₂ e per year by 2031, compared to 349,736 tCO₂e per year in 2011.

Figure 1. Otonabee-South Monaghan Baseline Emissions



Milestone 2 – Setting an Emissions Reduction Target

In 2016, Otonabee-South Monaghan completed Milestone 2 that established a GHG emissions reduction target. A corporate sector GHG emissions reduction target of 25 percent was created using 2011 as the baseline year. This reduction target is equivalent to removing 125 tCO₂ e from municipal operations by 2031, compared to their 2011 baseline level of 499 tCO₂ e emitted per year.

Milestone 3 – Developing a Local Action Plan/CCAP

One of the key requirements of the completion of Milestone 3 was the adoption of both the Corporate Sector and Community Sector emissions reductions targets and the Action Plan by the respective Council. On March 21, 2016, the Council of the Township of Otonabee-South Monaghan passed Motion R524-2016:

“That the Council of the Township of Otonabee-South Monaghan hereby receives the presentation on Sustainable Peterborough - Climate Change Action Plan for information; and further Council hereby adopts both the Corporate and Community GHG Reduction Targets and Local Action Plans and will work with CCAP on implementation and next steps.”

The CCAP outlined nine overarching strategies to remove 125 tCO₂ e from municipal operations by 2031. Planning, tracking, and evaluating the actions and projects that reduce GHG emissions are required to understand and monitor progress against its GHG emission commitment target. Evaluating corporate mitigation successes will enable policymakers to decide what initiatives or new strategies could be enacted to limit further emissions.

The CCAP was developed to outline the potential actions to assist the Township in achieving its emissions reduction targets. Further details on specific strategies are provided in the Milestone 2 and 3 Report (<https://sustainablepeterborough.ca/wp-content/uploads/2016/11/Chapter-8-Otonabee-South-Monaghan-Community-and-Corporate-Climate-Action-Plans-FINAL.pdf>).

Section 3: Milestone 4 – Implementation of the CCAP

The implementation of climate change mitigation and adaptation strategies is a continual process in the effort to reduce GHG emissions from corporate assets. Since 2011, Otonabee-South Monaghan has striven to incorporate many of the nine strategies outlined in the CCAP. In 2019, the township submitted its *Energy Management Plan (Revised)* document to the Ontario government compliant with O. Reg. 397/11 (previously known as 397/11), which delineated completed actions as well as recommitting the township to energy conservation and GHG reduction (Appendix A). The following (Table 3) presents completed corporate actions that the municipality has achieved to date.

Table 3. Completed and Ongoing Corporate Mitigation and Adaptation Actions

CCAP Corporate Strategy	Action Description	Year	Quantifiable GHGs Saved
Strategy 7: Deliver preventative water maintenance	Culverts upgraded to handle heightened water flows during extreme weather events	2012	
Strategy 5: Utilize renewable energy sources	Installed solar speed indicators on municipal roads	2013	
Strategy 5: Utilize renewable energy sources	Council approved two MicroFIT applications within the township	2013	
Strategy 4: Enhance operational efficiency	Streetlight and building lighting audits conducted	2013	
Strategy 8: Improve energy of streetlighting system	LEDs installed in Keene, Stewart Hall, and Bailieboro.	2015	0.25 tCO ₂ e (6,365 kWh)
Strategy 4: Improve the performance of existing buildings	LEDs incorporated at Keene ice rink	2015	1.3 tCO ₂ e (35,360 kWh)
Strategy 4: Enhance operational efficiency	At Township Office insulation upgraded, a more energy-efficient HVAC system installed, and water heater replaced with a new model	2015	
Strategy 4: Enhance operational efficiency	Exterior lighting system upgraded to LED at Fire Station 1	2016	0.03 tCO ₂ e (884 kWh)
Strategy 4: Enhance operational efficiency	Heat recovery unit installed at the OSM Community Centre	2016	
Strategy 4: Enhance operational efficiency	LEDs installed at Bailieboro and Keene Libraries, and the Keene Medical Centre	2016	0.4 tCO ₂ e (11,050 kWh)
Strategy 2: Improve equipment efficiency	HVAC was cleaned at the Keene Medical Centre and the furnace scoured at the Bailieboro Library	2016	
Strategy 4: Enhance operational efficiency	Lions Den attic reinsulated to improve energy efficiency	2016	

Strategy 4: Enhance operational efficiency	OSM Community Centre equipped with a new energy plant	2017	
Strategy 1: Institutionalize energy efficiency/low carbon thinking	Implemented procurement by-law with explicit reference to energy-efficiency for future projects and programs	2017	
Strategy 4: Enhance operational efficiency	Insulation and lighting upgrades at the Keene and Elgeti/Crystal Springs pump houses	2017	0.02 tCO ₂ e (530 kWh)
Strategy 1: Institutionalize energy efficiency/low carbon thinking	Implemented procedures to shutdown facilities nightly that are not being occupied	2017	
Strategy 4: Enhance operational efficiency	Insulation improvements at Stewart Hall Community Centre	2017	
Strategy 4: Enhance operational efficiency	Using non-potable water for ice making at OSM Community Centre, thereby saving energy by not treating water	2017	
Strategy 4: Enhance operational efficiency	Automatic lighting system installed at Keene Library, OSM Community Centre, and Stewart Hall	2017	
Strategy 7: Water service energy efficiency	Variable speed drive pumps installed at Keene and Stewart Hall drinking water systems	2018	2.5 tCO ₂ e (69,800 kWh)
Strategy 4: Enhance operational efficiency	Energy-efficient upgrades to chilling equipment, pumps, ice compressor, and electric motors at the OSM Community Centre.	2018	
Strategy 1: Institutionalize energy efficiency/low carbon thinking	Developed standard procedures for communicating energy-efficiency to all staff	Ongoing	
Strategy 1: Institutionalize energy efficiency/low carbon thinking	Continue to investigate energy-efficiency opportunities and energy audits	Ongoing	

Section 4: Milestone 5 – Monitoring Progress & Reporting Results

This progress report used 2018 data provided by Otonabee-South Monaghan to ascertain how the municipality is achieving its mitigation goals with respect to its CCAP.

Corporate Emission Reduction Progress in 2018

The corporate review revealed that Otonabee-South Monaghan rose by 12 percent above the baseline (Table 4) and increased by 63 tCO₂e from all its emission sources, as illustrated in Figure 2.

Table 4. Township Greenhouse Gas Emission Source from 2011 to 2018

Emission Source	2011 GHG (tCO ₂ e)	2018 GHG (tCO ₂ e)	Percent Difference
Buildings (Electricity, natural gas, propane, fuel 1&2)	159	184	15%
Streetlights (Electricity)	2	0.25	-87%
Transportation (Diesel & gasoline)	317	375	18%
Waste (Organic matter emissions)	5	2	-60%
Water Treatment (Electricity)	16	1	-93%
Totals	499	562	12%

Figure 2. 2018 GHG Emissions Compared Against the BAU and CCAP Target

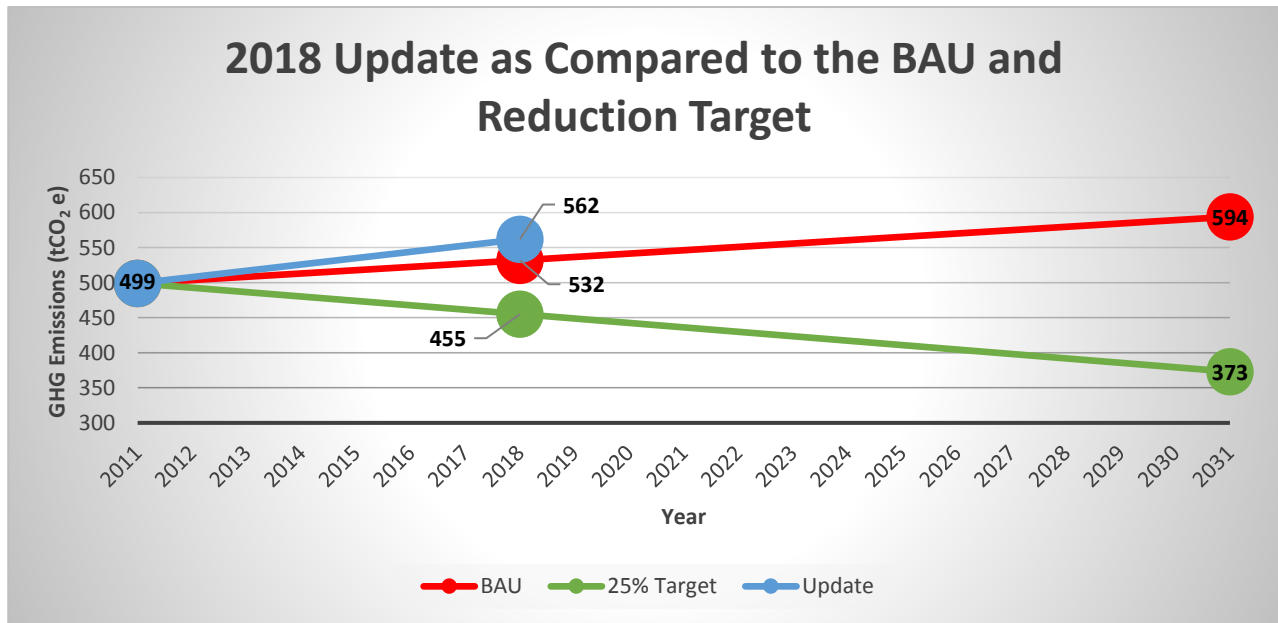


Figure 2. The Business-as-usual (BAU) emission projections as compared to the Reduction Target goal is outlined until 2031. 562 tCO₂ e is the current emission attributed to OSM in 2018.

Corporate Consumption Analysis and Discussion

Assessing energy and fuel consumption rates for all emission sources in Otonabee-South Monaghan may reveal connections outlined within the corporate mitigation strategies found in the CCAP. Table 5 describes the individual contribution from each energy source to its associated sector.

Table 5. Otonabee-South Monaghan Consumption Data per Sector

2011 Consumption	Natural Gas (m ³)	Electricity (kWh)	Propane (L)	Heating Oil (L)	Gasoline (L)	Diesel (L)
Buildings	15,542	624,881	26,865	7,393		
Water		147,562				
Streetlights		13,720				
Vehicles					74,228	52,820
Totals	15,542	697,517	26,865	7,393	74,228	52,820

2018 Consumption	Natural Gas (m ³)	Electricity (kWh)	Propane (L)	Heating Oil (L)	Gasoline (L)	Diesel (L)
Buildings	70,944	615,118	20,062	2,851		
Water		67,987				
Streetlights		14,412				
Vehicles					30,112	114,114
Totals	70,944	697,517	20,062	2,851	30,112	114,114

Sector: Corporate Facilities

Electricity

Analyzing electricity consumption (Figure 3) from all corporate facilities between 2011 and 2018 was found to have an 11 percent decrease in electricity usage. The sizable decline in electricity consumption can be attributed to the closure of the Crystal Spring pump house, which closed during this review period. Extensive LED lighting retrofits occurred as well as institutionalized low carbon training that changed staff behaviour to consider the impact of energy use.

In addition to the reduction in consumption, corporate GHGs associated with electricity abated by 51 tCO₂ e as a result of the closure of all of Ontario's coal powerplants starting in 2013 that decarbonized the electrical grid. This resulted in a fivefold decrease in associated GHGs linked to Ontario electricity production since 2011 (Table 6).

Figure 3. Electricity Consumption

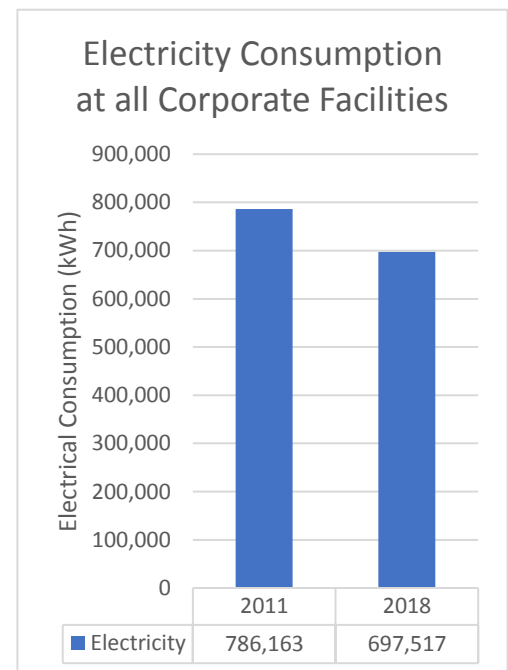


Table 6. Ontario Grid Associated GHG Emissions

The shuttering of coal powerplants has made the entire electrical grid throughout the province a much greener option today than the one found in the baseline year. However, it should be noted that the Ontario grid still maintains natural gas-fired powerplants in its energy mix that are significant contributors to GHG emissions

Year	Emission Factor (kgCO ₂ e)
2011	0.098040
2014	0.040011
2016	0.035548
2017	0.017298

(IESO, 2019). More natural gas powerplants are scheduled to come online over the coming years to offset refurbishments of Ontario's nuclear powerplants. This will result in the emission factors outlined in Table 6 to rebound and thereby negatively affect the gains found in electricity's decarbonization. Ultimately, corporate electricity emissions will increase in the following years until the restoration of Ontario's nuclear capacity is reinstated.

Natural Gas

Natural gas was found to have a 78 percent increase overall (Figure 4). This increase can be credited to Enbridge Inc.'s expansion of natural gas lines into the township, which linked three new corporate facilities in 2014. Also, higher demand from two facilities was observed, likely due to both buildings being commissioned during data collection for the baseline. Lastly, two additional buildings that use natural gas were uploaded to the municipality since 2011.

Corporate GHG emissions associated with natural gas usage intensified by 133.7 tCO₂ e from 29.3 tCO₂ e due to this expansion in service and additional buildings coming online.

Figure 4. Natural Gas Consumption

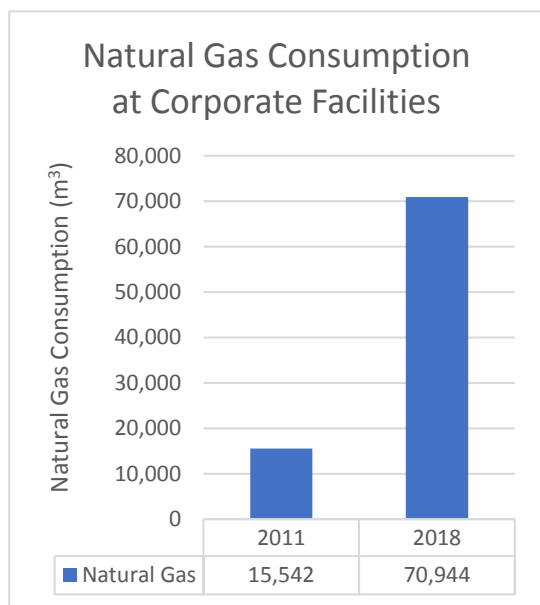
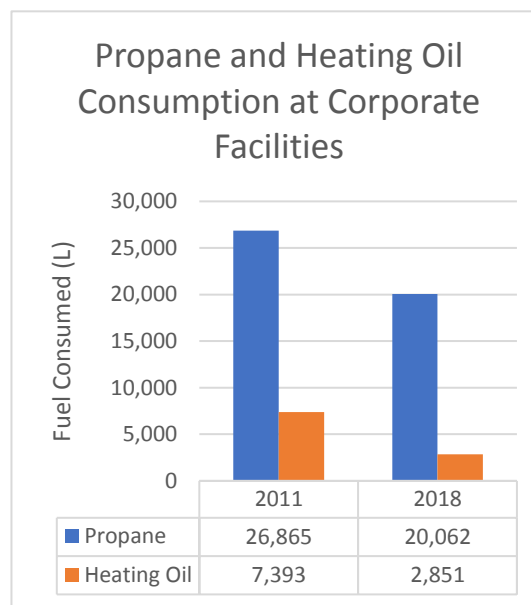


Figure 5. Propane & Heating Oil Consumption



Propane & Heating Oil

Evaluating heating oil revealed a 61 percent decrease in fuel consumption, which is due to two corporate buildings eliminating oil as its heating source for natural gas (Figure 5). During this review period, propane declined by 25 percent as a result of one facility disconnecting service.

This reduction in usage translates to a retreat in GHG emissions of 9 tCO₂ e and 12 tCO₂ e for propane and heating oil, respectively.

Sector: Water

The water infrastructure in Otonabee-South Monaghan saw a drop in electricity of 54 percent (Figure 6) during the review period. This sizable retraction of usage is because of the closure of the Crystal Springs pump house.

With the decommissioning of the pump house and the decarbonization of the electrical grid, GHG emissions released were lowered to 1 tCO₂ e from 16 tCO₂ e during this review period.

Sector: Streetlights

Streetlights had a slight increase in electricity usage of 5 percent since 2011 (Figure 7). No new lighting standards were installed to explain this marginal rise in consumption.

As previously stated in the preceding corporate sector reviews, the decarbonization of the Ontario electrical grid aided in reducing streetlighting emissions by 87 percent.

Sector: Corporate Fleet and Staff Travel

The corporate fleet (Figure 8) was found to have a 54 percent increase in diesel usage as opposed to a 59 percent decrease in gasoline consumption. This shift in fuel use is a direct result of the purchasing of three new diesel vehicles for the corporate fleet, which replaced three old gas-fuelled trucks. Staff travel did not significantly change during this review period.

Figure 6. Electricity Consumption

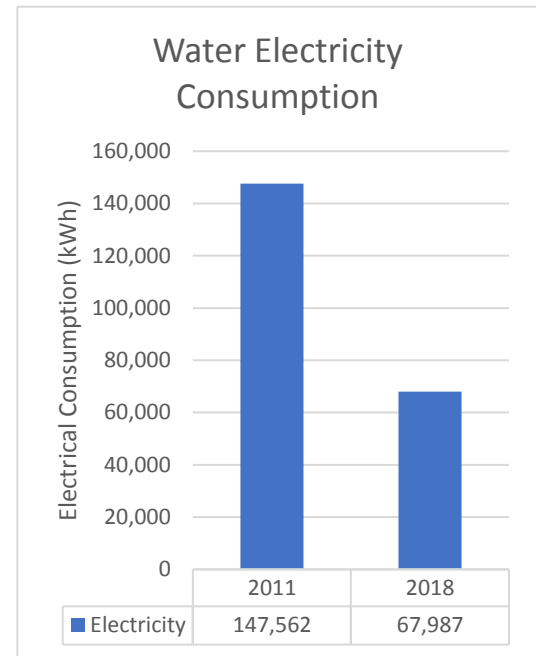


Figure 7. Electricity Consumption

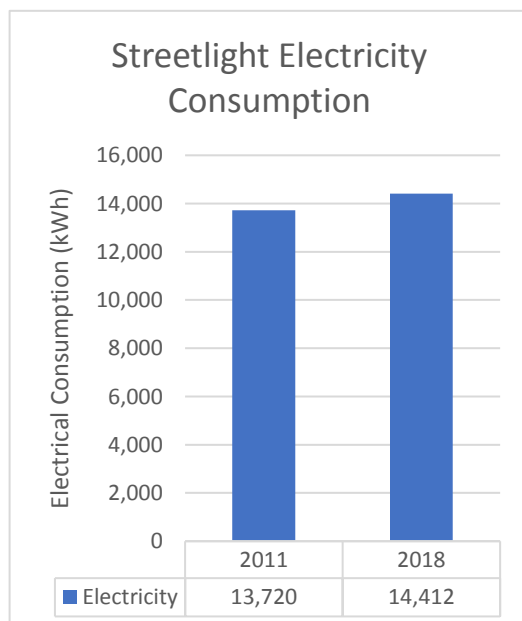
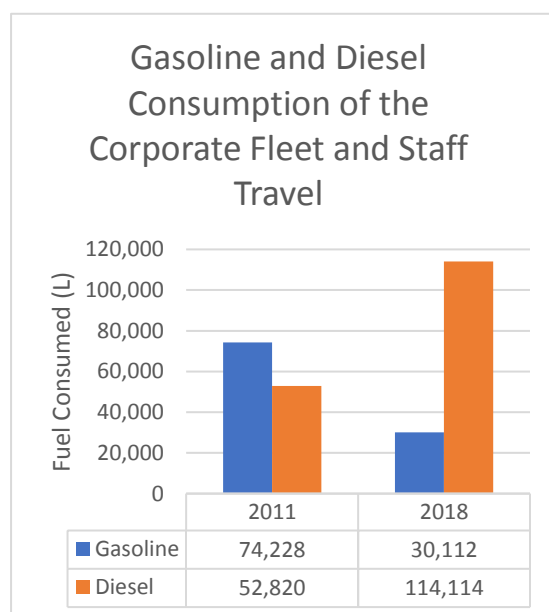


Figure 8. Vehicle Fuel Consumption



Sector: Corporate Waste

A 21-tonne decrease in corporate waste sent to the landfill in 2018 was recorded (Figure 9). This reduction can be explained by the diversion of organic waste to composting bins located at the community centre and other corporate facilities. This was achieved by educating staff about recycling and composting strategies, which greatly assisted in enhancing the diversion rate of organics and recyclable materials away from the landfill.

Lastly, this report could not ascertain exact fugitive methane gas leakage from the Peterborough County/City Landfill, so an assumption of 75 percent of methane collection was used. Of the waste that was sent to landfill, the composition ratio of organic material was updated to reflect recent waste audit figures conducted by the County Waste Management Department (Table 7).

Figure 9. Total Waste Tonnage

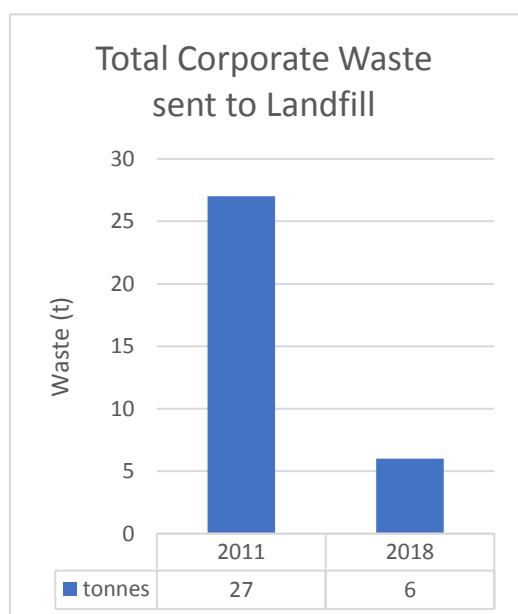


Table 7. Waste Composition

Waste Composition (%)		
Type	2011	2018
Food scraps	16	35
Garden/plant	0.8	2
Paper/cardboard	10	11
Wood products	3	5
Textiles	5	6

Future Corporate Actions

The following is a renewed timeline for Milestone 3 corporate actions as of this report. The timeframe has been adjusted to omit long-term action due to that range nearing the 2031 target.

Table 8. Projected Timeline for Corporate Mitigation Actions

Township of Otonabee-South Monaghan Corporate Action Plan	Timeframe			
	Completed	Ongoing	Short (1-5 years)	Medium (6-10 years)
Buildings				
Strategy 1: Institutionalize energy efficiency and low carbon thinking into the organization				
Implement employee training for energy efficiency		X		
Implement staff behaviour change programs to reduce the usage of electricity and heating in day-to-day activities		X		

Establish a policy to consider the highest energy efficiency as part of procurement requirements and evaluation		X		
Monitor incentive programs offered through utilities and other third-party funding sources to be leveraged for implementing energy efficiency improvements		X		
Strategy 2: Enhance Operational efficiency of existing buildings				
Develop and deliver an equipment preventative maintenance program on an ongoing basis		X		
Continue to implement an energy management plan and regularly update (every five years)		X		
Conduct regular energy audits of Township facilities on a rotational basis to identify opportunities for improved efficiency and produce annual energy report cards		X		
Investigate to identify any gas leaks and repair as necessary		X		
Continue to implement the utility bill validation process to identify and correct any billing issues and variations in energy usage		X		
Strategy 3: Build municipal facilities to ensure high environmental performance				
Establish a Green New Building Policy to require new municipal buildings and significant renovations be built to high environmental standards		X		
Install geothermal heating and cooling systems for new buildings and significant renovations if feasible		X		
Establish a Green New Building Policy to require new municipal buildings and major renovations be built to high environmental standards		X		
Strategy 4: Improve the environmental performance of existing municipal facilities				
Conduct energy audits/assessments of each facility to identify opportunities to improve energy efficiency		X		
Continue implementation of interior and exterior LED lighting retrofit program in facilities where feasible	X			
Install programmable thermostats and occupancy sensors in all facilities where feasible	X			
Replace appliances with Energy STAR-rated appliances as needed	X			
Upgrade insulation/building envelope while conducting other essential building work (where feasible)		X		
Continue to replace windows and doors with high efficiency according to replacement schedule/need		X		
Replace mechanical equipment with high efficiency according to replacement schedule/need		X		
Convert electric hot water heaters to natural gas		X		
Strategy 5: Utilize renewable energy sources				
Continue to seek and implement opportunities for solar voltaic panels and other renewable energy options at all municipal facilities		X		

Fleet				
Strategy 6: Transition the municipal fleet to be more efficient and less carbon-emitting				
Formalize and continue with a preventative maintenance program for vehicles and equipment		X		
Ensure that the Procurement Policy consists of a replacement schedule that considers the following: a) right-sizing vehicle/ appropriate vehicle class through replacement schedule b) transitioning to low emission and alternative fuel vehicles c) use of anti-idling technology d) fuel and vehicle performance monitoring		X		
Implement an operator training and education program		X		
Explore conducting vehicle/fuel performance audits		X		
Water & Sewage				
Strategy 7: Enhance the operational efficiency of the water services system				
Upgrade drinking water supply system pumps to variable speed	X			
Upgrade remaining mechanical equipment as per replacement schedule		X		
Continue to deliver preventative maintenance program		X		
Continue to deliver operator training and education program		X		
Continue to monitor and track the energy performance		X		
Streetlighting				
Strategy 8: Improve energy efficiency of the streetlighting system				
Retrofit all street lighting and parking lot lighting to LED	X			
Retrofit street signage to be solar powered		X		
Solid Waste				
Strategy 9: Reduce the amount of organic waste generated through municipal operations				
Continue to participate in office waste reduction and diversion initiatives		X		
Continue to collect organic waste from Township offices and manage in backyard composters		X		
Conduct a corporate waste audit to understand the waste composition and identify opportunities for improvement		X		
Explore enhancing the waste diversion program for all facilities and parks		X		
Develop/formalize a corporate waste diversion target and strategy		X		
Develop and implement a corporate green procurement policy		X		
Develop and implement a green event program		X		

Decision-making Process

Developing and implementing climate actions is well entrenched in Otonabee-South Monaghan because of the Township Council Resolution Motion R524-2016. This resolution has led to the operationalization by senior management and staff in carrying out actions. Township staff currently plan and implement specific actions that are dependent on the municipal budgetary cycle, external incentives and grants, regional leadership and best practices, and end-of-life replacement schedule. All these factors dictate the level of climate action realization within the township.

Asset Management

In 2017, the province passed Ontario Regulation 588/17, requiring municipalities to develop and adopt a Strategic Asset Management Plan (AMP) by July 1, 2019. The AMP requires climate change to be considered for all assets. The inclusion of energy-related factors in the AMP would promote energy conservation as a priority in the municipal budget and longer-term financial planning.

Conclusion

With the adoption of the Climate Change Action Plan on March 2016, the Township of Otonabee-South Monaghan committed to reducing its corporate sector GHG emissions by 25 percent below the 2011 baseline levels by 2031. Instead, the municipality has witnessed a rise in GHG emissions by 12 percent or 63 tCO₂ e. The inclusion of two new buildings into the corporate asset ledger, whereby expanding the total corporate square footage, has played a part in this upturn in emissions. Natural gas consumption surpassed the gains found in electricity's decarbonization, which hampered meeting the reduction target. Lastly, replacing the corporate fleet with new diesel vehicles exacerbated emissions.

To counteract the growth in emissions, the Township can enact more strategies found in the CCAP. Removing the remaining facilities heated by propane and heating oil and replacing those with electric heat is an option to lower emissions by approximately 35 tCO₂ e. Continue to right-size the fleet, driving less often, and maximizing route efficiency is another recommendation to decrease fuel use. Last, continue building re-insulation and window/door replacement programs to increase the energy efficiency of corporate buildings that will lessen natural gas consumption.

The Township has already engaged in and accomplished many initiatives outlined in the CCAP since 2011. With 2031 fast approaching, more action towards the path of decarbonization to ensure that the Township reaches its 25 percent reduction target is needed.

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Appendix A

Future Climate Projections

*Refer to for more information: https://www.peterborough.ca/en/city-hall/resources/Documents/Climate-Science-Report_Peterborough_Sep17-2018.pdf

Energy Conservation and Demand Management Plan 2019-2023

*Refer to for more information: <http://www.osmtownship.ca/en/township-hall/Energy-Management-Plan.aspx>