City of Peterborough

To:	**Members of the General Committee**
From:	**Cynthia Fletcher** **Commissioner of Infrastructure and Planning Services**
Date:	**June 7, 2021**
Subject:	**Report IPSIM21-018** **Reduction of Corporate GHG Emissions Progress Report**

Purpose

To provide a progress update on the Reduction of Corporate GHG Emissions.

Recommendations

That Council approve the recommendations outlined in Report IPSIM21-018 dated June 7, 2021, of the Commissioner of Infrastructure and Planning Services, as follows:

That Report IPSIM21-018 be received for information.

Budget and Financial Implications

There are no budgetary or financial implications associated with the recommendation.

Background

GHG Reduction Targets

In December 2016, Council approved the recommendations of Report CSD16-031 – Adoption of the Climate Change GHG Reduction Targets and Action Plans. This report adopted a greenhouse gas (GHG) emission reduction target of both Community and Corporate Sector emissions of 30% from the 2011 baseline levels by 2031 as budgets permit.

In September 2019, Council declared a Climate Emergency "for the purpose of naming, framing and deepening our commitment to protecting our community, its economy, and its ecosystems from climate change." The declaration recognized "the need to achieve a target of 45% GHG emission reduction by 2030 and net-zero by 2050."

In March 2020, Report IPSIM20-003 – Climate Change Initiatives Update provided Council with an update on the various climate change initiatives completed and in progress. At the March 30, 2020 meeting of Council, Council endorsed achieving a Corporate reduction in GHG emissions of 45% by 2030 and requested annual progress reports.

This report is intended to provide an update on the City's progress to achieving a 45% reduction of Corporate Sector GHG emissions from 2011 levels by 2030.

Understanding Corporate and Community Sector GHG Emissions

GHG emissions that result from the municipal operations of the City of Peterborough are defined as Corporate Sector emissions. These emissions result from the day-to-day operations by the municipality to deliver services to the community and include:

- methane gas generated through the decomposition of waste at the landfill;
- gasoline and diesel fuel used in fleet vehicles and equipment owned and operated by the City;
- natural gas used for space and water heating at facilities owned and operated by the City (including the wastewater treatment plant); and
- indirect emissions from generating the electricity used in municipal facilities and streetlights.

The City of Peterborough has control over the Corporate GHG emission profile and can impact these through municipal decision-making.

Community Sector emissions arise from the activities of residents and businesses living and operating in the City. These emissions result from:

- fossil fuel use (primarily natural gas) for residential home heating;
- gasoline and diesel fuel used in personal vehicles for transportation;
- fossil fuels used by commercial and industrial operations (fleets & buildings); and
- indirect emissions from generating the electricity used in residential, commercial and industrial applications.

The City of Peterborough does not have control over the Community GHG emission profile; however, the behaviours and activities that create these emissions can be influenced by municipal policies and programing.

This report focuses on the progress related to GHG reductions for the Corporate Sector.

Corporate Sector GHG Emissions Baseline and Targets

In 2016, the Climate Change Action Plan (CCAP) established a Corporate Sector GHG Emissions Baseline of 2011 with five contributing sectors: Waste, Fleet, Buildings, Wastewater Treatment, and Streetlights. As part of updating the City's progress on achieving the established reduction targets the 2011 Baseline required corrections to three sectors: Waste, Fleet and Streetlights. This included a discrepancy in the amount of solid waste entering the municipally owned and operated Bensfort Road Landfill. Sixty percent of these emissions are attributed to the City since the historical use is approximately 60/40 between the City and the County of Peterborough. This has an impact on the Corporate Sector GHG Emissions Baseline and associated targets.

The corrected 2011 Baseline for Corporate Sector GHG Emissions is presented in Table 1.

Table 1. Original and Corrected Corporate Sector GHG Emissions Baseline (2011)

Corporate Sector	**Original GHG (tCO_2e)**	**Corrected GHG (tCO_2e)**
Waste (Organic matter decomposition)	2,769	10,223
Fleet (Diesel, gasoline)	5,920	5,905
Buildings (Electricity, natural gas)	4,747	4,747
Wastewater Treatment (Electricity, natural gas)	1,085	1,085
Streetlights (Electricity)	608	531
Total	**15,129**	**22,491**

The 2016 CCAP established a 30% reduction from 2011 levels by 2031, and the Climate Emergency Declaration increased that target to a 45% reduction by 2030. These targets are summarized in Table 2.

Table 2. Corporate Sector GHG Emissions Baseline (2011) and Reduction Targets

2011 Baseline	2016 CCAP Emissions Target (30% by 2031)	Climate Emergency Declaration Emissions Target (45% by 2030)
22,491 tCO_2e	**15,744 tCO_2e**	**12,370 tCO_2e**

Corporate Sector GHG Emissions Update

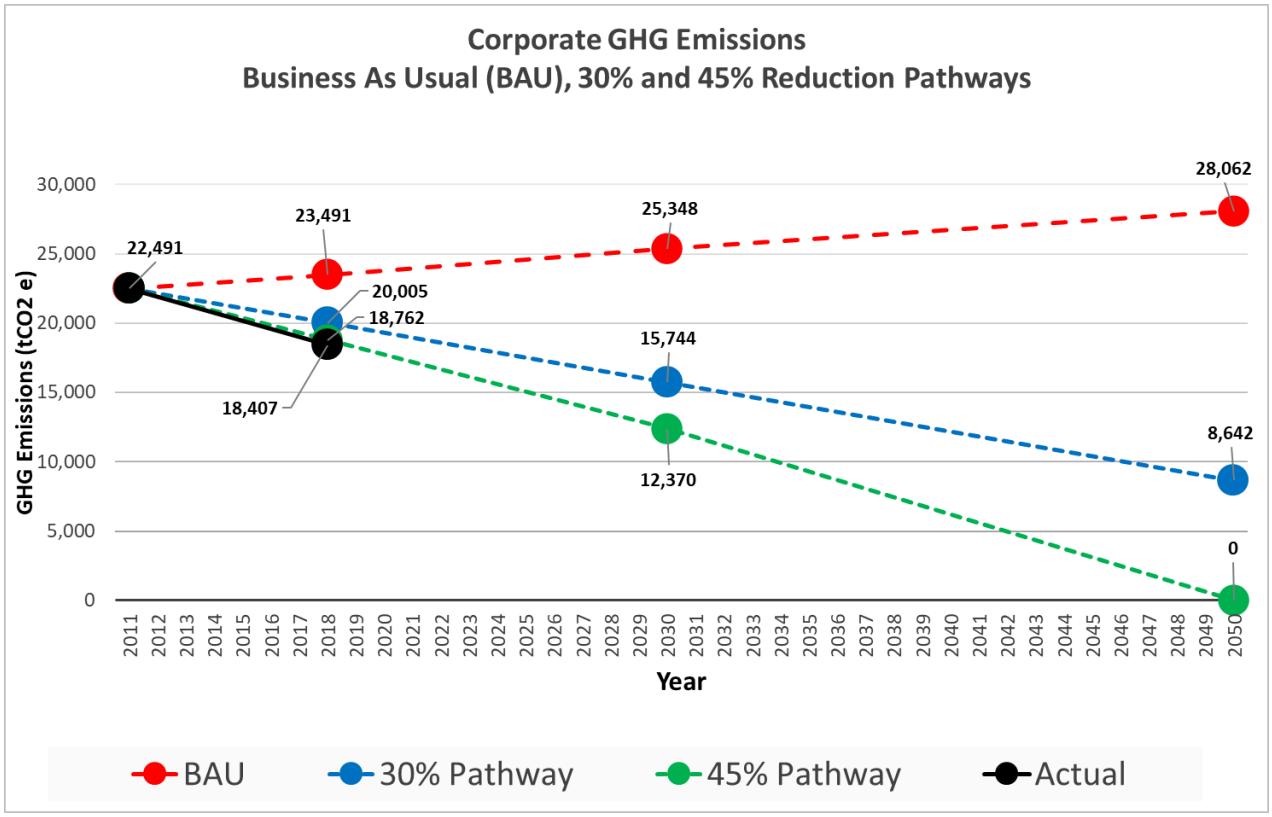
An updated assessment to track progress on achieving GHG emission reductions was completed using 2018 data. This is the most recent reporting year with certified emission factor values to be able to determine the indirect GHG emissions from generating electricity supplied by the Ontario electricity grid. Table 3 shows the progress made in GHG emissions reduction by contributing sector from 2011 to 2018 and includes the percent change.

Table 3. Corporate Sector GHG Emissions (2011 – 2018)

Corporate Sector	**2011 GHG Baseline (tCO_2e)**	**2018 GHG (tCO_2)**	**Change**
Waste	10,223	7,232	-29%
Fleet	5,905	7,234	+22%
Buildings	4,747	3,260	-31%
Wastewater Treatment	1,085	512	-52%
Streetlights	531	169	-68%
Total	**22,491**	**18,407**	**-18%**

From 2011 to 2018, annual Corporate Sector GHG emissions reduced from 22,491 tCO_2e to 18,407 tCO_2e representing a reduction of approximately 18%. Figure 1 shows the Corporate GHG Emissions trend over this period and includes the targets of 45% reduction by 2030 and net-zero by 2050.

Figure 1. Corporate Sector GHG Emissions Trend and Targets (2011 – 2050)



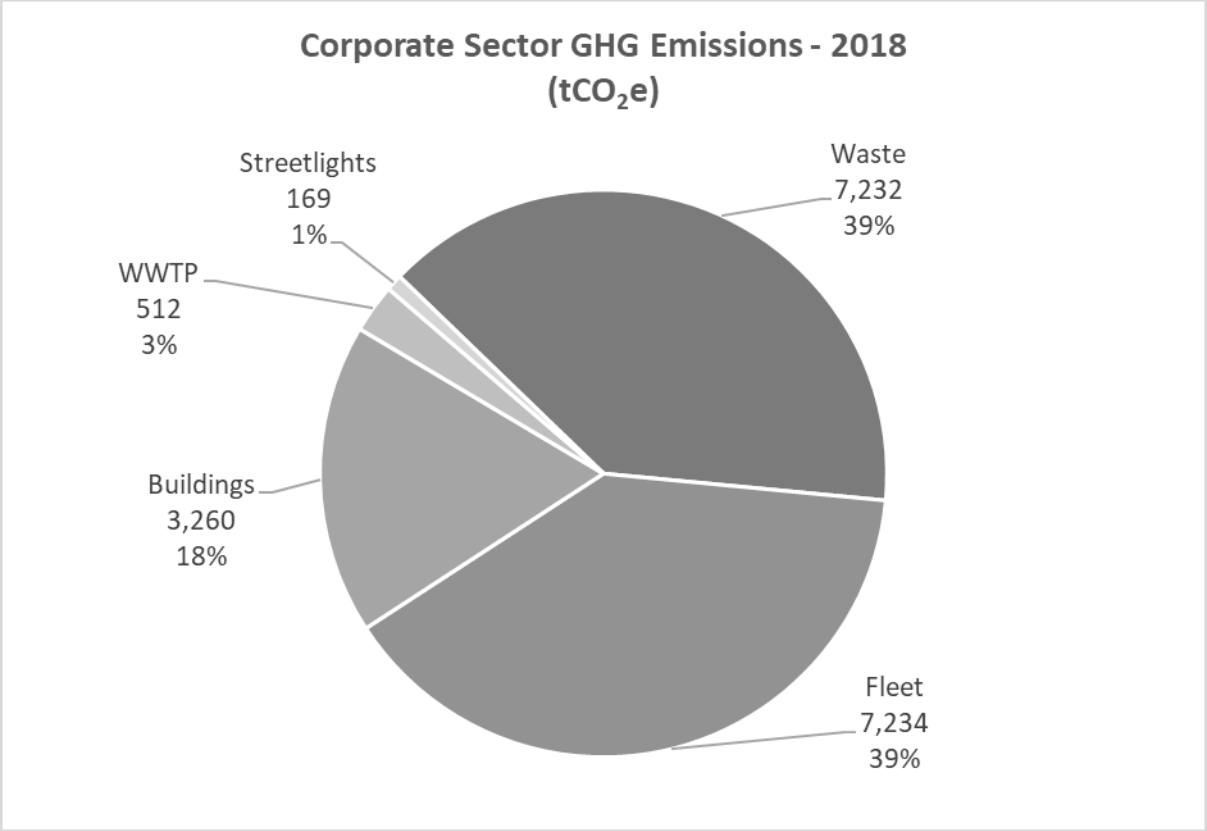
It is important to note that the City has benefited from important GHG reduction initiatives undertaken at the Provincial level. The most significant example is the decarbonization of the provincial electricity grid through the closure of coal-fired power plants from 2005 to 2014 with four of the five provincial coal-fired generating stations closing between 2012 and 2014. This action greatly reduced the GHG emissions resulting from the generation of electricity and the indirect emissions created from using electricity as a result. This example highlights the importance of supporting actions from other levels of governments and indicates that decisions on how electricity is generated in the Province can influence the ability of the City to meet its targets.

Furthermore, these trends highlight the need for focused actions at the municipal level in each of the major contributing corporate sectors to maintain progress towards achieving reduction targets.

Achieving the Corporate Sector GHG Emission Targets

Figure 2 summarizes the proportional contributions of the various corporate sectors to the GHGs emitted in 2018.

Figure 2. Corporate Sector GHG Emissions (2018)



To achieve the 45 percent reduction target in Corporate Sector GHG emissions of 12,370 tCO_2e by 2031 requires annual GHG emissions reductions of 6,037 tCO_2e from 2018. This reduction will need to be achieved primarily through reductions to the top three Corporate Sectors; Waste, Fleet, and Buildings, as these make up ~97% of the Corporate emission profile.

Existing initiatives in progress for the Corporate Waste and Streetlight Sector will achieve a reduction of approximately 1,873 tCO_2e and 73 tCO_2e respectively from 2018 levels as explained below. This would require approximately 4,091 tCO_2e to be reduced from the Fleet and Buildings sectors from 2018 levels. Dividing this reduction proportionally between Fleet and Building sectors would result in a sector reduction target of 2,821 tCO_2e and 1,270 tCO_2e respectively. As existing, proposed and future studies are completed, this distribution will be revisited based on the cost-benefit analysis and implementation plans recommended.

Table 4 summarizes the proposed reductions in Corporate Sector GHG emissions to achieve a 45% reduction by 2030.

Table 4. Projected Corporate Sector GHG Emissions for 45% Reduction (2011 – 2030)

Corporate Sector	2011 GHG Baseline (tCO_2e)	2030 GHG Target (tCO_2)	Change
Waste	10,233	5,359	-48%
Fleet	5,905	4,413	-25%
Buildings	4,747	1,990	-58%
Wastewater Treatment	1,085	512	-53%
Streetlights	531	96	-82%
Total	**22,491**	**12,370**	**-45%**

The following sections describe each Corporate Sector's expected reduction and planned or completed climate actions.

Corporate Sector: Waste

The Corporate Waste Sector contributed approximately 39% of the Corporate Sector GHG emissions in 2018. These emissions result from the operation of the Bensfort Road Landfill due to the methane created from the anaerobic decomposition of organic waste deposited and the proportionately higher impact of methane as a GHG. Report IPSES20-005, outlined the workplan and timelines for the review of waste management programs and options for the future. Council approved that workplan in February of 2020 to include;

- Waste Management Master Plan (2020 – 2022)
- Source Separated Organics Program (2019 – 2023)
- Landfill Comprehensive Review (2024 – 2025

The City has initiated a project to greatly reduce the GHG emissions through the development of the Source Separated Organics (SSO) program in 2023. This program will divert organic waste from the Bensfort Road Landfill to the new Green Resource Organics Works (GROW) facility. This program is one of the comprehensive and ongoing Waste Management bodies of work. Organic waste in the form of textiles, wood products, and soiled paper and cardboard will continue entering the landfill and produce GHG emissions; however, at a reduced rate. This estimate also relies on compliance by residents and businesses diverting organic material out of the landfill stream and into the SSO facility and will be supported by other elements of the Waste Management Workplan.

For climate planning purposes, this report takes a conservative approach in estimating GHG emissions associated with the waste sector. This report considers that all organic matter deposited into the landfill immediately contributes to emitted methane gas from anaerobic decomposition regardless of landfill dynamics or the reaction kinetics of methane conversion from organic waste. This methodology allows for the overall impact of waste diversion and the corresponding landfill methane budget to be assessed on an

annual basis whereas the actual release of methane would take place over a longer period of time and have smaller annual GHG emissions.

This project is estimated to significantly lower annual Corporate Waste Sector emissions to approximately 5,359 tCO_2e by 2030. This represents an approximately 48% reduction in annual GHG emissions from the 2011 Baseline.

Table 5 summarizes the GHG emission reductions projected from 2011 to 2030 for this sector.

Table 5. Projected Corporate Waste Sector GHG Emissions (2011 – 2030)

Waste	2011 (tCO_2e)	2018 (tCO_2e)	2018 Percent Change from 2011	2030 (tCO_2e)	2030 Percent Change from 2011
	10,223	7,232	-29%	5,359	-48%

Corporate Sector: Fleet

The Corporate Fleet Sector contributed 39% of the Corporate Sector GHG emissions in 2018. Since the baseline year of 2011, the fleet has been expanded to provide additional levels of service across multiple departments. This expansion resulted in the increase of Corporate Fleet Sector GHG emissions by 22% since 2011.

The additions to the fleet since 2011 include:

Transit

- Added low-emission diesel buses
- Purchased a community bus

Public Works

- Additional vehicles purchased to support community growth

Other (Police, Fire, Environmental Services, Parking, etc.)

- Added police cruisers due to community growth

Actions to mitigate the GHG Emission increase due to the growth in fleet included:

- Fuel switched 11 accessible vans from diesel to gasoline
- Fuel switched from coloured dyed diesel vehicles to clear dyed diesel (lower SO_x content) and gasoline vehicles
- All police vehicles have been converted from diesel to gasoline

Figure 3 summarizes the Corporate Fleet Sector GHG emissions by service area in 2018 and show that Transit and Public Works fleets combined account for approximately 89% of Fleet GHG emissions.

Figure 3. Corporate Fleet Sector GHG Emissions (2011 – 2018)

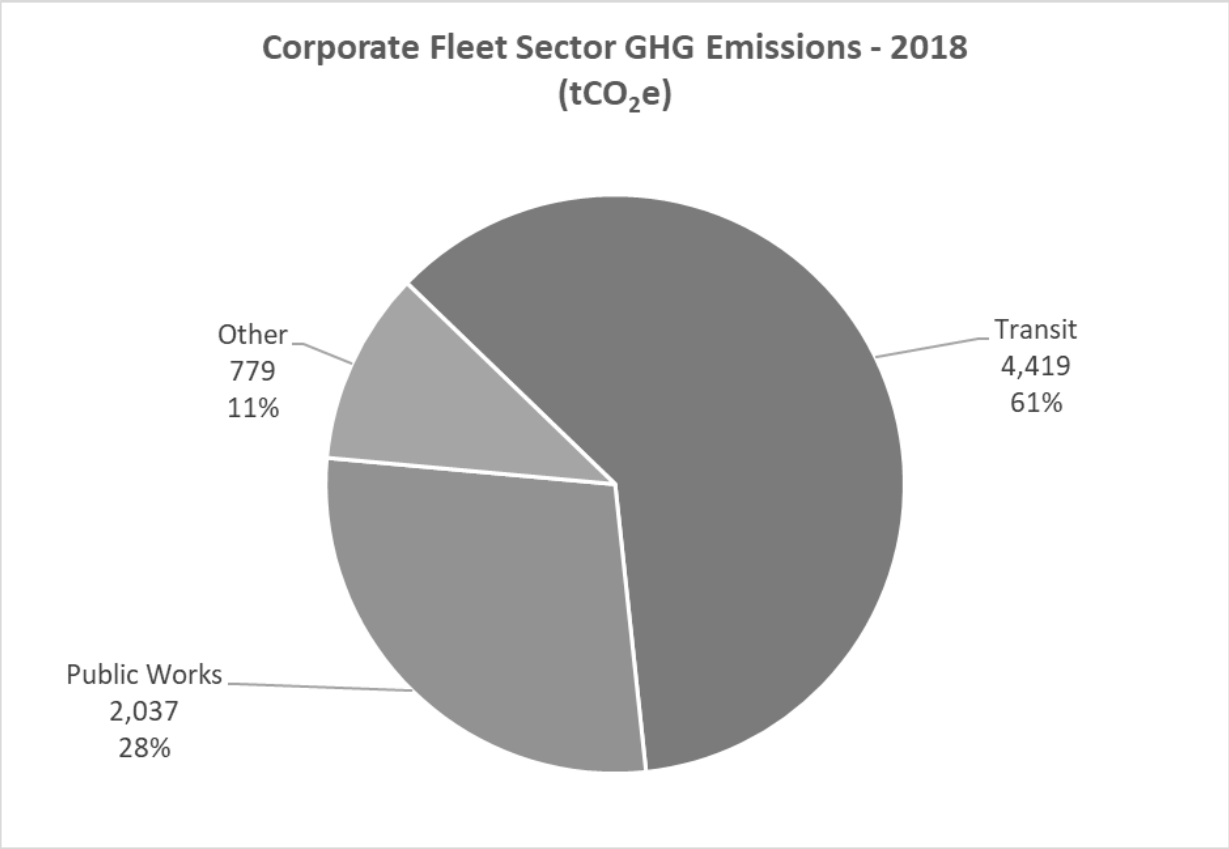


Table 6 summarizes the GHG emission reductions targeted from 2011 to 2030 for this sector to achieve an overall Corporate reduction of 45% by 2030.

Table 6. Targeted Corporate Fleet Sector GHG Emissions (2011 – 2030)

Fleet	2011 (tCO_2e)	2018 (tCO_2e)	2018 Percent Change from 2011	2030 (tCO_2e)	2030 Percent Change from 2011
	5,905	7,234	+22%	4,413	-25%

Corporate Sector: Buildings

The Corporate Buildings Sector contributed 18% GHG emissions in 2018. Since the baseline year of 2011 GHG emissions from building have been reduced by 31 percent.

A portion of these emission reductions were achieved through mechanical system improvements from equipment upgrades and preventative maintenance programs, as well as from building envelope enhancements. However, the primary factor that resulted in lower GHG emissions was the impact from the closure of Ontario's coal-fired generating stations in 2014 as discussed above. The decarbonization of the electrical grid significantly reduced the GHG emission factors associated with electricity production in Ontario from 98 gCO_2e/kWh in 2011 to 31 gCO_2e/kWh in 2018. This

sizable decline has driven most of the Corporate Building Emission reductions recorded in 2018.

However, the Province is planning to increase supply in the electrical grid through the expansion of natural gas-fired generating stations this decade. This will reverse the trend of declining electricity emission factors and they are projected to reach 71 gCO_2e/kWh by 2030[1].

Several building energy renovations between 2013 to 2018 recorded sizable reductions in GHG emissions across multiple facilities. These energy retrofits included:

- Installation of building automated systems at City Hall, Evinrude Centre, and the Main Library
- HVAC upgrades at the Memorial Centre, Kinsmen Arena, Peterborough Sport and Wellness Centre, Art Gallery, and the Main Library
- Key mechanical renovations across all arenas

Table 7 summarizes the GHG emission reductions targeted from 2011 to 2030 for this sector to achieve an overall Corporate reduction of 45% by 2030.

Table 7. Targeted Corporate Buildings Sector GHG Emissions (2011 – 2030)

Buildings	2011 (tCO_2e)	2018 (tCO_2e)	2018 Percent Change from 2011	2030 (tCO_2e)	2030 Percent Change from 2011
	4,747	3,260	-31%	1,990	-58%

Corporate Sector: Wastewater Treatment Plant

The wastewater treatment plant (WWTP) and 13 pumping stations generate 3 percent of corporate emissions. The WWTP has benefitted from the decarbonization of the provincial electricity grid which supported its reduction in 2018 from the 2011 baseline. The 2030 reduction target maintains a business-as-usual scenario until 2030 with the only change coming from the fluctuation of electricity emission factors.

Table 8 summarizes the GHG emission reductions targeted from 2011 to 2030 for this sector to achieve an overall Corporate reduction of 45% by 2030.

Table 8. Targeted Corporate Wastewater Treatment Sector GHG Emissions (2011 – 2030)

Wastewater Treatment	2011 (tCO_2e)	2018 (tCO_2e)	2018 Percent Change from 2011	2030 (tCO_2e)	2030 Percent Change from 2011
	1,085	512	-53%	512	-53%

[1] The Atmospheric Fund. (2019). A Clearer View of Ontario's Emissions. Retrieved from: https://taf.ca/wp-content/uploads/2019/06/A-Clearer-View-on-Ontarios-Emissions-June-2019.pdf

It is anticipated that advances in wastewater treatment technology will continue to improve and present energy recovery opportunities and these will be considered in future master planning exercises.

Corporate Sector: Streetlights

Streetlighting contributed approximately 1 percent of Corporate Sector GHG emissions in 2018. This sector is dependent on the same provincial electrical grid's GHG emission factors that was noted in the discussion on the Corporate Building Sector. In 2018, streetlights underwent a conversion from metal halide to LED luminaires. The energy consumption after the transition lowered energy usage by 54% or 3,090,000 kWh in 2019. The installation of adaptive lighting controls further decreased electricity use by an additional 96,000 kWh. The final round of streetlighting conversion will retrofit the remaining decorative lighting downtown to further reduce streetlighting emissions. After every streetlight has been converted and the energy savings realized this sector will ultimately rise and fall with the carbon content of the provincial grid. The projected GHG emissions for streetlights following remaining conversion is approximately 96 tCO_2e in 2030.

Table 9 summarizes the GHG emission reductions targeted from 2011 to 2030 for this sector to achieve an overall Corporate reduction of 45% by 2030.

Table 9. Targeted Corporate Streetlight Sector GHG Emissions (2011 – 2030)

Wastewater Treatment	2011 (tCO_2e)	2018 (tCO_2e)	2018 Percent Change from 2011	2030 (tCO_2e)	2030 Percent Change from 2011
	531	169	-68%	96	-82%

Peterborough Environmental Advisory Committee

The progress update for the Corporate Sector Reduction in GHG Emissions, as outlined in this report, was received for information by the Peterborough Environmental Advisory Committee (PEAC) at the May 19, 2021 meeting.

Summary

The City's Corporate GHG emissions have declined by approximately 18 percent since the baseline year of 2011. The majority of this reduction has resulted from Provincial initiatives over the past decade to significantly reduce the GHG emissions associated with generating electricity in Ontario through the closure of coal-fired generating stations. To achieve the 45% GHG emission reduction target identified in the Climate Emergency Declaration of 2019, focused investments that maximize the impact of corporate actions will be required in this decade.

Submitted by,

Cynthia Fletcher
Commissioner, Infrastructure and Planning Services

Contact Name:
Michael Papadacos, P.Eng.
Manager, Infrastructure Management
Phone 705-742-7777 ext. 1756
E-mail address: mpapadacos@peterborough.ca

James Byrne, M.CC.
Climate Change Coordinator, Infrastructure Management
Phone 705-742-7777 ext. 1882
E-mail address: jbyrne@peterborough.ca