City of Peterborough

To:	**Members of the General Committee**
From:	**Blair Nelson, Commissioner, Infrastructure, Planning and Growth Management**
Meeting Date:	**December 2, 2024**
Report:	**Community Sector Greenhouse Gas Emission Inventory and Update, Report IPGACP24-029**

Subject

A report to provide the General Committee with the findings of the Community Sector Greenhouse Gas Emission Inventory and Update report.

Recommendation

That Council approve the recommendation outlined in Report IPGACP24-029, dated December 2, 2024, of the Commissioner, Infrastructure, Planning and Growth Management as follows:

That the presentation be received for information.

Background

The City of Peterborough completed its annual inventory of Community Sector greenhouse gas (GHG) emissions generated from community-wide sources in 2022 compared to the 2011 baseline year (see Appendix A for details). Community Sector emission sources are comprised of the following:

- Residential buildings
- Commercial buildings
- Industrial buildings
- Transportation

Greenhouse gas emissions are derived from the combustion of fossil fuels or purchased grid electricity during the operation of community transportation and building assets.

The assessment revealed that Community Sector emissions declined by 18 percent or 107,233 tonnes of carbon dioxide equivalent (tCO_2e) in 2022 from 2011 levels. However, annual emissions grew by 1 percent or 5,401 tCO_2e in 2022 from 2021 levels. Community emissions were primarily impacted by the final months of the COVID-19 pandemic altering travel, school, and work. The Transportation Sector was especially affected, likely due to travel restrictions and the high cost of fuel in 2022.

Community Sector emissions are projected to decline by 17 percent or 100,158 tCO_2e from 2011 levels by 2030. Key programs to facilitate mitigation of the Community Sector by 2030 include the Home Energy Efficiency Program, Green Economy Peterborough, and federal policy to shift the Transportation Sector toward electric vehicles.

Strategic Plan

Strategic Pillar: Community & Well-being

Strategic Initiative: Demonstrate strong leadership in environmental stewardship by proactively addressing issues and challenges of climate change and the environment.

In 2019, City Council approved the Climate Emergency Declaration that requires City staff to report back to Council on climate action. The Declaration also requires that City staff "greatly accelerate timelines for our existing actions to reduce the effects of climate change; add new actions and proposals to reduce greatly our GHG emissions" by 45 percent in 2030 and net zero emissions by 2050.

Engagement and Consultation

The Community Sector Greenhouse Gas Emission Inventory and Update was presented to the Peterborough Environmental Advisory Committee on September 18, 2024 by the Climate Change Project Manager.

The Committee passed the following motion:

"That the Peterborough Environmental Advisory Committee recommends that staff present the Greenhouse Gas Emission Inventory and Updates Reports to Council; and

That the Peterborough Environmental Advisory Committee encourages aggressive action on major emission categories, such as transit and facilities."

Budget and Financial Implications

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

Attachments

Appendix A: Community Sector Greenhouse Gas Emission Inventory and Update Report

Submitted by,

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Commissioner, Infrastructure, Planning and Growth Management

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Appendix A

Community Greenhouse Gas Emission Inventory and Update Report

Purpose

The Community GHG Emission Inventory and Update Report is the evaluation of greenhouse gas emissions originating from energy and fuel consumption from end users in Peterborough. The Report will provide high-level explanations for emission trends and include the corporate response to mitigate Community Sector emissions.

Background

Climate change is being driven by the increasing concentration of atmospheric greenhouse gases (GHG), such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), produced primarily from human emission sources. The exponential growth of GHG emissions is transforming the global climate system and is causing a shift in the frequency, duration, and intensity of weather events and modifications of long-term weather patterns. In recent years, Peterborough has experienced weather events that exceeded historical local weather norms, such as:

- In 2023, wildfire smoke from fires in northern Quebec and Ontario impacted Peterborough significantly in June, deteriorating air quality to record levels and reaching the high-risk levels of 9 on the Air Quality Health Index (AQHI) on June 6. Multiple days that summer peaked at 6 on the AQHI scale. Previous summers recorded multiple AQHI maximum highs of 4, or moderate-risk, for a few days per year.

- In 2023, a summer storm inundated the west end, centred over the Byersville watershed, dropping 88 mm of rain in 4 hours, with 70 mm falling in a single hour between 5:00 pm and 6:00 pm on August 3. The historic monthly mean for total rainfall in August for Peterborough is 74 mm.

- In 2024, warm winter temperatures were recorded from December 2023 to February 2024, which was significantly higher than the 30-year (1976-2005) mean winter temperatures for Peterborough. Documented mean temperatures from the Peterborough Airport in December, January, and February were 0.4ºC, -3.7ºC, and -2.3ºC, respectively, which is substantially warmer than the 30-year mean of -5ºC, -8.8ºC, and -7.3ºC for each winter month. El Nino conditions did contribute possibly as much as 3ºC, but the remaining increase is likely caused by climate change warming wintertime mean temperatures.

- Record-breaking summer rainfall was recorded in southern Ontario in 2024 which surpassed the highest monthly precipitation amount for any month in the province. The median rainfall readings between the Peterborough Airport and Trent University weather stations recorded monthly rainfalls of 58%, 8%, and 21% higher than the historical average in June, July, and August, respectively.

To counter the effects of runaway global climate change triggering extreme local weather events, Peterborough joined several Canadian municipalities in declaring a Climate Emergency Declaration (CED) to focus municipal efforts on developing robust decarbonization solutions. On September 23, 2019, Peterborough City Council passed the (CED) for "the purpose of naming, framing and deepening our commitment to protecting our community, its economy, and its ecosystems from climate change." The CED instigated a new science-based GHG mitigation goal of a 45 percent reduction by 2030 and net zero by 2050 from the 2011 emission baseline. The updated Community Sector target superseded the original abatement goal of 30 percent by 2030 from the 2011 baseline. In addition, the CED directed City staff to accelerate the implementation of new climate action projects to facilitate achieving the community GHG abatement goal and secure external funding opportunities from other levels of government to finance local mitigation projects.

Despite the CED, the City of Peterborough does not have direct control to reduce Community Sector GHG emissions generated in Peterborough. The Federation of Canadian Municipalities identifies that municipalities can influence only up to 50 percent of their community's GHG emissions through policies and programs targeted at land use, transportation, water, and waste management. Additional commitment from the provincial and federal governments is needed to bridge the mitigation gap through policy direction and program creation. Nevertheless, the City is actively developing projects within its sphere of influence to motivate community members to undertake climate-friendly initiatives within their own sphere of influence (i.e., home, work, school, etc.). Encouraging buy-in for climate action that residents and businesses willingly participate in can enable the City to meet the near and long-term community abatement goals. Without active public participation in joining the transition, Peterborough will likely fall short of decarbonizing community emission sources.

Inventory Boundary and Emission Sources

The Community Sector GHG inventory boundary includes all energy sources originating and consumed per year within the Peterborough city limits. The Peterborough Airport is incorporated into the inventory because of its proximity to Peterborough and is operated as a municipal airport even though it serves the broader region. Any Corporate Sector operation emissions created by the municipality captured within community datasets have been removed to avoid double counting. These include emissions produced from municipal buildings, wastewater pumping and treatment, lighting assets, and non-fleet staff vehicles used in the course of City business.

In Peterborough, Community Sector emissions are comprised of two main sectors: Stationary and Transportation, for which each is separated into relevant sub-categories. Stationary emissions are produced from activities resulting from fossil fuel combustion and grid-supplied electricity usage from residential, commercial, and industrial buildings. The commercial sub-sector includes multi-unit residential buildings (MURB) due to the high natural gas consumption that differentiates it from low-rise (i.e., ≤3-storey) residential buildings. However, commercial electricity data is no longer classified solely as commercial and is now grouped with industrial businesses due to a new classification by Hydro One. Natural gas consumption remains disaggregated by user type, which is either commercial, MURBs, or industrial customers. Transportation emissions are produced from the combustion of vehicle fuels and grid-supplied electricity to power on-road vehicles, boats, and aircraft refuelled within the reporting boundary. On-road vehicles include all private and commercial vehicles registered in Peterborough, while watercraft pertain to only vessels that refuel at the Del Crary Marina.

Direct sources of in-boundary GHG emissions include the combustion of natural gas, heating oil, propane, gasoline, diesel, aviation fuel, and marine fuel. Electricity consumption is the sole indirect source of GHG emissions produced outside the inventory boundary. To note, hydroelectric stations and solar arrays located within the city boundary that supply the Ontario electricity grid are considered to be indirect electricity sources due to the facilities feeding into the provincial power grid. Lastly, all non-direct community sources of emissions (also known as Scope 3) are not included in the inventory due to the difficulty of assessing the scale of these emissions for Peterborough. An example of non-direct emissions is manufactured goods produced outside the inventory boundary and consumed by residents or businesses in Peterborough.

Community data was aggregated to preserve the privacy of end-users in Peterborough. Natural gas data was received via postal codes, grouping end-users together, while high-level community-scale sectoral data was collected for vehicles, aviation, and electricity data. Heating oil and propane data were aligned with national figures and downscaled to approximate the relative use of each fuel within Peterborough. Marine fuel revenue records were used to estimate the litres of fuel sold using the average summer costs of premium gasoline and diesel.

GHG Emission Calculations

Community Sector emission sources were calculated using a customized spreadsheet with the assembled sectoral activity data and its corresponding source emission factors per reporting year. The emission factors for each direct and indirect emission source were collected from Canada's National Inventory Reports for 2022. Activity data for 2023 was collected but certified emission factors are not yet available for the 2023 reporting year, resulting in emissions being estimated. In this report, 2022 is the official reporting year, while 2023 is presented as the projected trend (and marked with an *),

and it will be revised with certified emission factors in the following community GHG inventory report.

Annual activity consumption data was collected from several data sources with varying degrees of data quality (see Table 1) and computed against each respective emission factor. Global warming potentials released in Assessment Report 5 by the Intergovernmental Panel on Climate Change were used. Community GHG calculations adhere to the GHG Protocol for Cities ("GHG Protocol") accounting guidelines for Community Sector reporting. This included following the GHG Protocol's principles of relevance, completeness, consistency, transparency, and accuracy to ensure a fair and accurate account of GHG emissions in Peterborough. All calculated GHG emissions are represented as metric tons of carbon dioxide equivalent (tCO_2e).

Table 1. Data Collection and Data Quality

Source	Data Source	Data Unit	Data Quality	Comments
Electricity	Hydro One	Kilowatt Hour (kWh)	High – electricity utility bills scaled to community level	Aggregated metered data available
Natural Gas	Enbridge Gas Inc.	Cubic meter (m^3)	High – natural gas utility bills scaled to the postal code level	Aggregated metered data available
Heating Oil	Natural Resources Canada	Litre (L)	Low – national data figures were used and scaled to align with the Peterborough context	No local data available
Propane	Natural Resources Canada	Litre (L)	Low – national data figures were used and scaled to align with the Peterborough context	No local data available
Gasoline	Kalibrate Technologies Ltd.	Litre (L)	Medium – gasoline fuel sales from all gas stations within Peterborough	Aggregated metered data available
Diesel	Kalibrate Technologies Ltd.	Litre (L)	Medium – diesel fuel sales from all gas stations within Peterborough	Aggregated metered data available
Aviation Fuel	City of Peterborough	Litre (L)	High – fuel bills at Peterborough Airport	Metered data available in 2018
Marine Fuel	City of Peterborough	Litre (L)	Low – fuel sales used to calculate fuel use	Fuel sales available in 2020

An additional calculation was required for on-road transportation due to the origin and destination of vehicles refuelling in Peterborough. Trip origins and travel directions were obtained from the Environmental Insight Explorer (EIE) provided by Google, which aggregated vehicle movements using the cellphone location services of drivers. The EIE data classified trips originating and wholly remaining in-boundary while also capturing trips inbound to Peterborough and outbound from the city. Total trip lengths in kilometres per year were captured and calculated against the ratio of in-boundary versus inbound and outbound trips. An annual weighted factor was developed and applied to the in-boundary gas station fuel sales to differentiate Peterborough drivers from non-residents. This process permitted the estimation of fuel sold being attributed to Peterborough residents and is in compliance with the GHG Protocol.

Local heating oil and propane data were unavailable to determine the usage rate for both space heating fuels in Peterborough. National data collected from Natural Resources Canada identified an annual rate for heating oil and propane used instead of local consumption. Peterborough is assumed to follow the national rate for both fuels; however, the national reduction rate is likely a conservative estimation of the actual conversion to other heating fuels, such as natural gas. The rate was applied to the corresponding base year fuel values and estimated for each reporting year.

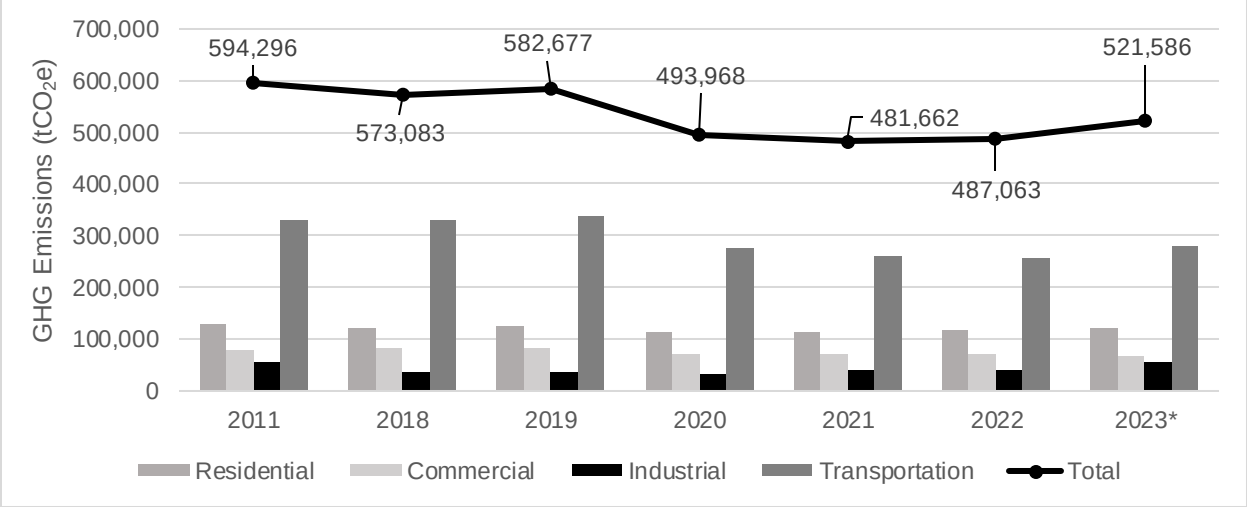
Aviation fuel utilized an induced travel weighted factor to account for aircraft flights that originated and terminated solely at the Peterborough Airport and trips that commenced or ended at an airport other than the Peterborough Airport. This process resulted in all local trips being accounted for while removing 50 percent of one-way trips, which is permitted under the GHG Protocol.

Marine fuel sold at the Del Crary Marina was determined using 2022 fuel sales data and calculated using the average gasoline and diesel prices in Peterborough from May to September 2022. As a result of the high traffic and movement afforded by the Trent Severn Waterway, 50 percent of inbound and outbound watercraft trips were removed from the amount of fuel purchased from the marina. All local watercraft with their home port as Peterborough were calculated as in-boundary trips. Thereby, a total of 55 percent of marina movement was attributed to the Community Sector.

Community Sector GHG Emissions Update

The Community Sector assessment revealed that GHG emissions totalled 487,063 tCO_2e in 2022. Emissions decreased by 107,233 tCO_2e or 18 percent in 2022 from 2011 levels (Figure 1).

Figure 1. Community Sectoral and Total GHG Emissions



* estimated value – will be updated with release of certified 2023 emission factors

The decline in GHG emissions is consistent with the residual impact of the COVID-19 pandemic (March 2020 to May 2023) that altered school and some workplace operations. The final Provincial lockdown was issued in January 2022, which curbed resident movements before all public safety restrictions were lifted in March. The post-pandemic reopening in Peterborough was cautious, and it did not return to 2019 GHG levels due to observed changes in local travel patterns. The inhibition in transportation emissions is likely due in part to business work-from-home policies remaining in place for some sectors of the local workforce coupled with increases in the cost of gasoline, which peaked at $2.05/L in June 2022[1], due to geopolitical and energy market factors (see Table 3). The shift to electric vehicles (EVs) in Peterborough marginally contributed to lower gasoline fuel use due to Evs only accounting for 0.69 percent of all registered vehicles in the city in 2022.

The sectoral sub-category breakdown of annual Community Sector emissions is presented in Table 3.

Table 23. Community Sector GHG Emissions

Sector	2011 GHG (tCO_2e)	2021 GHG (tCO_2e)	2022 GHG (tCO_2e)	% Diff. from 2022 and 2021 levels	% Diff. from 2022 and 2011 levels
Stationary					
Residential	127,301	112,223	118,776	+6%	-7%
Commercial	80,088	69,646	72,251	+4%	-10%
Industrial	56,835	38,596	41,249	+7%	-27%

[1] Statistics Canada. (2024). Monthly average retail prices for gasoline and fuel oil, by geography. Retrieved from: https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810000101&pickMembers%5B0%5D=2.2&cubeTimeFrame.startMonth=01&cubeTimeFrame.startYear=2022&cubeTimeFrame.endMonth=12&cubeTimeFrame.endYear=2022&referencePeriods=20220101%2C20221201

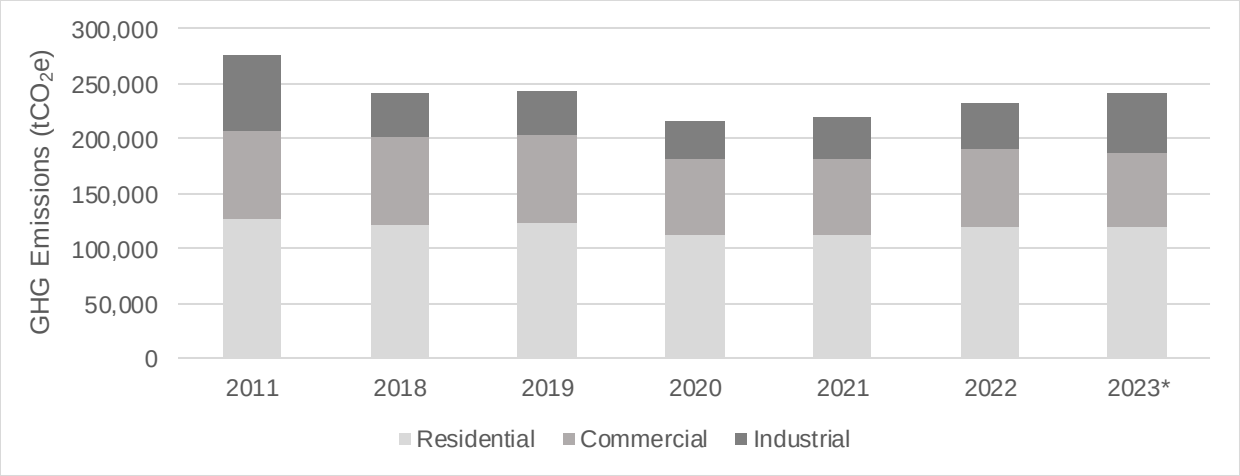
Sector	2011 GHG (tCO_2e)	2021 GHG (tCO_2e)	2022 GHG (tCO_2e)	% Diff. from 2022 and 2021 levels	% Diff. from 2022 and 2011 levels
Subtotal	264,224	220,465	232,276	+5%	-12%
Transportation					
On-road	328,135	258,638	252,729	-2%	-23%
Aviation	1,729‡	2,676	2,147	-20%	24%
Marine	208‡	185	126	-32%	-39%
Subtotal	330,072	261,197	254,787	-2%	-23%
Grand Total	**594,296**	**481,662**	**487,063**	**+1%**	**-18%**

‡GHG emissions are approximated

Stationary Sector GHG Emissions

In 2022, the Stationary Sector emitted 232,276 tCO_2e from all residential, commercial, and industrial buildings sources (Figure 2). The analysis observed that GHG emissions from the Stationary Sector decreased by 31,948 tCO_2e or 12 percent in 2022 from 2011 levels.

Figure 2. Total Stationary Sector GHG Emissions



* estimated value – will be updated with release of certified 2023 emission factors

Natural gas used for space heating is the primary source of emissions for stationary buildings, encompassing 86 percent of the total in 2022. However, space heating demand is dependent on several factors, like exterior temperatures, occupancy, and the energy efficiency of a building. Occupancy levels and the efficiency of buildings are unique factors and highly variable for each building; however, exterior outdoor air temperatures are relatively the same across Peterborough.

The seasonal impact of outdoor air temperature is quantified using the heating and cooling degree day indicators that are proportional to the energy demand to heat and cool buildings. In Peterborough, the 30-year average for heating and cooling degree days are 4,413 and 205, respectively. However, the 7-year average for heating degree

and cooling degree days has lowered by 6 percent and risen by 20 percent, respectively, over this reporting period (Table 4). This indicates that less space heating is needed, which can result in less GHG emissions being combusted from natural gas, heating oil, propane, and electric sources in the winter. Alternatively, space cooling requires more energy to maintain indoor temperatures, but associated GHG emissions are diminished due to the lower carbon content of electricity to provide cooling during warmer months.

Table 34. Peterborough Heating and Cooling Degree Days

Year	Heating Degree Days	Cooling Degree Days	Heating Degree Day Difference from 30-Year Avg.	Cooling Degree Day Difference from 30-Year Avg.
2011	4,137	218	-6%	7%
2018	4,271	349	-3%	71%
2019	4,533	186	3%	-9%
2020	4,077	338	-8%	65%
2021	3,886	281	-12%	37%
2022	4,329	192	-2%	-6%
2023	3,874	148	-12%	-28%
7-Year Average	4,158	245	-6%	20%
30-Year Avg. (1976-2005)	4,413	205		

Source: Government of Canada Climate Data

In southern Ontario, climate change is altering seasonal temperature averages, resulting in warmer winters and summers. In 2022, winter temperatures have risen by 1.9ºC and summer temperatures by 1ºC from the 30-year historic seasonal average (1961-1990) in Peterborough. This modification in weather norms is reflected in the amount of energy buildings use to heat and cool, which ultimately produces a significant portion of GHG emissions.

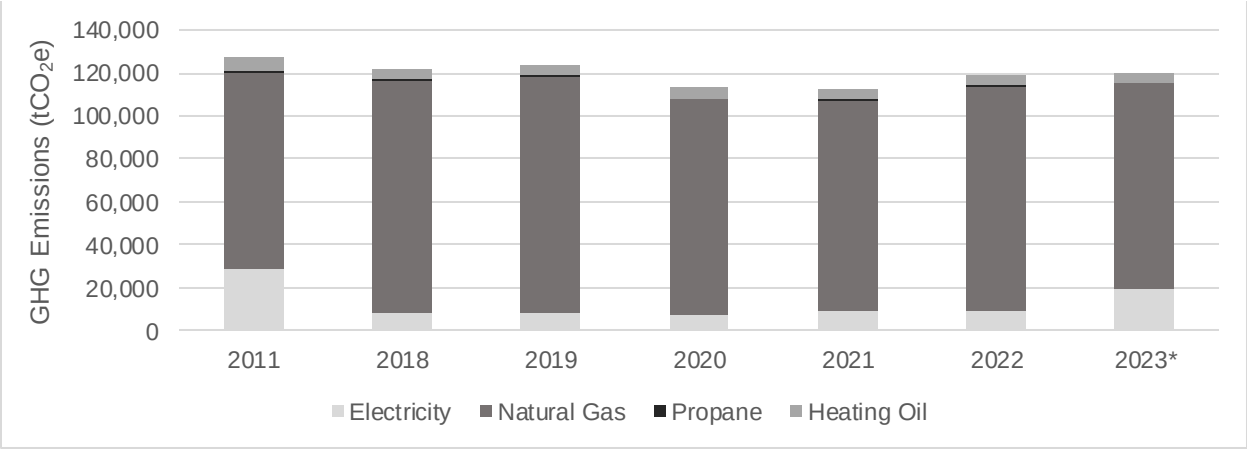
Residential GHG Emissions

Residential building emissions declined in 2022 from 2011 levels by 8,524 tCO_2e or 7 percent (Figure 3). The heating degree days observed for Peterborough over the reporting period heightened space heating requirements that edged natural gas use higher than in 2021 (Table 4). The completion of home renovations that installed energy conservation measures like insulation or heat pumps slightly reduced the overall growth of space heating emissions. In Peterborough, the number of homes that have participated in a national or utility energy renovation program since 2018 is 198, with these homes lowering annual energy use by 7,800 GJ and 500 tCO_2e on average.

Electricity GHG emissions for residential customers declined by 18,905 tCO_2e or 66 percent in 2022 from 2011 levels. Electricity usage has decreased by 18 million kWh since 2011, which can be attributed to changes in heating sources, modifications of plug

and process loads, and energy efficiency improvements. However, compared against 2020 and 2021 values, electricity usage observed in 2022 marked a decline of 10% and 7%, respective of the previous two years. This is likely a result of a decrease in working and schooling from home, which was a hallmark at the beginning of the pandemic and translated into more plug-load electricity consumed for power electronics and lighting.

Figure 3. Residential GHG Emission Sources



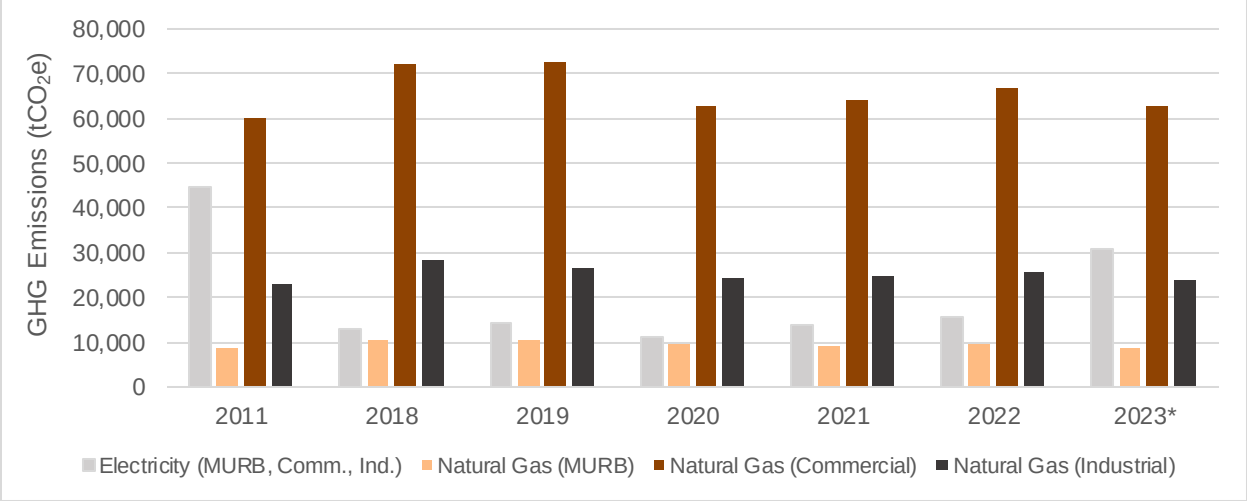
* estimated value – will be updated with release of certified 2023 emission factors

Commercial and Industrial GHG Emissions

The Commercial Sector natural gas usage comprising businesses and MURBs rose by 7,324 tCO_2e or 11 percent in 2022 from 2011 levels (Figure 4). Natural gas consumption in the Industrial Sector increased by 2,672 tCO_2e or 12 percent in 2022 from 2011 levels. Total natural gas use rose by 10 million cubic metres from 2011 levels in 2022, driven primarily by heating degree day requirements due to the year being near the 30-year historical average. This factor was apparent in MURB and commercial customers and slightly in industrial users, which is likely due to industrial process loads heating interior spaces and offsetting space heating requirements.

Electricity consumption for commercial, MURBs, and industrial customers decreased by 29,383 tCO_2e or 66 percent in 2022 from 2011 levels. Electricity usage declined by 22 million kWh since 2011, which can be attributed to multiple factors like changes to the total number of businesses, business operating hours, alteration to plug-in and process loads, and energy renovations.

Figure 4. Commercial and Industrial GHG Emission Sources

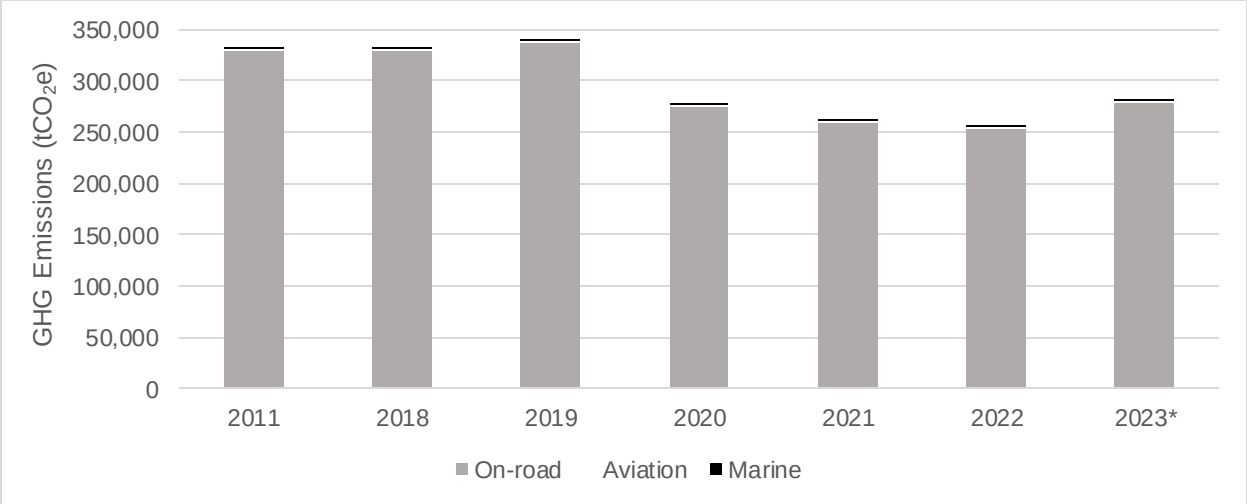


* estimated value – will be updated with release of certified 2023 emission factors

Transportation Sector GHG Emissions

In 2022, the Transportation Sector emitted 254,787 tCO_2e from all sources in Peterborough (Figure 5). Of this total, on-road commercial and private vehicles represent 99 percent of GHG emissions sources in 2022. Aviation and marine contributions to community transportation emissions are 0.95 percent and 0.05 percent, respectively. The assessment revealed that GHG emissions from the Transportation Sector decreased by 75,285 tCO_2e or 23 percent in 2022 from 2011 levels.

Figure 5. Total Transportation GHG Emissions

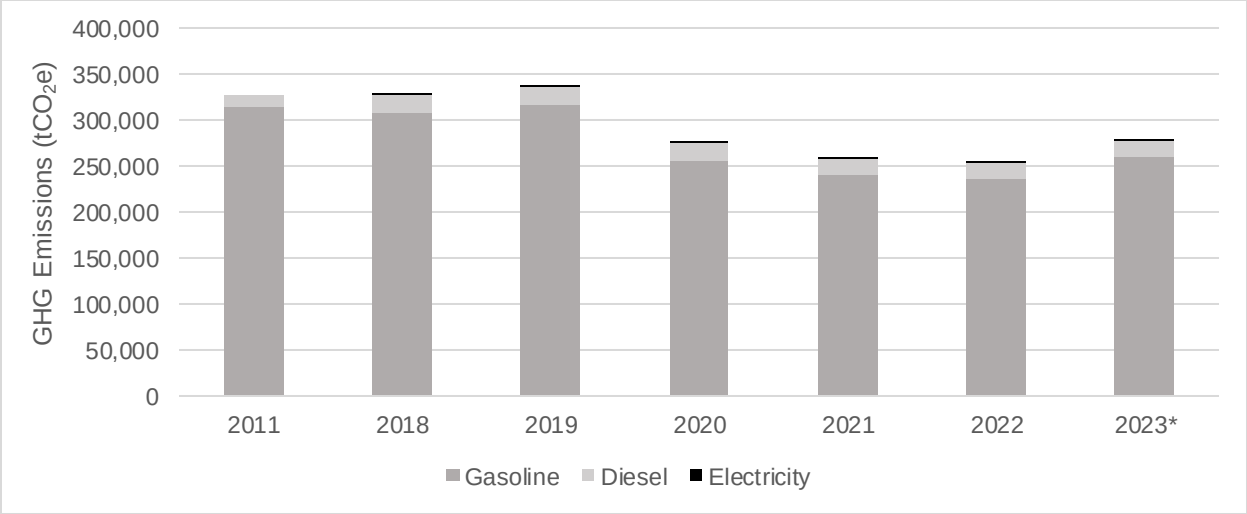


* estimated value – will be updated with release of certified 2023 emission factors

On-road GHG Emissions

The reduction in Transportation Sector GHG emissions was mainly attributed to the decline in on-road gasoline usage, which decreased by 23 percent in 2022 from 2011 levels (Figure 6). The curtailment of gasoline and diesel is linked to the end of the pandemic reducing some movement and delivery of goods in the first quarter of 2022. However, the high cost of fuel that peaked in June 2022 likely caused drivers and businesses to limit long drives or the total number of trips. Electric vehicles in Peterborough marginally contributed to lower gasoline fuel use due to EVs only accounting for 0.69 percent of all registered vehicles in the city in 2022. Lastly, emissions associated with EV charging are understood to be carried out predominately at home or the workplace and those emissions are captured in residential and commercial building electricity data.

Figure 6. On-Road Transportation GHG Emission Sources



* estimated value – will be updated with release of certified 2023 emission factors

The dual factors of the end of the pandemic and high fuel costs are further reflected in data gathered from Google's EIE tool that captured the decline of 6,100,000 total trips or 8 percent in 2022 from 2019 levels (Table 6). Data in 2023 is available, and total trips are nearing pre-pandemic levels, likely due to the easing of fuel prices from highs in 2022.

Table 46. Estimated Total On-road Trips per Year from 2018-2023

Directional Distance (trip/year)	2018	2019	2020	2021	2022	2023
Inbound trips	5,700,000	6,250,000	5,300,000	5,950,000	6,450,000	6,500,000
Outbound trips	5,750,000	6,400,000	5,300,000	5,900,000	6,400,000	6,500,000
In-boundary trips	54,500,000	60,300,000	46,700,000	50,600,000	54,000,000	56,500,000
Total	**65,950,000**	**72,950,000**	**57,300,000**	**62,450,000**	**66,850,000**	**69,500,000**

Aviation and Marine GHG Emissions

In 2022, total aircraft movements increased by 22 percent from 2011 levels (Table 7). This resulted in GHG emissions rising by 419 tCO_2e or 24 percent in 2022 from 2011 levels. The rise in aircraft movements between 2011 and 2018 is due to the establishment of the Seneca College School of Aviation at the Peterborough Airport in 2014.

Table 57. Aircraft Movement Types

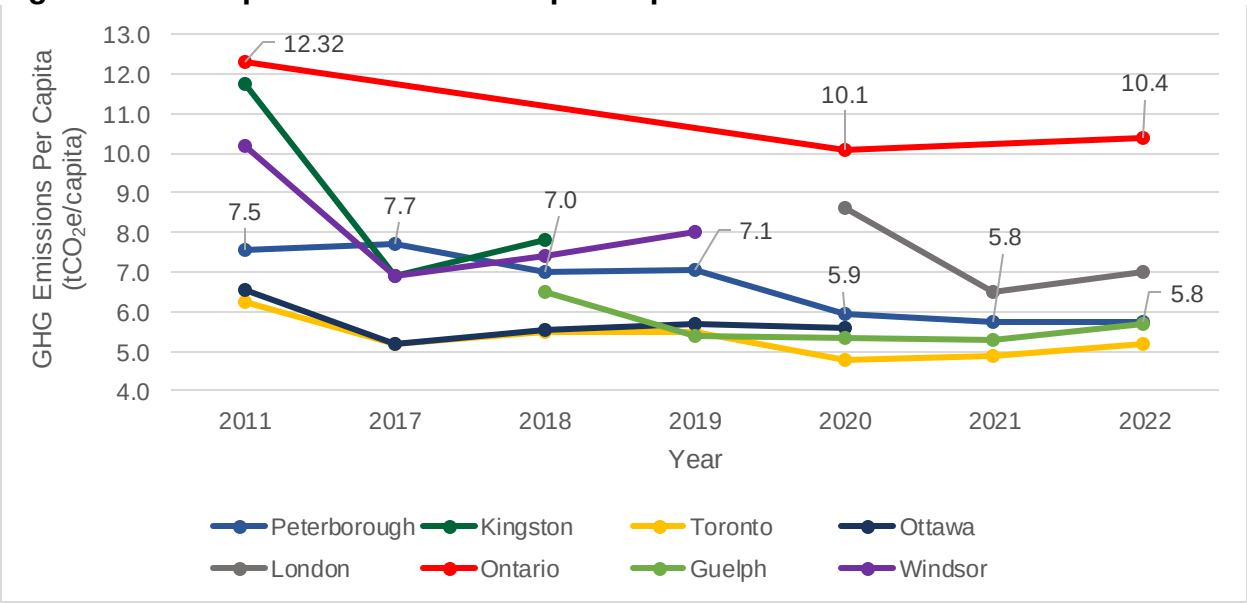
Aircraft Movement Type	2011	2018	2019	2020	2021	2022
Local	28,722	41,561	39,907	16,029	39,719	35,268
Itinerant	4,947	4,326	4,613	4,155	4,495	5,688
Total	**33,669**	**45,887**	**44,520**	**20,184**	**44,214**	**40,956**

Lastly, GHG emissions stemming from watercraft are assumed to have dropped by 24 percent in 2022 from 2011 levels, which is likely a symptom of marine gasoline costs hindering some marine trips.

GHG Emissions per Capita

An investigation into GHG emissions per capita was also undertaken and it revealed that Peterborough generated 5.8 tCO_2e per capita in 2022, down from 7.6 tCO_2e per capita in 2011. This calculation allows Peterborough to be compared against other municipalities to understand the rate of intensity of local emissions (Figure 7). It was observed that Peterborough ranked lower than most reporting municipalities in GHG emissions per capita, especially against the provincial average of 10.4 tCO_2e per capita.

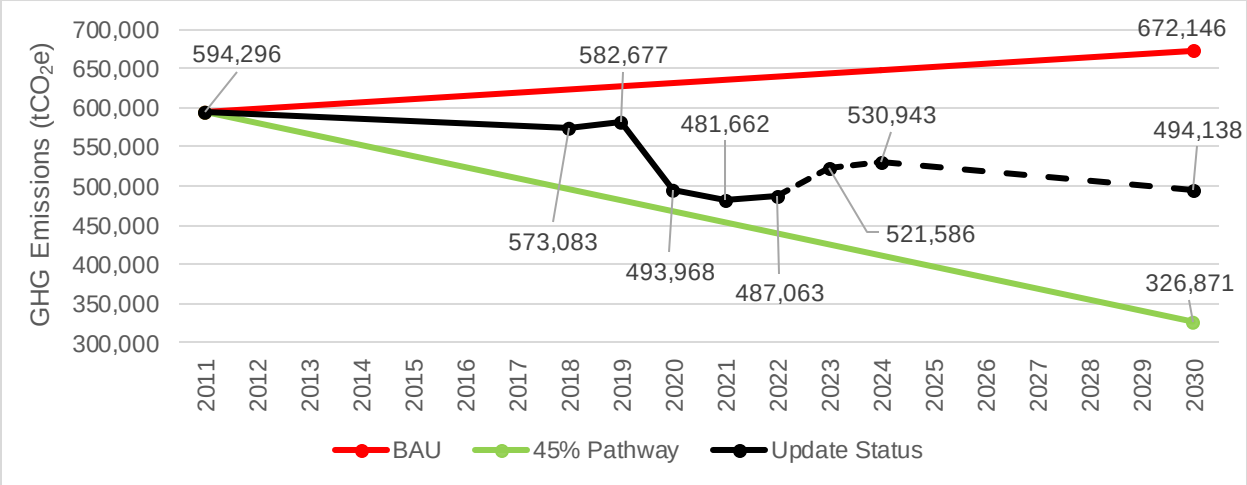
Figure 7. Municipal GHG Emissions per Capita



Achieving Community Sector 2030 Reduction Target

Community Sector emissions are projected to trend back toward the Business-as-Usual (BAU) trendline in 2023 (Figure 8). The rebound in GHG emissions is a result of the end of the pandemic without any public health restrictions impacting travel, school, or work. However, near-term emissions are not expected to rise back to 2019 levels in 2023 or 2024, primarily due to the high cost of transportation fuel inhibiting non-essential travel for some residents. By 2030, it is estimated that the Community Sector will lower total emissions by 100,158 tCO_2e or 17 percent from 2011 levels. Emission projections for 2030 follow a conservative approximation and are subject to many variables that can impact the pace of decarbonization. Future community updates will continue to refine the long-term outlook as more data becomes available.

Figure 8. 2030 Community Sector GHG Emission Projection



To achieve the 45% Reduction Pathway by 2030, a total of 325,600 tCO_2e would need to be lessened from Community Sector sources (Table 8). An approximation for each sector was created to mitigate emissions and support reaching the 45 percent goal. Reductions in Residential, Commercial, and Industrial Sector buildings can be achieved if incentives and contractor labour are available to homeowners and businesses to implement the energy conservation measures needed to lower emissions. Significant abatement from the Transportation Sector is deemed feasible if supported through aggressive adoption of EVs and through mode share shifts by residents to take public transit, cycling, and walking to offset the number of trips taken by internal combustion vehicles, along with encouraging infill development that better uses existing infrastructure and supports active transportation travel.

Table 68. Projected 2030 GHG Emissions

Sector	Actual GHGs in 2011 (tCO_2e)	Actual GHGs in 2022 (tCO_2e)	Projected 45% Reduction Pathway by 2030 (tCO_2e)	Projected 45% Reduction Pathway Percentage by 2030	Projected Likely Reduction by 2030 (tCO_2e)	Projected Likely Percentage to be Reduced by 2030
Residential	127,301	118,776	95,000	-25%	115,520	-9%
Commercial	80,088	72,251	65,000	-19%	71,251	-11%
Industrial	56,835	41,249	35,000	-38%	39,249	-31%
Transportation	330,072	254,787	130,000	-61%	268,118	-19%
Total	594,296	487,063	325,000	-45%	494,138	-17%

Conversely, the projected likely reductions take into account several known programs that exist or are soon to be established that will limit growth in community GHG emissions by 2030. The following is a list of assumptions that were identified as influencing community GHG emissions by 2030:

- The Residential Sector projection incorporated a medium uptake for the Home Energy Efficiency Program over 6 years to reduce up to 2,250 tCO_2e once established in 2025. Additional residential housing retrofit programs like the Home Efficiency Rebate Plus (HER+) offered by Enbridge Gas are projected to be able to lower emissions by 1,000 tCO_2e.

- Green Economy Peterborough is assessed to be able to support local member businesses in achieving up to 1,000 tCO_2e in avoided emissions for the Commercial Sector through energy coaching and identifying funding sources for companies to curb emissions by 2030.

- Financial support from the federal government and utilities can be accessed by Industrial Sector businesses, which could decrease emissions by up to 2,000 tCO_2e if applied.

- The transition to EVs is projected to align with national uptake rates with 60 percent of new vehicles purchased being an EV by 2030. This will result in 4,600 EVs out of a total of 48,800 light-duty vehicles in Peterborough by 2030. Public transit, cycling, and walking rates are assumed to be similar to 2022 levels in the projection.

To achieve the 2030 target, significant GHG abatement is needed that may be beyond the capacity of society to transition because of constrained material supply or high costs for key technologies like electric vehicles, heat pumps, and solar panels. Limitations in the number of local skilled tradespeople who can install these technologies at the scale required can further curb uptake. Provincial and federal government programming, policies, and incentives are needed to counteract supply chain and labour bottlenecks to support decarbonization.

Lastly, climate action is not the sole responsibility of the municipality but requires active participation from all levels of government to support achieving local climate goals. The provincial and federal governments are currently offering Peterborough residents and businesses access to funding and incentives for the transition. The Community Sector substantially benefits when external financing, incentives, and policies are enacted to accelerate the reduction of GHG emissions that the City of Peterborough alone cannot undertake or is outside the purview of the municipality. Moreover, to realize net zero by 2050, more Community Sector abatement measures must be developed and implemented over the next 26 years. The City will continue to take a leadership role in creating impactful climate actions in concert with support from external government partners. Only by working together will Peterborough ensure it can reach its Community Sector mitigation goals.

Summary

The Community Sector assessment revealed that GHG emissions declined by 107,233 tCO_2e or 18 percent in 2022 from 2011 levels. The stagnation of the Transportation Sector kept Community Sector GHG emissions below pre-pandemic levels as a result of waning COVID-19 restrictions and high summer fuel costs impacting travel patterns. Community Sector emissions are anticipated to rise in 2023 but remain below 2019 levels. Peterborough is projected to achieve a 17 percent decline by 2030 from 2011 levels, which is supported by the transition to EVs and implementation of building energy efficiency improvements across Community Sectors. Additional action is needed from higher levels of government to support decarbonizing efforts in Peterborough to attain net zero by 2050.