City of Peterborough

To:	**Members of the General Committee**
From:	**Jasbir Raina, Commissioner of Infrastructure and Planning Services**
Meeting Date:	**June 12, 2023**
Subject:	**Community Sector Greenhouse Gas Emission Inventory and Update, Report IPSACP23-019**

Purpose

A report to provide an update on Community Sector greenhouse gas emissions from 2018 to 2021.

Recommendations

That Council approve the recommendations outlined in Report IPSACP23-019, dated June 12, 2023 of the Commissioner of Infrastructure and Planning Services, as follows:

a) That the report be received for information; and

b) That the presentation from the Asset Management & Capital Planning Director and Climate Change Specialist be received.

Budget and Financial Implications

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

Background

The City has completed an inventory of greenhouse gas (GHG) emissions deriving from community sources from 2018-2021 to evaluate the mitigation trend compared against the 2011 community baseline (see Appendix A). The 2011 baseline was recalculated due to new community data being made available. The assessment adhered to the GHG Protocol guidelines to rebaseline and calculate Community Sector GHG emissions stemming from energy consumption via residential, commercial, and industrial buildings and transportation sectors.

The assessment revealed that Community Sector GHG emissions decreased by 105,132 tCO_2e or 18 percent in 2021 from 2011 levels. The decline over this period was a result of the COVID-19 pandemic that altered resident travel and work patterns. Additionally, the decarbonization of the Ontario electricity grid due to the shuttering of all coal power plants in 2014 supported the mitigation of electricity associated GHG emissions. While the future of travel and work patterns are not yet fully understood and could result in sustained changes, it is likely the abatement in Community Sector GHG emissions will trend back toward pre-pandemic levels in 2023 because of the easing of public health restrictions since 2022.

The City recognizes that it has limited direct control over Community Sector emissions but is committed to supporting residents and businesses in reducing emissions by developing programs designed to enable significant mitigation. Examples of City-led programs include the proposed Home Energy Efficiency Program, electric vehicle charging stations network expansion, community solar potential mapping, and modernizing the transportation network to be less reliant on single occupancy vehicles.

Achieving the 45 percent GHG reduction target in the Community Sector by 2030 will be challenging due to multiple factors over the next seven years. The City is projecting a 14 percent reduction by 2030 if the best-case scenario uptake for community programs is realized. However, if additional utility, provincial, and federal programs are created to support residents' transition, there is a slight possibility of reaching the 45 percent target by 2030.

Peterborough Environmental Advisory Committee

The findings discussed in this report were presented to the Peterborough Environmental Advisory Committee (PEAC) at the April 19, 2023, meeting for information and comment. The Committee passed the following recommendations:

a) That Report PEAC23-006 be received for information;

b) That the Committee endorse the findings of Report PEAC23-003 and advise City Council on the challenges to lowering community greenhouse gas emissions to meet the Climate Emergency Declaration 2030 and 2050 mitigation targets; emphasizing the urgency and significance of the challenge to meeting the targets; and

c) That the PEAC make the following recommendations:

   i) That the City identify opportunities to enhance broader engagement, motivate and encourage public action; pursue a more robust communication strategy/marketing campaign around this topic; and demonstrate leadership through various municipal initiatives and projects; and

   ii) That Council receive a detailed briefing on the contents of the GHG Emissions report; and reaffirm its commitment to the Climate Change Emergency Declaration; and

   iii) That the City build coalitions with other municipalities and organizations to make delegations to, and undertake targeted advocacy with, other levels of government to support meeting climate targets.

Submitted by,

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

Appendix A

Community Sector 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), produced primarily from human emission sources. The growth of GHG emissions is transforming the global climate system and is causing a shift in the frequency, duration, and intensity of extreme weather events. The projected alteration in the climate system by 2100 from unrestrained GHG emissions will result in a global temperature rise of 2.4ºC to 4.8ºC from the pre-industrial baseline. This significant temperature increase will disrupt food systems, impact human health outcomes, and affect world economies due to severe weather events and rising ocean levels.

In recent decades, Peterborough has experienced powerful weather events, exceeding historical weather norms, such as:

- The 2002 Flood produced by 200 mm of rain over a 12-hour period and over $1 million in insurance claims,
- The 2004 Flood caused by 240 mm of rain in 24-hours caused $21 million in damages to critical infrastructure such as culverts and bridges and $95 million in insurable losses community-wide; and
- The 2022 Derecho struck with wind speeds over 150 km/h and caused a multi-day blackout that resulted in $3 million in recovery costs and damages to City property (insurable losses community-wide to be determined).

In 2016, City Council approved the community Climate Change Action Plan (CCAP) to mitigate community sources of emissions to stem the rise in local GHG emissions contributing to global climate disruption. The CCAP targeted a 30 percent reduction in community-produced GHG emissions by 2031 from 2011 baseline levels. The plan includes 21 strategies that address emission reductions from residential, commercial, and transportation sectors developed in partnership with Sustainable Peterborough and ICLEI-Canada. The CCAP is a key guiding document to support City staff in developing future mitigation projects.

On September 23, 2019, City Council passed the Climate Emergency Declaration (CED) for "the purpose of naming, framing and deepening our commitment to protecting our community, its economy, and its ecosystems from climate change," thereby joining several Canadian municipalities in adopting resolute climate commitments. Moreover, the CED instigated a new science-based GHG reduction goal by superseding the CCAP target by raising the mitigation goal to 45 percent by 2030 and net-zero by 2050. In addition, the CED directed City staff to accelerate the implementation of climate action projects to facilitate achieving the community GHG abatement goals.

However, the City does not have direct control to reduce all GHG emissions 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. In addition, 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 Corporation of the City of Peterborough captured during the community data collection have been removed to avoid double counting (see IPSIM22-024 – Corporation Sector GHG Emissions Progress Report for details).

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 also includes residential apartment buildings due to the high electrical and natural gas consumption that differentiates it from low-rise (i.e., ≤3-storey) residential buildings. 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 provided 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 (NIR) for 2011, 2018, 2019, and 2020. However, 2021 emission factors were estimated due to the NIR not being available for the reporting year as a result of a 2-year lag for emission factor certification. Fossil fuel emission factors comprising natural gas, propane, heating oil, gasoline, diesel, jet, and watercraft fuels are expected to remain very similar or unchanged from 2020 values due to these sources' stable annual emission factors. Conversely, electricity emission factors are dynamic and may shift between reporting years, which introduces some uncertainty for the reported 2021 data. A regional climate agency's electricity emission factor projection for 2021 was used as a proxy value. The succeeding Community Sector GHG Inventory Report will recalculate the 2021 reporting year by applying the certified 2021 NIR emission factors once available to each emission source.

Annual activity consumption data was collected from several data sources with varying degrees of data quality (see Table 1) and computed against each year's 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 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	Peterborough Distribution Inc. and Hydro One	Kilowatt Hour (kWh)	High – electricity utility bills scaled to community level; community electric vehicle charging stations	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 direction was 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 2020 fuel sales data and calculated using the average gasoline and diesel price in Peterborough from May to September 2020. Fuel usage in 2020 was used to approximate 2018 and 2019 fuel usage by applying a weighted factor to each year. 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 Peterborough as its home port was calculated as in-boundary trips, with 100 percent of fuel combustion attributed to the Community Sector. Lastly, the effects of the shortened boating season due to the COVID-19 pandemic were corrected with a weighted factor for inbound, outbound, and in-boundary trips.

Recalculated Baseline Year

The CCAP defined 2011 as the baseline year to compare all sectors against to determine if annual community mitigation progress is being achieved. During the evaluation of the Community Sector, it was revealed that the baseline year data was partially incorrect by not aligning with information possessed by utility company records. The GHG Protocol permits baseline data to be amended if more accurate sectoral data is available.

Electricity data was improved by reassessing the 2011 sectoral electricity consumption information provided by Peterborough Distribution Inc., which determined that Commercial and Industrial data were underreported in the original CCAP report. Residential data was also updated in 2011. Transportation data was corrected by utilizing fuel sale records supplied by Kalibrate Technologies Ltd. from 23 in-boundary Peterborough gas stations instead of using a vehicle-kilometre travel model that underreported transportation emissions, especially commercial vehicles that were initially omitted. Base year aviation fuel consumption was not available and was

estimated using the annual aircraft movement in 2011 and weighted against the average aircraft movements from 2014-2019, along with that period's average fuel records to backcast probable consumption. Lastly, marine fuel was estimated using data on record from 2021 and backcast to 2011 by applying a weighted factor to account for the impact that the COVID-19 pandemic had on marine fuel data in 2021.

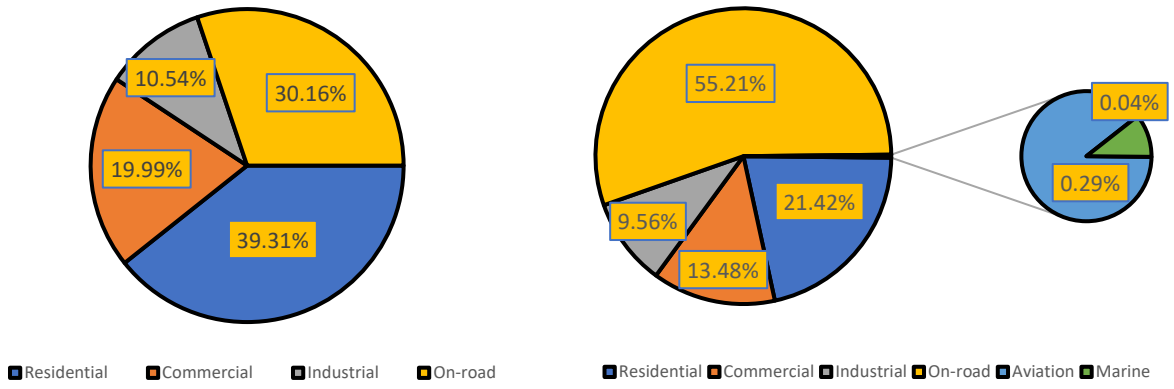
The Table 2 contains the updated baseline GHG emissions per sector.

Table 2. Rebaselined 2011 Community Sector GHG Emissions

Sector	Original GHG (tCO_2e)	Corrected GHG (tCO_2e)	Comments
Stationary			
Residential	137,482	127,301	Updated electricity data
Commercial	69,900	80,088	Updated electricity data
Industrial	36,863	56,835	Updated electricity data
Transportation			
On-road	105,498	328,135	Utilized new gasoline and diesel datasets
Aviation	-	1,729	Fuel and aircraft movements backcast
Marine	-	208	2021 fuel sales backcast
Total	**349,736**	**594,296**	

The result of the rebaselining shifted the leading community GHG emitting sector from the Residential Stationary category in the original baseline to On-road Transportation in the corrected baseline (Figure 1).

Figure 1. Original Community Sector Baseline vs Corrected Community Sector Baseline

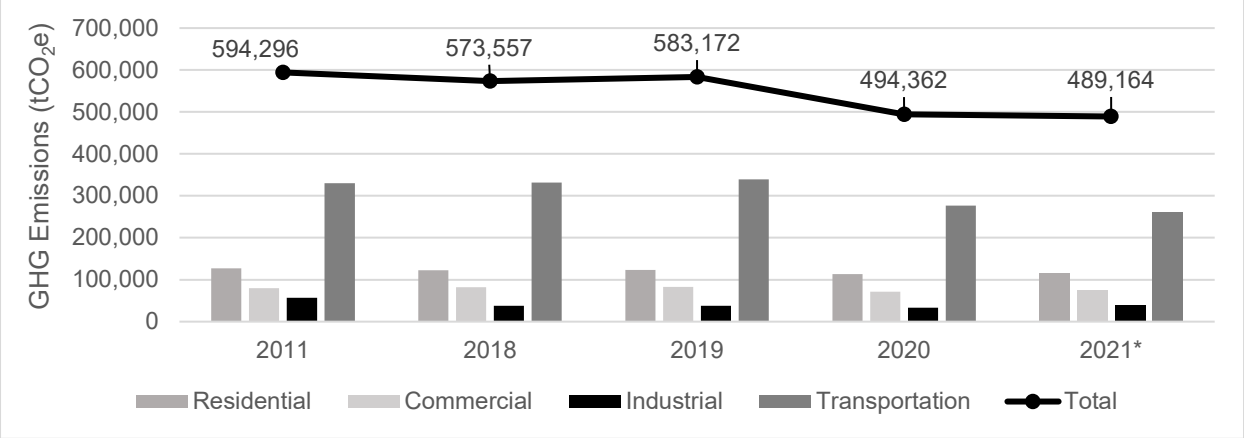


Community Sector GHG Emissions Update

The Community Sector assessment revealed that GHG emissions decreased from the 2011 baseline by 105,132 tCO_2e or 18 percent in 2021 (Figure 2). However, the decline in GHG emissions was primarily a result attributed to the beginning of the COVID-19 pandemic (March 2020) that altered work and school travel patterns due to lockdowns. A similar outcome was observed in the Corporate Sector GHG Emissions Progress Report (IPSIM22-024) that affected operations at facilities and the transit fleet as a direct result of the pandemic in 2020.

The second reason for the slight decline in pre-pandemic reporting years is a result of the decarbonization of the Ontario electricity grid from the closure of all coal power plants that lessened the emission factor of electricity in 2014. The lower carbon content of electricity attenuated the overall growth in community emissions that otherwise would have likely added more GHG emissions if the closure of the coal power plants did not occur. A similar conclusion was noted in the Reduction of Corporate GHG Emissions Progress Report (IPSIM21-018), along with an in-depth explanation provided in the Implications of Natural Gas Power Plants on Meeting Climate Action Targets Report (IPSIM22-004).

Figure 2. Community Sectoral and Total GHG Emissions



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

Table 3. Community Sector GHG Emissions

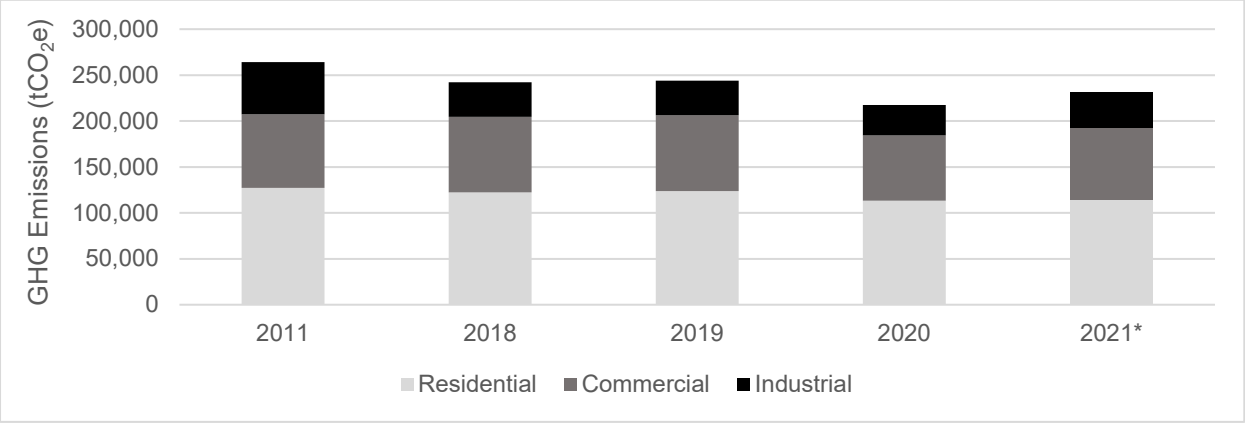
Sector	2011 GHG (tCO_2e)	2018 GHG (tCO_2e)	2019 GHG (tCO_2e)	2020 GHG (tCO_2e)	2021* GHG (tCO_2e)
Stationary					
Residential	127,301	122,228	123,615	113,152	114,779
Commercial	80,088	82,256	82,671	71,230	73,984
Industrial	56,835	37,720	37,497	33,193	39,049
Subtotal	264,224	242,204	243,783	217,575	227,812
Transportation					
On-road	328,135	327,014	336,146	274,589	258,487
Aviation	1,729‡	3,131	3,035	2,076	2,676
Marine	208‡	208‡	208‡	122	189
Subtotal	330,072	331,353	339,389	276,788	261,352
Grand Total	**594,296**	**573,557**	**583,172**	**494,362**	**489,164**

*GHG emissions in 2021 are projected
‡GHG emissions are approximated

Stationary Sector GHG Emissions

In 2021, the Stationary Sector emitted 227,812 tCO_2e from all residential, commercial, and industrial sources in Peterborough (Figure 3). Residential housing comprised 52 percent, commercial 33 percent, and industrial 15 percent of stationary GHG emissions. The analysis observed that GHG emissions from the Stationary Sector decreased by 32,785 tCO_2e or 12 percent in 2021 from 2011 levels.

Figure 3. Total Stationary Sector GHG Emissions



In southern Ontario, climate change is altering seasonal temperature averages, resulting in warmer winters and summers. As of 2021, winter temperatures have risen by ~2ºC and summer temperatures by ~1ºC from the 30-year seasonal average (1976-2005) 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.

The seasonal impact of outdoor air temperature can be 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 5-year average for heating degree days was lower by 5 percent and cooling degree days higher by 34 percent over this reporting period (Table 4). This indicates that less space heating was needed, which can result in less GHG emissions being combusted from natural gas, heating oil, and propane sources in the winter. Alternatively, space cooling required more energy to maintain indoor temperatures, but GHG emissions are mitigated due to the lower carbon content of electricity to provide cooling during warmer months.

Table 4. Peterborough Heating and Cooling Degree Days

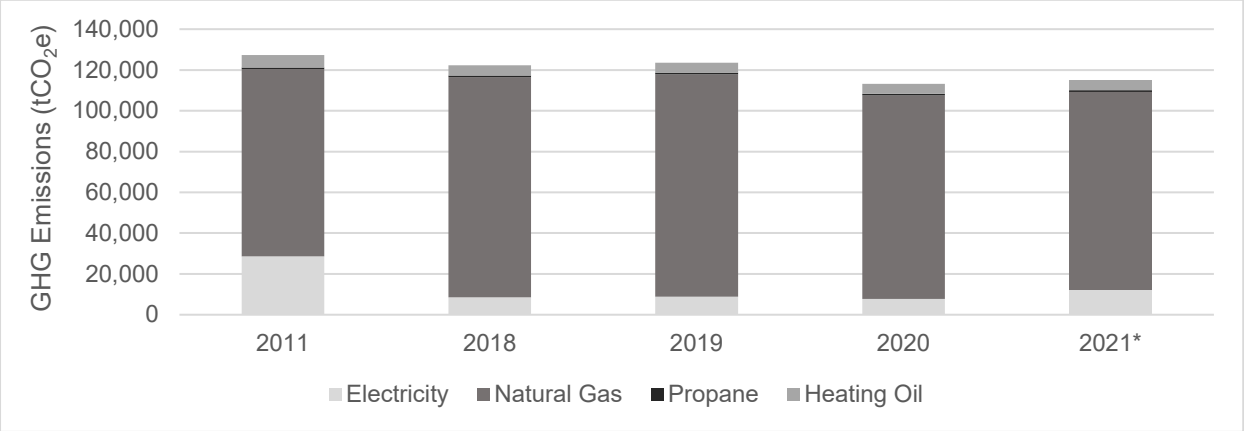
Year	Heating Degree Days	Cooling Degree Days	Heating Difference from 30-Year Avg.	Cooling Difference from 30-Year Avg.
2011	4,137	218	-6%	7%
2018	4,271	349	-3%	71%
2019	4,533	186	3%	-9%
2020	4,077	338	-8%	65%
2021	3,886	281	-12%	37%
4-Year Average	**4,181**	**275**	**-5%**	**34%**
30-Year Avg. (1976-2005)	4,413	205		

Source: Government of Canada Climate Data

Residential GHG Emissions

The Residential Sector emissions declined in 2021 from 2011 levels by 12,522 tCO_2e or 10 percent (Figure 4). Over this period, the population of Peterborough grew by approximately 4,300, with an additional 1,275 homes constructed to support that growth. The growth in natural gas emissions in 2011 is likely attributed to the expansion of natural gas as the primary heating source for new homes and the conversion of electrically heated houses to gas heat. The amount of GHG emissions as a result of space heating is consistent with the heating degree days observed for Peterborough over the reporting period. Lastly, the decarbonization of the Ontario electricity grid is evident in the level of electricity-derived GHG emissions after 2011.

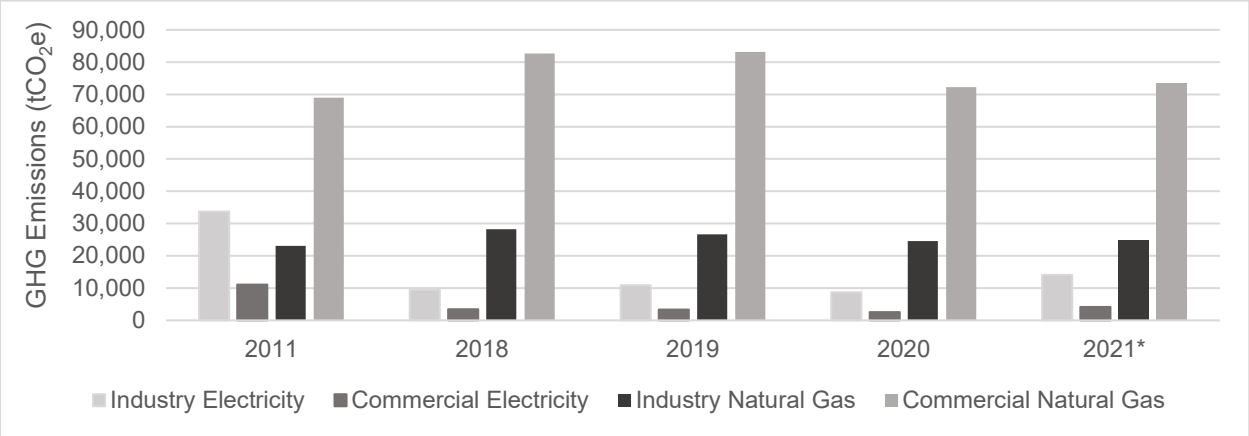
Figure 4. Residential GHG Emission Sources



Commercial and Industrial GHG Emissions

The Commercial Sector emissions declined by 2,477 tCO_2e in 2021 from 2011 levels or 3 percent (Figure 5). Likewise, Industrial Sector GHG emissions decreased by 17,787 tCO_2e in 2021 from 2011 levels or 31 percent, primarily driven by the decarbonization of electricity. Commercial businesses were more susceptible to heating and cooling degree days than industrial companies with a trend similar to the Residential Sector.

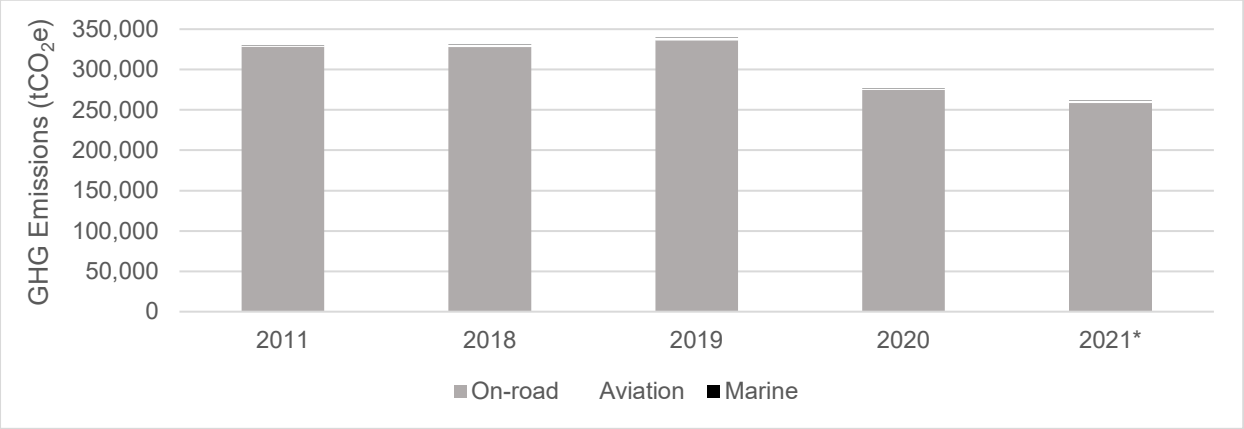
Figure 5. Industrial and Commercial GHG Emission Sources



Transportation Sector GHG Emissions

In 2021, the Transportation Sector emitted 261,352 tCO_2e from all sources in Peterborough (Figure 6). Of this total, on-road commercial and private vehicles represented 99.1 percent of GHG emissions sources in 2021. Aviation and marine contributions to community transportation emissions are 0.75 percent and 0.15 percent, respectively. The assessment revealed that GHG emissions from the Transportation Sector decreased by 68,720 tCO_2e or 21 percent in 2021 from 2011 levels.

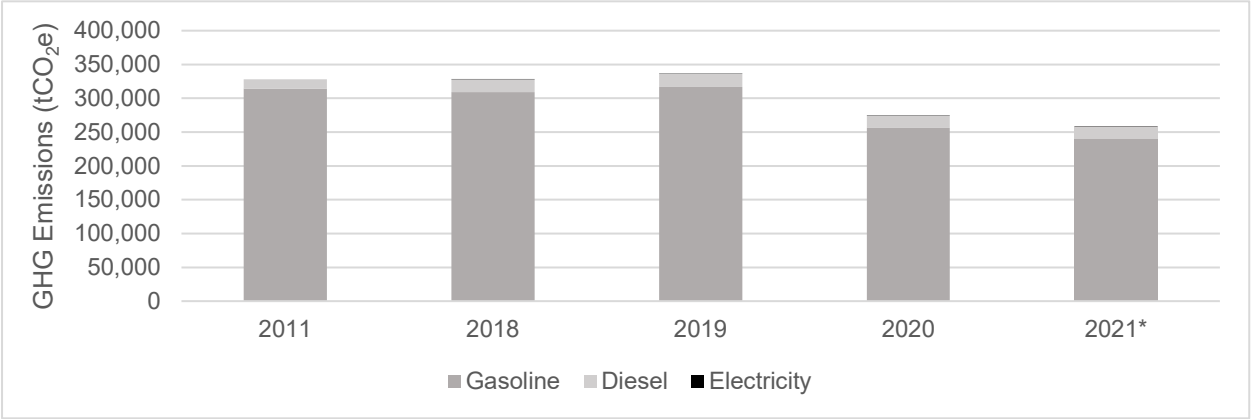
Figure 6. Total Transportation GHG Emissions



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 22 percent in 2021 from 2011 levels (Figure 7). The curtailment of gasoline is directly related to the COVID-19 pandemic that disrupted travel patterns. Alternatively, diesel consumption remained relatively steady, likely as a function of commercial logistics and goods shipments being less affected by the pandemic due to many businesses remaining open.

Figure 7. On-Road Transportation GHG Emissions



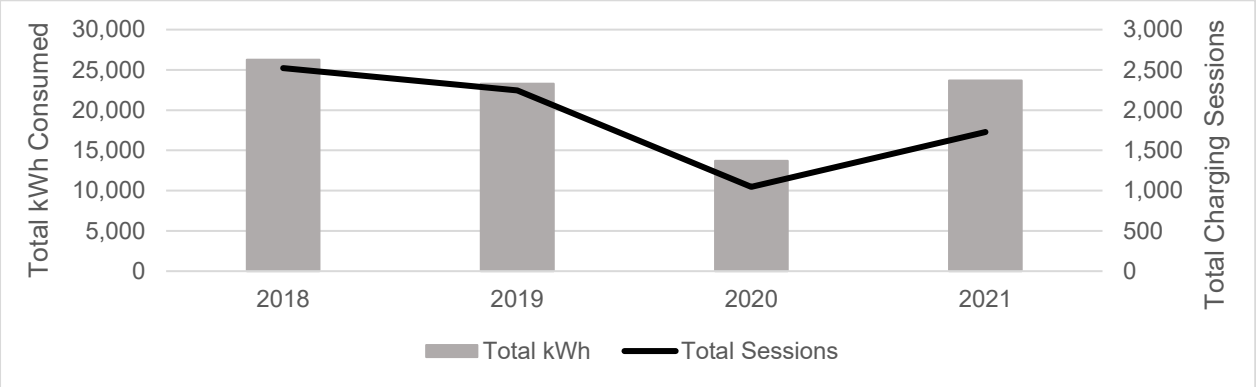
The pandemic is further reflected in data gathered from Google's EIE tool that captured the decline of 17,700,000 total trips or 21 percent in 2020 from 2019 levels (Table 5).

Table 5. Estimated Total On-road Trips per Year from 2018-2021

Directional Distance (trip/year)	2018	2019	2020	2021
Inbound trips	11,400,000	12,500,000	10,600,000	11,900,000
Outbound trips	11,500,000	12,800,000	10,600,000	11,800,000
In-boundary trips	54,500,000	60,300,000	46,700,000	50,600,000
Total	**77,400,000**	**85,600,000**	**67,900,000**	**74,300,000**

The pandemic also affected public EV charging stations, with an overall decline of charging sessions of 53 percent recorded at six community refuelling stations in 2020 from 2019 levels (Figure 8). However, most EV charging is understood to be carried out at home or at work and therefore is not captured in public EV charging data but in building utility data.

Figure 8. Public Electric Vehicle Charging Station Electricity Consumption



Aviation and Marine GHG Emissions

Before the pandemic, Peterborough Airport experienced 51,000 annual takeoffs and landings on average. In 2020, total aircraft movements declined by 55 percent from 2019 levels due to the Seneca College School of Aviation restricting instructional programming because of the pandemic (Table 6). This resulted in GHG emissions declining by 32 percent in 2020 from 2019 levels but rebounded in 2021 to near 2019 levels. To note, 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 6. Aircraft Movement Types

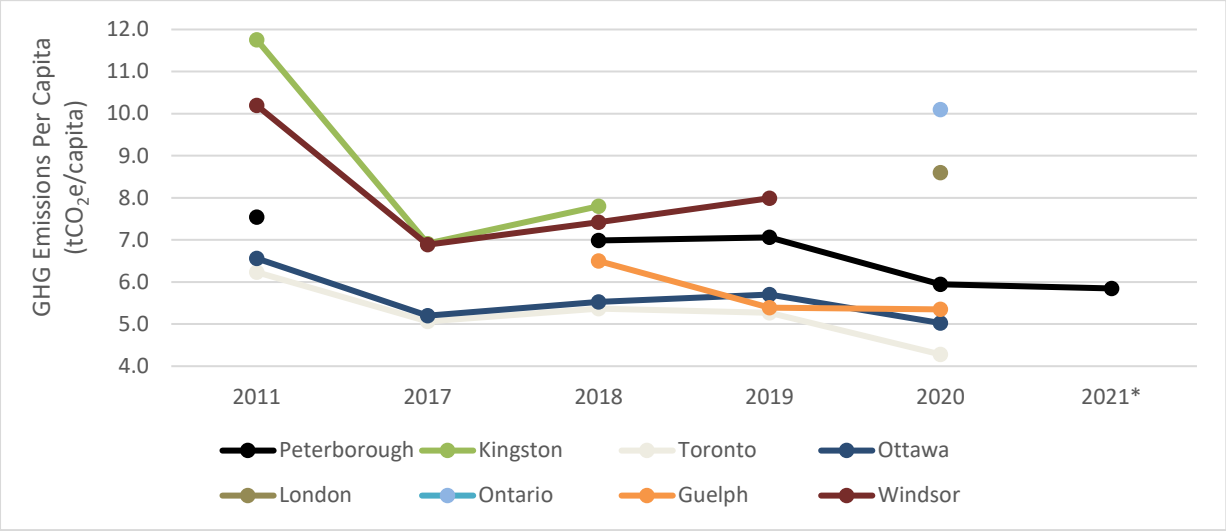
Aircraft Movement Type	2011	2018	2019	2020	2021
Local	28,722	41,561	39,907	16,029	39,719
Itinerant	4,947	4,326	4,613	4,155	4,495
Total	**33,669**	**45,887**	**44,520**	**20,184**	**44,214**

Lastly, GHG emissions stemming from watercraft are assumed to have dropped by 10 percent in 2020 from 2019 levels, as a result of a shortened docking season permitted at the Del Crary Marina during the pandemic.

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 2021, down from 7.5 tCO_2e per capita in 2011. This calculation allowed Peterborough to be compared against other municipalities to understand the rate of intensity of local emissions (Figure 9). It was observed that Peterborough ranked lower than most reporting municipalities in GHG emissions per capita, especially against the provincial average of 10.1 tCO_2e per capita.

Figure 9. Municipalities GHG Emissions per Capita

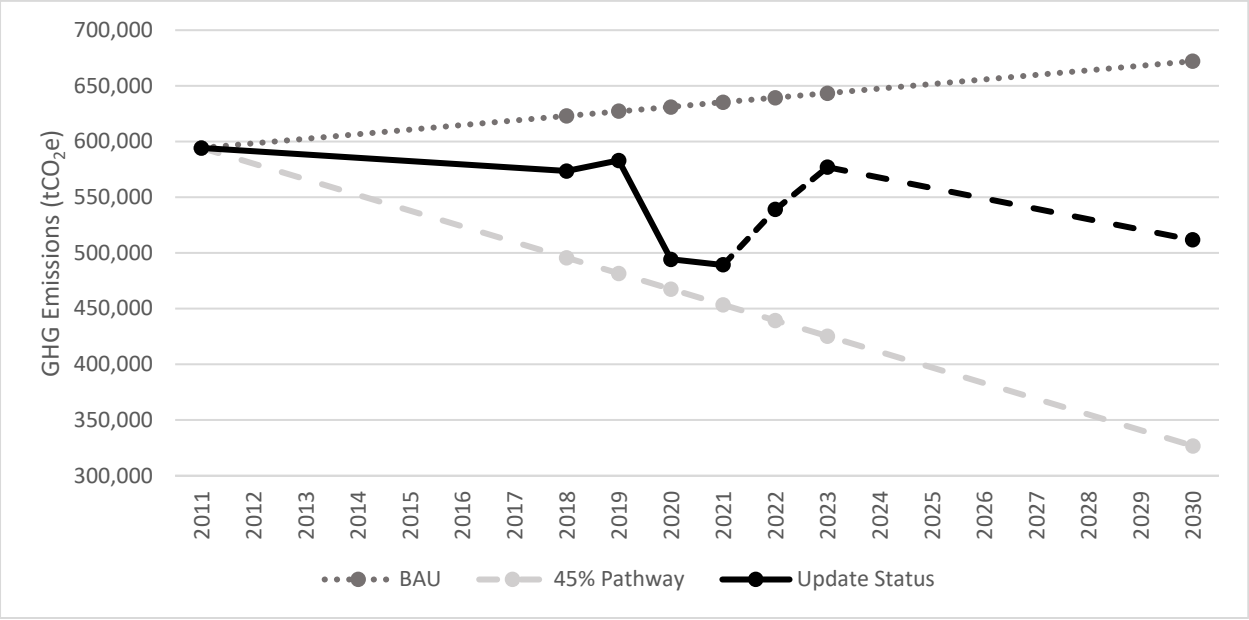


Achieving Community Sector 2030 Reduction Target

The COVID-19 pandemic is the primary cause that precipitated the observed substantial decline in 2020 and estimated stagnant levels in 2021 (Figure 10). In 2022 and 2023, society is expected to trend towards pre-pandemic energy consumption levels, specifically on-road transportation, resulting in community GHG emissions likely rising to near 2019 levels by 2023. The estimation considered the public health pandemic guidance requiring limited contact in January 2022, which is assumed to have mitigated

local transportation emissions. An observed warm winter and cool summer lowered energy use for heating and cooling for residential and commercial buildings. With pandemic-associated restrictions lifted in 2023, the estimation only considered heating and cooling, which was projected to be lower due to an observed warm winter in Q1 2023.

Figure 10. 2030 Community Sector GHG Emission Projection



An approximation was created to assess the amount of GHG emissions required to be reduced to meet the 45 percent mitigation goal by 2030 compared against the likely reduction given the anticipated rate of transition for the Community Sector (Table 7).

Table 7. Projected 2030 GHG Emissions Required vs Likely Achievable Rate

Sector	Actual 2011 (tCO_2e)	Actual 2021* (tCO_2e)	Projected 2030 (tCO_2e)	% Required to be Reduced	Projected 2030 (tCO_2e)	% Likely to be Reduced
Residential	127,301	114,779	80,000	-37%	107,000	-16%
Commercial	80,088	73,984	60,000	-25%	69,000	-14%
Industrial	56,835	39,049	30,000	-47%	37,000	-35%
Transportation	330,072	261,352	160,000	-52%	299,000	-10%
Total	594,296	489,164	330,000	-45%	512,000	-14%

To achieve the 2030 target, significant GHG emission reductions are needed. This transition may be beyond the capacity of society due to limited material supply, such as electric vehicles, heat pumps, and solar panels not being available or limited local skilled trades to install these technologies at the scale required. Moreover, local population and business growth will increase the demand for energy for buildings and

mobility, which would need to be counteracted through immediate net-zero measures to avoid a rise in absolute annual GHG emissions.

Under the Likely Achievable scenario, an estimated 14 percent reduction from 2011 levels can probably be realized if materials and skilled trades are readily available and planned community programs achieve their best-case scenario uptakes. Specifically, the following existing or planned City-led and external partners (i.e., province, federal, utilities, NGOs) mitigation program offerings were considered in the Likely Achievable scenario (Table 8). However, if additional provincial or federal programming, policies, or incentives are developed to expedite the transition, there is a slight chance that the 45 percent target may be met in 2030.

Lastly, climate action is not the sole responsibility of the municipality and requires active participation from all levels of government to support achieving local climate goals. The provincial and federal governments are offering Peterborough residents and businesses access to funding and incentives for climate transitioning. The Community Sector substantially benefits when external funding and policies are enacted to accelerate the reduction of GHG emissions that the City alone cannot undertake or is outside the purview of the municipality. To realize net-zero by 2050, more Community Sector abatement measures must be developed and implemented over the next 27 years. The City will continue to take a leadership role in creating impactful climate actions in concert with support from utilities and provincial and federal governments. Only by working together with these partners will Peterborough ensure reaching net-zero.

Table 8. Existing and Planned Mitigation Initiatives in Likely Achievable Scenario

Sector	Initiative	Details	Est. GHG Reduction by 2030	Lead Organization
Residential	Home Energy Efficiency Program	- Home retrofit program to support homeowners finance energy renovations, - LIC and third-party financing loan stream, - Targeting 1,350 homes by Year 6 after launch, - Planned launch in 2024 subject to securing Federation of Canadian Municipalities funding	- 6,800 tCO_2e - 6% below 2021 levels by 2030	City
	Canada Greener Homes Initiatives (CGHI)	- Canada Greener Homes Grant provides up to $5,000 in energy renovation grants and $600 to cover the required home energy audit costs, - Homeowners can apply for the Canada Greener Homes Loan to access interest-free financing up to $40,000 to cover the cost of energy retrofits, - Oil to Heat Pump Affordability Grant offers up to $5,000 to replace a heating oil furnace with a cold climate heat pump, - CGHI's constellation of programs can assist 700,000 homeowners nationwide till 2030	- 1,000 tCO_2e - 1% below 2021 levels by 2030	Federal
	Clean Home Heating Initiative (CHHI) Pilot	- Province in partnership with Enbridge Gas Inc., offered limited grants of $3,000-$4,500 to install hybrid heat pumps for homeowners in Peterborough, - NRCan estimates that a hybrid heat pump can reduce annual household GHG emissions by 30 percent once installed	- 150 tCO_2e	Province and Enbridge Gas
	Solar PV Map	- A community solar PV map was created to provide info to building owners about the capacity of their building to add rooftop solar panels	- Enabling initiative	City

Sector	Initiative	Details	Est. GHG Reduction by 2030	Lead Organization
Commercial	Green Economy Peterborough (GEP)	- Low carbon economic hub that supports local businesses in reducing operational GHG emissions while also improving adaptation outcomes, - Members receive coaching from GEP staff to access educational and networking opportunities to realize GHG abatement goal	- 5,000 tCO_2e - 7% below 2021 levels by 2030	GreenUP (funded in part by the City)
Industrial	Save-on-Energy	- Program offers grants for commercial and industrial businesses to replace aging equipment, undertake lighting upgrades, and hire an energy manager	- 500 tCO_2e - 1% below 2021 levels by 2030	Hydro One
	Fix Incentive Program	- Program provides companies with subsidies to lower space heating and hot water consumption, along with enhancements to ventilation systems	- 1,500 tCO_2e - 4% below 2021 levels by 2030	Enbridge
Transportation	Zero Emission Vehicles	- Ontario residents can receive a $5,000 incentive to purchase a battery electric vehicle, - The federal government is also providing incentives for purchasing or leasing medium and heavy-duty zero-emission vehicles - The federal government is mandating that only zero-emission vehicles be sold in Canada by 2035	- 29,000 tCO_2e - 10% below 2021 levels by 2030	Federal
	EV Station Installation	- In 2022, 8 public EV stations were installed at two locations: Simcoe St Parkade and Del Crary Park - Improve charging capabilities in the downtown to support resident's transition	- Enabling initiative	City
	Peterborough Transit	- Existing bus network offers immediate low-carbon transition opportunities for all residents - Current fleet uses low-diesel engine technology to lower bus emissions by 25% from traditional buses	- Enabling initiative	City

Sector	Initiative	Details	Est. GHG Reduction by 2030	Lead Organization
	Peterborough Transit: Trip Planner	- Integrated bus route schedules on Google Maps to enhance customer trip planning	- Enabling initiative	City
	Peterborough Transit: On-demand Service	- PTBOnDemand utilizes non-standard bus routes by pairing multiple customers' destinations together to enable customized routing	- Enabling initiative	City
	Peterborough Transit: The Link	- The Link rural bus route services Lakefield, Curve Lake First Nation, Bridgenorth, and Ennismore communities with connections to Peterborough Transit	- Enabling initiative	City
	Peterborough Transit: Youth Ride for Free	- Youth under 12 ride for free to foster lifelong transit ridership behaviours in residents	- Enabling initiative	City
	Peterborough Transit: Bike Racks	- Installation of five bus bike racks to support multi-modal commuting	- Enabling initiative	City
	Cycling Network	- 42 km of highly accessible bike trails and lanes available to cycle to support residents adopting low-carbon travel	- Enabling initiative	City

Summary

The Community Sector assessment revealed that GHG emissions declined by 105,132 tCO_2e or 18 percent in 2021 from 2011 levels. Stationary and Transportation Sectors recorded sizable reductions because of the COVID-19 pandemic, which altered residents' and businesses' work and travel patterns. Community Sector emissions are anticipated to return to near pre-pandemic levels by 2023.

The City has created many community-facing initiatives to encourage community mitigation efforts, like the Home Energy Efficiency Program. However, the best-case GHG emission scenario expects a 14 percent reduction to be achieved by 2030 from 2011 levels with present policies and initiatives enacted. Additional action is needed from higher levels of government and utility companies to support decarbonizing efforts in Peterborough to attain net-zero by 2050.