



# ST. CATHARINES

*Corporate and Community Greenhouse Gas Inventory*



# Clean Air Partnership

## ABOUT THE CLEAN AIR PARTNERSHIP:

Clean Air Partnership (CAP) is a registered charity that works in partnership to promote and coordinate actions to improve local air quality and reduce greenhouse gases for healthy communities. Our applied research on municipal policies strives to broaden and improve access to public policy debate on air pollution and climate change issues. Clean Air Partnership's mission is to transform cities into more sustainable, resilient, and vibrant communities where resources are used efficiently, the air is clean to breathe and greenhouse gas emissions are minimized.

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# INTRODUCTION

## 1.0 | INTRODUCTION

Climate Change is one of the most urgent challenges facing humanity. The City of St. Catharines declared a climate emergency in 2019 urging sectors in the government and community to apply a climate lens to everyday activities and decisions such as energy usage, transportation and waste.

*Canada's Changing Climate Report* found that Canada is warming twice as rapidly as the rest of the world.<sup>1</sup> Due to human activity, as well as a combination of climate processes and feedback mechanisms, warming in Canada is expected to increase further in the future. This will have major implications on local climate as well as to human and environmental health, and economic development.

The Intergovernmental Panel on Climate Change (IPCC) released a report in the fall of 2018, *Special Report on Global Warming of 1.5°C*, stressing the urgency in limiting global temperature rise to 1.5°C above pre-industrial levels by the end of the century.<sup>2</sup> The Report stated that global net anthropogenic CO<sub>2</sub> emissions must decline by 45% from 2010 levels by 2030 to reach net zero by 2050 as projected through modelled pathways.






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<sup>1</sup> [Canada's Changing Climate Report](#), 2019

<sup>2</sup> [Special Report on Global Warming of 1.5°C](#), 2018

## 1.1 | CLIMATE CHANGE AND THE CITY OF ST. CATHARINES

In St. Catharines, the effects of climate change are evident through increased flood events and more extreme heat days. Several significant actions have been made to mitigate emissions. Mitigation efforts have resulted in a 15% decrease in energy use in City buildings a 25% reduction in greenhouse gas (GHG) emissions since 2011. Energy use from streetlights has been reduced by 62% through LED retrofits. These are just two examples of how the City has committed to achieving their climate change goals. St. Catharines has also joined the Partners of Climate Protection (PCP) program delivered by the Federation of Canadian Municipalities (FCM) and ICLEI-Local Governments for Sustainability. This program supports and guides the municipality in reducing GHG emissions through the Milestone Framework. The five milestones are:

-  **Milestone 1:** Creating a baseline emissions inventory and forecast
-  **Milestone 2:** Set emissions reduction target
-  **Milestone 3:** Develop a local action plan
-  **Milestone 4:** Implement the local action plan
-  **Milestone 5:** Monitor progress and report results

This report summarizes the baseline inventory of GHG emissions for both municipal operations (corporate emissions) and community activities within the City's geographical boundaries, to fulfill the requirement of Milestone 1 of the PCP program.



# 1.2 | MILESTONE 1

A greenhouse gas inventory summarizes and tracks the GHG emissions released by both corporate and community activities. For St. Catharines, 2018 was selected as the baseline year for this inventory. Two separate inventories were created, one for corporate emissions and one for community emissions.

The following sectors are included in their respective inventories:

CORPORATE INVENTORY	COMMUNITY INVENTORY
BUILDINGS AND FACILITIES	RESIDENTIAL BUILDINGS
FLEET VEHICLES	INSTITUTIONAL AND COMMERCIAL BUILDINGS
STREETLIGHTS AND TRAFFIC SIGNALS	INDUSTRIAL BUILDINGS
WATER AND WASTEWATER	OTHER BUILDINGS
CORPORATE SOLID WASTE	TRANSPORTATION
	COMMUNITY SOLID WASTE



# METHODOLOGY



## 2.0 | METHODOLOGY

### 2.1 | DATA SOURCES

In order to compile and complete a thorough corporate and community GHG emissions inventory, complete, accurate and real consumption data were used. In the absence of consumption data, assumptions were made using downscaled provincial data. Table 1 lists out all the data sources that were used for each sector.

**TABLE 1. SUMMARY OF DATA SOURCES USED FOR GHG EMISSIONS INVENTORY**

SECTOR	DATA SOURCE	DATA TYPE
CORPORATE INVENTORY		
BUILDINGS AND FACILITIES	Enbridge Inc.	Natural gas consumption data (m <sup>3</sup> )
	Alectra Inc.	Electricity consumption data (kwh)
	St. Lawrence Seaway Management Corporation	Electricity consumption data (kwh) solely for the Lock 3 Museum
FLEET VEHICLES	Lake Street Service Centre – 383 Lake Street	Diesel and unleaded gasoline consumption data (L)
	Fire Station #4 – 16 Walnut Street	Diesel and unleaded gasoline consumption data (L)
	Community, Recreation and Cultural Services – 320 Geneva Street	Diesel and unleaded gasoline consumption data (L)
	St. Catharines Transit Commission	Diesel consumption data (L)



SECTOR	DATA SOURCE	DATA TYPE
CORPORATE INVENTORY		
STREETLIGHTS AND TRAFFIC SIGNALS	Alectra Inc.	Electricity consumption data (kwh)
	Niagara on the Lake Hydro	Electricity consumption data (kwh) solely for Glendale Ave
	St. Lawrence Seaway Management Corporation	Electricity consumption data (kwh) for Lock 3 Museum streetlights
WATER AND WASTEWATER	City of St. Catharines (various departments)	Electricity consumption data (kwh)
SOLID WASTE	City of St. Catharines (various departments)	Waste generation amount (tonnes)
COMMUNITY INVENTORY		
ELECTRICITY	Alectra Inc.	Electricity consumption data (kwh)
NATURAL GAS	Enbridge Inc.	Natural gas consumption data (m <sup>3</sup> )
TRANSPORTATION	Kent Group Ltd	Diesel and unleaded gasoline consumption data (L)
SOLID WASTE	Niagara Region	Waste generation amount (tonnes)
PROPANE	Statistics Canada	Consumption data (L)

## 2.2 | GHG EMISSION CALCULATION

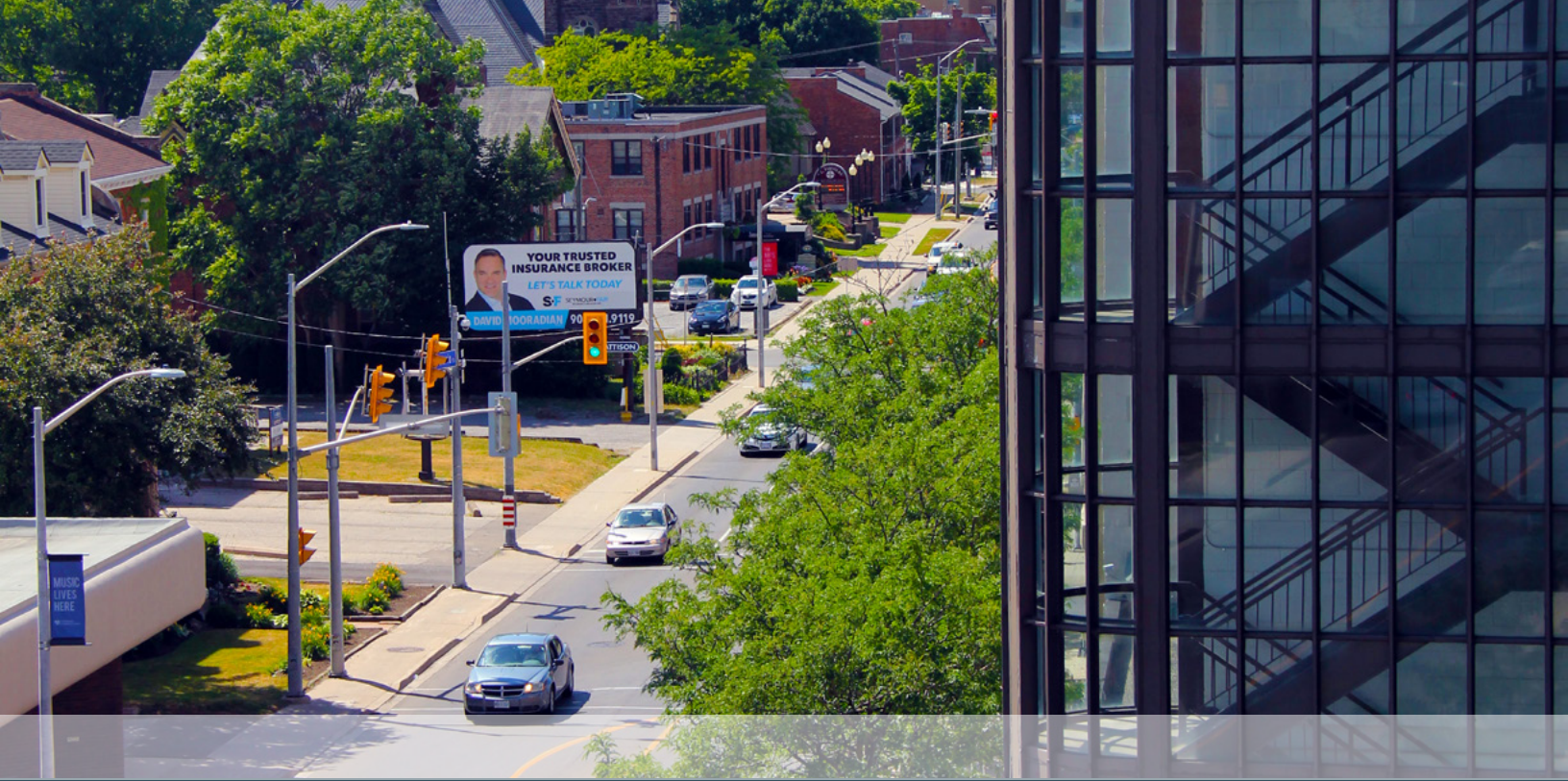
The main GHGs of concern include carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and fluorinated gases (perfluorocarbons, hydrofluorocarbons, sulphur hexafluoride and nitrogen trifluoride), however, CO<sub>2</sub> is the primary gas emitted through anthropogenic activity to the atmosphere. Each gas will remain in the atmosphere for various periods of time, ranging from years to thousands of years. Therefore, the global warming potential (GWP) of each gas was calculated in order to determine the effect they have in warming the atmosphere. The GWP, for each gas, describes the total warming impact relative to CO<sub>2</sub> over 100 years. As a result, CO<sub>2</sub>e, also referred to as carbon dioxide equivalent, is the unit used for the representation of the warming impact for all gases. All anthropogenic activity emits GHGs into the atmosphere and by using a factor, it will convert the emission of different gases into CO<sub>2</sub>e for that activity. This factor is the emission coefficient.

Once the consumption data for the inventory were collected, appropriate emission coefficients were applied to each energy source to calculate the GHG emissions (see Table 2). The following emission coefficients were obtained from Canada's National Inventory Report Part 2<sup>1</sup> and the solid waste GHG emissions were calculated using the PCP Milestone Tool.<sup>2</sup> The methane commitment methodology provided by the PCP Milestone Tool was used to calculate both corporate and community solid waste emissions. The mass of solid waste and the composition of the waste stream is included in this model to generate CO<sub>2</sub>e emissions. GHG emissions generated from electricity usage were calculated with the corresponding electricity emission intensity value specific to Ontario for 2017.

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<sup>1</sup> [Canada's National Inventory Report Part 2, 2017](#)

<sup>2</sup> [PCP Milestone Tool](#)



**TABLE 2. SUMMARY OF EMISSION COEFFICIENTS**

ENERGY SOURCE	EMISSION COEFFICIENT (CO <sub>2</sub> E)
ELECTRICITY	20 g/kWh
NATURAL GAS	1.888 kg /m <sup>3</sup>
DIESEL	2.681 kg/L
UNLEADED GAS	2.307 kg/L
PROPANE	1.515 kg/L

# CORPORATE INVENTORY



## 3.0 | CORPORATE GREENHOUSE GAS INVENTORY (2018)

In 2018, 16,464 tonnes of CO<sub>2</sub>e were emitted by the City of St. Catharines' corporate operations. Table 3 summarizes the total corporate GHG emissions by sector and Table 4 summarizes the emissions by energy source. The same information is presented graphically in Figure 1 and Figure 2.

**TABLE 3. ST. CATHARINES CORPORATE EMISSIONS BY SECTOR**

SECTOR	CO <sub>2</sub> E PRODUCED (TONNES)
BUILDINGS AND FACILITIES	4,558
FLEET VEHICLES	8,911
STREETLIGHTS AND TRAFFIC SIGNALS	112
WATER AND WASTEWATER	6
SOLID WASTE	2,877
TOTAL	16,464

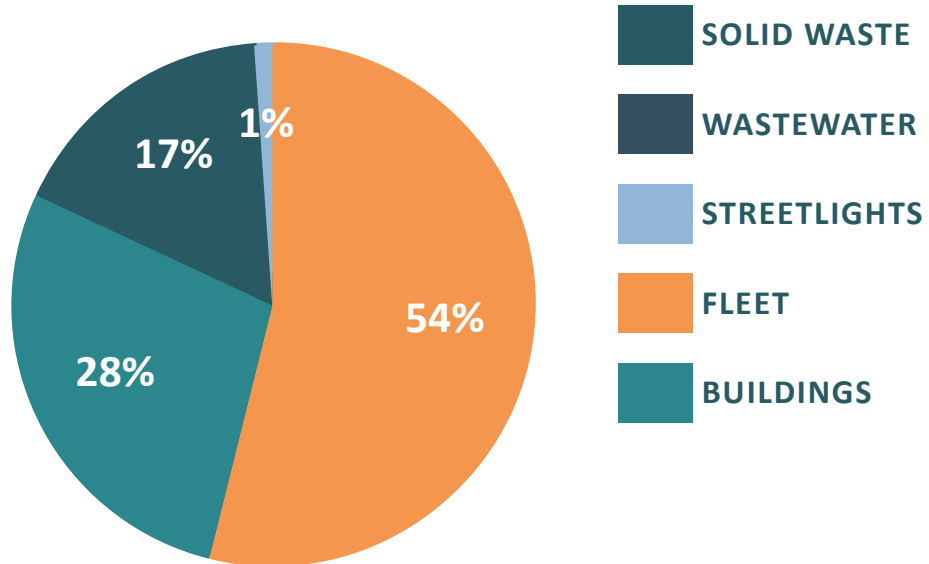


**TABLE 4. ST. CATHARINES CORPORATE EMISSIONS BY ENERGY SOURCE**

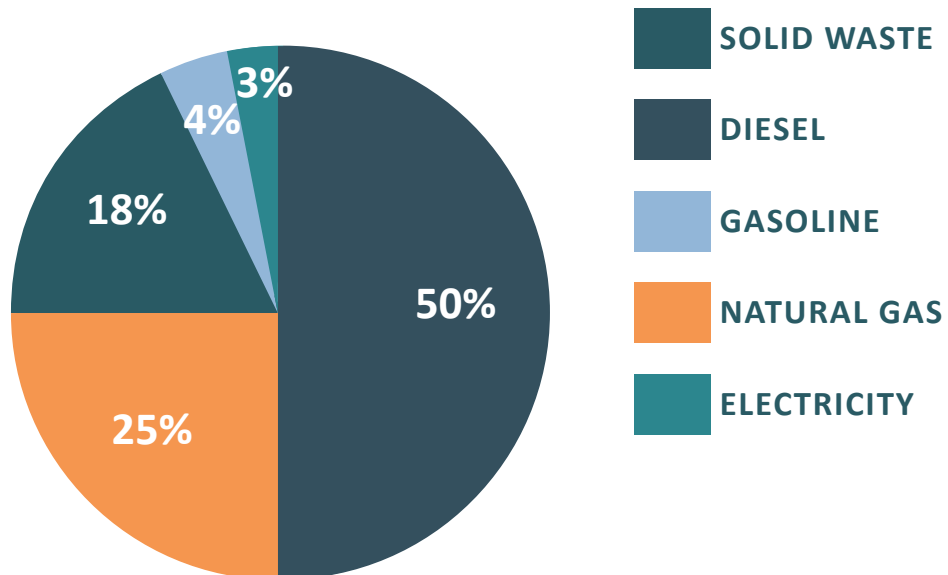
ENERGY SOURCE	CONSUMPTION	CO <sub>2</sub> E PRODUCED (TONNES)
ELECTRICITY	28,673,117 kwh	573
NATURAL GAS	2,159,668 m3	4,102
GASOLINE	305,770 L	705
DIESEL	3,060,800 L	8,206
SOLID WASTE	2,103 tonnes	2,877
TOTAL		16,463

**Note:** The difference in Total Emission between Table 3 and Table 4 is due to rounding.

**FIGURE 1. ST. CATHARINES CORPORATE EMISSIONS BY SECTOR**



**FIGURE 2. ST. CATHARINES CORPORATE EMISSIONS BY ENERGY SOURCE**



### 3.1 | BUILDINGS AND FACILITIES

Corporate buildings and facilities make up 28% of the corporate emissions. From this sector, 10% of emissions comes from electricity while 90% of emissions comes from natural gas. The City of St. Catharines owns a total of 44 buildings and facilities ranging from administrative offices to fire stations and cultural facilities. All buildings that were included in the corporate inventory are municipally owned with some level of operational control. Leased buildings were also included in this inventory as they are also buildings that the City has operational control over. Assumptions on the hydro usage were made for 6 leased buildings, based on the building benchmarks in the St. Catharines Energy Conservation and Demand Management Plan (CDMP) (see Table 5).<sup>1</sup> The breakdown of emissions by building and the total GHGs produced are summarized in Table 6 and 7, graphically represented as Figure 3.

**TABLE 5. BENCHMARK BUILDINGS FROM THE CDMP**

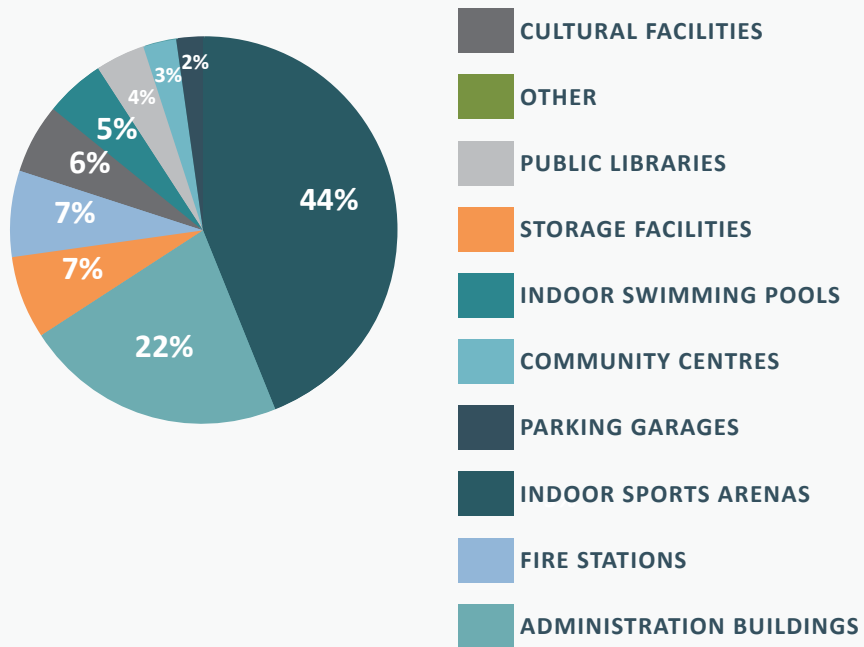
LEASED BUILDING	BUILDING BENCHMARK
Q.E. FACER COMMUNITY CENTRE	COMMUNITY CENTRE
HAIG BOWL ARENA	CULTURAL FACILITY
MERRITTON ARENA	COMMUNITY CENTRE
MERRITTON COMMUNITY CENTRE	COMMUNITY CENTRE
ROBERTSTON SCHOOL	ADMINISTRATION BUILDING
ROBERTSTON SCHOOL — ANNEX	COMMUNITY CENTRE

<sup>1</sup> [Energy Conservation and Demand Management Plan](#), 2019

**TABLE 6. BREAKDOWN OF OPERATIONAL TYPE CONSUMPTION AND EMISSIONS**

OPERATIONAL TYPE	ELECTRICITY CONSUMPTION (KWH)	ELECTRICITY EMISSIONS (TCO <sub>2</sub> E)	NATURAL GAS CONSUMPTION (M <sup>3</sup> )	NATURAL GAS EMISSIONS (TCO <sub>2</sub> E)
ADMINISTRATIVE OFFICES AND RELATED FACILITIES, INCLUDING MUNICIPAL COUNCIL CHAMBERS	4,976,618	100	473,904	900
FIRE STATIONS AND ASSOCIATED OFFICES AND FACILITIES	884,680	18	111,223	211
INDOOR SPORTS ARENAS	9,517,545	190	968,172	1,839
PARKING GARAGES	832,553	17	38,875	74
COMMUNITY CENTRES	1,577,482	32	64,692	123
CULTURAL FACILITIES	2,195,193	44	111,928	213
INDOOR SWIMMING POOLS	2,018,529	40	135,802	258
STORAGE FACILITIES WHERE EQUIPMENT OR VEHICLES ARE MAINTAINED, REPAIRED OR STORED	733,671	15	165,953	315
PUBLIC LIBRARIES	26,219	0.5	89,117	169
OTHER	16,112	0.3	0	0

**FIGURE 3. ST. CATHARINES CORPORATE BUILDINGS AND FACILITY  
GHG EMISSIONS BY OPERATIONAL TYPE**



**TABLE 7. ELECTRICITY CONSUMPTION AND GHG EMISSIONS  
FROM BUILDINGS AND FACILITIES**

ENERGY SOURCE	CONSUMPTION	CO <sub>2</sub> E (TONNES)
ELECTRICITY	22,778,606 kwh	456
NATURAL GAS	2,159,668 m <sup>3</sup>	4,102

## 3.2 | FLEET

The corporate fleet makes up 54% of corporate emissions. The GHG emissions generated in this sector were calculated through corporate fleet inventory and fuel consumption data. St. Catharines Transit was also included in the fleet sector because this is a service that the City traditionally has provided. In 2018, St. Catharines' corporate fleet totaled 210 vehicles (light and heavy-duty vehicles) and 254 pieces of equipment across all departments. Below is a breakdown of vehicles in each department (see Table 8).

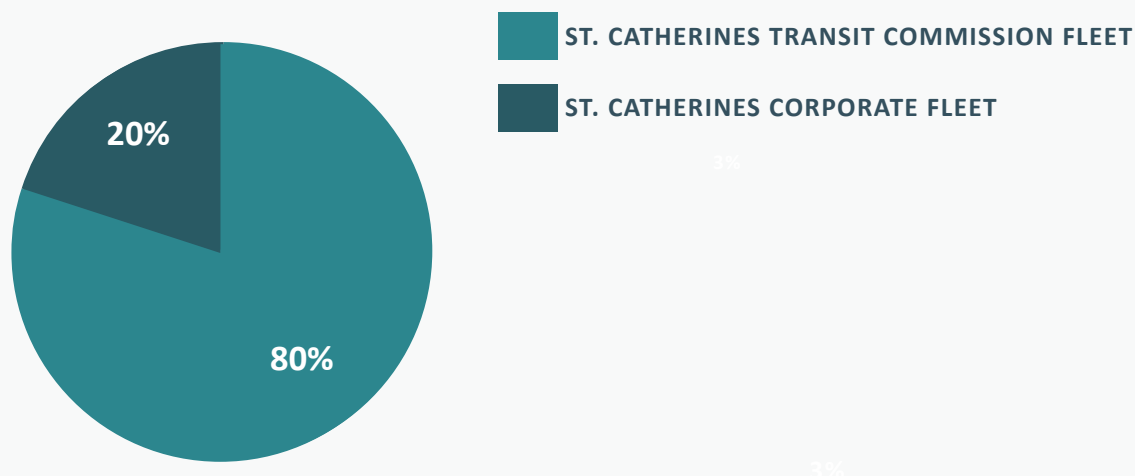
**TABLE 8. BREAKDOWN OF VEHICLES WITHIN THE CITY OF  
ST. CATHARINES CORPORATE INVENTORY**

AREA	NUMBER OF VEHICLES
ARENA	4
CEMETERY	5
ENVIRONMENTAL	4
FINANCE	7
LIBRARY	1
POOL CARS	4
LSSC	151
FIRE SERVICES	34



Within St. Catharines Transit, there are 76 conventional transit buses that service St. Catharines and to the nearby municipality of Thorold. There are 5 bus routes that run in Thorold out of 25 routes which includes, weekday, weekend and holiday service. These 5 bus routes make up approximately 20 % of the total routes. However, due to the limitations of the data, the Thorold bus routes were included with the rest of the St. Catharines Transit fleet that provide service to St. Catharines. Figure 4 displays the distribution of corporate emissions by the City's corporate fleet and St. Catharines Transit Commission. Numerical values are summarized in Table 9. The total fuel consumption and GHG emissions from both fleets are summarized in Table 10.

**FIGURE 4. DISTRIBUTION OF EMISSIONS FROM ST. CATHARINES  
AND ST. CATHARINES TRANSIT COMMISSION**





**TABLE 9. TOTAL GHG EMISSIONS BY BOTH THE CORPORATE FLEET  
AND THE TRANSIT COMMISSION FLEET**

FLEET	CO <sub>2</sub> E (TONNES)
ST. CATHARINES CORPORATE FLEET	1,808
ST. CATHARINES TRANSIT COMMISSION FLEET	7,104

**TABLE 10. TOTAL FUEL CONSUMPTION AND GHG EMISSIONS FROM FLEET**

FUEL	CONSUMPTION (L)	CO <sub>2</sub> E (TONNES)
DIESEL	3,060,800	8,206
UNLEADED (GAS)	305,770	705

### 3.3 | STREETLIGHTS AND TRAFFIC SIGNALS

Streetlights and traffic signals make up 1% of the corporate emissions. Table 11 summarizes the energy consumption and emitted emissions from this sector.

**TABLE 11. ELECTRICITY CONSUMPTION AND GHG EMISSIONS  
FROM STREETLIGHTS AND TRAFFIC SIGNALS**

SECTOR	ELECTRICITY CONSUMPTION (KWH)	CO <sub>2</sub> E (TONNES)
STREETLIGHTS AND TRAFFIC SIGNALS	5,616,133	112

### 3.4 | WATER AND WASTEWATER

Water and wastewater make up 0.03% of the corporate emissions. In St. Catharines, there are three water and wastewater treatment plants (Port Dalhousie Wastewater Treatment Plant, Port Weller Wastewater Treatment Plant and Decew Water Treatment Plant) which are owned and operated by the Niagara Region. The City has no control or influence over these plants so therefore, they are excluded from the corporate inventory. The breakdown of the facilities is summarized in Table 12 and the total energy consumption and GHG emissions from this sector is summarized in Table 13.

**TABLE 12. BREAKDOWN OF ST. CATHARINES WATER AND WASTEWATER FACILITIES**

DESCRIPTION	CONSUMPTION (KWH)
SEWER FLOW MONITORS (10)	15,279
COMBINED SEWER STORAGE FACILITIES (7)	63,009
WASTEWATER PUMP STATION	1,740
DRINKING WATER PUMP STATION	25,783
FIRE PUMP	161
BULK WATER STATION	18,792
OUTDOOR RECREATION POOLS (3) AND SPLASH PAD (1)	153,614

**TABLE 13. ELECTRICITY CONSUMPTION AND GHG EMISSIONS  
FROM WATER AND WASTEWATER FACILITIES**

SECTOR	ELECTRICITY CONSUMPTION (KWH)	CO <sub>2</sub> E (TONNES)
WASTEWATER FACILITIES	124,763	3
WATER FACILITIES	153,614	3



### 3.5 | CORPORATE SOLID WASTE

Corporate solid waste emissions make up 17% of all corporate emissions. The amount of solid waste was calculated through the number of waste containers and the number of weekly/biweekly pick-ups at each site. These sites are not limited to, but include fire stations, corporate buildings and parks. The generated waste is sent to the Walker South Landfill in the City of Niagara Falls. This landfill is an anaerobic managed solid waste disposal site and the GHG emissions were calculated through the methane commitment approach using the PCP Milestone Tool. Total solid waste generation and GHG emissions from this sector is summarized in Table 14.

**TABLE 14. SOLID WASTE GENERATION AND GHG EMISSIONS FROM SOLID WASTE**

SECTOR	WASTE GENERATION (TONNES)	CO <sub>2</sub> E (TONNES)
CORPORATE SOLID WASTE	2,103	2,877

# ST. CATHARINES INVENTORY



## 4.0 | COMMUNITY GREENHOUSE GAS INVENTORY (2018)

In 2018, 862,914 tonnes of CO<sub>2</sub>e were emitted by the community of St. Catharines. Table 15 and 16 summarize the total community GHG emissions and are graphically represented as Figure 5 and 6. The community of St. Catharines produced approximately 6.4 tonnes of CO<sub>2</sub>e per capita in 2018.

**TABLE 15. ST. CATHARINES COMMUNITY EMISSIONS BY SECTOR**

SECTOR	CO <sub>2</sub> E PRODUCED (TONNES)
RESIDENTIAL	184,107
COMMERCIAL	90,214
INDUSTRIAL	31,359
OTHER	108,875
TRANSPORTATION	402,725
SOLID WASTE	45,635
TOTAL	862,914



**TABLE 16. ST. CATHARINES COMMUNITY EMISSIONS BY ENERGY SOURCE**

ENERGY SOURCE	CONSUMPTION	CO <sub>2</sub> E PRODUCED (TONNES)
ELECTRICITY	1,105,846,005 kwh	22,117
NATURAL GAS	206,615,983 m <sup>3</sup>	392,438
GASOLINE	163,452,275 L	377,084
DIESEL	7,034,204 L	18,859
PROPANE	4,476,289 L	6,782
SOLID WASTE	35,212 tonnes	45,635
TOTAL		862,915

**Note:** The difference in Total Emission between Table 15 and Table 16 is due to rounding.

FIGURE 5. ST. CATHARINES COMMUNITY GHG EMISSIONS BY SECTOR

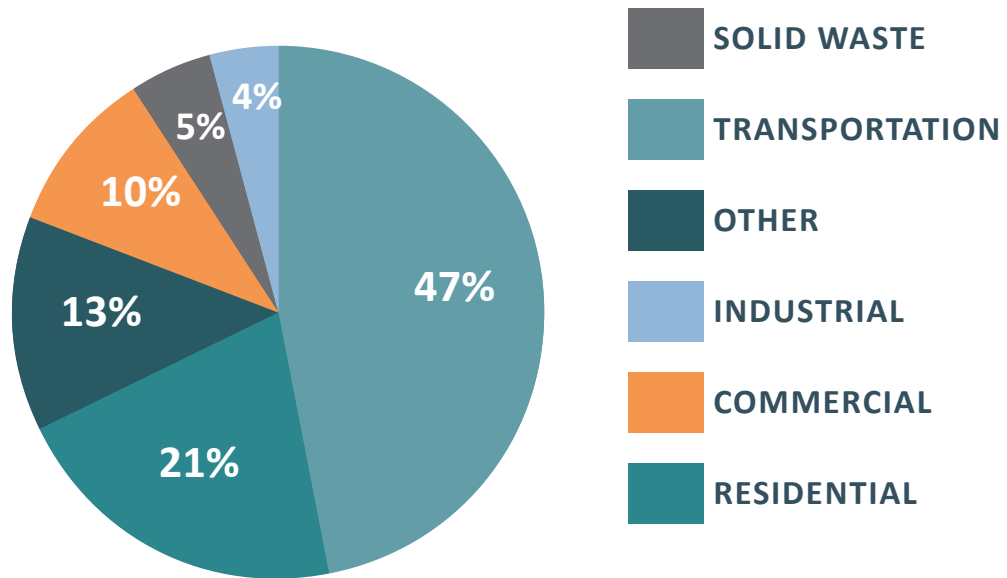
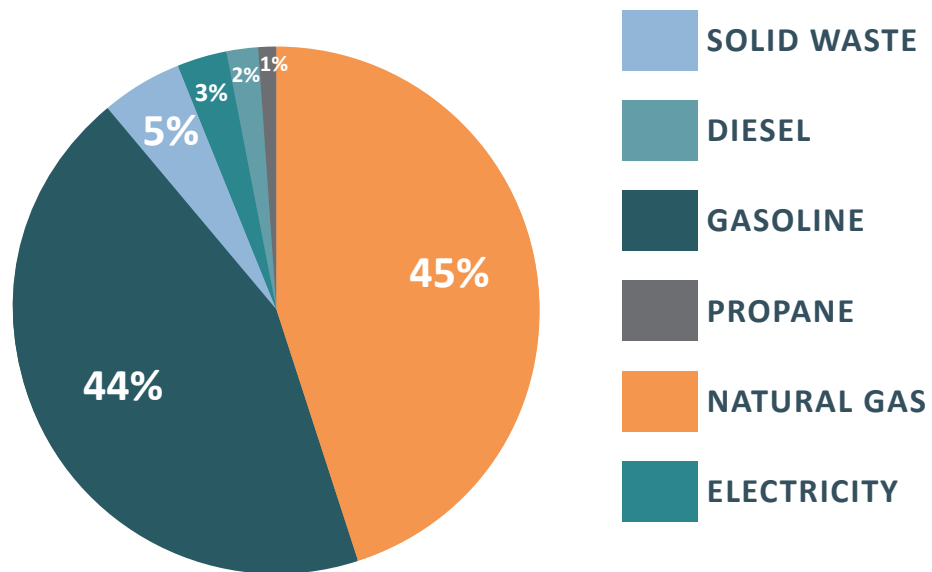


FIGURE 6. ST. CATHARINES COMMUNITY GHG EMISSIONS BY ENERGY SOURCE

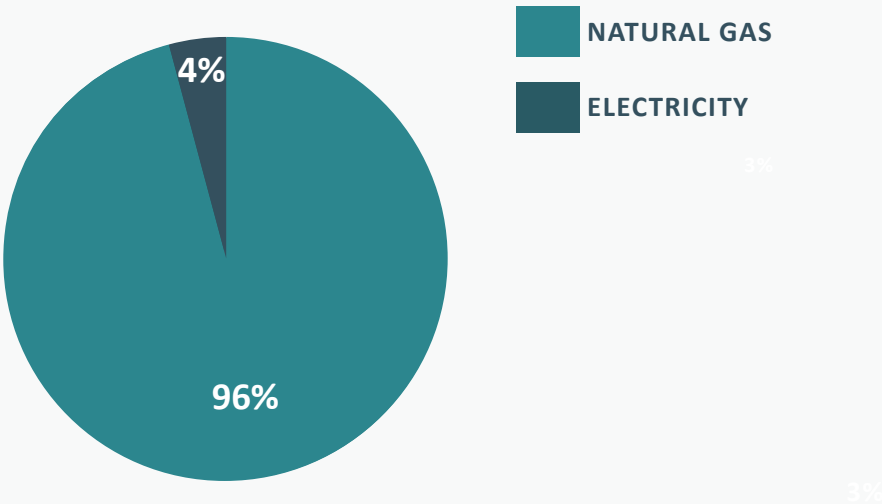




### 4.1 | RESIDENTIAL BUILDINGS

Residential buildings make up 21% of St. Catharines' community emissions. There were two main energy sources that were included to calculate the GHG emissions for this section: electricity and natural gas (see Figure 7).

**FIGURE 7. DISTRIBUTION OF RESIDENTIAL EMISSIONS BY ENERGY SOURCE**



### 4.1.1. | ELECTRICITY

In 2018, the demand from residential households serviced by Alectra Utilities was 384,432,112 kwh. This value is the metered usage and not an adjusted value for kwh (see Table 17).

**TABLE 17. ELECTRICITY CONSUMPTION AND GHG EMISSIONS FROM RESIDENTIAL BUILDINGS**

SECTOR	TOTAL CONSUMPTION (KWH)	CO <sub>2</sub> E (TONNES)
RESIDENTIAL	384,432,112	7,689

### 4.1.2. | NATURAL GAS

In 2018, there were 43,736 residential accounts using natural gas as provided by Enbridge Gas. Their natural gas consumption was 92,883,327 m<sup>3</sup> (see Table 18).

**TABLE 18. NATURAL GAS CONSUMPTION AND GHG EMISSIONS FROM RESIDENTIAL BUILDINGS**

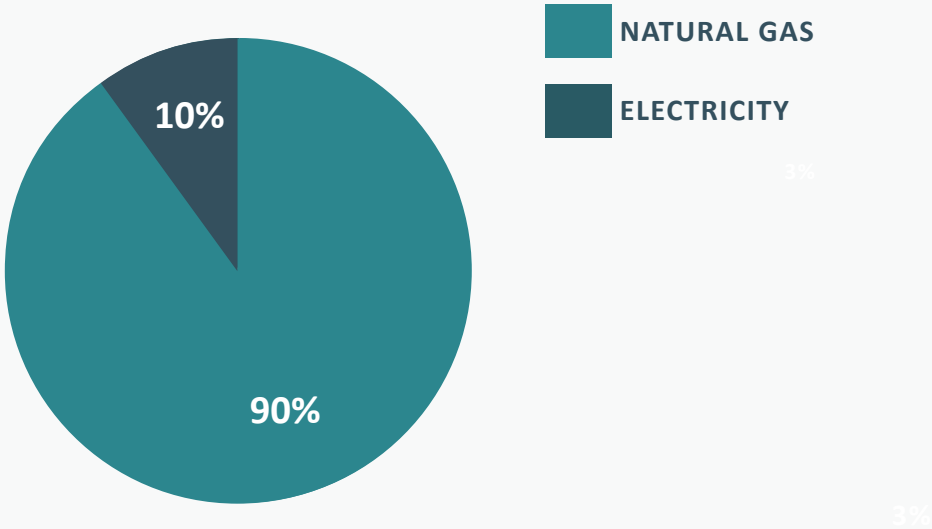
SECTOR	CONSUMPTION (M <sup>3</sup> )	CO <sub>2</sub> E (TONNES)
RESIDENTIAL	92,883,327	176,419



## 4.2 | COMMERCIAL BUILDINGS

Commercial buildings make up 10% of St. Catharines' community emissions. There were two main energy sources that were included to calculate the GHG emissions for this section: electricity and natural gas (see Figure 8).

**FIGURE 8. DISTRIBUTION OF COMMERCIAL EMISSIONS BY ENERGY SOURCE**



### 4.2.1 | ELECTRICITY

In 2018, the demand from commercial buildings serviced by Alectra Utilities was 462,761,486 kwh (see Table 19). This value is the metered usage and not an adjusted value. The buildings that classify as a commercial building uses less than 50 kilowatts monthly.

**TABLE 19. ELECTRICITY CONSUMPTION AND GHG EMISSIONS FROM COMMERCIAL BUILDINGS**

SECTOR	TOTAL CONSUMPTION (KWH)	CO <sub>2</sub> E (TONNES)
COMMERCIAL	462,761,486	9,255

### 4.2.2 | NATURAL GAS

In 2018, there were 3,519 commercial customers using natural gas as provided by Enbridge Gas. In this category, apartment buildings are included alongside commercial buildings. Their natural gas consumption was 42,624,399 m<sup>3</sup> (see Table 20).

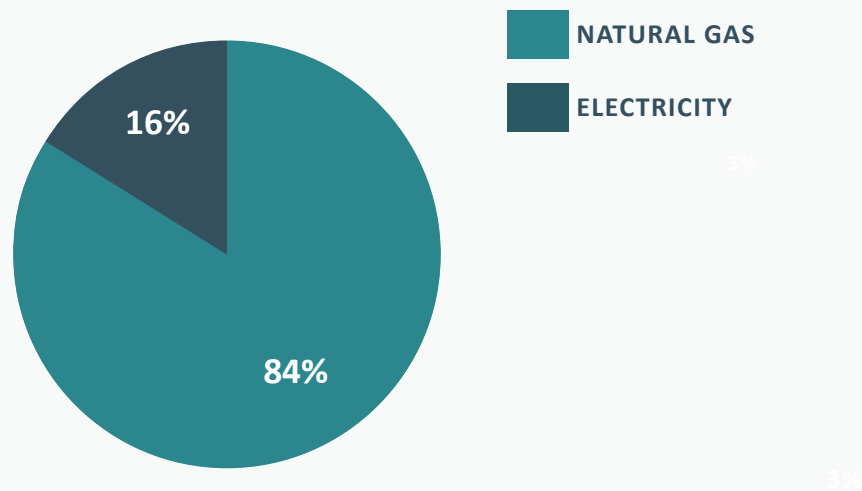
**TABLE 20. NATURAL GAS CONSUMPTION AND GHG EMISSIONS FROM COMMERCIAL BUILDINGS**

SECTOR	CONSUMPTION (M <sup>3</sup> )	CO <sub>2</sub> E (TONNES)
COMMERCIAL	42,624,399	80,959

## 4.3 | INDUSTRIAL BUILDINGS

Industrial buildings make up 4% of St. Catharines' community emissions. There were two main energy sources that were included to calculate the GHG emissions for this section: electricity and natural gas (see Figure 9).

**FIGURE 9. DISTRIBUTION OF INDUSTRIAL EMISSIONS BY ENERGY SOURCE**



### 4.3.1. | ELECTRICITY

In 2018, the demand from industrial or large use buildings serviced by Alectra Utilities was 258,652,407 kwh (see Table 21). This value is the metered usage and not an adjusted value for kwh. The buildings that classify as an industrial building use more than 50 kilowatts.

**TABLE 21. ELECTRICITY CONSUMPTION AND GHG EMISSIONS FROM INDUSTRIAL BUILDINGS**

SECTOR	TOTAL CONSUMPTION (KWH)	CO <sub>2</sub> E (TONNES)
INDUSTRIAL	258,652,407	5,173

### 4.3.2 | NATURAL GAS

In 2018, there were 35 industrial customers using natural gas as provided by Enbridge Gas. The total natural gas consumption was 13,786,553 m<sup>3</sup> (see Table 22).

**TABLE 22. NATURAL GAS CONSUMPTION AND GHG EMISSIONS FROM INDUSTRIAL BUILDINGS**

SECTOR	CONSUMPTION (M <sup>3</sup> )	CO <sub>2</sub> E (TONNES)
INDUSTRIAL	13,786,553	26,186

## 4.4 | OTHER BUILDINGS

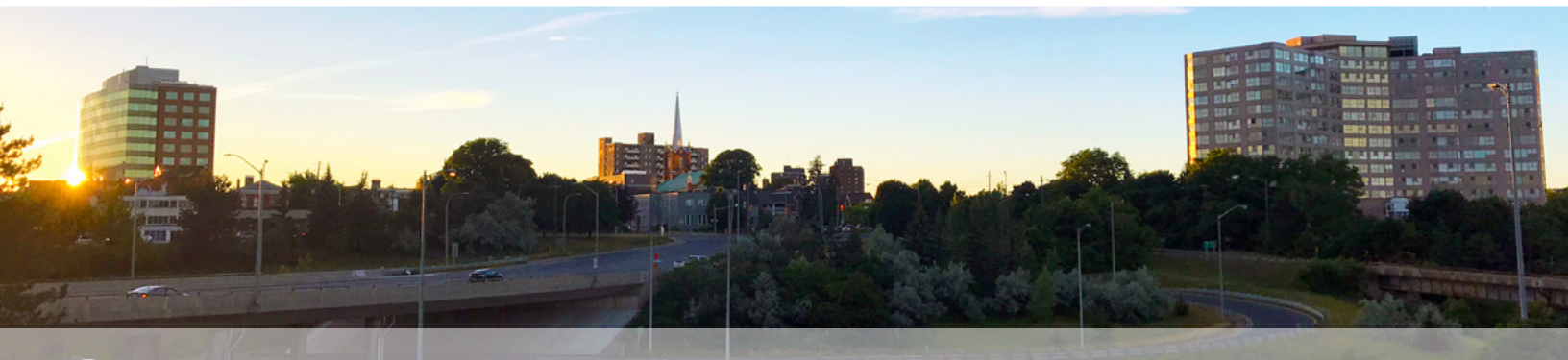
Other buildings make up 13% of St. Catharines' community emissions. The buildings in this section were large buildings that consumed > 25% of the total consumption of a given postal code. Alectra Utilities did not have a separate category for other buildings.

### 4.4.1 | NATURAL GAS

In 2018, there were 593 customers classified as other in the data provided by Enbridge Gas. The total natural gas consumption was 57,321,704 m<sup>3</sup> (see Table 23).

**TABLE 23. NATURAL GAS CONSUMPTION AND GHG EMISSIONS FROM OTHER BUILDINGS**

SECTOR	CONSUMPTION (M <sup>3</sup> )	CO <sub>2</sub> E (TONNES)
OTHER	57,321,704	108,875



### 4.5 | TRANSPORTATION

Community transportation emissions make up 47% of the community's emissions. The transportation sector includes personal transportation vehicles, but excludes rail and air transportation by residents. Marine and off-road vehicle fuel consumption was also not included in this inventory due to unavailable data (see section 5.1). The data that was collected, provided the total amount of gasoline and diesel sold in retail gasoline sites in the city of St. Catharines' geographical boundaries.

Due to the limitations of available data, the fuel sold within the City's boundaries are assumed to be used in the city. Therefore, the emissions in this sector will be from the total consumption of the fuels.

In 2018, 163.4 million litres of gasoline and 7.0 million litres of diesel were purchased from all retail gasoline sites in St. Catharines. This data was obtained from the Kent Group Ltd.

Assumptions regarding commercial propane emissions were made through downscaled provincial data from Statistics Canada<sup>1</sup> and with an annual growth rate of 0.9% from Niagara 2041<sup>2</sup> to determine St. Catharines' population in 2018. Commercial propane was assumed to be solely used for transportation fuel. Table 24 and Figure 10 summarizes the result of emissions from the transportation sector.

**TABLE 24. SUMMARY OF COMMUNITY FUEL CONSUMPTION AND GHG EMISSIONS**

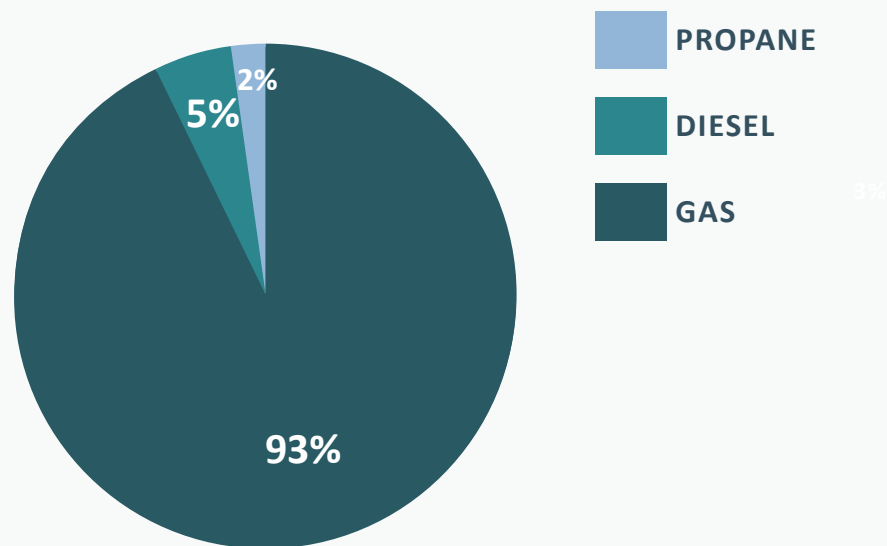
FUEL	CONSUMPTION (L)	CO <sub>2</sub> E (TONNES)
<b>GASOLINE</b>	163,452,275	377,084
<b>DIESEL</b>	7,034,204	18,859
<b>PROPANE</b>	4,476,289	6,782
<b>TOTAL</b>	<b>174,962,768</b>	<b>402,725</b>

<sup>1</sup> [Statistics Canada](#), 2020

<sup>2</sup> [Niagara 2041](#), 2016



**FIGURE 10. DISTRIBUTION OF COMMUNITY TRANSPORTATION  
EMISSIONS BY ENERGY SOURCE**



## 4.6 | COMMUNITY SOLID WASTE

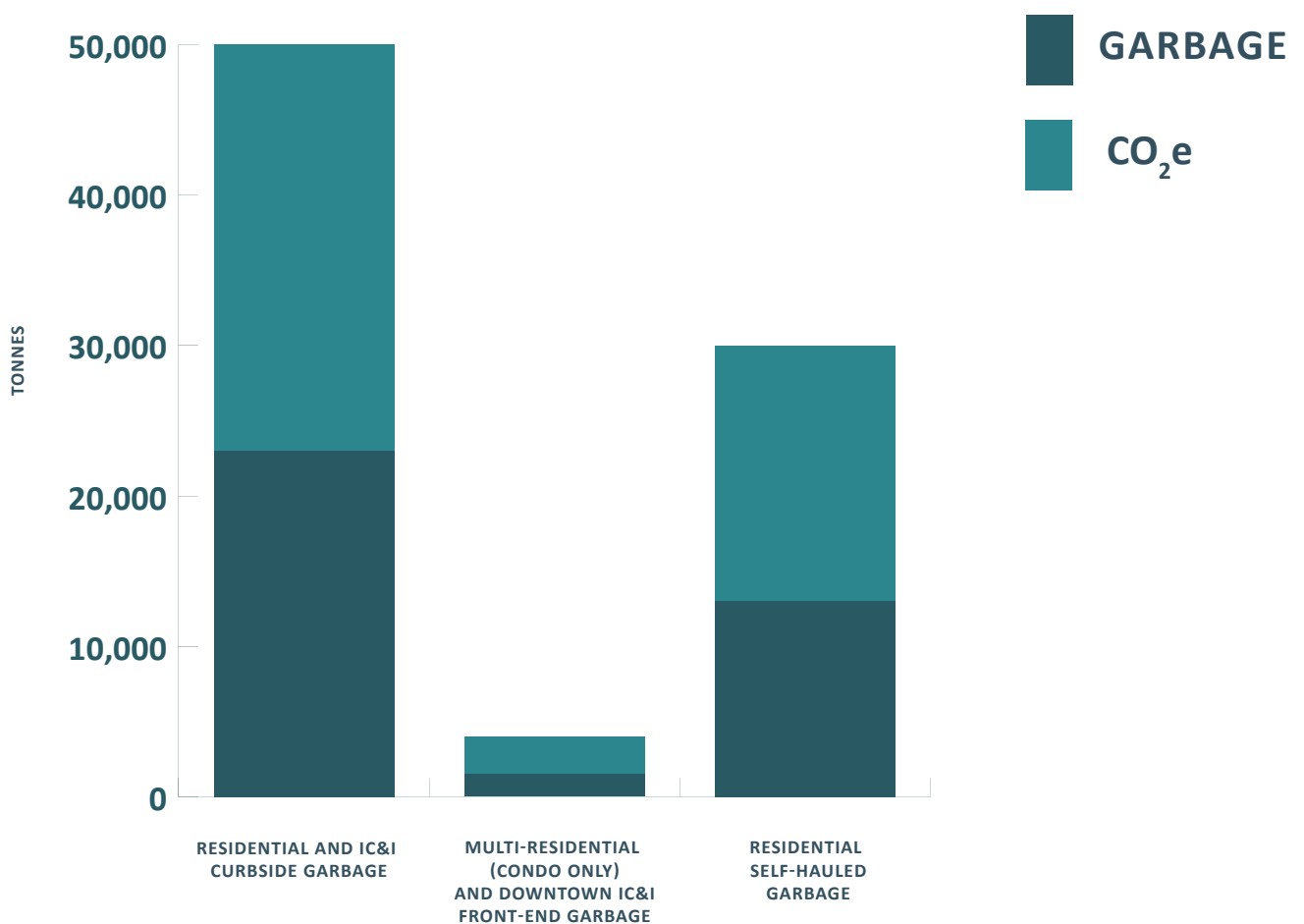
Community solid waste emissions make up 5% of the community's emissions. Niagara Region operates the community waste management and garbage collection and includes in part, downtown private businesses, however, is not inclusive of all private businesses. This waste comes from three different groups: residential and IC&I curbside garbage, multi-residential (condo only) and downtown IC&I front-end garbage, and residential self-hauled garbage. The waste generated from the three groups in St. Catharines is sent to the Walker South Landfill in the City of Niagara Falls. This landfill is an anaerobic managed solid waste disposal site and the GHG emissions were calculated through the "methane commitment" approach using the PCP Milestone Tool. Table 25 and Figure 11 summarizes the resulted emissions for the community solid waste sector.

**TABLE 25. SUMMARY OF COMMUNITY SOLID WASTE GENERATED AND GHG EMISSIONS**

GROUP	WASTE GENERATED (TONNES)	CO <sub>2</sub> E (TONNES)
RESIDENTIAL AND IC&I CURBSIDE GARBAGE	21,332	27,646
MULTI-RESIDENTIAL (CONDO ONLY) AND DOWNTOWN IC&I FRONT-END GARBAGE	1,018	1,319
RESIDENTIAL SELF-HAULED GARBAGE	12,862	16,669
TOTAL	35,212	45,635



**FIGURE 11. SUMMARY OF COMMUNITY SOLID WASTE  
GENERATED AND RESULTING GHG EMISSIONS**



# **LIMITATIONS**



## **5.0 | LIMITATIONS AND AREAS OF IMPROVEMENT**

### **5.1 | COMMUNITY TRANSPORTATION**

Transportation emissions were calculated using total fuel sales of retail gas stations located within the city's geographical borders. This will include all fuel sales from non-residents as well. In order to have a more accurate inventory of the community's GHG emissions, additional supporting data will need to be available which can include surveys from residents of vehicle kilometres travelled as well as data on the number of light duty vehicles and heavy duty vehicles registered in the City.

St. Catharines is home to two marinas: Port Dalhousie Pier Marina and St. Catharines Marina. Marine transportation emissions contribute to the total community GHG emissions but are not included for this inventory as the only data available was from 2014. The total amount of diesel sold were 80,000 L and 20,000 L for gas for both clubs that year. Due to any potential factors that may have occurred within the four years from 2014-2018, the consumption values may differ slightly or drastically. As an area of improvement for this inventory, this section should only be included in the community transportation sector when real consumption values are available.

Off-road vehicles also contribute to community transportation emissions but due to the limitations of the fuel sales data provided, the amount of fuel consumption solely for off-road vehicles within the City's boundaries were unknown. The fuel consumption sales may include all fuel consumption for off-road vehicles as well as on-road vehicles but as noted above, there is no clear distinction due to the limitations of the current data. However, based on the Government of Ontario's data catalogue<sup>1</sup>, off-road vehicle registration numbers were available for 2016 for Niagara Region. Based on a per capita calculation, there were 3,470 fit and active off-road vehicles registered in the City of St. Catharines for 2016. For future inventories, the inclusion of off-road diesel consumption and updated vehicle registrations, will result in a value closer to the real total of community transportation GHG emissions.

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<sup>1</sup> [Government of Ontario's Data Catalogue](#), 2019

# CONCLUSION



## 6.0 | CONCLUSION

The PCP program, as mentioned earlier in this inventory, supports and guides municipalities in reducing GHG emissions through the Milestone Framework. The next milestones that the City of St. Catharines could look to fulfill through the PCP program are milestone 2 and 3, which would set an emissions reduction target and develop a local action plan. It is also recommended that a GHG emission inventory be updated every 3-4 years to document any emission trends as a result from ongoing and future emission reduction and climate action plans.

