



City of Toronto

2018 Greenhouse Gas Emissions Inventory



Introduction

On October 2, 2019, Toronto City Council declared a climate emergency, joining a global call to recognize the urgency of the climate crisis, and adopted a stronger emissions reduction target for Toronto: net zero by 2050 or sooner.

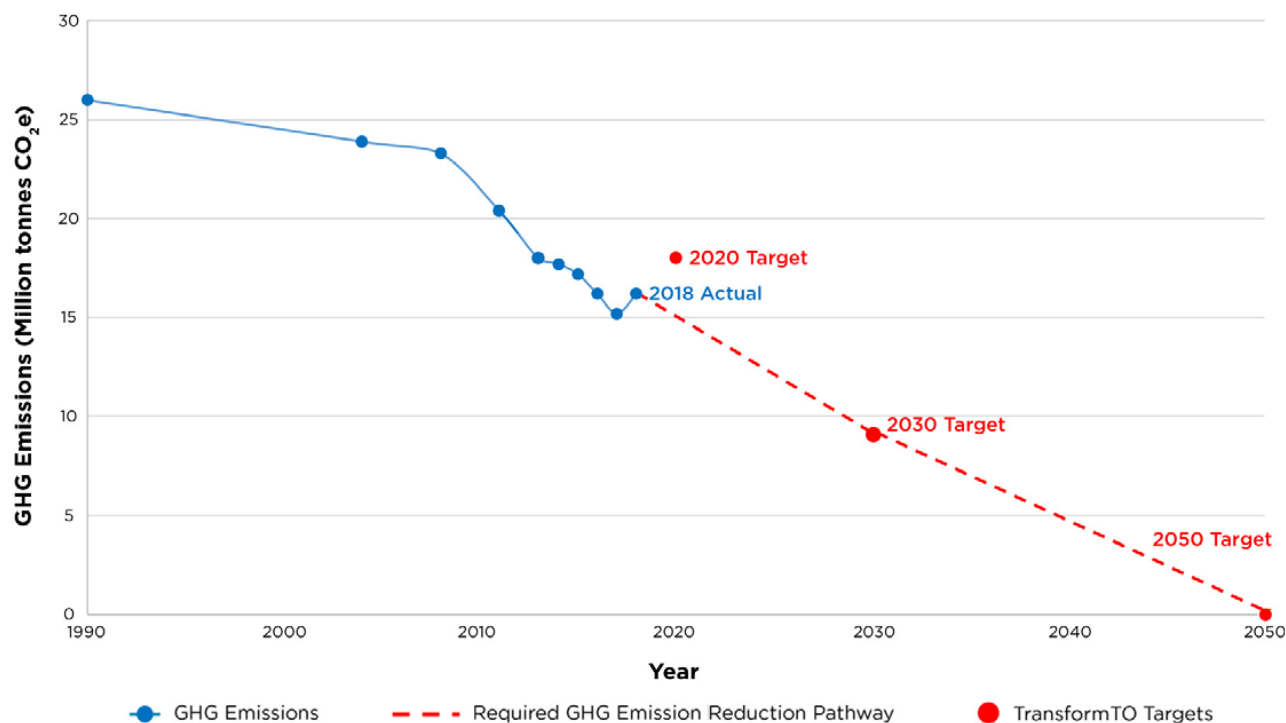
The 2018 Greenhouse Gas Inventory presented in this document tracks Toronto's progress towards net zero and identifies key emissions sources.

Toronto's greenhouse gas (GHG) reduction goals, status, and progress:

GHG Reduction Target	2018 Status	Progress
30% by 2020, from 1990 levels	37% lower than 1990 levels	On track
65% by 2030, from 1990 levels	37% lower than 1990 levels	Toronto must halve its 2018 emissions within 10 years to meet the 2030 target
Net zero by 2050	16.2 megatonnes emitted	16.2 megatonnes must be eliminated

Toronto's pathway to net zero will look like Figure 1 below.

Figure 1: Toronto Community-Wide Greenhouse Gas (GHG) Emissions



Highlights

In 2018, Toronto's community-wide GHG emissions were 16.2 megatonnes (MT) eCO₂, which is 37 per cent lower than in 1990. Toronto is on track to achieve its target of a 30 per cent reduction by 2020.

However, community-wide emissions increased seven per cent over 2017, when Toronto emitted 15.1 MT eCO₂.

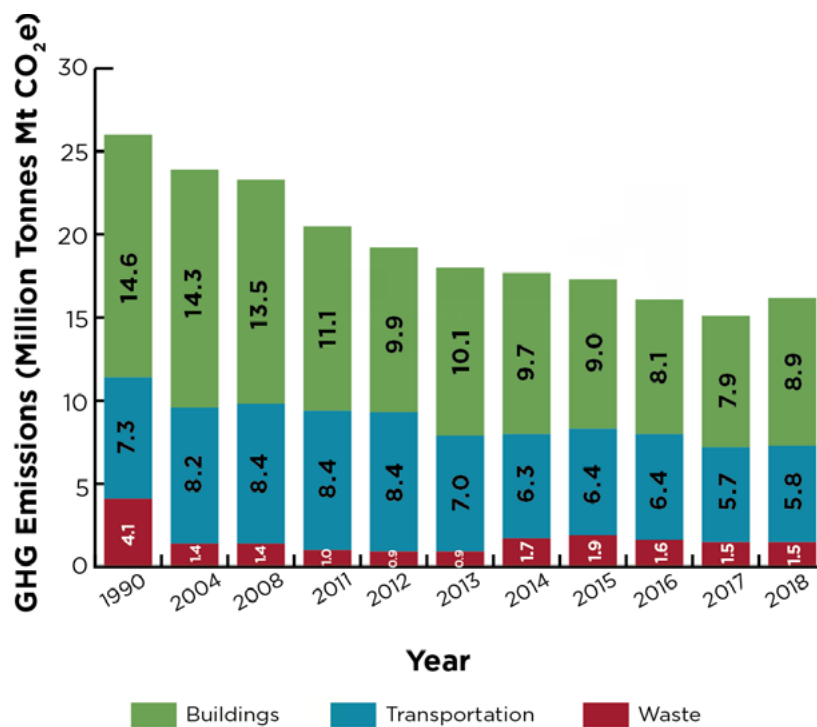
The seven per cent increase in GHG emissions between 2017 and 2018 occurred mainly in the buildings sector and can be explained by a cooler winter season which drove up natural gas usage by about ten percent in 2018. A sharp increase in the emissions factor for electricity also contributed to the increase in emissions from buildings.¹

Transportation emissions remained almost the same as 2017 accounting for just over a third of overall community-wide emissions, with most of those emissions still coming from gasoline used in passenger cars and trucks.

Waste emissions have remained a constant share of the community-wide emissions over the last few years. They originate from all landfills, open and closed, within and outside the city's boundary.

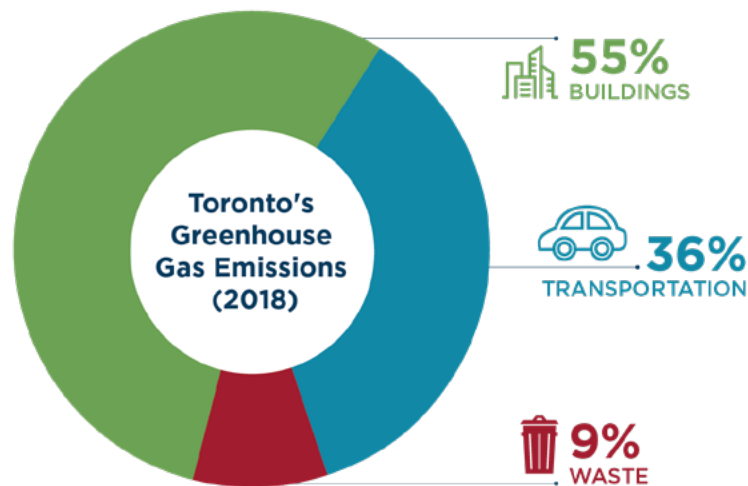
Figures 2 and 3 below show the year over year changes in sectoral emissions and the percentage breakdown of emissions according to sector for 2018.

Figure 2: GHG Emissions by Sector (1990 - 2018)



¹The emissions factor for electricity is directly related to the sources of electricity generation used in the provincial grid mix for any given year. In 2018, the province increased its use of carbon intensive natural gas to generate electricity in order to make up for the loss of nuclear power generated electricity resulting from nuclear plant refurbishments.

Figure 3: Toronto's Greenhouse Gas Emissions (2018)



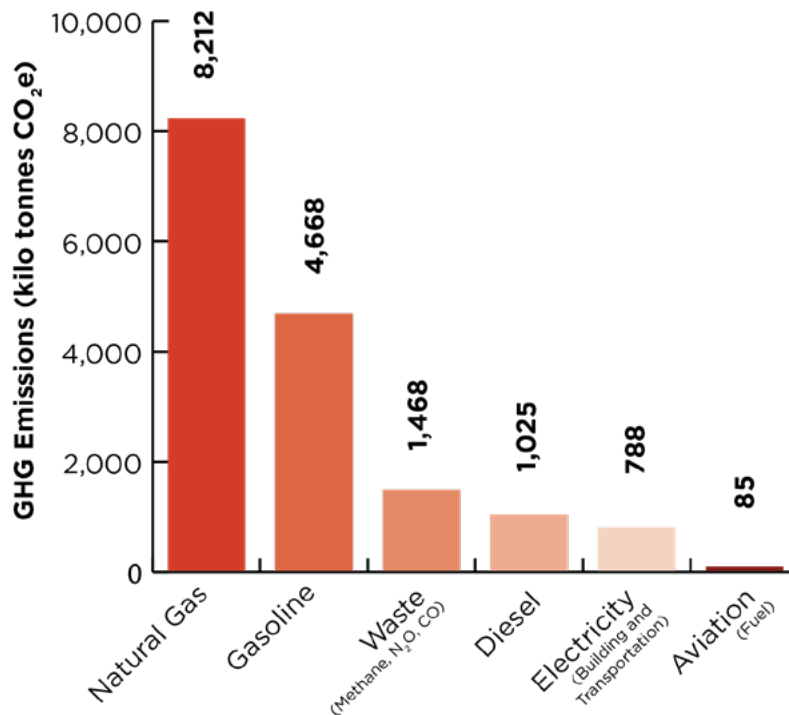
The City of Toronto's corporate emissions, or local government emissions, rose 13 per cent over 2017 but remained stable as a share of community-wide emissions at 4 per cent. Refer to page 12 of this document for more information on the City's local government emissions.

Key Drivers - Emissions by Source (Natural Gas, Electricity, Gasoline, Methane)

Figure 4 shows emissions by source. Natural gas consumption to heat buildings continues to be the largest source of emissions community-wide, accounting for approximately 50 per cent of all emissions. Second to natural gas is gasoline, which accounts for almost 30 per cent of emissions. The third largest source of emissions comes from the release of methane from landfills, which makes up about 9 per cent. Electricity consumption emits about 5 per cent of city-wide emissions.



Figure 4: Greenhouse Gas Emissions by Source (2018)



Natural Gas

Natural gas used to heat buildings continues to be the largest emissions source at approximately 8.2 MT². Compared to 2017, emissions from natural gas increased by 10 per cent overall. A cooler winter in 2018 compared to 2017 had an impact on increased heating needs thus increasing natural gas usage.

Gasoline

Gasoline use in on-road vehicles is the second largest emissions source at approximately 4.7 MT. Emissions from gasoline use have remained relatively stable, even while total vehicle kilometers travelled (VKT) have increased. The reason that emissions have not gone up is primarily due to increases in the overall fuel efficiency of passenger vehicles. Passenger vehicles alone make up about 50 per cent of on-road vehicles in Toronto, and account for 30 per cent of community-wide emissions.

Methane

Emissions from our landfills, both closed and operating, measured at 1.4 MT in 2018. The majority of emissions emanate from closed landfills; these will continue to be a steady source of emissions for the lifetime of the landfills.

Electricity

Emissions from electricity were measured at approximately 0.78 MT, an increase of 68 per cent over 2017, with 8 per cent of that increase a result of increased consumption, and the greater portion (~ 60 per cent) due to an increase in the emissions factor for electricity in 2018.

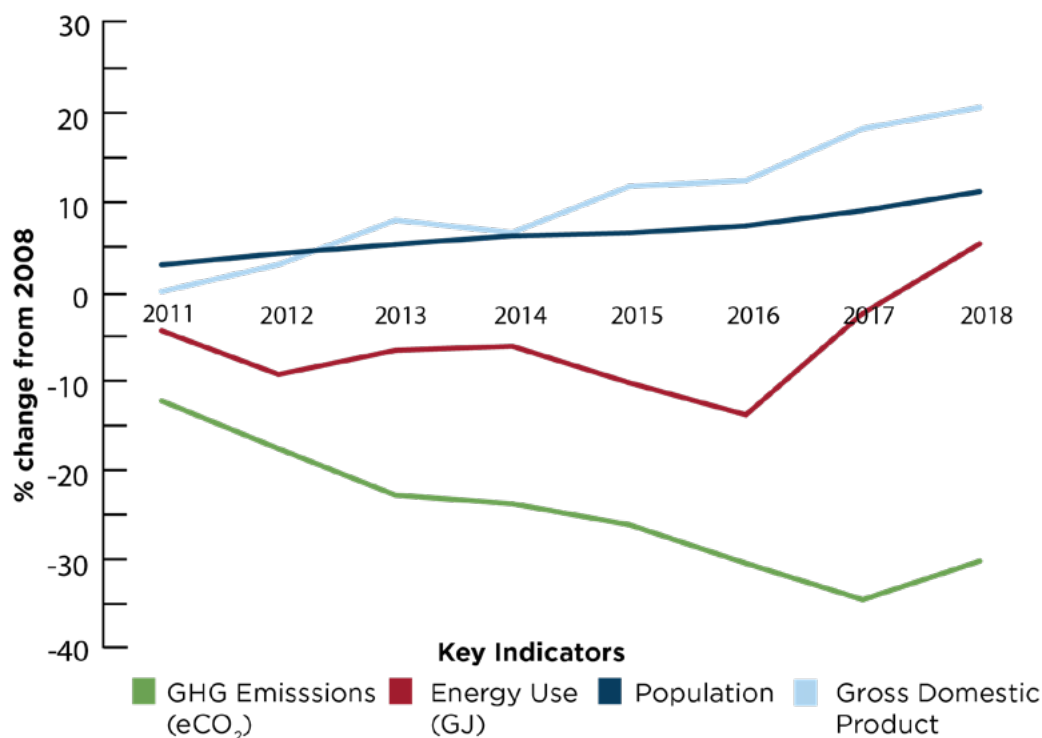
²Total residential, commercial, institutional and industrial plus fugitive emissions

Population, Economic Growth and Greenhouse Gas Emissions

Understanding the relationship between factors such as population, economic growth and greenhouse gas emissions is important as they are indicative of a city's well-being and resilience.

Figure 5 shows that GHG emissions in Toronto have de-coupled from economic prosperity (as measured by GDP), population and energy use. Generally over time, community-wide emissions are decreasing even as population and GDP rise, which indicates that Toronto is on the path to a low-carbon future.

Figure 5: Energy, GHG Emissions and Economic Indicators (% Change from 2008)



What's included in the 2018 Inventory

Toronto's GHG inventory consists of direct and indirect GHG emissions from three dominant sectors – buildings, transportation, and waste.

- Energy used by buildings is used to calculate the emissions produced from the consumption of natural gas and electricity.
- Transportation emissions represent emissions from on-road passenger vehicles, heavy trucks, and buses as well as from commuter rail and some marine and aviation navigation. Freight rail emissions are not accounted for in this inventory as reliable data for these emissions sources is currently not available. Identifying emissions sources from all transportation modes continues to be a methodological challenge. Due to the number of different authorities and private businesses that may contribute to transportation emissions as well as the varying levels of voluntary, sometimes proprietary versus regulated reporting, this section of the inventory presents the best data available at time of collection.

- Waste emissions, primarily methane, originating in landfills constitute the majority of Toronto's waste emissions. In addition, there is a small portion of emissions from wastewater treatment. Emissions from privately managed waste are estimated.

Currently, lifecycle emissions from the products and services consumed by residents, businesses and institutions in Toronto are not included in this inventory. Work to define and calculate these emissions is currently being undertaken.

Details on Sectors and Sources

The three dominant sources of greenhouse gas emissions in Toronto are: energy use in buildings; transportation fuels; and waste in landfills. Toronto shows a steady decline in emissions from 1990 however, in 2018, emissions increased by approximately 1 MT from 2017, specifically in the buildings sector. Figure 2 on page 3 of this document shows the total emissions of these three sectors combined.

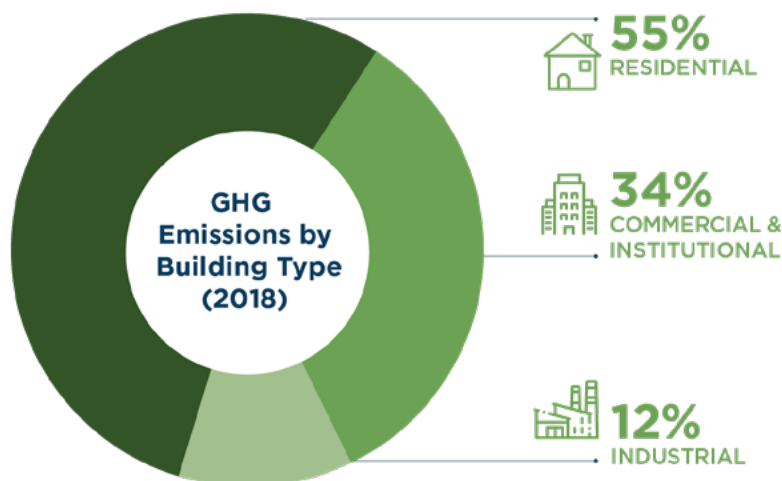
Buildings

In 2018, emissions from residential, commercial and industrial buildings emitted approximately 8.9 MT of the city's total inventory making buildings the largest source of emissions at 55 per cent. Compared to 2017, overall building emissions increased by 13 per cent.

Residential buildings account for 55 per cent of all building emissions and at 4.9 MT, they account for 30 per cent of all community-wide emissions.

Figure 6 breaks down the emissions contribution of each type of building – residential, commercial/institutional and industrial³.

Figure 6: GHG Emissions by Building Type (2018)

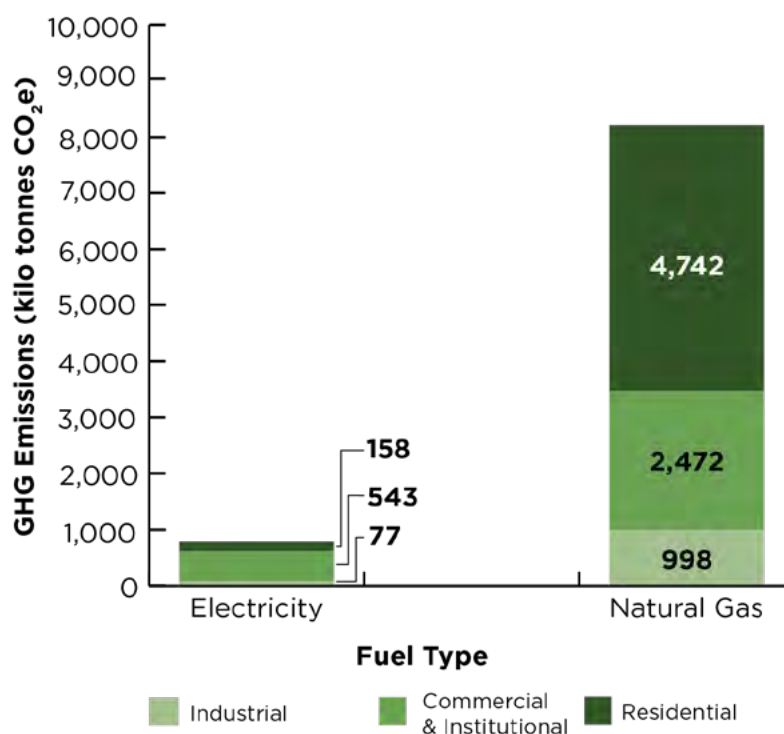


³Industrial emissions include emissions from heating and industrial cooling in buildings as well as process emissions.

Emissions Sources in Buildings

Figure 7 shows the proportion of emissions coming from the two main fuel sources -- electricity and natural gas -- by building type. Natural gas, used for heating during the winter months, and the contribution of emissions from natural gas in buildings is approximately 10 times greater than emissions contributed from electricity.

Figure 7: GHG Emissions from Buildings by Fuel and Building Type (2018)



Natural Gas Emissions in Residential Buildings

Natural gas emissions have increased in the residential (20 per cent) and industrial building categories (3 per cent) since 2017 but decreased slightly (2 per cent) in the commercial category with an overall increase in all building types of ten per cent.

Fluctuations in the consumption of natural gas are highly weather dependant. In 2018, the number of Heating Degree Days (HDD) increased by 10 per cent compared to 2017. In other words, the winter of 2018 was about 10 per cent cooler in temperature than 2017. This correlates well with the increase in natural gas consumption.

Natural gas represents 91 per cent of emissions from all buildings, and almost 97 per cent of emissions from residential buildings, highlighting the need to reduce natural gas emissions in buildings.

On close examination, we see that the proportion of natural gas emissions is higher from single-family homes than from multi-unit residential buildings (MURB): 57 per cent (single-family) and 43 per cent (multi-unit residential).

However, the main growth in GHG emissions is within the MURB category with a 513,693 tonnes eCO₂ increase from 2017 to 2018.

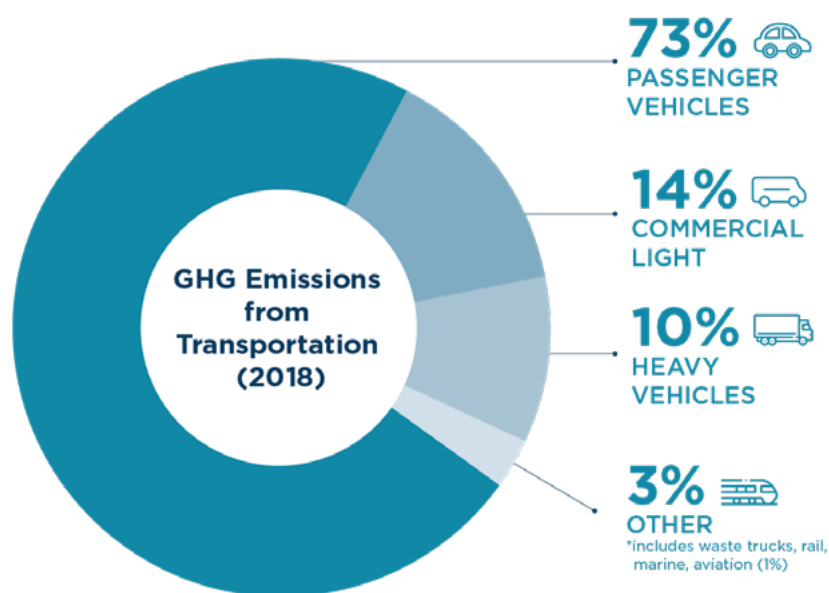
According to Municipal Property Assessment Corporation (MPAC) data obtained for the years 2016 and 2020, single-family floor space increased by 2 per cent while multi-unit residential floor space increased by roughly 7.5 per cent over the four-year period.

Furthermore, within the MURB sub-category, floor space for rental apartments increased by about 3.3 per cent from 2016 to 2020 whereas residential condominium space increased by almost 13 per cent.

Transportation

Transportation emissions in 2018 were approximately 5.8 MT, accounting for 36 per cent of the city-wide inventory. On-road vehicle emissions from cars, trucks, vans, and buses dominate the emissions profile accounting for approximately 97 per cent of all transportation emissions. The largest portion of on-road emissions, approximately 73 per cent, are attributed to passenger cars and trucks.

Figure 8: GHG Emissions from Transportation (2018)



The “Other” category includes TTC rail emissions, from electricity used to power streetcars and subways. In total, these emissions account for only 0.17 per cent of all transportation emissions, making the TTC’s subways and streetcars an almost “emissions free” public transit mode. Also in this category are GO and UP commuter rail, which capture mainly diesel emissions within the city boundary, and together they make up 1.36 per cent. Marine emissions reporting is limited and captures only the fuel used by the City’s marine fleet (e.g. Toronto Island Ferry, Toronto Police, EMS and Fire vessels) totalling 0.03 per cent. Similarly, emissions from aviation include only aviation fuel used at Billy Bishop airport on Toronto Island, which accounts for 1.46 per cent of total transportation emissions.

GHG emissions associated from the extensive air travel of Toronto residents to and from Toronto Pearson International are not captured in this inventory due to current constraints in acquiring data.

Emissions Sources in Transportation

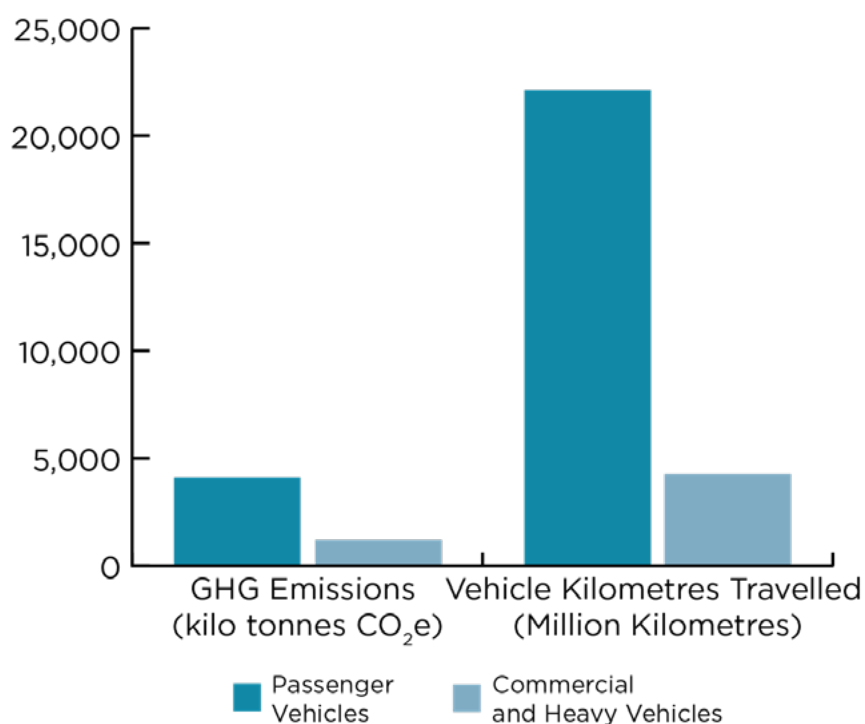
The City uses a model, created by the University of Toronto that uses vehicle count data from Transportation Services to produce a spatial-temporal model of traffic in Toronto⁴.

The results of the model show that Vehicle Kilometres Travelled (VKT) increased between 2017 and 2018 however, overall emissions from on-road vehicles have decreased by approximately 48,503 tonnes of eCO₂. The reduction primarily reflects improvements in vehicle fuel efficiency and a gradual uptake of electric vehicles in Toronto⁵.

Generally, the proportion of emissions from passenger vehicles in 2018 is consistent with 2017. Approximately 80 per cent of all emissions from transportation continue to originate from gasoline-powered vehicles which include passenger cars, SUVs, vans, and commercial light trucks. Passenger vehicles make up about 50 per cent of on-road vehicles. Commercial diesel vehicles, which include commercial delivery vehicles, account for approximately 12 per cent of all emissions in the city.

As a fuel, gasoline accounts for about 30 per cent of total inventory emissions.

Figure 9: Transportation GHG Emissions and Related VKT (2018)



Note: "Passenger Vehicles" include cars and trucks fueled by gasoline

⁴Traffic Emission Prediction Scheme, University of Toronto, Transportation Services, Environment and Energy, Toronto Atmospheric Fund

⁵Starting in 2004, the Canadian government and US federal EPA began harmonizing vehicle technical standards in order to ensure that vehicles and engines entering the Canadian market met more stringent exhaust emission standards (see On-Road Vehicle and Engine Emission Regulations). Successive reviews of the technical harmonization have led to improvements in emissions of cars and light duty trucks with the most recent revisions applied to the 2017 to 2025 model years

Waste Emissions from Landfill

Waste emissions in 2018 were approximately 1.5 MT, accounting for about 9 per cent of the community-wide inventory. Approximately 1.4 MT of emissions from the waste sector are landfill emissions, which include emissions estimated for waste disposal in private landfills, with the remaining being a small portion from wastewater treatment processes.

The key to reducing methane emissions from landfill are the landfill gas capture and processing systems in place, and waste reduction.

Toronto uses a first order decay model to determine the emissions from methane in any given year – from both historical waste and current waste going to landfill.



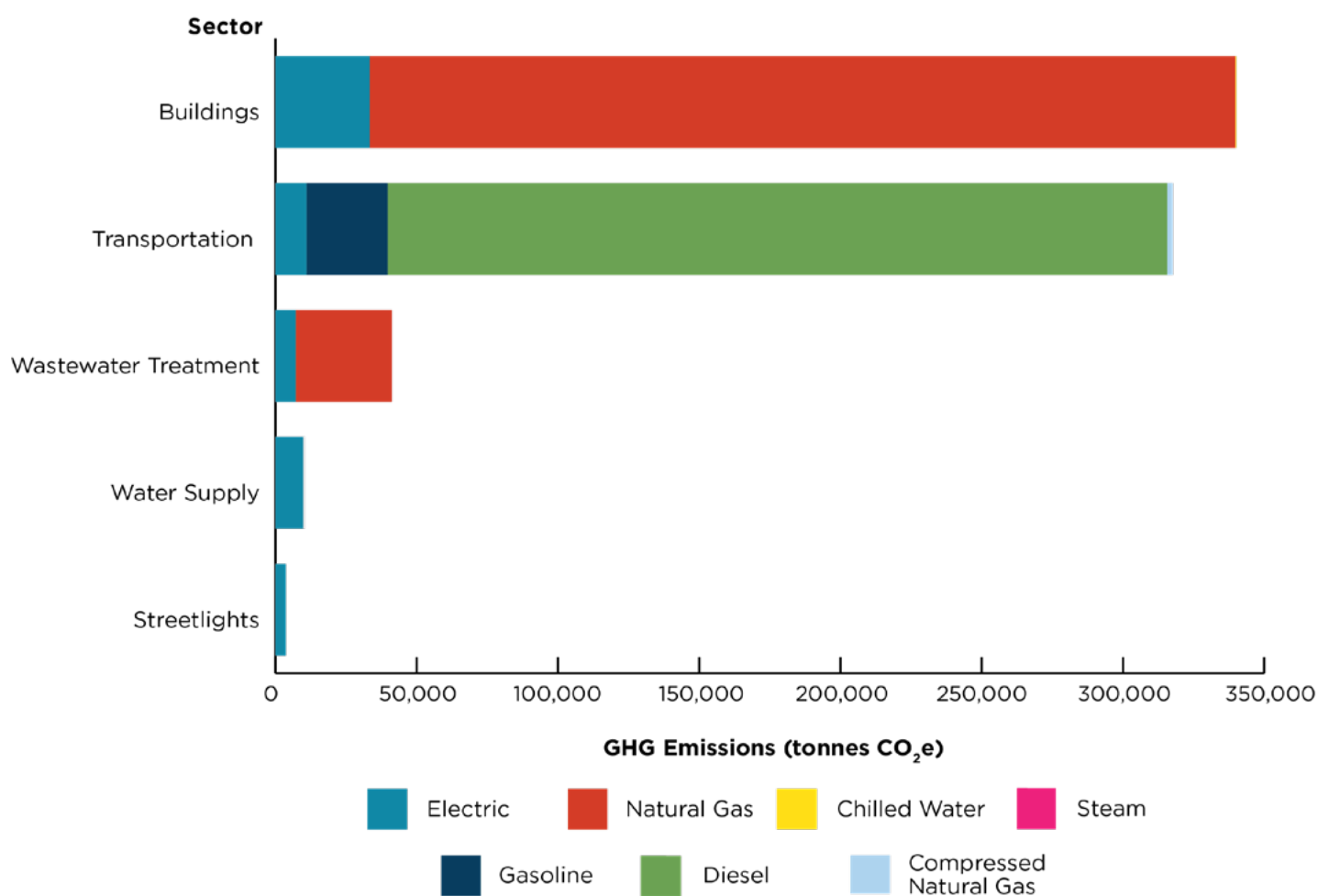
City of Toronto Corporate (Local Government) Emissions

The City of Toronto's corporate, or local government emissions, are calculated based on the energy used in all municipal buildings (offices, community recreation centres, TCHC housing), vehicles fleets including TTC transit vehicles, water supply and treatment and streetlights.

In 2018, corporate emissions were 0.71 MT eCO₂, which is about four per cent of Toronto's 2018 city-wide emissions. The City's corporate emissions increased by 13 per cent from 2017 but remained a relatively stable share of community-wide emissions in both 2017 and 2018.

Figure 10, below, shows the City's corporate sources broken down by main operational sectors: buildings, vehicles, water treatment and streetlights.

Figure 10: City of Toronto Corporate GHG Emissions by Sector and Source (2018)



The largest source of emissions at the corporate level appears again in the buildings sector, with the combination of electricity and natural gas consumption making up about 48 per cent of the City's corporate emissions. Natural gas alone makes up about 43 per cent of all corporate emissions while diesel fuels from the combined fleets of TTC, EMS, Fire, Police Services and the City's corporate fleet make up almost 39 per cent.

Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories

Toronto's community-wide emissions are calculated and reported as per guidance in the [Global Protocol for Community-Scale Greenhouse Gas Emissions Inventory \(GPC\)](#). The GPC provides a robust framework for accounting and reporting city-wide greenhouse gas emissions to support climate action planning. Use of the GPC is also required to uphold Toronto's commitment as a signatory of the Global Covenant of Mayors for Climate and Energy. Toronto's level of compliance is BASIC.

Toronto's "A List" Score on GHG Accounting and Action Reporting

As a Global Covenant of Mayors signatory, Toronto has been disclosing its GHG emissions inventory and its climate mitigation and adaptation actions annually to the [Carbon Disclosure Project \(CDP\)](#) in order to share Toronto's progress and benchmark against other cities facing similar challenges.

For the third year in a row, the City of Toronto is recognized on the 2020 Carbon Disclosure Project (CDP) Cities "A" List for its leadership and transparency on climate action. Toronto is one of 88 cities globally to receive an "A" rating.





Stay Involved

Stay informed about what the City of Toronto and its partners are doing to reduce greenhouse gas emissions in the city. Subscribe for e-updates at [Toronto.ca/transformto](https://toronto.ca/transformto)

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