City of Winnipeg Corporate Greenhouse Gas Emissions

2024

INTRODUCTION

This report provides an update on the City's Corporate Greenhouse Gas (GHG) Inventory for 2024. The tracking and measurement of greenhouse gas (GHG) emissions is called for in OurWinnipeg 2045:

- Good Governance Objective 1: Establish and implement priority actions through evidence-informed decision-making processes.
- Environmental Objective 1: Prioritize the transition to a resilient, low-carbon future through demonstrated organizational and community leadership, and collaborative actions that mitigate and adapt to a changing climate.

The Corporate GHG Inventory follows the Partners for Climate Protection (PCP) protocol for municipal GHG accounting. The PCP Inventory protocol focuses on municipal operations and is consistent with Corporate GHG inventories produced to date. The scope of data collected has increased since the first inventory in 1998. The collection process has been refined over the years to improve the accuracy and completeness of the inventory.

Energy used for operations comes in different forms; including litres of vehicle fuel, kilowatt hours of electricity, and cubic meters of natural gas. To allow comparisons between these energy sources, the volume of each is converted to the amount of work each unit of fuel does. This translates these different fuel types into gigajoules (GJ) of energy. With this, 30 litres of gasoline, 26 litres of diesel, 26 m^3 of natural gas, and 278 kilowatt hours (kWh) of electricity all contain the same amount of energy: 1 GJ.

Similarly, there are the three most significant GHGs related to climate change, with different strengths of impacts. These include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (NO_2). For the purposes of GHG accounting, methane is considered 25 times more potent than carbon dioxide as a GHG, and nitrous oxide is 298 times more. The impacts of these two GHGs are expressed in equivalent CO_2 levels, and the sum of the three is expressed in "CO_2 equivalent", or CO_2e.

2024 Inventory

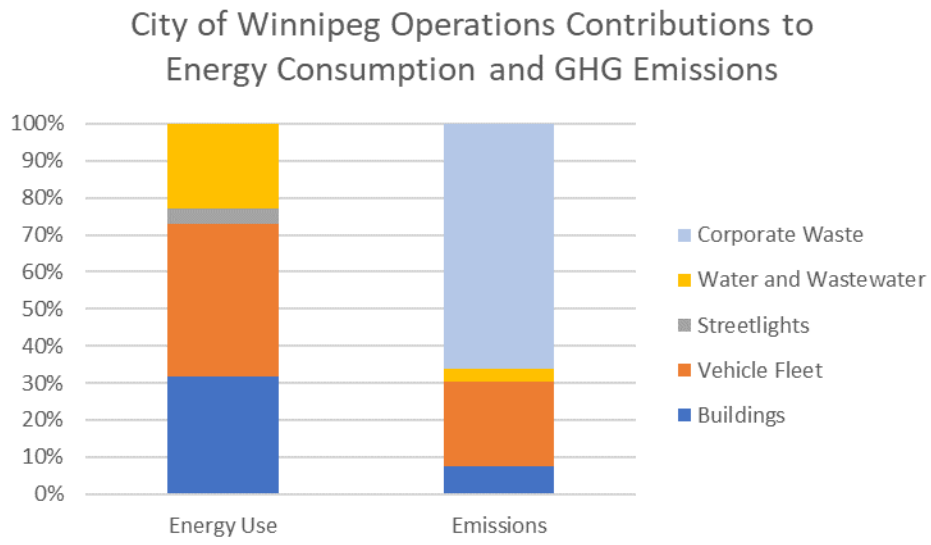
In 2024, total energy use decreased -0.6% and total emissions increased 3.9% compared to the previous year. Energy use and emissions decreased within the Buildings sector. The Vehicle Fleet sector remained relatively stable (no real change in energy use, emissions increased 0.2%). Both the Water and Wastewater and Corporate Waste sectors increased emissions. Water and Wastewater increased energy use and emissions (by 8.6% and 28.8%, respectively) from a large increase primarily in natural gas usage. The Corporate Waste sector increased the tonnage of landfilled waste and consequent emissions by

6.1%. Overall, the use of natural gas and electricity both decreased (-1.0% and -1.1%, respectively), as did aviation fuel (-28.9%), while use of gasoline increased +0.4%, and diesel fuel remained constant.

CORPORATE GHG INVENTORY (2024)

Source	2024			
	Energy (GJ)	% change from 2023	Total CO_2e (tonnes)	% change from 2023
Buildings	835,714	-7.1%	24,391	-10.0%
Vehicle Fleet	1,086,415	0.0%	72,922	+0.2%
Streetlights	110,042	0.0%	37	0.0%
Water & Wastewater	600,422	+8.6%	10,467	+28.8%
Corporate Waste	-		211,995	+6.1%
TOTAL	2,632,593	-0.6%	319,811	+3.9%

Figure 1 - Energy Use and GHG Emissions for City Operations



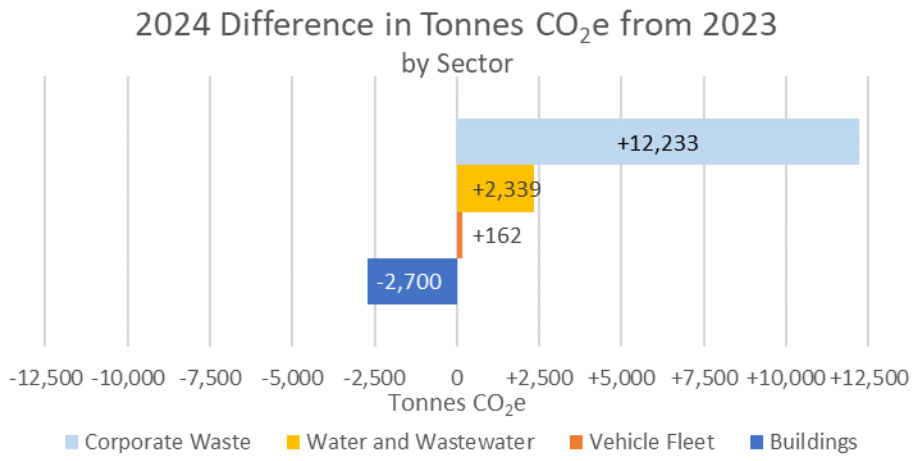


Figure 2 – Difference in GHG emissions tonnages from 2023 to 2024

TOTAL ENERGY USE AND GHG EMISSIONS IN 2024 BY SECTOR

Energy use decreased between 2023 and 2024, while emissions increased. Energy use decreased –0.6% over this time, with a decrease in the Buildings sector (-7.1%), partly offset by an increase in the Water and Wastewater sector (+8.6%), while Vehicle Fleet sector stayed constant (0.0% change). Emissions increased +3.9% overall, mostly driven by Corporate Waste (+6.1%), and the Water and Wastewater sector (+28.8%), partly offset by the Buildings sector (-10.0%), with nearly no change from the Vehicle Fleet sector (0.2%). As the Corporate Waste sector is almost two thirds of total Corporate emissions (66.6% of emissions in 2024) an increase in this sector has a significant impact on the total emissions.

Energy Use by Source

The Corporate Waste sector is excluded from this section. Waste emissions do not come from the consumption of energy but from the decomposition of waste in landfills.

In 2024, diesel was the largest energy source at 32.6% of total use, 54.3% of energy use related GHGs, or 18.3% of total emissions. This is due to diesel's relatively high carbon content.

Electricity was the second largest energy source at 32.1% of energy used and, owing to its low carbon content, was just 0.3% of energy-related emissions and 0.1% of total operation emissions.

Natural gas use accounted for 26.6% of total energy use and 32.1% of energy use related GHGs, or 10.8% of total emissions.

Gasoline (in an ethanol blend) accounted for 8.5% of energy use and 12.9% of energy use related emissions, or 4.4% of total emissions.

Aviation fuel impacts were negligible.

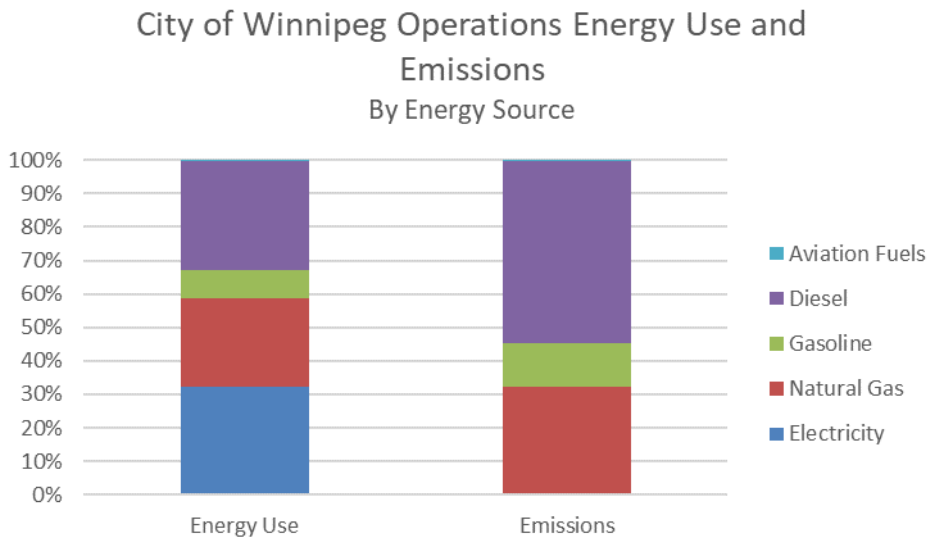


Figure 3 – Energy sources proportion of total energy use and total emissions – excludes Corporate Waste emissions

Emissions and Energy Use by Sector

Energy use and emissions in City operations are usually linked. While the Corporate Waste sector reports emissions from waste that gets landfilled, the rest of the Corporate inventory of emissions arises from the use of energy. The Buildings sector uses electricity to power lights and computers, and primarily natural gas to keep the space habitable for employees and residents. The Water and Wastewater sector uses electricity to drive pumps and equipment, and natural gas to keep biological processes running and water lines thawed. The Vehicle Fleet sector uses fuels of all types to keep equipment and vehicles running. All these energy sources produce GHG emissions, even electricity. The difference is in the amount of emissions per unit of work.

The Corporate Waste sector is the source of 66.6% of total emissions in 2024. This waste, which includes all material taken to the Brady Road Resource Management Facility, has a significant impact on reported emissions percentages in the inventory. Small changes in landfilled waste can mask real shifts in emissions from Buildings and Fleet sectors, two sectors where the City has more direct control.

Vehicle & equipment fuel use was the largest energy user and second largest CO_2e emitter in 2024 at 41.3% of total energy use and 22.8% of total emissions.

Buildings (excluding those involved in providing water & wastewater services) were the second largest user of energy, using 31.7% of all energy, and producing 7.6% of emissions.

Water and Wastewater infrastructure was the third largest user of energy. In 2024 it used 22.8% of total energy and had the fourth highest GHG emissions at 3.3% of total.

The Streetlights and Traffic Signals sector used the least energy at 4.2% of total consumption and 0.01% of total emissions.

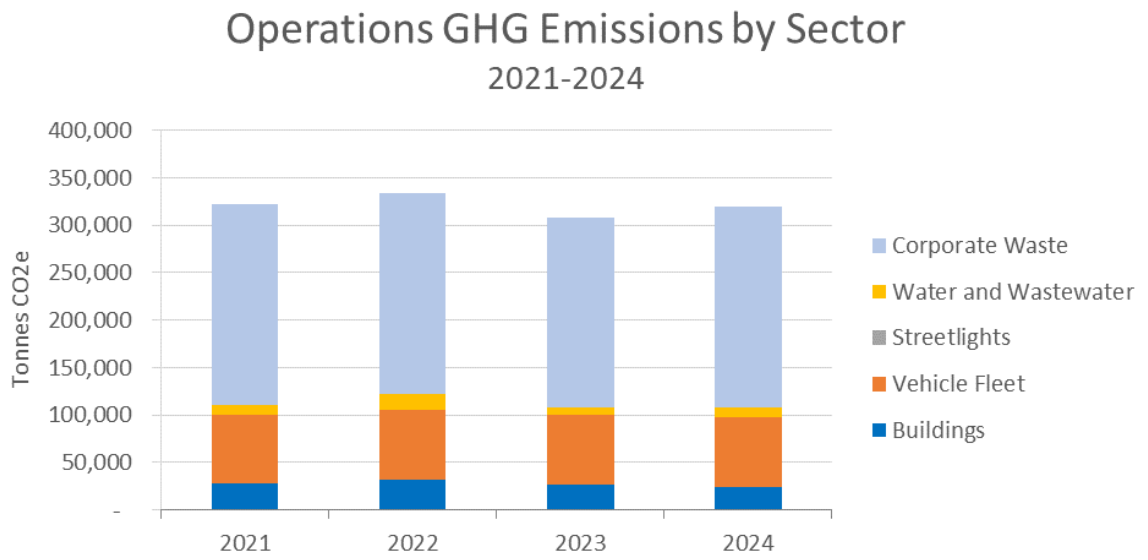


Figure 4 - Emissions Use for Corporate Operations 2020 – 2024

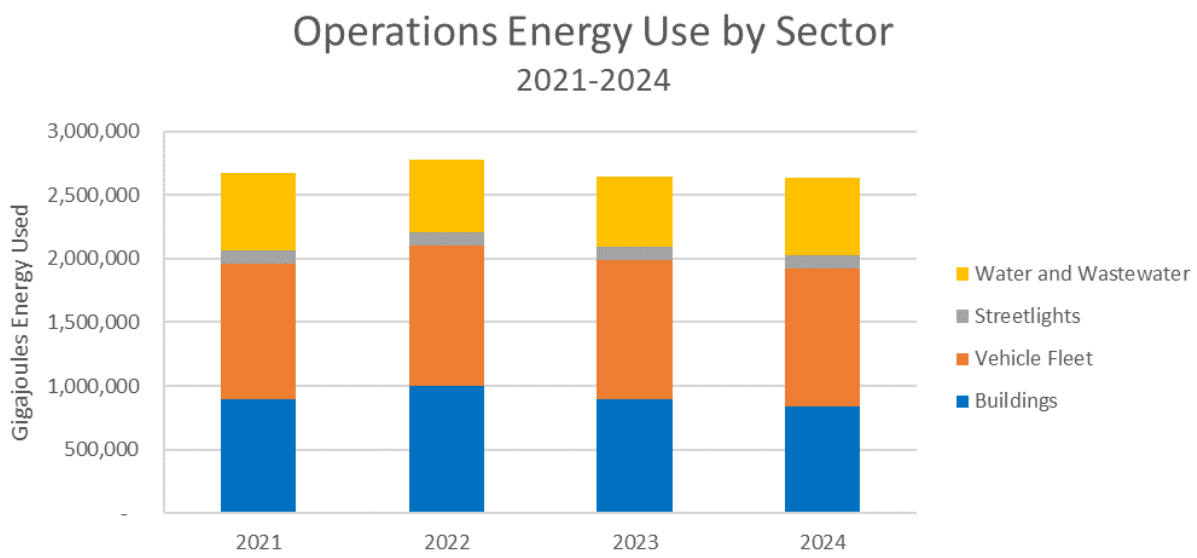


Figure 5 – Energy Use for Corporate Operations 2021 – 2024

For energy use over time, in general, the graphs below show relatively stable levels of energy use and emissions. Figure 6 shows a general improvement over time of lower emissions for each unit of energy consumed. This improvement is approximately 10% over the period 2015-2024. This period saw the improvement of fuel standards increasing the proportions of ethanol in fuels (up 1.5% to 10% total in gasoline and up 2.5% to 5% total in diesel), as well as lower heating demand in 2024 than 2015 (6.6% fewer Degree Days Heating).

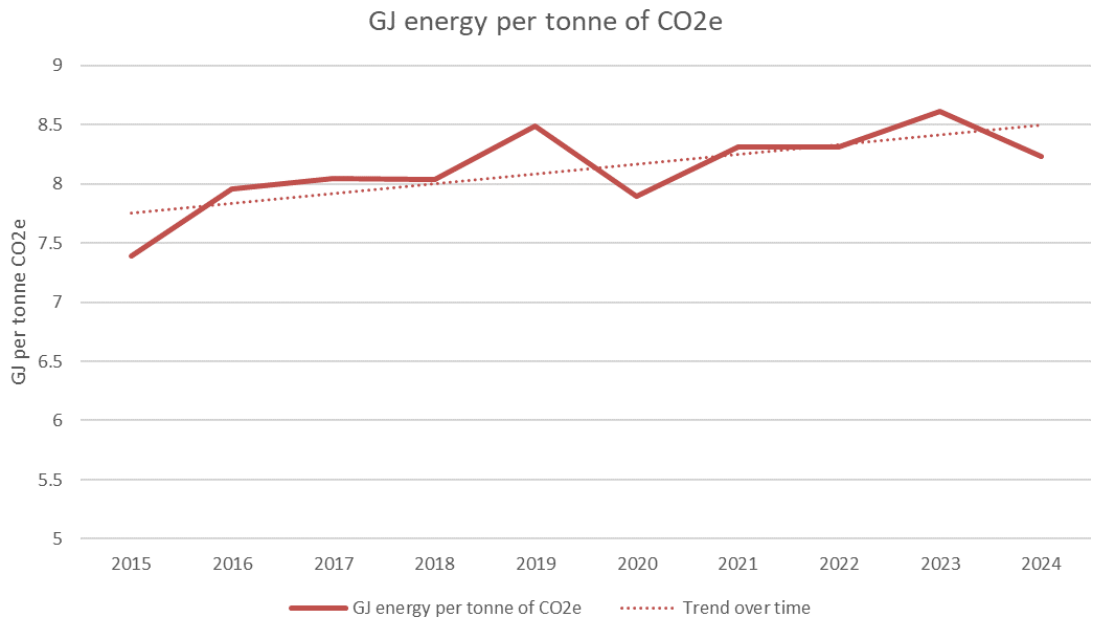


Figure 6 – Energy units per tonne of carbon emitted for Corporate Operations 2015 – 2024

Buildings

Energy in the Buildings sector is primarily used for heating and is heavily influenced by weather. Other energy uses come from lighting, appliances, computers, among other consumers.

This sector has shown negligible improvements over time. Between 2021 and 2023 energy use moved in lockstep with heating needs, measured in Degree Days Heating (DDH). In 2024 there was a decrease in energy use relative to DDH but this could be an effect of temperatures remaining above the need to use building heating systems.

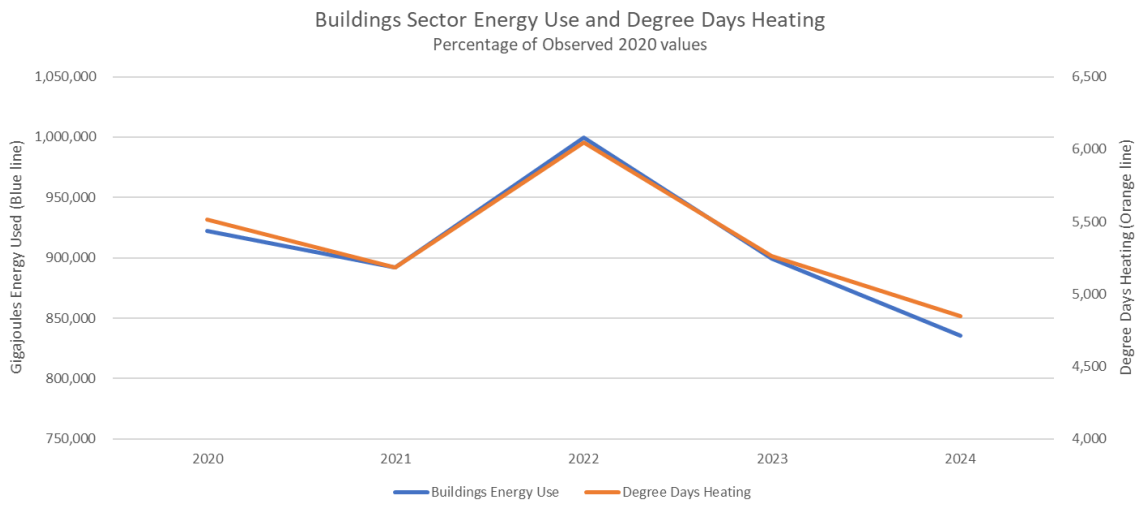


Figure 7 - Influence of Heating Requirements on Buildings Sector Energy Use

Vehicle Fleet

The Vehicle Fleet sector includes energy and emissions from vehicles and heavy equipment used in City operations but does not include all contracted vehicle usage at this time.

2024's Vehicle Fleet energy use stayed at 2023 levels, but with emissions increasing 0.2%. This was primarily driven by Transit, which used 0.6% more fuel than in 2023. Nearly all other Fleet categories increased as well: Public Works by 1.0% (63 tonnes CO_2e), WPS by 6.2% (158 tonnes CO_2e), WFPS by 3.4% (68 tonnes CO_2e), and all other Fleet emissions together increased 13.6% (154 tonnes CO_2e). Commuting is estimated to have stayed relatively constant. Water and Waste Department fleet emissions dropped -2.1% (-207 tonnes CO_2e), the only decreasing department from 2023 to 2024.

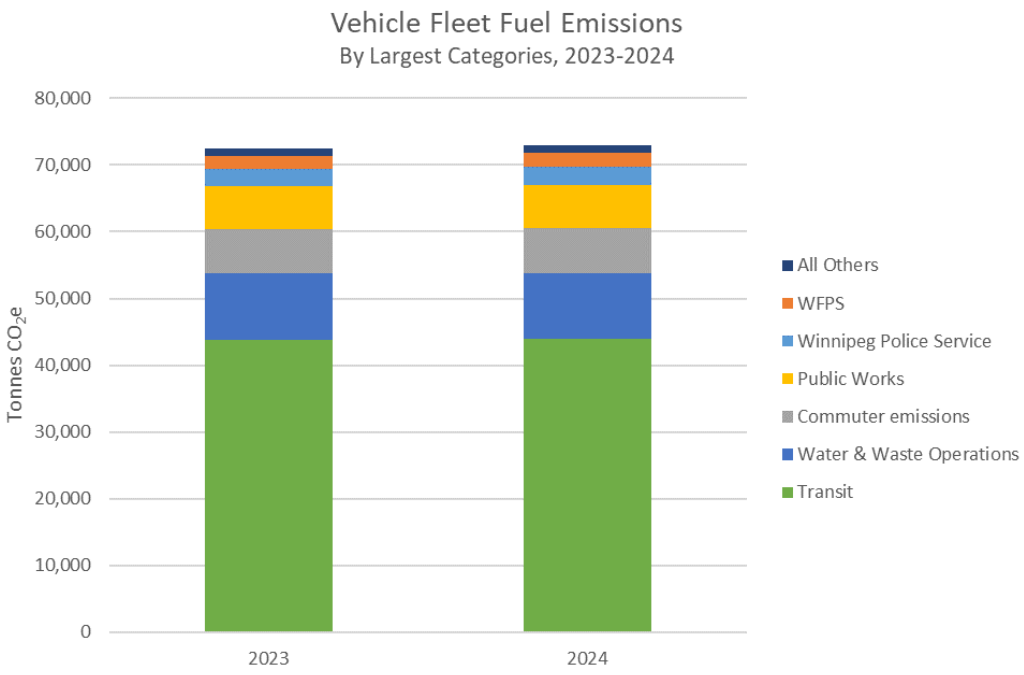


Figure 8 - Fleet Emissions Profile, 2022 and 2024

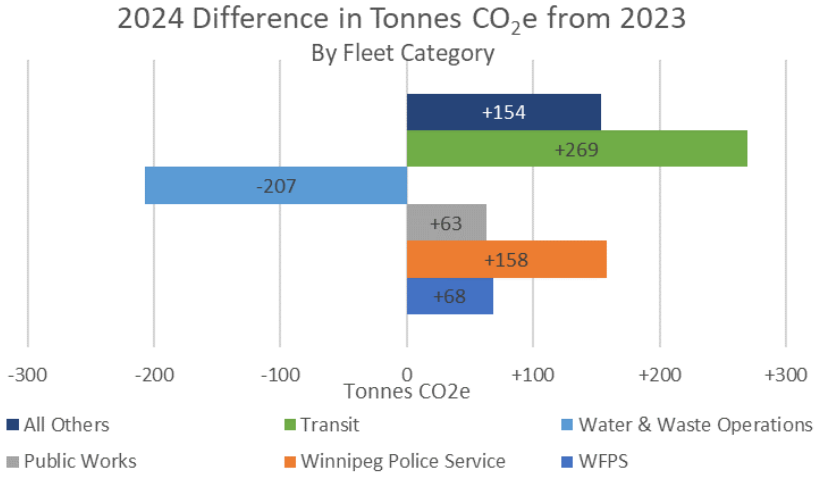


Figure 9 - Tonnage Difference from 2023 by Fleet Category

Employee commuting impacts have been included in Winnipeg's inventories since 2018. 2024 saw the second year of the Flexible Workplace Program. This program has reduced commuting kilometres (km) by 531,875 km monthly, or 6,382,496 km annually. This represents emissions reductions from commuting by 14.7%, or 1,153 tonnes CO_2e.

Streetlights

Streetlights only use electricity. In Manitoba this is a relatively clean energy source, so this sector produces negligible emissions. Most Winnipeg streetlights have been switched to LED lights. This has decreased energy use substantially.

Water and Wastewater

Water & Wastewater infrastructure energy use increased in 2024 by 8.6%, and emissions increased by 28.8%. The Wastewater sector is significantly impacted by precipitation entering the sewer system and needing to be processed by the wastewater treatment plants. The chart below shows the link between precipitation, treated wastewater, and energy use by wastewater infrastructure from 2020 to 2024. 2024 shows a large divergence from this trend of tight linking, with an increase in emissions to a relative decrease in precipitation.

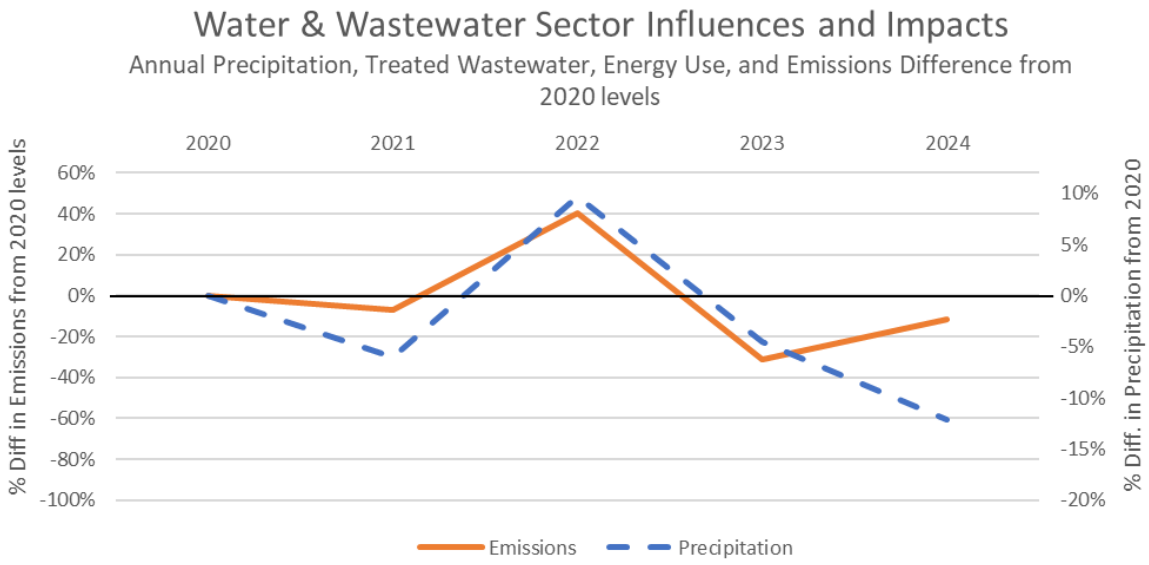


Figure 10 – Comparison of Water & Wastewater Energy Use, Treated Wastewater, and Precipitation levels as a proportion of 2020 levels

Corporate Waste

Waste emissions are based on tonnage of waste delivered to the Brady Road Resource Management Facility. Emissions from this sector are a result of methane generation from landfilled refuse, as opposed to the combustion of fossil fuels. Methane generation from decomposition of waste can peak several years after landfilling and can continue for more than 50 years.

Starting with the 2023 inventory, emissions from the Waste sector have included projected emissions from all waste landfilled by the City and/or landfilled at Brady Road Resource Management Facility. This change to the accounting process has increased the reported amount of waste for the sector by a factor of between 17 and 18 times, with corresponding increases in the GHG emissions associated with the sector. This is reflected in a total of 211,995 tonnes CO_2e for 2024. This new process will also allow for a more accurate reflection of the methane emissions from the actual landfilled waste mix in future reports, as the composition of the waste is better understood.

Since 2020, biosolids diversion has saved the City from landfilling 283,585 tonnes of biosolids, which would have produced 65,623 tonnes of CO_2e. In 2024, it accounted for 14,432 tonnes of CO_2e avoided, or 6.3% of the total Corporate Waste stream.

There has been a trend towards a decrease in waste landfilled overall over the last five years. A peak in the amount of waste landfilled was last seen in 2020, with over 344,000 tonnes of waste generating approximately 230,657 tonnes of CO_2e. The amount of waste landfilled in 2024 was over 316,538 tonnes; 12,233 tonnes (6.1%) more than 2023, but 27,892 tonnes (-8.1%) less than the peak year of 2020.



Figure 11 - Change in Corporate Waste Emissions, 2020-2024