City of Winnipeg Corporate Greenhouse Gas Emissions Inventory - 2019

Office of Sustainability
City of Winnipeg

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A. INTRODUCTION

Purpose

The purpose of this report is to provide an update on the City's corporate greenhouse gas (GHG) inventory for the year 2019. It includes discussion on trends observed since 2014 as well as opportunities for continued reductions in GHG emissions at the corporate level.

Methodology (Brief)

This inventory considers the three most common greenhouse gases: carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_20). The emissions are reported in standard units as carbon dioxide equivalents (CO_2e). The inventory follows the requirements of the Global Protocol for Community-scale Greenhouse Gas Emissions (GPC) for municipalities. Emissions rates are based on energy use and other relevant data and emissions factors from standard, reliable sources. Attachment 1 provides a synopsis of the data sources used to develop this inventory. It includes internal City sources, external parties and relevant literature sources (e.g., National Inventory Report, Intergovernmental Panel on Climate Change).

Whenever possible, data referenced is inclusive of January 1, 2019 through December 31, 2019. Spatially, the inventory captures emissions within the City of Winnipeg's boundaries.

B. CORPORATE GHG INVENTORY (2014-2019)

Energy Consumption and GHG Emissions by Source

Table 1 summarizes the City's energy consumption and GHG emissions by source for 2014 to 2019. Electricity was the most significant source of energy consumed at approximately 34% (slightly more than biodiesel at 33%), though it accounted for only a very small fraction of total GHG emissions in each year. This is attributed to the relatively low emissions factor for electricity consumption resulting from Manitoba's predominantly hydroelectric power generation.[1]

Vehicle fuel (ethanol, biodiesel, aviation) accounted for 38% of the City's energy consumption and was also the most significant source of GHG emissions in 2019. Biodiesel fuel alone accounted for about 48% of the City's GHG emissions.

Natural gas accounted for approximately 28% of the City's energy consumption in 2019, with associated GHG emissions amounting to 29% of total City emissions.

[1] According to the National Inventory Report 1990-2016 - Greenhouse Gas Sources and Sinks in Canada (Part 3). Annex 13. Issued in 2018, only the Province of Quebec currently shares an equally low emissions factor for electricity consumption.

While the trend in emissions from 2014 to 2019 appears to show a general increase, it is important to note that it largely reflects the increased scope of data collection and analysis for the current inventory (e.g., incorporation of additional emissions sources).

Table 1: Energy Consumption and GHG Emissions by Source (2014-2019)

YEAR	ENERGY TYPE						TOTAL
	Electricity	Natural Gas	Ethanol Blend (E8.5)	Biodiesel Blend (B2)	Aviation	Solid Waste	
2014							
GJ	1,059,821	867,399	144,359	827,580	5,202	-	**2,904,360**
%	36%	30%	5%	28%	0%	-	100%
CO2e(t)	1,178	42,825	9,066	57,909	358	13,938	**125,273**
%	1%	34%	7%	46%	0%	11%	100%
2015							
GJ	1,014,138	752,790	137,266	811,942	5,769	-	**2,721,906**
%	37%	28%	5%	30%	0%	-	100%
CO2e(t)	1,127	37,167	8,620	56,814	397	14,282	**118,406**
%	1%	31%	7%	48%	0%	12%	100%
2016							
GJ	1,014,416	771,584	129,577	806,663	5,528	-	**2,727,769**
%	37%	28%	5%	30%	0%	-	100%
CO2e(t)	1,127	38,094	8,137	56,447	383	14,048	**118,236**
%	1%	32%	7%	48%	0%	12%	100%
2017							
GJ	988,344	827,512	127,859	801,327	7,799	-	**2,752,842**
%	36%	30%	5%	29%	0%	-	100%
CO2e(t)	1,098	40,856	8,029	56,072	543	12,318	**118,916**
%	1%	34%	7%	47%	0%	10%	100%
2018							
GJ	919,844	791,093	126,851	891,969	5,304	0	**2,735,060**
%	34%	29%	5%	33%	0%	-	100%
CO2e(t)	1,022	39,058	16,025	62,409	366	13,097	**131,976**
%	1%	30%	12%	47%	0%	10%	100%
2019							
GJ	914,216	768,811	130,306	884,554	4,472	0	**2,702,358**
%	34%	28%	5%	33%	0%	-	100%
CO2e(t)	1,016	37,958	16,242	61,890	307	11,741	**129,154**
%	1%	29%	13%	48%	0%	9%	0%

Energy Consumption and GHG Emissions by Sector

Table 2 presents the City's energy and GHG emissions by sector. The buildings sector accounted for a significant portion of the City's energy consumption in 2019 (electricity plus natural gas) at about 37% of energy use. This translated to about 23% of the City's corporate GHG emissions.

While the vehicle fleet sector accounted for a similar proportion of the overall energy consumption, the GHG emissions associated with this sector were considerably higher. In 2019, vehicle fleet emissions approximated 61% of the City's total emissions. This is a notable increase from previous years that is largely attributable to increased reporting and tracking (e.g., hauling contracts, commuter travel).

The waste sector (water, waste water and corporate waste) accounted for about 16% of the City's emissions.

Table 2: Energy and Greenhouse Gas Emissions by Sector (2014-2019)

YEAR	SECTOR					TOTAL
	Buildings	Vehicle Fleet	Streetlights	Water and Sewage	Corporate Waste	
2014						
GJ	1,124,636	977,141	204,254	598,329	-	**2,904,360**
%	39%	34%	7%	21%	0%	100%
CO2e(t)	34,216	67,333	227	9,560	13,938	**125,273**
%	27%	54%	0%	8%	11%	100%
2015						
GJ	994,643	954,977	204,381	567,904	-	**2,721,905**
%	37%	35%	8%	21%	0%	100%
CO2e(t)	28,959	65,831	227	9,108	14,282	**118,406**
%	24%	56%	0%	8%	12%	100%
2016						
GJ	1,017,598	941,769	182,770	585,632	-	**2,727,769**
%	37%	35%	7%	21%	0%	100%
CO2e(t)	29,341	64,967	203	9,678	14,048	**118,236**
%	25%	55%	0%	8%	12%	100%
2017						
GJ	1,033,948	936,985	166,750	615,159	-	**2,752,842**
%	38%	34%	6%	22%	0%	100%
CO2e(t)	30,432	64,644	185	11,336	12,318	**118,916**
%	26%	54%	0%	10%	10%	100%
2018						
GJ	1,009,203	1,024,123	134,037	567,697	-	**2,735,060**
%	37%	37%	5%	21%	0%	100%
CO2e(t)	30,782	78,799	149	9,149	13,097	**131,976**
%	23%	60%	0%	7%	10%	100%
2019						
GJ	995,247	1,019,331	112,776	575,004	-	**2,702,358**
%	37%	38%	4%	21%	0%	100%
CO2e(t)	29,951	78,439	125	8,897	11,741	**129,154**
%	23%	61%	0%	7%	9%	100%

2019 GHG Inventory

GHG emissions by source and sector for 2019 are displayed in Figures 1 and 2 below. Vehicle fuel (all types combined) accounted for approximately 61% of the City's GHG emissions.

Figure 1: GHG Emissions by Source (2019)

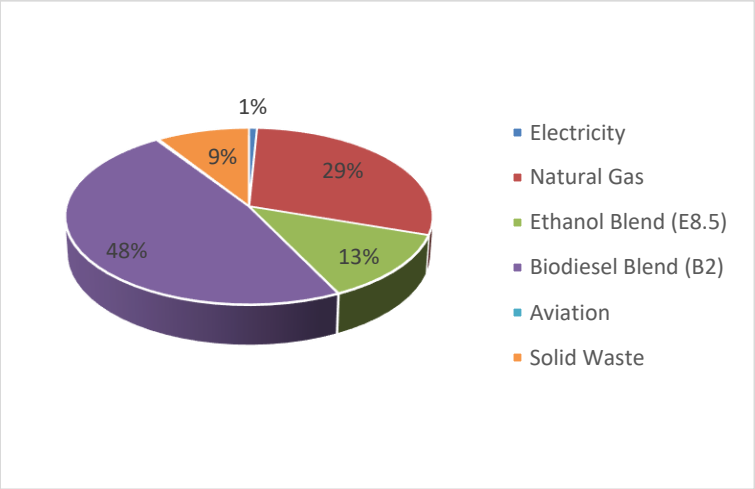


Figure 2: Corporate GHG Emissions by Sector (2019)

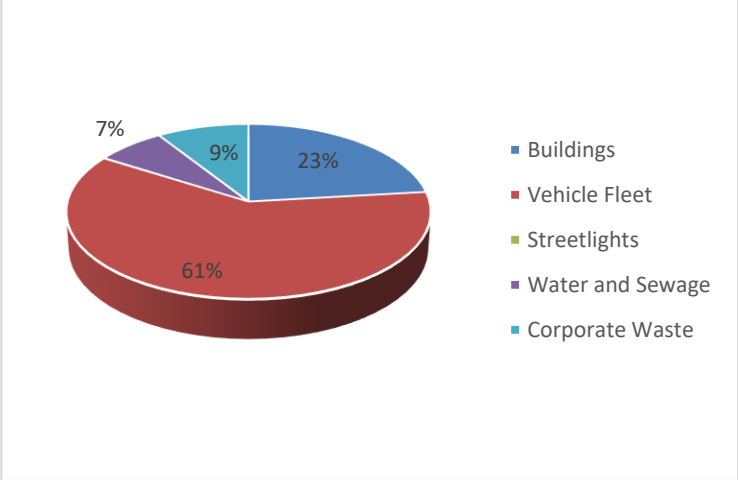
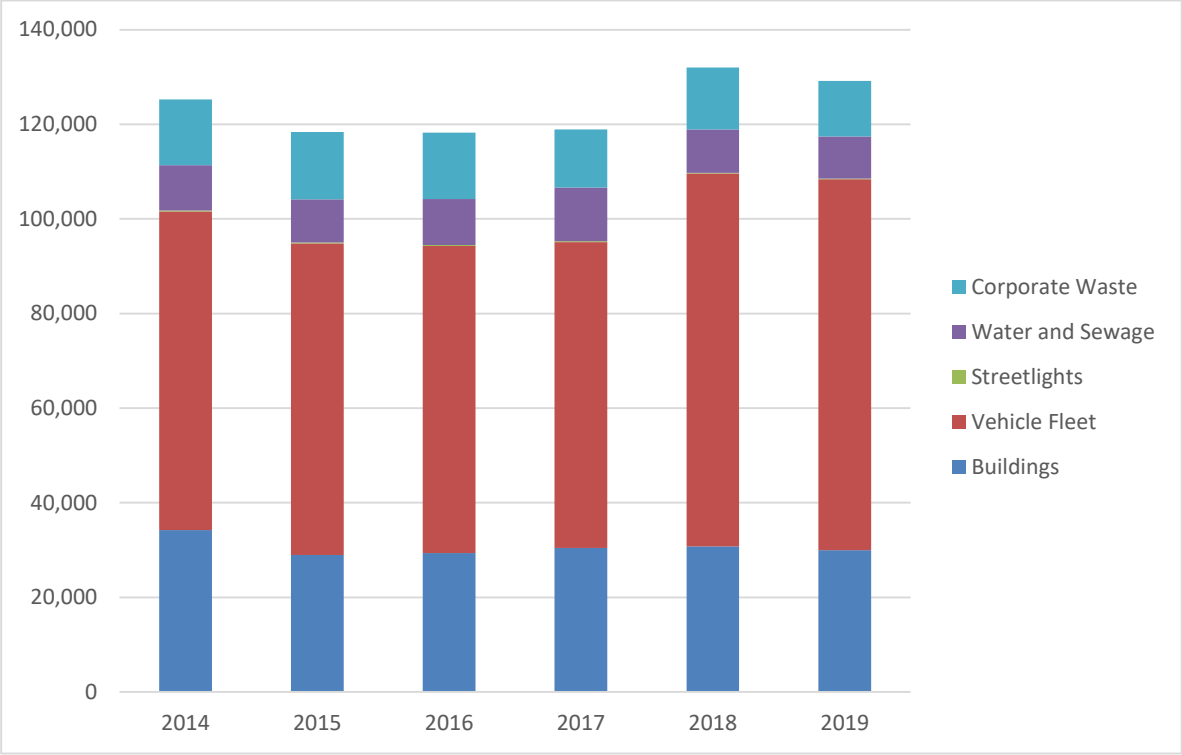


Figure 3 shows the trend from 2014 through 2019. As noted above, the increased emissions shown for 2018 and 2019 largely reflect the increased scope of data collection and analysis for the current inventory.

Figure 3: Corporate GHG Emissions by Sector (2014 to 2019)

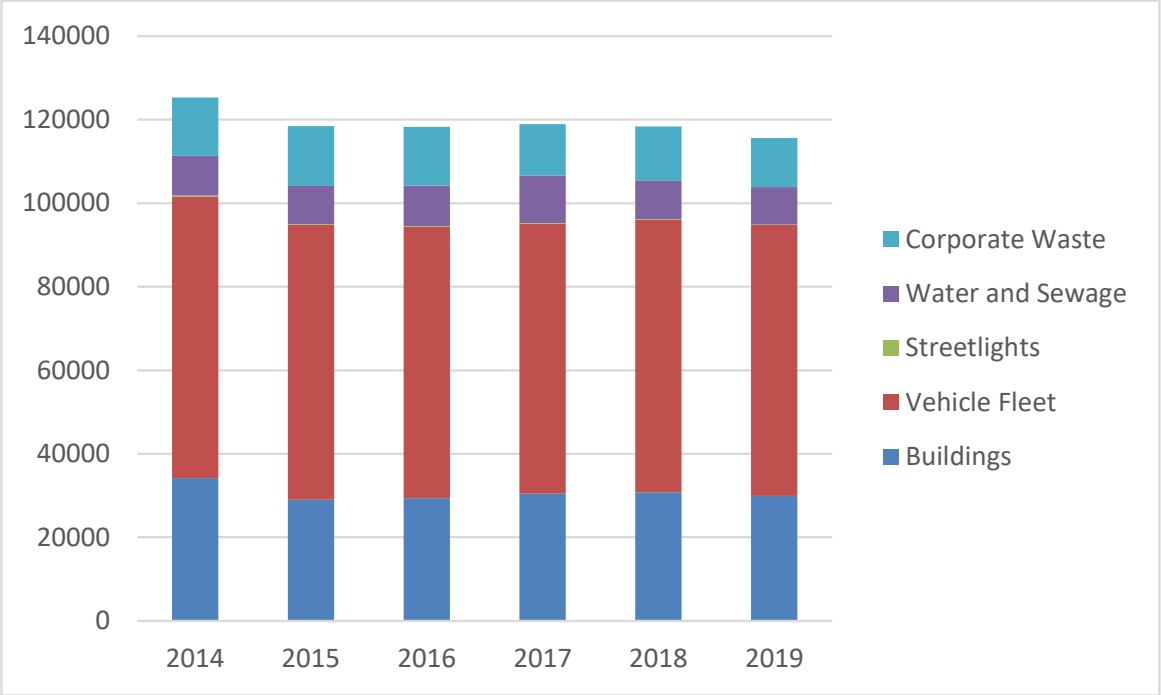


C. TRENDS AND KEY DRIVERS

The City developed its first inventory and forecast of corporate greenhouse gas emissions for the year 1998. Subsequent corporate GHG emission inventories were conducted for the years 2003, 2006, 2007, 2011 through 2017 and most recently for 2018 and 2019.

The approach to the corporate GHG inventory has changed considerably since 2016. The methods have been updated to reflect GPC reporting standards, and to account for the availability of new sets of data not previously utilized. In order to provide a meaningful comparison of GHG trends over time, it was necessary to remove the additional emissions sources factored into the inventory in 2018 and 2019. Figure 4 presents the results of this exercise. Relative to 2014, the City's emissions have decreased by approximately 8%.

Figure 4: Summary of Adjusted Total Annual Emissions Trends from 2014 to 2019 (tonnes eCO_2)



A number of changes were made to the inventory for 2014 through 2019. While these updates complicate comparisons with previously assembled inventories, they also provide improved accuracy and robustness to the inventory process. These changes included (starting):

- Including Winnipeg Transit fuel data (2014)
- Incorporating City-owned, community-operated community centres (2014)
- Incorporating aviation fuel used by *Air1* and by insect control contractors (2014)
- Fuel consumption associated with waste hauling (2018)
- Fuel consumption associated with employee commuting (to/from work) (2018)

Table 3 provides a detailed breakdown, by sector, of the GHG emissions for this time period. From 2014 to 2019 GHG emission reductions were observed for all sectors (including vehicle fleet after adjusting for the increased 2018/2019 scope). Over the six-year period, the City's corporate GHG emissions have declined by approximately 8% and are characterized as follows:

- GHG emissions in the buildings sector decreased by about 12%. A notable portion of this may be attributable to a decrease in the number of facilities/properties in the City's inventory including the removal of highly inefficient buildings in the inventory;
- Vehicle fleet emissions decreased by about 4% during the time period (after adjusting for increased scope);

- The reduction in streetlight GHG emissions is the result of ongoing City-wide transition to LED lighting as well as improvements in Manitoba Hydro's grid-associated emissions over time; and
- Emissions associated with water and sewage, and corporate waste decreased substantially (by 7% and 16% respectively) from 2014 to 2019. Some of the reduction may be a result of ongoing waste diversion programming implemented at the corporate level in accordance with the Corporate Waste Reduction Strategy (e.g., improved communication with departments, organics collection at 65 Garry, 510 Main and 185 King).

Table 3: GHG Emissions by Sector (2014-2019)

Sector	2014 (tonnes eCO_2)	2015 (tonnes eCO_2	% Change	2016 (tonnes eCO_2	% Change	2017 (tonnes eCO_2	% Change	2018 (tonnes eCO_2	% Change	2019 (tonnes eCO_2	% Change	% Change (Total)	% Change (Total, Adjusted)*
Buildings	34,216	28,959	-15%	29,341	1%	30,432	4%	30,782	1%	29,951	-3%	-12%	-12%
Vehicle Fleet	67,333	65,831	-2%	64,967	-1%	64,644	0%	78,799	22%	78,439	0%	16%	-4%
Streetlights	227	227	0%	203	-11%	185	-9%	149	-19%	125	-16%	-45%	-45%
Water and Sewage	9,560	9,108	-5%	9,678	6%	11,336	17%	9,149	-19%	8,897	-3%	-7%	-7%
Corporate Waste	13,938	14,282	2%	14,048	-2%	12,318	-12%	13,097	6%	11,741	-10%	-16%	-16%
Total	**125,273**	**118,406**	**-5%**	**118,236**	**0%**	**118,916**	**1%**	**131,976**	**11%**	**129,154**	**-2%**	**3%**	**-8%**

*NOTE: accounts for additional scope for 2018 and 2019.

Table 4 lists some of the key actions and activities that have contributed to changes in the City's corporate GHG emissions.

Table 4: Key Drivers of Change, 2013 to 2019

Key Drivers	Detail	Year
Completion of New City Buildings or Significant Operational Changes	WFPS Station #11 on Portage @ Route 90	2013
	WPS West District Station at 2321 Grant Ave.	2013
	WPS Firing Range at 1745 Wyper Road	2013
	East Yard Public Works main building at 960 Thomas Ave.	2013
	Winnipeg Transit Garage at 600 Brandon Ave.	2014
	East Elmwood Community Centre	2015
	Garden City Community Centre	2016
	Dakota Community Centre Sports Field House	2017
	Windsor Park Library	2017
	East Yard Public Works complex operational increases	2017
	Civic Centre Parkade	2018
	Vimy Arena	2018
Electricity Emission Factors	Emissions associated with the consumption of electricity from the provincial grid have decreased significantly since 2007. This is a consequence of the Provincial coal phase-out and average or above-average lake levels.	
Construction at Millennium Library	Work on the Millennium library parkade in 2013 resulted in a one-year spike in emissions of approximately 1,300 tonnes CO_2e.	
Changes in the City Vehicle Fleet	The number of fleet vehicles managed by the WFMA has steadily decreased since 2013.	
Use of Personal Vehicles for Business Purposes	The use of personal vehicles for business purposes has steadily decreased since 2010.	
Corporate Waste	City-generated waste has tended to fluctuate from year to year although waste from facilities specifically has increased steadily since 2010. Construction and demolition waste decreased significantly from 2014 to 2019.	
LED Traffic Signal Conversion	Ongoing transition of traffic signals to LED has led to a continuous reduction in electricity use.	

NOTE: List is not exhaustive; provides a representative sampling of potential contributors to the City's emissions profile.

D. OPPORTUNITIES

A number of sector-specific undertakings have been put in place to support the City's efforts to reduce its GHG emissions. Some of these are City-led initiatives and others have been developed through partnerships with industry, academia and other organizations. The following describes opportunities going forward for reducing corporate greenhouse gas emissions. It includes ongoing initiatives already in place that were identified in the previous Status Report on the Corporate Climate Action Plan (2016) and relevant actions identified in Winnipeg's Climate Action Plan under Strategic Opportunity #1 – Corporate Leadership.

Buildings

The buildings sector accounted for 38% of energy use and 26% of emissions in 2017. Going forward, emission reduction opportunities will include:

- The City's *Green Building Policy: New City-owned Buildings and Major Additions* (adopted 2011).
- The City's *Green Building Policy for Existing City-owned and Leased Buildings* (adopted 2011).
- Maintain an inventory of City owned buildings in the Portfolio Manager which provides capacity to monitor energy consumption, estimate GHG emissions, and undertake analyses.
- Continue to offer educational opportunities on how to improve energy efficiency by reducing consumption in City owned and other commercial buildings throughout Winnipeg.
- Explore renewable energy sources that directly displace natural gas use.

Streetlighting

Opportunities remain for upgrades to park and pathway lighting although as noted above, associated emissions are very low given the City's reliance on predominantly renewable hydro-electricity.

Vehicle Fleet

Ongoing and new emission reduction opportunities will include those identified in the *Winnipeg Fleet Management Agency's Green Fleet Plan* (adopted 2010):

- Right Sizing the fleet.
- Purchase the most fuel efficient light duty, and lowest greenhouse gas emitting vehicles where operationally feasible.
- Replace older diesel engines with low emitting diesel engines.
- Evaluate and use alternative fuels.
- Implement and enforce a corporate anti-idling policy and install idle reduction technologies.
- Deploy fuel efficient driver training.
- Evaluate new advanced vehicles and technologies.
- Investigate maintenance and management practices to reduce fuel use.
- Inclusion of personal vehicle use, rental vehicles, and outsourced work.
- Transportation demand management.
- Communication and outreach.

Other ongoing and new initiatives include the following:

- Implement steps toward transit electrification as outlined by the Electric Bus Demonstration project task force.
- Two electric vehicles and two level three charging stations are in use as part of the City's Electric Vehicle Pilot.
- The Intuitive Routing System program is being implemented by the City's Parking Authority.
- Continue participation in active transportation programming like *GoManitoba*, employee commuting surveys, and Commuter Challenge.
- Bids for contracted fleet services require collection of fuel consumption data and sustainable procurement requirements.

Waste

Emission reduction opportunities will include the following new and ongoing initiatives:

- Seek out additional opportunities to implement enhanced waste reduction programs at other City facilities. To date, initiatives are underway at the Planning, Property and Development department (65 Garry Street and 185 King Street), and City Hall (510 Main).
- The Brady Road Resource Management Facility landfill gas system expansion was completed mid-2020, bring the facility's methane collection efficiency to 75%.
- The Residential Food Waste Collection pilot project launched in 2020.
- Explore additional opportunities related to biosolids use (for soil fabrication, agricultural application).

Ongoing Inventory Improvement

Opportunities exist to undertake the following:

- Continue to increase and account for additional emissions sources in the corporate GHG inventory (e.g., ice surfacing equipment, air travel) as mandated in the GPC requirements.
- Set corporate targets for emissions and energy consumption.

Other

Other actions and opportunities underway to help the City reduce its corporate GHG emissions include the following:

- Ongoing meetings of the Climate Change Working Group.
- Ongoing corporate GHG inventory work.
- Enhanced internal communication efforts.
- Winnipeg's Climate Action Plan describes a number of Key Directions and Actions that relate specifically to corporate leadership on GHG reductions.

ATTACHMENT 1: TECHNICAL BACKGROUND

To date, the City of Winnipeg has been measuring corporate emissions from municipal operations in general accordance with the Partners for Climate Protection (PCP) Protocol: Canadian Supplement to the International Emissions Analysis Protocol. It offers modern guidance on good practice emissions accounting for local governments in Canada. The City has committed to adhering to the Global Protocol for Community-Scale GHG Emissions (GPC). This protocol has an expanded scope of GHG reporting and includes, for example, off-road transportation (rail, air) and contracted services. Subsequent inventories will be refined to align with the GPC protocol.

Greenhouse gas inventories provide an imperfect measure of corporate emissions, and are subject to continuous improvement in scope of reporting, increased transparency, and robustness as the City improves its tracking and data collection methods. Alignment with modern reporting protocols and adjustments to emission factors also require periodic inventory revisions. Consequently, inventory revisions are often necessary to provide the most robust and accurate data possible.

This update was subject to the following fuel consumption additions (2018, 2019):

- Employee commuting – taken from the City's 2019 employee commuting survey;
- Major waste hauling contracts;
- Hauling of biosolids and leachate;

Additional refinements to the City's inventory are expected in the future, including emissions resulting from additional contracted local services (e.g., snow removal and spring cleaning). As of 2020, The City has begun to incorporate language into bid opportunities and contracts so that appropriate data will be available for future iterations of the corporate GHG inventory. Table A-1 provides additional detail regarding scope, protocol requirements, accounting methods, and the relative contribution (where possible) to the City's inventory.

ATTACHMENT 2: DATA SOURCES

Data	Sector	Source
Building electricity and natural gas consumption	Buildings	Manitoba Hydro, Portfolio Manager, appropriate City departments
General building inquiries	Buildings	Municipal Accommodations
Streetlight electricity consumption	Streetlights	Manitoba Hydro, appropriate City departments
Corporate fleet fuel consumption	Transportation	WFMA
Transit fleet fuel consumption	Transportation	Transit
Employee use of personal vehicle for City business	Transportation	Finance
WPS Air1 fuel consumption	Transportation	Police Service
Insect control helicopter fuel consumption	Transportation	Insect Control
Waste contractor fuel consumption (biosolids, leachate, residential services)	Transportation	Water and Waste
Landfill waste (construction, demolition, yard waste, etc.)	Waste	Water and Waste
City facility waste	Waste	Water and Waste
Conversion factors, emissions coefficients	All	National Inventory Report 1990-2016 (Environment Canada); Intergovernmental Panel on Climate Change (5th Assessment); Report on Energy Supply and Demand in Canada