MANAGEMENT REPORT

Date: November 29, 2023
To: Infrastructure, Transportation and Safety Sub-committee
From: Sadaf Ghalib, Climate Change Program Manager
Report Number: ITS23-032
Attachments: None

Title: Annual Corporate Greenhouse Gas Emissions – 2022

Objective: To report annually on the City of Stratford's Corporate Greenhouse Gas (GHG) emission inventory and progress toward meeting corporate GHG emission reduction targets for the year-ending December 31, 2022.

Background:

City-wide GHG Emission Reduction Targets

On February 10, 2020, Council declared a climate emergency and further introduced City-wide GHG emission reduction targets, applicable to both the City's internal (corporate) operations and the overarching community. These targets are aligned with the Paris Agreement[1] and follow the recommendation set out by the Intergovernmental Panel on Climate Change (IPCC) for collaboratively achieving the GHG emission reductions required to limit global warming to 1.5 degree Celsius[2].

- 30% (below 2017 emission baseline levels) by 2030
- 60% (below 2017 emission baseline levels) by 2040
- Near to Net-zero by 2050

To support the climate emergency declaration, the City has established a strategic framework through the Corporate Energy and Emissions Plan 2023, that provides recommendations to embed a Climate Lens throughout corporate operations and serves as a roadmap toward its goal of moving the City's operations toward a zero-carbon future by 2050. Through a range of near- and longer-term initiatives and actions, the

[1] Canada signed and ratified the Paris Agreement on October 6, 2016, and committed to reduce GHG emissions by 30% below 2005 levels by 2030. It was also recognized that a collaborative approach between federal, provincial and territorial (FPT) governments is important to reduce GHG emissions and to enable sustainable economic growth.
[2] Intergovernmental Panel on Climate Change, 6th Assessment Report (2021): https://www.ipcc.ch/assessment-report/ar6

City is committed to deliver on the targets set forth by the climate emergency declaration and to showcase its leadership.

City Steps to Accelerate Emission Reductions

Following the initial establishment of the Climate Emergency targets, Council also supported creation of a new Climate Action Division within the Infrastructure Services Department. To advance this collaborative work, a specialist position was created to provide technical expertise, interdepartmental support, thought leadership for Corporate climate action initiatives, and to ensure that the City is on track to meet its targets.

On October 23, 2023, City Council endorsed the Corporate Energy and Emissions Plan (CEEP) 2023. This document provides guidance on how the City can accelerate efforts toward decarbonization and operationalize actions to support energy efficiency and achieve the required emission reduction targets to align with provincial and federal objectives. The CEEP also aids informed financial decision-making and serves as a roadmap to achieve the 2030 milestone and beyond; by outlining 31 actions for corporate facilities, fleet, waste, infrastructure, policy updates, and the development of specific tools to pursue decarbonization efforts and support overall energy and emissions management.

The City is actively working toward implementing the identified strategies outlined in the CEEP. Staff have initiated energy, cost and emissions monitoring and are documenting the City's progress in achieving its climate goals.

Analysis:

Ontario Regulation 25/23 Requirements

The provincial requirement Ontario Regulation 25/23 (previously O. Reg. 507/18) requires Ontario's Broader Public Sector, including municipalities, to proactively track and monitor their energy usage, as well as develop/update energy conservation and demand management plans every 5 years. All municipalities are required to publicly report their emissions annually in July for the prior calendar year.

Under this regulation, the City of Stratford has been reporting energy usage to the province and has undertaken a range of measures to enhance energy conservation and efficiency efforts. The current plan for 2019-2024 is underway and is expected to be updated for the next 5-year cycle in early 2024. Efforts led by the City within its facilities since 2011 have resulted in a consistent emissions trend annually, with a slight deviation in the emissions trajectory observed through 2020 to 2022. The influencing factors of these emissions reductions can be attributed to:

- Ongoing lighting upgrades in major facilities to LED lighting;
- Fleet GPS tracking to monitor and evaluate vehicle performance;
- Upgrades of gas-powered equipment (ice resurfacer, ice edger) to electric powered units;

- Updated emission factors[3] for gasoline and diesel, and consumption intensity values for electricity.

O. Reg. 25/23 considers overall facility energy consumption which encompasses the entirety of Scope 2 emissions and selected Scope 1 emissions[4].

Recognizing the urgency to address repercussions of climate change and to accelerate decarbonization throughout operations, CEEP was created to go above and beyond basic provincial requirements, to consider a holistic approach toward energy efficiency, target a wider umbrella of emissions (Scope 1, Scope 2, and Scope 3 where applicable), whilst supporting financial sustainability. The Plan also addresses gaps in the reporting structure and aims to streamline energy management and emissions reporting in accordance with the GHG Protocol[5]. For example, select City facilities were accounted for and reported to the province under O. Reg. 25/23; energy usage and emissions generated from other major city assets including fleet, wastewater, water infrastructure and municipal solid waste were not considered, thus resulting in an inaccurate overview of energy usage and emissions.

As a guiding document to achieve energy reductions, cost savings and GHG emission reductions, the CEEP also provides roadmaps to measure and monitor progress within key asset classes that are directly influenced by the City.

2022 Corporate GHG Emissions

The 2022 corporate GHG emissions were measured for the period January 1, 2022 to December 31, 2022. In 2022, total corporate GHG emissions were 4,153.69 tCO_2e, approximately 18.78% below the baseline year of 2017 (5,114.41 tCO_2e). This is 17.5% lower than what would have been expected in the business as usual (BAU) scenario (with consistent annual emission generation and no substantial corrective action taken to manage these emissions), without the Climate Emergency Declaration, and without development and implementation of CEEP. This brings the City on track to achieve the required GHG emission reduction target of 30% by 2030. Figure 1 illustrates that Council's declaration of a Climate Emergency in early 2020, followed by allocating additional capital resources and dedicated staff for corporate climate action, has been successful in initiating a range of climate mitigation and adaptation initiatives.

[3] Canada's National Inventory Report 1990-2021: Greenhouse Gas Sources and Sinks in Canada, Part 2, Table A6.1-1, "CO_2 Emission Factors for Marketable Natural Gas"

[4] Scope 1 emissions are direct greenhouse (GHG) emissions that occur from sources that are controlled or owned by an organization. These include emissions associated with fuel combustion in boilers, furnaces, and vehicles.
Scope 2 emissions are indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling. Although Scope 2 emissions physically occur at the facility where they are generated, they are accounted for in an organization's GHG inventory as they are a result of the organization's overall energy use.

[5] The GHG Protocol provides a standard framework and tools for measuring and managing GHG emissions from private and public sector operations.

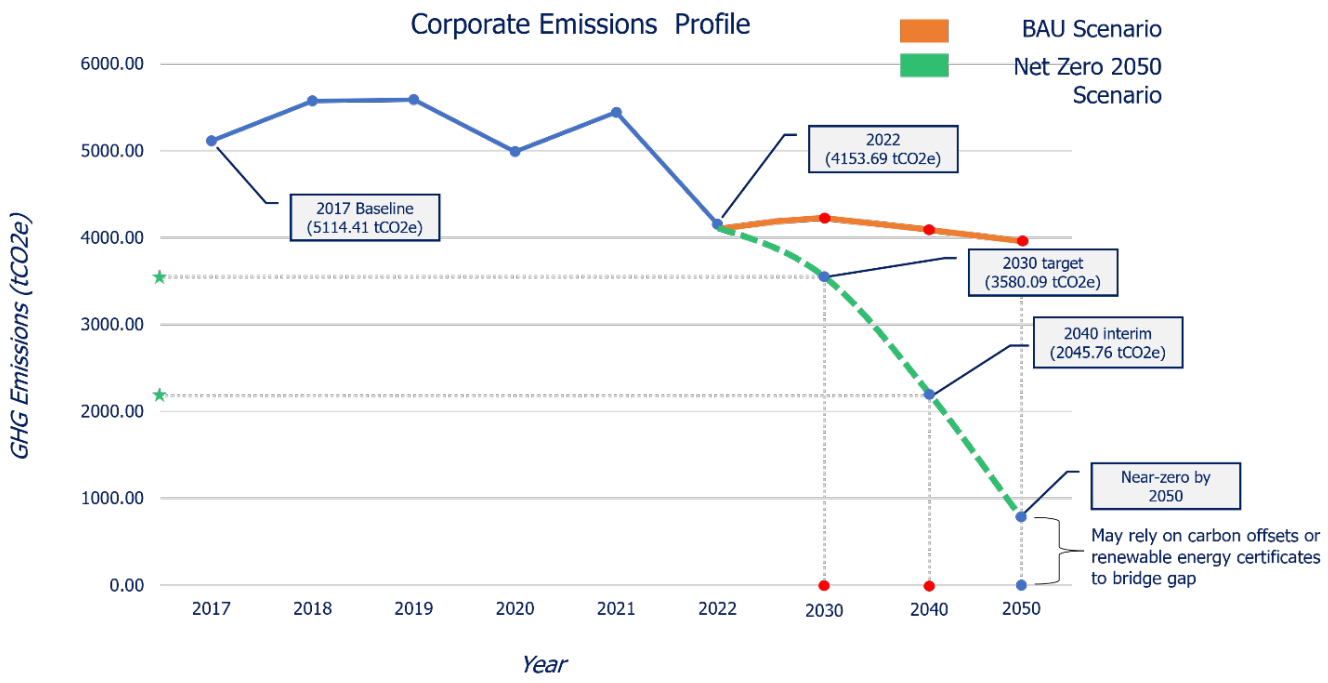

Figure 1 – Projected corporate emissions trajectory- Business as Usual Scenario and alignment with CEEP implementation scenario with Net Zero targets.

Note – A 'near-zero' emission scenario would translate to approximately 80 – 100% reduction in emissions from baseline. This is a conservative approach recognizing that some sectors (e.g., industry and/or heavy-duty equipment) will be challenging to decarbonize and may need to rely on carbon offsets, renewable energy certificates or future technology.

From the emissions trajectory (Figure 1), it is observed that the decommissioning of and subsequent sale of the Kiwanis Centre property has been a major contributor to reduced emissions after 2018. Ongoing initiatives since 2021, such as fleet upgrades to hybrid vehicles, indoor and outdoor lighting upgrades in facilities to LEDs have also contributed to overall reductions. However, it must be noted that any new builds commissioned by the City, such as the Grand Trunk Development, that have not been accounted within the emissions measurement so far, would result in an addition of these emissions when developed. To stay on track to meet the City's corporate GHG objectives whilst enhancing corporate assets, it will be prudent to create low-carbon or preferably net-zero, energy efficient buildings as recommended in the CEEP.

Annual variations in seasonal temperatures can also influence GHG emission outcomes from year to year by causing fluctuations in energy consumption to accommodate thermal comfort. Such variations cannot be predicted at this time. In the period 2020 – 2021, added implications of COVID-19 have made it challenging to determine the extent to which corporate emissions have been impacted.

Table 1 Corporate GHG Emissions profile for all asset classes 2017 – 2022

Year	Total Corporate GHG Emissions (tCO_2)	Change in GHG Emissions (tCO_2)	Relative to 2017 Baseline
2017	5,114.41	Baseline	Not Applicable
2018	5,574.04	+8.99	Increase
2019	5,589.20	+9.28	Increase
2020	4,988.71	-2.46	Decrease
2021	5,442.35	+6.41	Increase
2022	4,153.69	-18.78	Decrease

Future annual data will feed the results of annual reporting. At this time, it is difficult to estimate any consistent changes in the corporate emissions trajectory which is influenced by a variety of factors including: data availability and measurement, fuel emission intensity factor (the quantity of emissions contained in a single unit of fuel), weather fluctuations, and unprecedented severe weather events.

Climate Action Overview for 2022

In 2022, the City initiated several corporate projects and policy updates with the application of a Climate Lens:

- Continued to implement the City's 2019-2024 Corporate Energy Conservation and Demand Management Plan (required under O. Reg 25/23), which has been posted on the City's Climate Change webpage and is available for public viewing at City Hall and City Hall Annex, upon request;
- Developed the Corporate Energy and Emissions Plan (CEEP) 2023 as a guiding document to achieve energy savings, cost savings and emission reductions throughout corporate operations;
- Initiated implementation of the Buildings Roadmap and Green Fleet Roadmap as recommended in CEEP 2023;
- Initiated update of current policies and plans, e.g., Procurement Policy, Transportation Master Plan;
- Intended to support informed decision making during the budget process, staff developed a 'climate lens assessment and calculator tool' to indicate the environmental impact of City projects (e.g., asset replacement, fleet replacements and other new procurement) and, in most cases, quantify related emissions;
- Ongoing street light upgrades to LEDs;

- Ongoing facility lighting upgrades to LEDs;
- Ongoing procurement of low-carbon fleet vehicles (to replace those at the end of service life), e.g., hybrid models.

Historical Emissions (2011 onward)
Substantial reductions in City-wide emissions were observed from 2011 to 2017 (2,578.91 tCO_2e), led by a myriad of drivers such as the following:

- Gradual shift of electric power generation, transmission, and distribution industry in the province from coal-fired generation toward other sources such as nuclear energy that are less carbon intensive in terms of GHG emissions;
- The above variation also resulted in considerable change in the provincial electricity emission intensity factor. While the electricity consumption intensity reduced from 250 gCO_2eq/kWh in 2011 – 2012 to 20 gCO_2eq/kWh in 2020 – 2021, the natural gas consumption intensity increased from 1,871 g/m^3 in 2011 – 2012 to 1,921 g/m^3 in 2020 – 2021;
- The removal of the City-owned Kiwanis Centre facility from corporate building stock resulted in an immediate decrease of GHG emissions. Annual electricity savings of 73,200 kWh and natural gas savings of 21,884.41 m^3 were realised, which contributed toward an estimated overall emission reduction of 43.53 tCO_2e from the corporate inventory.

2022 Corporate Emissions by Sector
In order to meet or exceed the 2030 milestone for 30% emission reduction (1,535 tCO_2e) and pave the way to achieve the 2040 milestone for 60% emission reduction (3,068.64 tCO_2e), an aggressive approach needs to be implemented and continued on an ongoing basis.

The energy consumption and resultant GHG emissions for the City's key asset classes (buildings, fleet, solid waste, outdoor lighting, and water and wastewater) for 2017 (Climate Emergency baseline year), and 2022 (current year) are summarized in Table 2.Table 2 Summary of Emissions by Asset Class in Baseline Year (2017) versus Current Year (2022)

Asset Class	Energy Type(s) in Use	2017 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	2017 – 2022 Overall Emission Reductions (%)
Buildings	Electricity Natural Gas	2,251.82	2,038.06	-9.49
Fleet	Natural Gas Diesel	1,902.25	1,500.23	-21.13

Asset Class	Energy Type(s) in Use	2017 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	2017 – 2022 Overall Emission Reductions (%)
Outdoor Lighting	Electricity	719.75	380.20	-47.20
Solid Waste	-	145.50	130.01	-10.34
Water & Wastewater	Electricity Natural Gas	57.18	55.00	-3.81
Municipal Airport	Electricity Natural Gas	38.40	50.40	+24

In summary, compared to the 2017 baseline year, the City's total GHG emissions for 2022 decreased by approximately 18% (or 960.72 tonnes of CO_2e).

<u>Building Asset Class:</u>
GHG emissions generated by the City's buildings and facilities have decreased by an overall 9.05% between 2017 and 2022. Together, natural gas and electricity consumption reductions accounted for an emission reduction of 213 tCO2e.

In the same time frame, electricity consumption was noted to be invariable, resulting in consistent measure of GHG emissions generated for both baseline year 2017 (196 tCO2e) and current year 2022 (198.45 tCO2e). The key driver for this consistency is largely due to the update in carbon intensity of electricity in 2017 (20 gCO_2 eq/kWh) and future years leading up to 2022 (30 gCO_2 eq/kWh), as identified through the Province's updated methodology, and consistent with Canada's submission to United Nations Framework Convention on Climate Change (UNFCCC) National Inventory Report 1990 – 2021 (2023)[6]. The carbon intensity of natural gas (1,921 gCO_2/m^3) remained unchanged from 2017 to 2022.

Some of the decreased electricity consumption can also be attributed to the ongoing energy conservation and efficiency measures being implemented. For example, LED lighting upgrade completed at the Rotary Complex and Burnside Agriplex resulted in both energy savings and emission reductions. Similar ongoing upgrades at the William Allman and Dufferin Arenas are anticipated to contribute toward energy efficiency efforts.

[6] National Inventory Report 1990-2021: Greenhouse Gas Sources and Sinks in Canada, Part 3, Table A13-2 to Table A13-14, 2021 values.

Fleet Asset Class:
GHG emissions generated by the corporate fleet have decreased by over 21% between 2017 and 2022. Natural gas and diesel usage in fleet and equipment account for the entirety of these emissions.

As a note, there was insignificant change in the emissions coefficient (that translates to carbon intensity) of both natural gas (2.31 kg per liter) and diesel (2.68 kg per liter), which remained consistent between 2017 and 2022.

To advance this transition, the City is gradually phasing out the use of fossil fuel powered vehicles wherever feasible, with other low-carbon options as they become available. Stemming from the recommendations of the CEEP to bolster the commitment toward decarbonization, all future procurement is planned to be hybrid vehicles, and electric vehicles (EVs) when and where feasible.

Committed Initiatives and Future Considerations
The City continues to consider and undertake projects that reduce fossil fuel consumption and to identify energy efficiency measures in both the buildings and fleet sectors. This report follows the Council adoption of CEEP 2023, wherein a detailed outline of recommended actions and strategies that are proposed to be led by the City over the next 10 years is available for reference.

The following section identifies energy efficiency and emission reduction initiatives underway and planned within next 5 years:

1. Buildings Asset Class

- Review of all City buildings listed in the CEEP Buildings Roadmap to identify deficiencies and retrofit opportunities for improved building performance, including energy and cost savings;
- Implementation of energy efficiency and electrification opportunities identified in existing ASHRAE Level 1[7] energy study;
- Commitment to an ASHRAE Level 1 and Level 2 energy study on remaining City buildings and consideration in future annual budget deliberations;
- Ongoing efforts to incorporate energy efficiency in planned upgrades for social housing;
- Articulate an approach to advance new buildings and developments as net-zero standard compliant, such as the Grand Trunk Development.

[7] ASHRAE Level 1 audit is a basic evaluation of a building through a walk-through assessment, review of utility bills and other applicable operating data, and interviews with operating staff. This basic evaluation is designed to identify glaring energy problems. With the detail of this audit, low-cost upgrades are proposed, energy efficiency projects can be prioritized, and it is determined if a more detailed audit is necessary.

2. Fleet Asset Class

- Ongoing installation of electric vehicle (EV) chargers at public parking lots;
- Ongoing procurement of low-carbon vehicles to deliver services, such as hybrid vehicles, plug-in hybrids and EVs;
- Plan to ensure that charging infrastructure are equipped to enhance in correlation with deployment of an all-electric corporate fleet;
- Review electric capacity of City facility parking spaces for EV infrastructure deployment in the near-term and develop a future – proofing strategy to upgrade a majority of parking stalls to be 'EV-ready' (a parking stall that has an adjacent energized outlet or an electrical junction box/receptacle) where an EV supply equipment, (EVSE – i.e., an EV charger) can be installed in the future;
- Align with Community Climate Action Plan (CCAP) recommendations and consider creating shared models for use.

3. Corporate Initiatives

Policy tools are challenging to quantify in relation to direct GHG emission reductions, but they are necessary to ensure that the City, and the overarching community take action on climate change in a holistic manner. Being at the forefront of climate action, municipalities are well-positioned to create policy tools and instruments to drive change within the community.

If the City continues in a state of 'business as usual', it is likely the City will not achieve its aggressive climate action objectives. It is important for climate goals to be at the forefront of all decision-making as it relates to investments in infrastructure.

The following policies are being updated and developed with consideration given to the application of a strategic climate lens.

- Update the City's Procurement Policy to include Sustainability Guidelines.
- Official Plan Review update to integrate a climate lens, and plan for a resilient, adaptive community.
- Develop the Community Climate Action Plan as a guiding document for the community to embrace low-carbon living and contribute to collective emission reduction goals.

Through the development of CEEP 2023, a pathway to achieve the City's climate emergency targets has been identified, and actions are being embedded into existing budgets to ensure maximum success.

Financial Implications:

Not applicable: There are no financial implications to be reported as a result of this informational report.

Alignment with Strategic Priorities:

Strengthening our Plans, Strategies and Partnerships
Partnering with the community to make plans for our collective priorities in arts, culture, heritage and more. Communicating clearly with the public around our plans and activities.

Developing our Resources
Optimizing Stratford's physical assets and digital resources. Planning a sustainable future for Stratford's resources and environment.

Alignment with One Planet Principles:

Equity and Local Economy
Creating safe, equitable places to live and work which support local prosperity and international fair trade.

Sustainable Water
Using water efficiently, protecting local water resources and reducing flooding and drought.

Travel and Transport
Reducing the need to travel, encouraging walking, cycling and low carbon transport.

Material and Products
Using materials from sustainable sources and promoting products which help people reduce consumption.

Zero Waste
Reducing consumption, reusing and recycling to achieve zero waste and zero pollution.

Zero Carbon Energy
Making buildings and manufacturing energy efficient and supplying all energy with renewables.

Staff Recommendation: THAT the report titled, "Annual Corporate Greenhouse Gas Emissions – 2022" (ITS23-032), be received for information.

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