

# Corporate Energy Conservation and Demand Management Plan 2024 – 2029



Prepared in compliance with O. Reg. 25/23, requiring Ontario's Broader Public Sector to prepare an updated energy conservation and demand management plan every 5 years. Approved by the Corporate Leadership Team.

To inquire or request any additional information regarding this plan, please contact:

**Sadaf Ghalib**  
**Climate Change Program Manager**  
**City of Stratford**  
**519-271-0250**



# Table of Contents

|                                              |    |
|----------------------------------------------|----|
| Section 1: Introduction.....                 | 3  |
| Strategic Direction.....                     | 3  |
| Background on O. Reg. 25/23.....             | 4  |
| Validity Period.....                         | 5  |
| Scope and Methodology.....                   | 5  |
| Section 2: Vision and Objectives .....       | 7  |
| Section 3: Energy Management Principles..... | 8  |
| Section 4: Energy and Emissions Trends.....  | 9  |
| Section 5: Energy Performance.....           | 12 |
| Facilities .....                             | 12 |
| Corporate Fleet and Equipment.....           | 14 |
| Outdoor Lighting.....                        | 14 |
| Solid Waste .....                            | 15 |
| Water and Wastewater.....                    | 15 |
| Section 6: Ongoing and Future Planning.....  | 18 |
| Appendix A.....                              | 19 |
| Buildings Roadmap.....                       | 19 |
| Appendix B.....                              | 27 |
| Fleet Roadmap.....                           | 27 |

# Section 1: Introduction

The City of Stratford’s Corporate Energy Conservation and Demand Management Plan (CECDMP, or “Plan”) for 2024 to 2029 has been developed in compliance with Ontario Regulation (O. Reg.) 25/23 Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans. A significant area of focus of this Plan is to measure and monitor utility data, understand, and implement energy efficiency through corporate operations, consider emissions generation and management as an overarching strategy and contribute positively toward Ontario’s energy transition to a sustainable, resilient future.

In line with the regulation’s requirements, this Plan has been developed for the 5-year period from 2024 – 2029 and includes the following key elements:

- City Council and Corporate Leadership commitment and vision for managing energy usage within all corporate asset classes including but not limited to facilities, fleet and infrastructure.
- Details about the City’s energy and emissions baseline and progress toward net-zero targets and energy efficiency aspirations. A summary of initiatives underway and planned future initiatives is outlined for each corporate asset class.
- A specific, actionable inventory of measures for energy conservation and demand management strategies which include associated energy savings information, estimated emissions generation and cost implications.

The City intends to revisit and update this Plan with long-term strategies identified in the next few years for the period 2029 – 2033, as required under the regulation.

## Strategic Direction

This updated CDM Plan 2024 – 2029 is guided by three objectives to facilitate the achievement of energy conservation goals. These include: streamline the process of energy and emissions management, provision of tools to consistently monitor and track energy and costs across all corporate facilities, promoting energy awareness and management training to enable staff to identify energy and cost-saving opportunities, devise initiatives to deliver energy and cost savings projects, programs and processes across the corporate portfolio. These objectives were further strengthened by Council’s Strategic Priorities 2024 – 2027 that prioritize environmental sustainability and stewardship as key drivers.

Further, Council have provided direction to staff to prioritize the development and implementation of long-term strategic plans that sustain efforts to advance emissions reduction initiatives and embed a fulsome sustainability, or climate lens within the City's operations and processes.

## Background on O. Reg. 25/23

O. Reg. 25/23 was adopted as an update to its predecessor (O. Reg. 507/18) and mandates every public sector agency: municipality, municipality service board, post-secondary education institution, public hospital, and school board, update their previous Conservation and Demand Management Plans by July 1, 2024, and update it every five years afterwards.

O. Reg. 25/23 aims to streamline utility data and energy reporting to the province, modernizing the process of tracking energy use and reporting through an electronic reporting system (Portfolio Manager). Organizations are also required to report on the annual greenhouse gas emissions (GHG) generated along with mitigation strategies planned to address long-term energy efficiency and GHG reduction and enlist financial implications associated with the energy transition.

As required by the regulation, Conservation and Demand Management plans should include two sections. The first section should discuss the public agency's annual energy consumption and the emissions associated with their operations. The second section must provide a description of previous, current, and proposed ways to conserve or reduce energy that is consumed by the operations of the public agency. This in turn assists in the management of the public agency's demand for energy and will forecast the results of current and proposed measures.

Per the regulation requirements, each report must include:

- The address at which the operation is conducted.
- The type of operation.
- The total floor area of the indoor space in which the operation is conducted and, in cases, the total indoor floor area of the building or facility in which the operation is conducted.
- A description of the days and hours in the year during which the operation is conducted and, if the operation is conducted on a seasonal basis, the period, or periods during the year when it is conducted.
- The types of energy purchased for the year and consumed in connection with the operation.

- The total amount of each type of energy purchased for the year and consumed in connection with the operation.
- The total amount of GHG emissions generated through the year with respect to each type of energy purchased and consumed in connection with the operation.
- The GHG emissions and energy consumption for the year from conducting the operation, calculating,
  - The annual mega-watt hours per mega liter of water treated and distributed, if the operation is a water works,
  - The annual mega-watt hours per mega liter of sewage treated and distributed, if the operation is a sewage works, or
  - Per unit of floor space of the building or facility in which the operation is conducted, in any other case.

## Validity Period

This report is valid between the dates of July 1, 2024 – June 30, 2029. According to O. Reg. 25/23 requirements, this Plan will need to be updated before or on July 1, 2029.

## Scope and Methodology

The CDM Plan considers energy use and GHG emissions of City-owned assets; community initiatives are not stipulated within this regulation.

The following corporate asset classes are addressed within buildings and facilities, water and wastewater pumping and treatment plants, municipal solid waste, outdoor lighting, and fleet. The Plan also reviews energy use and emissions and plans for energy use and greenhouse gas emission reductions, based on Scope 1 and Scope 2 inventories.

Scope 1 emissions are defined as direct emissions from sources owned or controlled by the organization. An example of this would be the emissions from the burning of natural gas or propane in on-site equipment. This is typically the second largest contributor to a facility's GHG emissions.

Scope 2 emissions are defined as indirect emissions from sources owned or controlled by the organization. An example of this would be the downstream emissions from electricity purchased from the grid for use in on-site equipment. This is typically the smallest contributor to a facility's GHG emissions.

Scope 3 emissions are defined as emissions from sources not owned or directly controlled by the organization. An example of this would be emissions from vehicles used in employee travel and commuting. Scope 3 emissions were not included in this inventory as it is difficult to quantify, and data is not readily available. However, this would typically be the largest contributor to a facility’s GHG emissions.

Recognizing that these indirect emissions remain a critical part of the organization’s energy and emissions reduction strategy, it is important to ensure that procurement processes also reflect a climate lens, particularly around purchasing sustainable goods and services. The City’s Procurement Policy is currently being updated with this lens, to ensure a climate considerations are a priority in all purchasing decisions.

Figure 1 summarizes the City of Stratford’s corporate GHG emissions profile from 2017 – 2022, including Scope 1 and 2 emissions, as well as emission reduction targets and milestone years.

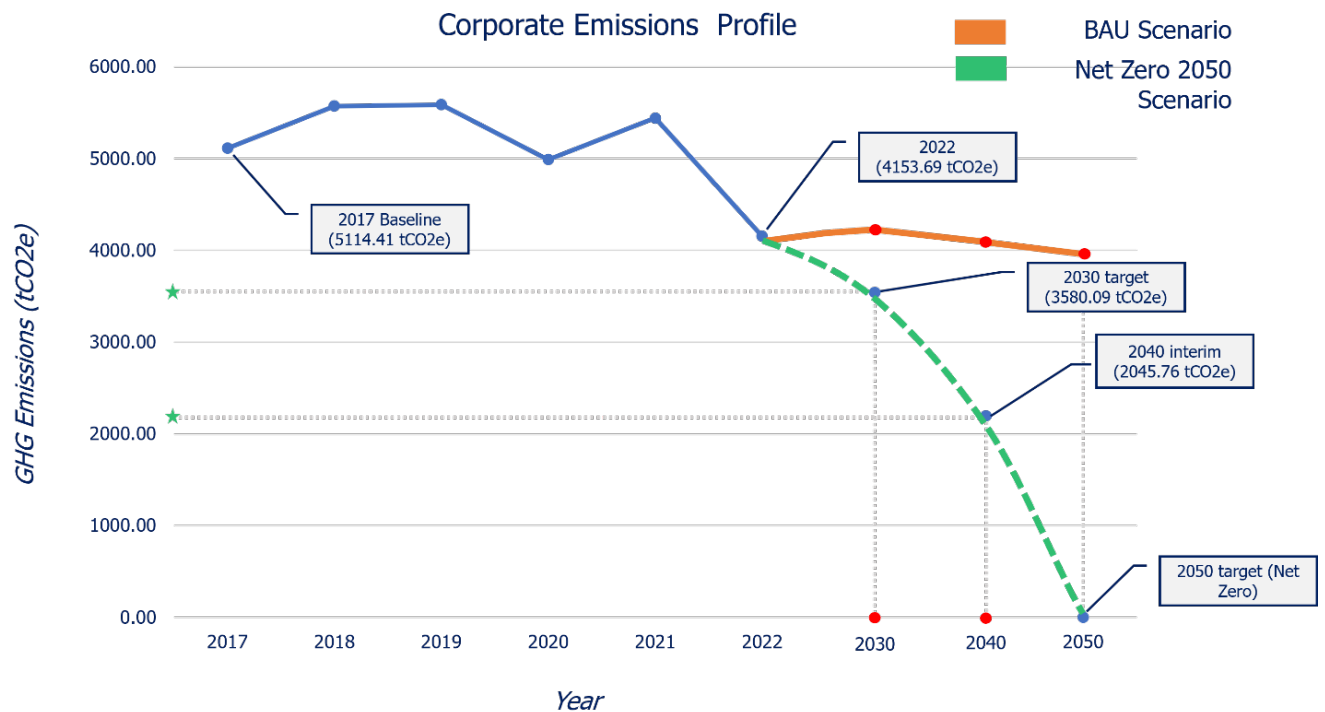


FIGURE 1 CORPORATE EMISSIONS PROFILE AND TRAJECTORY

## Section 2: Vision and Objectives

The City is committed to delivering tangible results that showcase its leadership in the realm of energy efficiency and climate action. Complementing a suite of corporate wide strategies, the 2024 – 2029 CDM Plan lays out specific goals and strategic objectives:

Our Commitment: As part of our long-term financial sustainability, the City of Stratford is committed to asset management, energy management and incremental transition. To this end, the City will allocate the necessary staff and resources to implement the CDM Plan in conjunction with the Corporate Energy and Emissions Plan (CEEP) 2050 to address major energy consumers: buildings and fleet, on our road to net-zero emissions. We are committed to embedding a climate lens throughout our operations, leading environmental stewardship and energy efficiency practices in the region.

Our Vision: Through an agile and collaborative approach, the City will strive to continuously improve the energy performance of its built assets in order to minimize operating energy costs, and resultant carbon emissions whilst exemplifying the corporation's leadership in the energy transition and economic development.

### Our Objectives:

#### Objective 1: Energy and Emissions Tracking and Monitoring

Track energy consumption and emissions generation annually, and present annual reports (e.g., using key performance indicators, or KPIs) thus ensuring usage is monitored and assessed as required. This approach is intended to make corporate energy and emissions data available to all staff and Council and support the application of a climate lens in all decision-making, opportunity identification and continuous improvements.

#### Objective 2: Training, Capacity Development and Awareness

Develop a capacity-building and training program which ensures staff have the appropriate knowledge regarding energy use and conservation. The program will support the creation of a conservation culture through engagement and awareness.

#### Objective 3: Opportunity Identification and Project Delivery

Deliver energy and cost savings through the implementation of processes and programs that advance energy efficiency and fuel switching efforts. Integral to this Plan and its implementation will be a robust energy management program and prioritization of energy efficiency measures for each identified corporate asset class.

## Section 3: Energy Management Principles

The City of Stratford's energy management practices will focus on opportunities for energy efficiency, exploration of renewable energy generation, and identifying emissions reduction opportunities for all City's assets.

The main benefits to the City include:

- Reducing GHG emissions related to energy use, thereby enhancing environmental performance.
- Reducing energy use translates to cost savings and also mitigates rising fossil fuel costs.
- Durable and efficient assets ensure high performance equipment is prioritized, thereby reducing increased maintenance and replacement costs.
- Showcasing leadership in climate action and environmental stewardship

The City intends to continue pursuing optimized energy management and climate action planning, employing a consistent approach:

- Analyze energy sources and data.
- Standardize and categorize facilities by typology and area, identify actions, and develop performance indicators for tracking.
- Set clear energy objectives and emissions targets for each year.
- Create an action plan with specific strategies, projects and policies that align with objectives and support emission reduction targets.
- Monitor progress and evaluate performance through an annual monitoring mechanism such as KPIs.



## Section 4: Energy and Emissions Trends

The City has been monitoring energy usage and tracking greenhouse gas (GHG) emissions from 2011 for corporate facilities and infrastructure including buildings, outdoor lighting, and water and wastewater. Corporate fleet was added as an asset class to envision a fulsome analysis of emissions trends and comply with Scope 1 and Scope 2 emissions.

An energy baseline (2017) and a comprehensive inventory enables tracking of annual progress against milestone years (2030, 2040 and 2050) with the ability to accelerate action and course correct where needed.

Energy consumption data were collected from Festival Hydro Inc. and Enbridge Gas Inc. for each of the City’s facilities, as well as its water and wastewater facilities, solid waste, and outdoor lighting accounts. The resulting data set (see Table 2) is representative of the City’s current level of energy performance by fuel type.

Table 1 City Facilities

| Building Name                    | Address                            | Operation Type                              |
|----------------------------------|------------------------------------|---------------------------------------------|
| Avondale Cemetery                | 4 Avondale Ave, Stratford          | Administrative offices and related facility |
| Anne Hathaway Daycare Centre     | 103 Bruce St, Stratford            | Public facility                             |
| Boathouse Information Centre     | 30 York St, Stratford              | Recreational facility                       |
| City of Stratford Annex Building | 82 Erie St, Stratford              | Administrative offices and related facility |
| City of Stratford City Hall      | 1 Wellington St, Stratford         | Administrative offices and related facility |
| Community Services               | 27 Morenz Dr, Stratford            | Administrative offices and related facility |
| Dufferin Arena                   | 51 Oak St, Stratford               | Recreational facility                       |
| Fire Station #1                  | 388 Erie St, Stratford             | Fire station and administrative offices     |
| Fire Station #2                  | 44 McCarthy Rd, Stratford          | Fire station and administrative offices     |
| Police Station                   | 17 George St, Stratford            | Police station and associated facilities    |
| Public Library                   | 19 St Andrew St, Stratford         | Public library                              |
| Queens Park Snack Bar            | 440 Richard Monette Way, Stratford | Recreational facility                       |

|                            |                             |                                 |
|----------------------------|-----------------------------|---------------------------------|
| Rotary Complex             | 353 McCarthy Rd, Stratford  | Recreational facility           |
| Tourism Alliance           | 47 Downie St, Stratford     | Administrative office           |
| Transit Garage             | 60 Corcoran St, Stratford   | Administrative office           |
| Wastewater Treatment Plant | 701 West Gore St, Stratford | Infrastructure related facility |
| Water Treatment Facility   | 82 Erie St, Stratford       | Infrastructure related facility |
| William Allman Arena       | 17 Morenz Dr, Stratford     | Recreational facility           |

Table 2 Total Utility Consumption

| Energy Source       | Source Supplier | Unit of Measurement           | Total Amount of Energy Consumed |
|---------------------|-----------------|-------------------------------|---------------------------------|
| Electricity (Hydro) | Festival Hydro  | Kilowatt hour (kWh)           | 10,318,818                      |
| Natural Gas         | Enbridge Gas    | Cubic meter (m <sup>3</sup> ) | 247,877                         |

The corporate emissions inventory from 2022 indicates that the total GHG emissions from all asset classes of corporate operations was equal to 4,153.90 tCO<sub>2</sub>e. Civic buildings, including airport buildings generated the largest quantity of GHGs (2,038.06 CO<sub>2</sub>e) followed by fleet (1500.23 tCO<sub>2</sub>e). Emissions tracking in 2022 indicated an 18% decrease in emissions across the organization (from 2017 baseline), with the biggest reductions achieved in buildings and fleet sectors. Reductions in observed emissions may also be attributed to the updated conversion factors for gasoline, diesel, and electricity as set by the Province annually.

Overall, energy and emission trends from 2011 – 2022 suggest a consistent decrease in emissions for all asset categories as a result of ongoing corporate-wide energy conservation and emission reduction efforts. With more effort placed on energy conservation and efficiency, along with strategic facility and fleet upgrades, it is anticipated that desired energy transition and emission reductions can be achieved.

Table 3 A comparison of Corporate-wide GHG Emissions Inventory

| Asset Class                   | 2017 GHG Emissions (tCO <sub>2</sub> e) | 2022 GHG Emissions (tCO <sub>2</sub> e) |
|-------------------------------|-----------------------------------------|-----------------------------------------|
| Buildings                     | 2,251.82                                | 2,038.06                                |
| Corporate Fleet and Equipment | 1,902.25                                | 1,500.23                                |
| Outdoor Lighting              | 719.75                                  | 380.20                                  |
| Solid Waste                   | 145 <sup>2</sup>                        | 130.01                                  |

| <b>Asset Class</b>   | <b>2017 GHG Emissions (tCO<sub>2</sub>e)</b> | <b>2022 GHG Emissions (tCO<sub>2</sub>e)</b> |
|----------------------|----------------------------------------------|----------------------------------------------|
| Water and Wastewater | 57.18                                        | 55                                           |
| Municipal Airport    | 50.5                                         | 50.40                                        |
| <b>Total</b>         | <b>5,114.41</b>                              | <b>4,153.90</b>                              |
|                      |                                              | Or 18% reduction from 2017 baseline          |

# Section 5: Energy Performance

## Facilities

Civic buildings used for service delivery of approved City services include 20 major facilities which are powered by a mix of hydropower and natural gas (Table 5). The corporate GHG inventory includes all City-owned facilities. Some facilities leased to third parties are considered Scope 3 for the purpose of this study and were excluded from this analysis.

Building emissions resulting from electricity and natural gas consumption account for approximately 42% of the City’s total GHG emissions. A majority of this energy usage is as a result of on-site combustion of natural gas for space heating followed by electricity consumption.

Although electricity consumption is not responsible for most emissions, it is imperative that the City recognize the importance of energy efficiency as a way to reduce operational and equipment maintenance costs. Savings through energy efficiency retrofits can further fund fuel switching efforts, which in turn will continue to contribute to the City’s energy conservation and management efforts.

Table 4 Buildings Total Energy Consumption and Emissions, 2022

| Asset Class-Buildings    | Natural Gas Consumption (cu. m.) | Electricity Consumption (kWh) | GHG Emissions (tCO <sub>2e</sub> ) |
|--------------------------|----------------------------------|-------------------------------|------------------------------------|
| Total Energy Consumption | 247,877                          | 56,374,670                    | 2038.10                            |

The Rotary Complex and Burnside Agriplex are the most significant consumers of energy and generate the highest quantity of annual GHG emissions; closely followed by William Allman Arena, Dufferin Arena, City Hall, City Hall Annex and the Police Station. Based on this analysis and with an intention to tackle most energy intensive facilities to achieve maximum impact, the City has prioritized projects and deep energy retrofits for these facilities within its short to medium term operational budget.

Table 5 Buildings – 2022 Breakdown of Energy Consumption and Emissions

| Building                                  | Natural Gas Consumption (cu. m.) | Electricity Consumption (kWh) | GHG Emissions (tCO <sub>2</sub> e) | Area (sq. ft.) |
|-------------------------------------------|----------------------------------|-------------------------------|------------------------------------|----------------|
| <b>Agriplex</b>                           | 24,397                           | 566,381                       | 62.73                              | 54,282         |
| Avondale Cemetery                         | 7,875                            | 4,391                         | 15.25                              | 5,535          |
| Anne Hathaway Daycare Centre              | 3,934                            | 46,295                        | 8.85                               | ??             |
| Boathouse Information Centre              | 3,120                            | 28,554                        | 6.79                               | 335            |
| <b>Annex Building</b>                     | 9,125                            | 332,146                       | 26.83                              | 26,054         |
| <b>City Hall</b>                          | 20,296                           | 446,107                       | 51.48                              | 23,400         |
| Community Services/Parks Office           | 11,771                           | 14,586                        | 23.02                              | 3,064          |
| <b>Dufferin Arena</b>                     | 10,636                           | 360,458                       | 30.52                              | 35,000         |
| Fire Station #1                           | 3,021                            | 55,366                        | 6.96                               | 7,292          |
| Fire Station #2                           | 2,815                            | 29,887                        | 6.64                               | 4,832          |
| Lions Pool                                | 17,122                           | 40,160                        | 34.74                              |                |
| <b>Police Station</b>                     | 8,198                            | 432,310                       | 27.85                              | 28,800         |
| Public Works Garage                       | 14,298                           | 89,427                        | 29.97                              | ??             |
| Public Library                            | 8,540                            | 221,483                       | 22.61                              | 17,202         |
| Queens Park Snack Bar                     | 1,368.36                         | 15,346                        | 0.43                               | 7,275          |
| <b>Rotary Complex</b>                     | 61,415                           | 2,098,034                     | 176.72                             | 132,533        |
| Social Services Housing 230, Britannia St | 6,250                            | 62,452                        | 13.75                              | ??             |
| Tourism Alliance                          | 3,882                            | 23,225                        | 8.11                               | 5,610          |
| Transit Garage                            | 8,320                            | 130,565                       | 19.64                              | 12,640         |
| William Allman Arena                      | 29,813                           | 728,152                       | 77.66                              | 38,610         |
| <b>Totals</b>                             | <b>255,206</b>                   | <b>5,878,718</b>              | <b>654.85</b>                      |                |

\* Note 1: Facilities in **bold** are the largest GHG emitters.

Appendix A provides a high-level list of intended actions to be implemented to address energy management for these facilities.

## Corporate Fleet and Equipment

Vehicle and equipment fleet (termed collectively as “fleet”) includes all motorized vehicles and equipment operated by the City. Corporate fleet predominantly consists of light, medium and heavy-duty vehicles. Emissions from fleet are the second largest source of GHG emissions after buildings, representing approximately 36% of the City’s total emissions. In 2022, the City’s vehicles emitted 1,500.23 tCO<sub>2</sub>e (Table 6). These emissions were primarily from the use of diesel and gasoline.

Table 6 Fleet – Energy Consumption and Emissions, 2017

| <b>Fleet – by Sector</b>                            | <b>Gasoline Consumption (L)</b> | <b>Diesel Consumption (L)</b> | <b>GHG Emissions (tCO<sub>2</sub>e)</b> |
|-----------------------------------------------------|---------------------------------|-------------------------------|-----------------------------------------|
| Community Services, Water Engineering, Public Works | 180,088.40                      | 328,368.80                    | 1,296.03                                |
| Police                                              | 88,398.23                       | -                             | 204.20                                  |
| <b>Total</b>                                        | <b>268,486.63</b>               | <b>328,368.80</b>             | <b>1,500.23</b>                         |

Notes: GHG emissions from fleet controlled by the City’s external partners are not counted toward the corporate inventory as these emissions are not in direct sphere of influence of the City.

Emissions from fleet use (along with facility energy use, equipment use and outdoor lighting) at the municipal airport have been accounted for within the Airport section.

Appendix B provides a high-level list of intended ongoing and planned initiatives to address energy management for corporate fleet.

## Outdoor Lighting

The majority of energy consumed in this asset class is related to streetlights and traffic lights. Other lighting assets include ornamental lighting, lighting used for parks, arenas, and sports fields. The emissions inventory for this asset class in 2017 amounted to 719.75 tCO<sub>2</sub>e (Table 7). Most lighting accounts are metered which provide actual electrical consumption. For those assets billed under flat-rates, consumption is estimated (e.g., overhead street lighting, traffic signals).

All traffic signals and streetlights are well into the process of being converted to LED lights from high pressure sodium (HPS) and metal halide. Upgrades to outdoor lighting within the municipal airport are also planned.

Table 7 Outdoor Lighting – Energy Consumption and Emissions, 2022

| Energy type | Energy Consumption (kWh) | GHG Emissions (tCO <sub>2</sub> e) |
|-------------|--------------------------|------------------------------------|
| Electricity | 2,879,039                | 380                                |
| Traffic     | 26,776                   | 0.75                               |

### Solid Waste

The City of Stratford owns and operates the City’s Landfill under the Ministry of Environment (MOE) Certificate of Approval No. A150101. The landfill receives non-hazardous waste generated within the city from residential, industrial, commercial, and institutional (ICI) sectors. The site has provisions for composting (leaf and yard waste), processing construction waste (concrete crushing and recycling) and accommodates a recycling depot for plastic, glass, cardboard, textiles, electronic waste, and batteries. Most recyclables received are segregated and transported off-site for processing.

In 2022, the city generated 60,153.62 tonnes of solid waste materials; this amount includes waste from all waste streams including but not limited to: general waste, recyclable material (concrete asphalt, cardboard, metal), organic (food scraps, leaf and yard waste), electronic waste and hazardous waste (contaminated soil, asbestos). Out of this total, approximately 21,618.09 tonnes were diverted from the landfill through recycling and other diversion programs.

Recognizing that municipal facilities are public facilities (Scope 3), and all waste generated is not necessarily through the organization, it is challenging to isolate the quantity of waste produced. Estimates were used for the purpose of this data collection. It is estimated that municipal waste accounted for approximately 0.75% of total waste, or 451 tonnes. Resultant emissions from municipal waste in 2022 equaled 160 tCO<sub>2</sub>e.

Table 8 Solid Waste – Comparison of GHG Emissions Generation from Municipal Solid Waste

| Year | Waste Generation (tonnes) | GHG Emissions (tCO <sub>2</sub> e) |
|------|---------------------------|------------------------------------|
| 2022 | 451                       | 160                                |

### Water and Wastewater

The majority of the energy consumed in the asset class of water and wastewater is a result of motors that drive water sanitary and storm sewer pumps. City assets include 11 sanitary pumping station, 1 stormwater pumping station, 11 water production wells

and 1 water pollution control plant. Energy is primarily derived from hydropower, or electricity and is therefore relatively low in emissions.

Recent available data suggests that water and wastewater asset class generated 3,281,900 kWh (11,814.84 GJ) of electricity in 2023, resulting in 91.89 tCO<sub>2e</sub> of emissions (Table 9).

Table 9 Water and Wastewater – Energy Consumption and Emissions, 2022 and 2023

| Year | Energy type | Energy Consumption (kWh) | GHG Emissions (tCO <sub>2e</sub> ) |
|------|-------------|--------------------------|------------------------------------|
| 2022 | Electricity | 2,753,548.40             | 77.10                              |
| 2023 | Electricity | 3,281,900.00             | 91.89                              |

The Stratford Water Pollution Control Plant (WPCP) is located at 701 West Gore Street in Stratford, Ontario and is owned by the City of Stratford and operated by the Ontario Clean Water Agency (OCWA). The facility is a wastewater treatment plant consisting of a raw sewage lift station, influent works, primary settling, aeration, secondary clarification, tertiary filtration, and ultraviolet light disinfection. The process residual is anaerobically digested. The effluent discharge is received by Avon River.

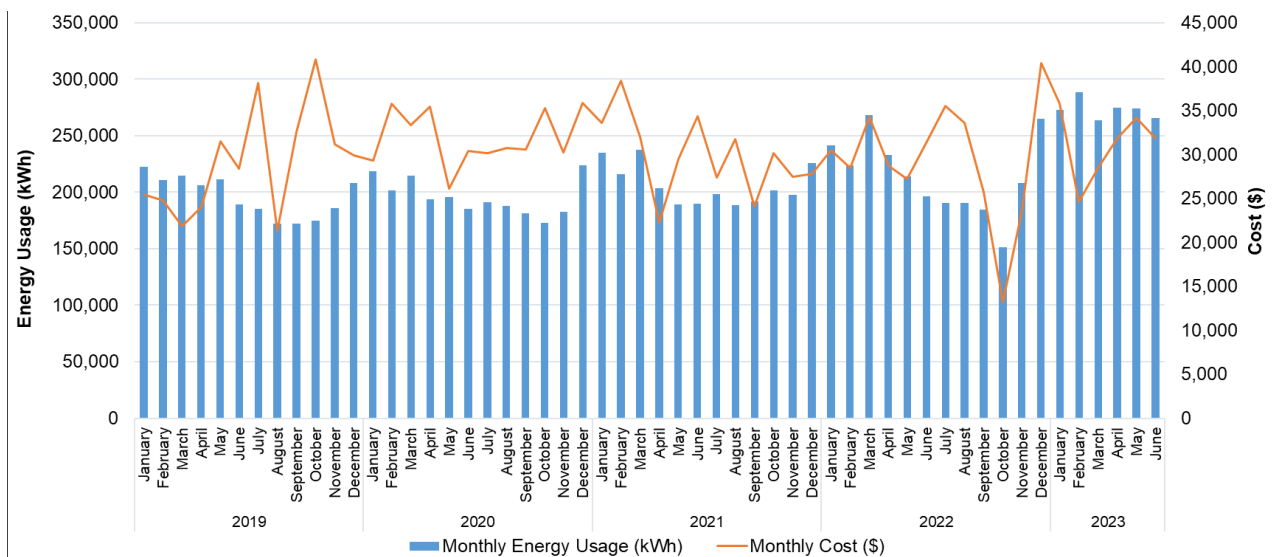


Figure 2 Monthly Energy Cost and Energy Consumption for Stratford WPCP (2019-Q2 2023)



## Notes:

- Observing the flow patterns for 2023, Q2 flow has been reduced by about 5%, while the Q1 flow has not had significant variations. Historically, Q2 has flow increase likely due to increased winter precipitation and associated snow melt in the region.
- The total electricity usage for Q1 and Q2 of 2023 accounted to 824,514 kWh and 813,413 kWh respectively indicating 12.4% & 26.4% increase in energy consumption compared to 2022. Quarterly electricity usage is significantly higher during the first two quarters of 2023 in comparison to previous years. The possible reason for this change may be attributed to capital upgrades and an increase in seasonal precipitation.
- The maximum recorded electrical demand for the quarters of 2022 had increased for Q2 by 10.7% while it decreased for Q1 by 7%.
- For the energy cost, there has been a significant increase in cost by around 10% for Q2, while the cost for Q1 lowered by about 4.6%. This increase in cost can be attributed to the increase in energy consumption of Q2 of 2023.

## Section 6: Ongoing and Future Planning

The City's energy conservation initiatives will be guided by the goal of positioning Stratford as a leading municipality in energy management practices. This will include the evaluation of the City's energy consumption and demands, and introduce concepts such as energy mapping, to evaluate conservation opportunities and implement an ongoing energy management program for the City.

Key focus areas are planned to include:

- New facility construction, including design and procurement (e.g., energy efficient design, evaluating integrated renewable energy opportunities, low energy, and low carbon equipment alternatives).
- Facility retrofits, retro-commissioning and re-commissioning (e.g., targeting facilities with high energy intensities and poorly operating systems to improve operations).
- Efficient asset procurement, including fleet and equipment (e.g., incorporating energy and climate considerations into procurement decisions).
- Pro-active maintenance and cleaning of assets, to ensure efficient operations and longer lifespans (e.g., preventative maintenance programs to ensure asset operations and durability is optimized).
- Staff and operator training, education, and awareness (e.g., incorporating sustainability and energy management in current and future staff responsibilities, staff awareness and training of energy conservation opportunities).
- Funding opportunities to enhance project viability (e.g., grant and incentive sources, developing internal funding mechanisms).

While identified energy conservation measures will be applied across the organization, buildings and fleet asset classes offer substantial opportunity to accelerate energy efficiency while impacting the emissions trajectory. Some ongoing and planned initiatives are listed in Appendix A.

Recognizing that the City of Stratford consumes a significant amount of energy, this plan will be used to guide the reduction of energy and to help in the implementation of impactful strategies, retrofit management, as well as monitoring and tracking consumption patterns. Future energy plans and goals will be considered on a regular basis. The goals need to be annually established along with the Council's approval of the municipal budget.

# Appendix A

## Buildings Roadmap

Table 3 Buildings Roadmap for major facility retrofits

| Facility                    | 2021 GHG emissions from NG use (tCO <sub>2</sub> e) | GHG reduction expected through deep retrofit | Budget Implications | Proposed timeline | Cumulative emissions (tCO <sub>2</sub> e) |
|-----------------------------|-----------------------------------------------------|----------------------------------------------|---------------------|-------------------|-------------------------------------------|
| Rotary Complex and Agriplex | 651.11                                              | 390.67                                       | \$1m-\$3m           | 2023-25           | 390.67                                    |
| William Allman Arena        | 96.68                                               | 58.01                                        | \$500,000-\$750,000 | 2024              | 448.68                                    |
| City Hall                   | 106.84                                              | 64.10                                        | \$1.5m-\$1.7m       | 2025              | 512.78                                    |
| Dufferin Arena              | 46.37                                               | 27.82                                        | \$800,000-\$1m      | 2026              | 540.60                                    |
| Public Works                | 62.44                                               | 37.47                                        | \$600,000-\$1.2m    | 2027              | 578.07                                    |
| Police Station              | 54.58                                               | 32.75                                        | \$2m-\$2.75m        | 2026              | 610.52                                    |
| Transit Office              | 47.93                                               | 28.76                                        | \$500,000-\$800,000 | 2027              | 639.28                                    |
| Public Library              | 43.99                                               | 26.39                                        | \$1.5m-\$1.7m       | 2029              | 665.67                                    |
| Annex Building              | 41.89                                               | 25.13                                        | \$900,000-\$1.65m   | 2028              | 690.80                                    |
| Airport Terminal            | 36.77                                               | 22.06                                        | \$1.5m-\$1.75m      | 2029              | 712.86                                    |
| Lions Pool                  | 32.89                                               | 19.73                                        | \$800,000-\$1m      | 2030              | 732.59                                    |

Note that avoided emissions by 2030 through deep retrofits (60% reductions with respect to baseline) = 732.59 tCO<sub>2</sub>e

Table 4 Recommended for Future Upgrades (timeline TBC) subject to Energy Audits (Level 1, 2)

|                           |     |                  |                  |               |         |
|---------------------------|-----|------------------|------------------|---------------|---------|
| Grand Trunk Community Hub | N/A | Likely near-zero | To be determined | 2030 & beyond | Unknown |
|---------------------------|-----|------------------|------------------|---------------|---------|

|                              |       | operational emissions |                        |               |        |
|------------------------------|-------|-----------------------|------------------------|---------------|--------|
| Community Services           | 12.6  | 8.5                   | \$250,000 to \$400,000 | 2030 & beyond | N/A    |
| Tourism Alliance             | 20.44 | 12.26                 | \$50,000 - \$80,000    | 2030          | 744.85 |
| Fire Station #1              | 12.22 | 7.33                  | \$50,000 - \$100,000   | 2027          | 757.07 |
| Fire Station #2              | 15.12 | 9.07                  | \$50,000 - \$100,000   | 2028          | 766.14 |
| Avondale Cemetery            | 8.93  | 5.35                  | ~\$300,000             | 2030          | 771.50 |
| Youth Focus Centre           | 7.84  | 4.70                  | ~\$300,000             | 2031          | 776.19 |
| Boathouse Information Centre | 6.24  | 3.74                  | ~\$300,000             | 2032          | 780    |
| Queens Park Snack Bar        | 2.63  | 1.58                  | ~\$300,000             | 2032          | 781.6  |

Emissions in 2022 are calculated on the basis of Ontario’s energy supply mix, that may vary in the future. Estimates can be provided for future year’s emissions, and a more accurate picture can be provided at a later time.

Recommended buildings for deep retrofit (extensive overhaul of mechanical systems, HVAC, occupancy controls, building envelope, fenestration, lighting as identified per building). See in order of upgrade. Emissions reduction owing to deep retrofits have been considered based on an estimate of 60% emissions savings. Should there be more emissions savings (more than 60%), the emissions saved will be higher and we will be in a comfortable position in terms of targets.

Note that based on financial costing studies and energy audits, selected buildings may need to be decommissioned to be replaced by higher performance buildings, and that may impact emissions significantly. Emissions for such a scenario cannot be estimated at this time.

## Planned Energy Conservation Measures (2023 onward)

There are a number of energy conservation measures (ECMs) across facilities owned and operated by the City. Preliminary audits (Level 1 walkthroughs) indicated low or no cost measures to improve building performance and reduce operating costs. This section describes the ECMs which are planned to be implemented from onwards of 2023.

Feasibility studies and energy audits are underway for some facilities, including Rotary Complex, Agriplex, William Allman Memorial Arena, Dufferin Lions Arena, Administration of Justice/Police Building, City Hall and City Hall Annex. These studies are anticipated to evaluate various ECMs and estimate their energy savings and implementation costs for retrofits.

For all other City facilities, Level 1 walkthroughs were conducted, and energy efficiency measures identified to be included in 5-year Capital Plan. Some projects identified were relatively short-term while some are ongoing.

Table 5 Planned and Ongoing Energy Conservation Measures

| Facility Name            | Current or Identified Measures                                                                                                                                                                                                                                                                                                                                                           | Timeline                                                                |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| City Hall Annex Building | <ul style="list-style-type: none"> <li>• Feasibility study including ASHRAE Level 1 and 2 energy audits, financial analysis</li> <li>• Completed HVAC replacement to upgrade end-of-life unit</li> <li>• Low-flow water fixtures and fittings</li> <li>• Building envelope improvements (insulation, airtightness, vapor barriers)</li> <li>• High-performance window upgrade</li> </ul> | HVAC replacement complete in 2024; Ongoing upgrades as per capital plan |
| Burnside Agriplex        | <ul style="list-style-type: none"> <li>• Feasibility Study including ASHRAE Level 1 and 2 energy audits, financial analysis</li> <li>• Building envelope retrofit</li> <li>• Roofing repairs and upgrades</li> <li>• Upgrade Mechanical system</li> </ul>                                                                                                                                | Ongoing upgrades as per capital plan                                    |
| Avondale Cemetary        | <ul style="list-style-type: none"> <li>• Building envelope improvements including insulation and weatherstripping</li> <li>• Ongoing Interior LED retrofits</li> <li>• Low-flow water fixtures and fittings</li> <li>• HVAC Makeup AHUs</li> <li>• Roof upgrades</li> <li>• LED upgrades at the Cemetery garage have been completed, also installed are occupancy sensors</li> </ul>     | Ongoing upgrades as per capital plan                                    |

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                      |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
|                 | <ul style="list-style-type: none"> <li>• Potential upgrades to hybrid/electric for furnace and water heater.</li> </ul>                                                                                                                                                                                                                                                                                                                                       |                                      |
| City Hall       | <ul style="list-style-type: none"> <li>• Feasibility Study including ASHRAE Level 1 and 2 energy audits, financial analysis</li> <li>• Building automation elements such as occupancy sensors</li> <li>• Building envelope retrofit including insulation, airtightness, vapor barriers</li> <li>• Upgrade HVAC system: AHUs, Condensers, Chiller System, Fan Coil Units</li> <li>• Interior LED lighting replacements</li> <li>• Washroom upgrades</li> </ul> | Ongoing upgrades as per capital plan |
| Dufferin Arena  | <ul style="list-style-type: none"> <li>• Feasibility Study including ASHRAE Level 1 and 2 energy audits, financial analysis</li> <li>• Refrigeration System</li> <li>• HVAC system</li> <li>• Smart Hub for ice plant</li> <li>• Roofing repairs and upgrade (EPDM)</li> <li>• Domestic Hot Water Boilers</li> </ul>                                                                                                                                          | Ongoing upgrades as per capital plan |
| Fire Station #1 | <ul style="list-style-type: none"> <li>• Interior LED retrofits</li> <li>• Building envelope upgrades to high performance windows</li> <li>• HVAC upgraded to an energy efficient unit</li> <li>• Opportunity to install a building automation system, including thermostats for temperature control</li> <li>• Backup generator has the potential to be upgraded to a natural gas-powered unit</li> </ul>                                                    | Ongoing upgrades as per capital plan |
| Fire Station #2 | <ul style="list-style-type: none"> <li>• Interior LED retrofits</li> <li>• Building envelope upgrades to high performance windows</li> <li>• HVAC upgraded to an energy efficient unit</li> <li>• Exterior lights to be upgraded to LED lighting</li> </ul>                                                                                                                                                                                                   | Ongoing upgrades as per capital plan |
| Police Station  | <ul style="list-style-type: none"> <li>• Feasibility study including ASHRAE Level 1 and 2 energy audits, financial analysis, opportunity to develop new facility, subject to Council direction</li> <li>• Roof Replacement</li> <li>• Building envelope improvements: insulation, airtightness, vapor barriers</li> <li>• HVAC system: Make up AHUs, Heat Pump, Variable Volume Fan</li> </ul>                                                                | Ongoing upgrades as per capital plan |

|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                      |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Public Works Yard                         | <ul style="list-style-type: none"> <li>• Energy audits (Level 1,2) required</li> <li>• Building envelope improvements including insulation and weatherstripping</li> <li>• HVAC system</li> <li>• Roofing repairs and upgrade (EPDM)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Ongoing upgrades as per capital plan |
| Public Library                            | <ul style="list-style-type: none"> <li>• Ongoing Interior LED retrofits</li> <li>• Low-flow water fixtures and fittings</li> <li>• HVAC Makeup AHUs</li> <li>• Heating Boilers</li> <li>• Roofing upgrade</li> <li>• Window replacements to high performance options, opportunity to upgrade building envelope with weatherstripping and insulation upgrades</li> <li>• Auditorium lighting has been upgraded to LED lighting</li> <li>• Other LED upgrades planned for the library, to be conducted in phases</li> <li>• Water heating equipment (rental) is powered by electricity</li> <li>• Staff washroom has been upgraded to have LED lighting, occupancy sensors</li> <li>• Exterior lighting has been upgraded to LED lighting</li> <li>• HVAC replacement planned for 2027 at the end of life cycle of current equipment; planned to be hybrid and more efficient unit</li> </ul> | Ongoing upgrades as per capital plan |
| Rotary Complex                            | <ul style="list-style-type: none"> <li>• Ongoing interior LED lighting retrofits</li> <li>• Feasibility study including ASHRAE Level 1 and 2 energy audits, financial analysis</li> <li>• Programmable thermostats</li> <li>• Upgrade Refrigeration System</li> <li>• Upgrade HVAC system</li> <li>• Install Smart Hub for ice plant</li> <li>• Roofing repairs and upgrade (EPDM)</li> <li>• Replace Domestic Hot Water Boilers</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Ongoing upgrades as per capital plan |
| Social Services Housing 230, Britannia St | Not applicable. This facility is built to passive house standards.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | N/A                                  |
| Tourism Alliance                          | <ul style="list-style-type: none"> <li>• Ongoing Interior LED retrofit including occupancy sensors, expected to be initiated in 2024 and 2025</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Ongoing upgrades as per capital plan |

|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
|                                          | <ul style="list-style-type: none"> <li>• Building envelope improvements including upgrading windows to energy efficient options (triple-glazed) at time of replacement.</li> <li>• Opportunity to install occupancy sensors in public areas, and energy efficient (energy star rated) appliances</li> <li>• Opportunity to install a Building Automation System (BAS)</li> <li>• HVAC replacement to electric option at the end of life cycle of current equipment deemed for replacement</li> </ul>                                                                                         |                                      |
| Transit Garage                           | <ul style="list-style-type: none"> <li>• Opportunity to upgrade facility based on bus fleet electrification plan from 2026 onward</li> <li>• Installation of charging infrastructure and vehicle storage</li> <li>• Investigate infrastructure upgrades for an electrified fleet.</li> <li>• LED upgrades throughout facility have been completed</li> <li>• Bus storage area has undergone LED lighting upgrade</li> </ul>                                                                                                                                                                  | Ongoing upgrades as per capital plan |
| William Allman Arena                     | <ul style="list-style-type: none"> <li>• Feasibility study including ASHRAE Level 1 and 2 energy audits, financial analysis</li> <li>• Roof Replacement</li> <li>• Exterior and interior LED Lighting retrofit</li> <li>• Building Automation such as lighting controls and occupancy sensors</li> <li>• HVAC equipment &amp; distribution system</li> <li>• Exterior Insulation and Finish System (EIFS)</li> <li>• Domestic Hot Water Heater</li> <li>• Upgrade Ice Resurfacer to all-electric option</li> <li>• Washroom upgrades</li> <li>• Refrigeration Distribution System</li> </ul> | Ongoing upgrades as per capital plan |
| Lions Pool (seasonal facility- 3 months) | <ul style="list-style-type: none"> <li>• Recently completed interior and exterior lighting upgrades to LED lights</li> <li>• LED upgrades in mechanical room</li> <li>• Planned upgrade to domestic hot water heater, boiler for pool at the end-of-life cycle, exhaust upgrade to electric (or low-carbon) options instead of conventional fossil fuel options</li> <li>• Opportunity to upgrade windows to high-performance options</li> <li>• Opportunity to upgrade washrooms with low-flow fixtures and faucets (water-sense</li> </ul>                                                 | Ongoing upgrades as per capital plan |



|                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |
|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
|                                                                          | <p>labelled), install occupancy sensors in washrooms</p> <ul style="list-style-type: none"> <li>Planned upgrade for pool pump in 2025</li> <li>No heating and cooling requirements in this facility as it is seasonal</li> <li>Ongoing building envelope enhancements including external brick cladding</li> </ul>                                                                                                                                                                                     |                                      |
| Boathouse Information Centre (seasonal facility)                         | <ul style="list-style-type: none"> <li>Planned replacement of air conditioner in 2024, replace to efficient options</li> <li>Interior lighting to LED options</li> <li>Opportunity to upgrade natural gas furnace to more efficient options, including consideration of an electric option</li> <li>Electric panel upgraded in 2023</li> <li>Occupancy sensors installed, thermostat has a set schedule</li> <li>Recently installed waterproofing membrane as building envelope improvement</li> </ul> | Ongoing upgrades as per capital plan |
| Community Services – Parks Office                                        | <ul style="list-style-type: none"> <li>Planned projects to undertake such as interior and exterior LED lighting upgrades, HVAC replacement, water heater upgrade, washroom upgrades to include water efficient fixtures and faucets.</li> </ul>                                                                                                                                                                                                                                                        | Ongoing upgrades as per capital plan |
| SERC Washrooms (seasonal facility- 6 months)                             | <ul style="list-style-type: none"> <li>Consists of outdoor lighting including sports field and pathway lighting</li> <li>Opportunity to retrofit lighting to LED options including those in mechanical room, to save on resultant energy and costs</li> <li>Opportunity to upgrade washroom and water heater upgrades at the end-of-life replacement</li> <li>Opportunity to install water-saving irrigation system for the playing field</li> </ul>                                                   | Ongoing upgrades as per capital plan |
| Upper Queen’s Park and bandshell washrooms (seasonal facility- 6 months) | <ul style="list-style-type: none"> <li>Opportunity to replace lighting to LED options, occupancy sensors and pump</li> <li>Two port L2 EV charging station installed in the parking area</li> <li>Opportunity to upgrade washroom and water heater upgrades at the end-of-life replacement</li> </ul>                                                                                                                                                                                                  | Ongoing upgrades as per capital plan |
| Splash Pad Facility , baseball diamond and washrooms                     | <ul style="list-style-type: none"> <li>Opportunity to upgrade plumbing and washroom fixtures</li> <li>Opportunity to upgrade interior and exterior lighting to LEDs and install occupancy sensors</li> </ul>                                                                                                                                                                                                                                                                                           | Ongoing upgrades as per capital plan |

|                              |                                                                                                                                                                                                                                                                                                                                                              |                                      |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| (seasonal facility)          |                                                                                                                                                                                                                                                                                                                                                              |                                      |
| Anne Hathaway Daycare Centre | <ul style="list-style-type: none"> <li>• Opportunity to replace lighting to LED options, occupancy sensors and pump</li> <li>• Building envelope improvements including weatherstripping, window upgrades and insulation upgrades also planned</li> <li>• Washroom upgrades</li> <li>• Opportunity to install efficient system for the splash pad</li> </ul> | Ongoing upgrades as per capital plan |

In 2022, a benchmarking analysis was completed for the four most energy intensive facilities to understand their electricity use intensity (EUI) and greenhouse gas intensity (GHGI) and compares them to similar facilities in the largest municipalities in southwestern Ontario. This benchmarking analysis is expected to help determine which facilities are performing poorly compared to similar facilities in other Ontario municipalities.

Subject to other planned studies and budget approvals, the City will keep this analysis in consideration when determining which facilities to prioritize for ECM implementation.

# Appendix B

## Fleet Roadmap

| Fleet Replacement                                         | Unit Cost (approx.) | Fuel Source                    | Estimated GHG emissions (tCO <sub>2</sub> e)                                          | Proposed timeline | Cumulative Emissions (tCO <sub>2</sub> e) ~8 years |
|-----------------------------------------------------------|---------------------|--------------------------------|---------------------------------------------------------------------------------------|-------------------|----------------------------------------------------|
| Option A: Mid-Size All Wheel Drive SUV-Hybrid, OR         | \$50,000            | Gasoline (~30% fuel efficient) | For 8 vehicles:<br>12 tCO <sub>2</sub> e/yr<br><br>140 tCO <sub>2</sub> e/12 years    | 2023-2024         | 93 tCO <sub>2</sub> e                              |
| Option B: Mid-Size All Wheel Drive SUV-Plug-in Hybrid, OR | \$50,000            | Gasoline (~30% fuel efficient) | For 8 vehicles:<br>12 tCO <sub>2</sub> e/yr<br><br>140 tCO <sub>2</sub> e/12 years    | 2023-2024         | 93 tCO <sub>2</sub> e                              |
| Option C: Mid-Size All Wheel Drive SUV- All Electric      | \$70,000            | Hydro                          | For 8 vehicles:<br>0.09 tCO <sub>2</sub> /yr<br><br>0.77 tCO <sub>2</sub> e/12 years  | 2023-2024         | 6.23 tCO <sub>2</sub> e                            |
| Pick-up Hybrid x 4                                        | \$65,000            | Gasoline (~30% fuel efficient) | For 4 vehicles:<br>5.82 tCO <sub>2</sub> e/yr<br><br>17.46 tCO <sub>2</sub> /12 years | 2023-2024         | 46.56 tCO <sub>2</sub> e                           |
| Service Van (1 Ton) x 1                                   | \$80,000            | Gasoline only                  | For 1 Van:<br>7.4 tCO <sub>2</sub> e/yr                                               | 2023-2024         | 59.20 tCO <sub>2</sub> e                           |

|                              |          |                  |                                                        |           |                |
|------------------------------|----------|------------------|--------------------------------------------------------|-----------|----------------|
|                              |          |                  | 88.8<br>tCO2e/yr                                       |           |                |
| Service Van<br>(3/4 Ton) x 1 | \$80,000 | Gasoline<br>only | For 1 Van:<br>6.93<br>tCO2e/yr<br><br>83.16<br>tCO2/yr | 2023-2024 | 55.44<br>tCO2e |

Note: Assumptions include service life of 12 years, fuel usage of 3000L per year and approximately 2000 kWh usage annual for EVs.